

THE EFFECT OF MUSIC THERAPY AND PEER-MEDIATED INTERVENTIONS
ON SOCIAL-COMMUNICATIVE RESPONSES OF CHILDREN WITH AUTISM
SPECTRUM DISORDERS

BY

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ABSTRACT

The purpose of this study was to examine the effect of music therapy on social-communicative behaviors (eye contact, vocalization/verbalization, and gesture imitation) of children with autism spectrum disorders. The target participants were two children with a tentative diagnosis or a diagnosis of autism spectrum disorders along with three typically developing children. ABAB reversal design was used to investigate the difference in the social-communicative behaviors between baseline (A) and music therapy intervention (B). The frequency of social-communicative behaviors of eye contact, vocalization/verbalization, and gestural imitation were reported through graphic analysis. In each condition, one or two typically developing children modeled the social-communicative behaviors for their peers with autism spectrum disorders. Results from the two participants indicated that the use of either intervention (non music or music) could increase one of the social-communicative behaviors in children with autism spectrum disorders, gestural imitation. As for vocalization/verbalization, the two target participants demonstrated this behavior more during the non-music condition than during the music condition. Eye contact results indicated that there was no different between the non-music and the music conditions.

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CHAPTER I

INTRODUCTION

According to the Autism Society of America (ASA) (n.d.), autism is “a complex developmental disability that typically appears during the first three years of life and is the result of a neurological disorder that affects the normal functioning of the brain, impacting development in the areas of social interaction and communication skills.” ASA also states that “Both children and adults with autism typically show difficulties in verbal and non-verbal communication, social interactions, and leisure or play activities.” Autism was once believed to be caused by poor parental care and social influences. However, through research using clinical observation and advanced medical technology, more and more evidence indicates that neurological influences play an important role in contributing to autism in children (Bauman & Kemper, 1994; Damasio & Maurer, 1978; DeLong, 1978; Maurer & Damasio, 1982). The major impairments of children with autism are in the areas of communication, social interaction skills, and restricted interests and behaviors. Kanner (1943) labeled children with these impairments as having “early infantile autism,” because the disorder seemed to be present from the earliest part of infancy.

Before autism spectrum disorders were considered a categorical neurological disorder, it was recognized as a type of childhood onset schizophrenia (American Psychiatric Association, 2003). The characteristics of childhood onset schizophrenia are as follows: language, motor, and social abnormalities, poor performance on academic work, and poor neuropsychological functioning in attention, working

memory and executive function (Nicolson, et al., 1999). However, individuals with schizophrenia hear voices that are perceived as forming a part of reality. Hence, the individual loses the ability to distinguish between reality and the product of imagination. When this hallucination symptom is coupled with paranoia, the voices might tell the individual that someone is conspiring against him or her. These characteristics of schizophrenia can be distinguished from the features of autism. Although individuals with autism are socially isolated, the origin of that isolation is quite different from that of people with schizophrenia.

According to Siegel (1996), the isolation of individuals with autism spectrum disorders is the most important criterion for diagnosing these children. The quality of this isolation includes the lack of awareness of others and the lack of ability to relate to people. Due to these factors, the social and communicative interaction of individuals with autism spectrum disorders is less frequent, and the quality of the interactions differs by degree with each disorder. For example, children with pervasive developmental disorders (PDD), such as Asperger's Disorder, Rett's Disorder, and Childhood Disintegrative Disorder, may want to approach others, but their interactions are in a self-serving quality; therefore, they do not consider the interests, feelings, or reactions of other persons. Children with autism have similar impairments in social interaction as children with Asperger's Disorder, Rett's Disorder, and Childhood Disintegrative Disorder, but these behaviors tend to be more significant and more isolating (Siegel, 1996). Generally speaking, children with PDD who have impairments in reciprocal social interaction may "lack a theory of mind"

(Baron-Cohen, Leslie, & Frith, 1985) defined as having difficulty interpreting what is going on in the mind of a social partner. Different degrees of isolation and quality of social interaction in children with PDD are commonly observed, and may be obstacles in interacting with typically developing peers.

It is necessary to understand the social and communicative development of typically developing children and children with autism spectrum disorders. The better typical development is understood, the more appropriate goals and objectives of interventions for children with autism spectrum disorders can be formed.

Siegel (1996) described that long before meaningful words are spoken, normal infants and toddlers are communicating through the use of gaze, sounds and vocalization, imitation, and gestures. These are the core elements to establish social and communicative skills. However, the use of the gaze patterns, sounds and vocalizations, imitation, and gestures are limited, absent, or delayed in the development of children with autism spectrum disorders (Siegel, 1996). From this perspective, it is generally accepted that many children with autism spectrum disorders experience significant difficulty in responding to normal social and communicative interaction (Dawson & Galpert, 1986).

Young infants have various sensorimotor competencies that enable them to respond accordingly, or socially (Dawson & Galpert, 1986). In contrast, the brain of a child with autism spectrum disorders is impacted by the complication of neurological dysfunction that impedes the normal information exchange between sensorimotor and cognitive process. Thus, a lack of early expressive and receptive abilities, which are

the basis of social and communicative interaction, is commonly observed in such children. The early expressive deficits of individuals with autism spectrum disorders, such as gaze patterns, sounds and vocalization, imitation, and gestures, make it difficult for others to provide contingent and appropriate feedback to them (Als, 1982); furthermore, these impairments place children with autism spectrum disorders at a disadvantage in future social-communicative development.

Since the early 1980's, this "theory of mind" has been widely discussed. According to Frith (1989), theory of mind "allows one to 'mind-read'." She states that a person is able to infer someone else's mental state "on the basis of such intangible, yet everyday notions as BELIEFS and WISHES" (p. 35). Repacholi and Slaughter (2003) described this ability as crucial for the social-cognitive development in childhood. This theory of mind ability is usually referred to as mind-reading, mentalizing, or belief-desire psychology, and enables people to function in and to understand the social-world. Understanding of mind is an important milestone in childhood. When a child is capable of catching the thoughts from another person, he or she starts to be aware of what that person is feeling, and how that person is going to respond. Within this mental conceptual exercise, an abstract social interaction is just established in the mind of the child. Wellman (1990) stated:

... Children come to understand that the overt actions of self and others are the products of internal mental states such as beliefs and desires. They thus come to distinguish between accidental and intended behavior, between wishes and reality, between plans and outcomes, between truth

and deception... Our understanding of the mind is part of our larger understanding of human action, our everyday or commonsense psychology. (p. 1)

However, impairments of individuals with autism spectrum disorders that are associated with this deficit in “theory of mind” are evident not only in relating to others, but also in acquiring any form of communication (Mitchell, 1997; Siegel, 1996). In addition, children with autism often have conspicuous linguistic and communicative impairments. They appear to be substantially lacking in common sense when they interpret other people’s requests (Mitchell, 1997). This problem will accumulate as time passes by and can become a notable impairment that will inevitably lead to a problem within social and communicative interaction.

There are a variety of treatments for individuals with autism spectrum disorders that typically target the common deficiencies in social interaction, communication, cognitive development and behavior. However, long before scientific and effective treatments were developed for treating individuals with autism, some old treatments were used based on limited knowledge of diagnosis.

According to Thaut (1999), early treatment for autism has been historically based on the theories of diagnosis and etiology; thus, individuals with infantile autism were initially treated as a person with a psychiatric disorder. Treatment for children with autism targeted emotional rejection and trauma due to poor parenting styles. However, the accumulated research has shown abundant evidence that supports various theories and clinical results in autism, with many different concepts of

treatments and models that have been subsequently developed. Thaut also pointed out that since the 1970s, research has focused on autism as “a developmental disorder based on brain dysfunction” (p. 168). Since that time, various programs have been developed that provide educational, linguistic, cognitive, and behavioral training for individuals with autism. Optimistically, the treatments that involved educational, linguistic, cognitive, and behavioral training approaches benefit individuals with autism more than psychiatric treatment (Thaut, 1999).

Public Law 94-142 in the U.S., ratified in 1974, enables children with disabilities to receive education in the “least restrictive environment”, so children with autism spectrum disorders can be seen in both special and regular classrooms of the public school system and developmental centers for special populations. Whether children with disabilities are placed in public school settings or in the developmental centers, the facilities must incorporate a broad range of medical and psychological services alongside the educational disciplines. Least Restrictive Environment means (as quoted in Turnbull, Turnbull, Shank, & Smith, 2004):

... an IDEA principle that requires that students with disabilities be educated to the maximum extent appropriate with students who do not have a disability and that they be removed from regular education settings only when the nature or severity of their disability cannot be addressed with the use of supplementary aids and services. (p. 513)

An evaluation is completed to determine if a student with a disability can be placed in the least restricted environment based on his or her interests and needs.

Different students with disabilities have different interests and needs; thus, there is no single definition of what a LRE will be for all students (Turnbull, Turnbull, Shank, & Smith, 2004).

Social interaction with typically developing peers can be considered a nonacademic benefit (Turnbull, Turnbull, Shank, & Smith, 2004). However, these nonacademic benefits are critical for children with autism spectrum disorders to learn. Since deficiency of communication and social interaction is a main characteristic of children with autism spectrum disorders, it is essential to expose them to an environment that can provide them opportunities to interact with people in order to increase their social skills which in turn can impact academic learning. Developing peer relationships have important benefits for language, communication, social, and cognitive development. The skills of children with autism might be different from typically developing peers, but it is likely that with appropriate educational and social-communicative interventions in classrooms, children with autism spectrum disorders may develop some functional and appropriate skills.

Within the educational approach, peer-mediated interventions have been labeled one effective way to help children with autism spectrum disorders improve their social-communicative responses (Kamp, et al., 1997; Kamps, et al., 2002). Huang and Wheeler (2006) reviewed five effective interventions for individuals with high-functional autism. One of the five is “peer-mediated intervention”, while the others are structured teaching approaches, self-monitoring or self-management strategies, video modeling, and social stories. Robertson et al. (2003) stated that the

rationale for inclusion in regular education was that young children with disabilities might learn important skills by participating in educational activities with their typically developing peers. Midland County Educational Service Agency (n.d.) describes that:

In peer mediated social interaction interventions, normally developing children are selected and trained to improve social interaction of children with autism. The peers can work one-on-one with a student with autism or within small groups. The social activities and interactions occur in natural settings such as during a group project in a classroom. Peer mediation was initially used with withdrawn preschool children. It has more recently been successfully used with students with autism and mental disabilities.

Roeyers (1996) examined the potential impact of integrated play groups for children with autism and their typically developing peers. In this study, each typically developing peer was assigned to a child with autism spectrum disorders. The children were 5 to 13 years old. He randomly divided 85 children with autistic spectrum disorders or pervasive developmental disorders not otherwise specified into two groups: experimental and control. Results indicated that children with autism spectrum disorders in the experimental group saw an increase in the amount of time spent in interaction, the length of sustained interaction, degree of responsiveness to partner's initiations, and the number of social initiations. In addition, the amount of time children spent in self-stimulatory behavior was decreased in the experimental group.

Another study that utilized peer-mediated interventions (Kamps et al. 1994) examined the peer tutoring approach between children with autism spectrum disorders and typically developing children. These children were three boys with autism who were between 8 and 9 years of age. They were high functioning in language, intellectual abilities, and academic skills but lacked social skills. The children with autism spectrum disorders were assigned to a different tutoring partner in each week. Results showed tutoring increased interaction between children with autism and their typically developing peers. Moreover, the children with autism spectrum disorders displayed improved academic achievement.

Music therapy is an additional effective treatment approach to address these same skills. Several studies have shown that music therapy has a positive impact on the communication, social, cognitive, and behavioral skills of children with autism spectrum disorders (Edgerton, 1994; Hairston, 1990; Nelson, Anderson, & Gonzales, 1984; Staum, & Flowers, 1984; Thaut, 1984). The American Music Therapy Association (2007a) defines music therapy as:

An established healthcare profession that uses music to address physical, emotional, cognitive, and social needs of individuals of all ages. Music therapy improves the quality of life for persons who are well and meets the needs of children and adults with disabilities or illnesses. Music therapy interventions can be designed to: promote wellness; manage stress; alleviate pain; express feelings; enhance memory; improve communication; promote physical rehabilitation.

The use of music for therapeutic aims for individuals with autism has been studied, and the literature reports that many individuals with autism respond positively to music (Buday, 1995; Edgerton, 1994; Nelson, Anderson, & Gonzales, 1984; Ulfarsdottir & Erwin, 1999).

Kaplan and Steele (2005) analyzed data related to goals and outcomes for forty music therapy clients who were diagnosed with autism spectrum disorders. The music interventions, session types, and formats were investigated. They analyzed the primary goals set by the music therapist, and found that language/communication was the highest chosen goal set for individuals with autism spectrum disorders. The second most frequent goal was behavioral/psychosocial. After music therapy sessions, one hundred percent of the subjects reached their initial objectives within one year or less regardless of session type, and more than seventy percent of the secondary objectives were achieved within a year or less. Meanwhile, over seventy percent of behavioral/psychosocial and language/communication goals were attained. With the optimistic high percentage of outcomes attained through music therapy, which addresses the typical characteristics of autism spectrum disorders, it seems that music therapy may have a positive effect and can benefit people diagnosed with autism spectrum disorders.

The American Music Therapy Association (2007b) asserts that music therapy can serve as an effective treatment to address the common characteristics of autism spectrum disorders:

1. Music is considered a “universal language” which provides bridges in a non-threatening setting between people and/or between individuals and their environment, facilitating relationships, learning, self-expression, and communication.
2. Music captures and helps maintain attention. It is highly motivating and engaging and may be used as a natural “reinforcer” for desired responses. Music therapy can stimulate clients to reduce negative and/or self-stimulatory responses and increase participation in more appropriate and socially acceptable ways.
3. Music therapy can enable those without language to communicate, participate and express themselves non-verbally. Very often music therapy also assists in the development of verbal communication, speech, and language skills. The interpersonal timing and reciprocity in shared play, turn-taking, listening and responding to another person are augmented in music therapy with children and adults with autism to accommodate and address their styles of communication.
4. Music therapy allows individuals with diagnoses on the autism spectrum the opportunity to develop identification and appropriate expression of their emotions.
5. Because music is processed in both hemispheres of the brain, music can stimulate cognitive functioning and may be used for remediation of some speech/language skills.

6. Music provides concrete, multi-sensory stimulation (auditory, visual, and tactile). The rhythmic component of music is very organizing for the sensory systems of individuals diagnosed with autism. As a result, auditory processing and other sensory-motor, perceptual/motor, gross and fine motor skills can be enhanced through music therapy.
7. Musical elements and structures provide a sense of security and familiarity in the music therapy setting, encouraging clients to attempt new tasks within this predictable but malleable framework.
8. Many people with diagnoses on the autism spectrum have innate musical talents; thus, music therapy provides an opportunity for successful experiences. Emphasis is placed on strengths, which in turn may be utilized to address each individual's areas of need.

Although music therapy is beneficial for individuals with autism spectrum disorders, there is very little research that addresses the involvement of typically developing peers in music therapy interventions with children who have autism spectrum disorders (Kern & Aldridge, 2006; Kern, Wolery, & Aldridge, 2007). In the survey by Kaplan and Steele (2005), results indicated that in the music therapy session type, peer modeling was used less than 5% of the time. Thus, very few music therapy research studies are published that explore music therapy strategies and outcomes in a peer-mediated setting. Music therapy may play an important role for supporting the development of social-communicative responses in the interaction

between the children with autism spectrum disorders, typically developing peers, teachers, and therapists due to music's inherent inclusion in society and culture.

Purpose Statement and Research Question

The purpose of this study will be to examine the effect of music therapy on the social-communicative behaviors (eye contact, vocalization/verbalization, and gesture imitation) of children with autism spectrum disorders.

The research question is:

Is there a difference in the following social-communicative behaviors of children with autism spectrum disorders between music therapy and non music therapy sessions?

- Eye contact,
- Vocalization/verbalization,
- Gestural imitation.

CHAPTER II

REVIEW OF LITERATURE

This chapter is the review of literature on autism spectrum disorders and treatments for their social-communicative behaviors. It has four parts. First is the description of autism spectrum disorders. Second are the social and communicative behaviors of children with autism spectrum disorders and typically developing children. Third is a review of clinical and research literature based on the beneficial treatments of peer-mediated and music therapy interventions on social-communicative behaviors of individuals with autism spectrum disorders. Finally, the purpose of the study concludes this chapter.

Autism Spectrum Disorders

History and Definition

Autism, what was originally called “early infantile autism,” was first described by an American child psychiatrist, Leo Kanner, who released his case study about eleven children who had extreme aloneness and a desire for the preservation of sameness with a variety of behavioral, cognitive, and affective symptoms (Kanner, 1943). Almost at the same time, Asperger (1944) used the term “autistic psychopathy” to describe similar characteristics of children in Vienna. Earlier than Kanner and Asperger’s observation on children with aloneness behaviors, Heller (1908) described six children with loss of language and abnormal mental abilities who were between three and four years of age. Their symptoms were identical to children with autism (Rapin, 1965). Kanner and Asperger viewed early infantile

autism to be caused by abnormal brain function, although the parents of these children tended to be highly intelligent and well educated.

Characteristics of Autism Spectrum Disorders

Clinical features of autism spectrum disorders may include abnormal social responses and behaviors, deficits in speech and language, cognitive disorders, repetitive and stereotypic behavior, poor eye contact, and an obsessive insistence on sameness (Bauman & Kemper, 1994). In some cases, individuals with autism spectrum disorders may demonstrate aggressive and/or self-injurious behaviors (Horner, et al, 2002; O'Reilly, et al, 2005). The Autism Society of America (2007) lists traits that might be observed in individuals with autism spectrum disorders:

1. Insistence on sameness; resistance to change.
2. Difficulty in expressing needs, using gestures or pointing instead of words.
3. Repeating words or phrases in place of normal, responsive language.
4. Laughing (and/or crying) for no apparent reason, showing distress for reasons not apparent to others.
5. Preference to being alone; aloof manner.
6. Tantrums.
7. Difficulty in mixing with others.
8. Not wanting to cuddle or be cuddled.
9. Little or no eye contact.
10. Unresponsive to normal teaching methods.

11. Sustained odd play.
12. Spinning objects.
13. Obsessive attachment to objects.
14. Apparent over-sensitivity or under-sensitivity to pain.
15. No real fears of danger.
16. Noticeable physical over-activity or extreme under-activity.
17. Uneven gross/fine motor skills.
18. Non responsive to verbal cues; acts as if deaf, although hearing tests in normal range.

Prevalence

Autism is a severe developmental disorder affecting about four in every 10,000 children (American Psychiatric Association, 2003). However, recently the Autism Society of America (ASA) (2007) revealed that “a 2007 Centers for Disease Control report found that 1 in 150 children in America today have an autism spectrum disorder (ASD). ASA estimates that 1.5 million Americans and their families are now affected. Autism is a national health crisis, costing the U.S at least \$35 billion annually.” Moreover, ASA claims that based on statistics from the U.S. Department of Education and related agencies, the rate of children with autism is growing ten to seventeen percent each year, so the prevalence of autism might be overwhelming in the following decades.

Diagnosis

Autism spectrum disorders are included in a group of disorders known as *Pervasive Developmental Disorders* (PDD). The related diagnoses of PDD are Autistic Disorder, Asperger's Disorder, Rett's Disorder, Childhood Disintegrative Disorder, and Pervasive Developmental Disorder, Not Otherwise Specified (PDD-NOS). These diagnoses are described in the following sections.

The Diagnostic and Statistical Manual of Mental Disorders- Text Revision (APA, 2003) states, "Pervasive Developmental Disorders are characterized by severe and pervasive impairment in several areas of development: reciprocal social interaction skills, communication skills, or the presence of stereotyped behavior, interests, and activities" (p. 69). The term "Pervasive Developmental Disorders" is used to describe autism (Autistic Disorder) and an array of non-autistic PDD (such as Asperger's Disorder, Rett's Disorder, and Childhood Disintegrative Disorder). Precisely, Pervasive Developmental Disorder, not otherwise specific (PDD, NOS) implies the presence of fewer and less severe signs of autism, so these children tend to have less cognitive impairment than those diagnosed with autism. The following sections briefly describe the symptoms and onset of the Pervasive Developmental Disorders (Autistic Disorder, Asperger's Disorder, Rett's Disorder, Childhood Disintegrative Disorder, and Pervasive Developmental Disorder, Not Otherwise Specified) based on DSM-IV-TR (2003).

Autistic Disorder

Three names that have referred to Autistic Disorder are early infantile autism, childhood autism, and Kanner's autism (APA, 2003). The onset of autistic symptoms is typically prior to age 3. The main features of Autistic Disorder are the abnormalities or impairments of the development in social interaction and communication. Salient features of restricted rituals and interests are also observed in individuals with Autistic Disorder (APA, 2003).

Asperger's Disorder

Gender ratio of Asperger's Disorder is higher in males than in females. The language acquisition is not significantly delayed or deviant in an individual with Asperger's Disorder by age 2. In addition, cognitive development is not significantly delayed in these children (Asperger, 1944; APA, 2003). Individuals with Asperger's Disorder are able to demonstrate age appropriate self-help skills, adaptive behavior, and curiosity about the environment (APA, 2003). However, those with Asperger's Disorder share some symptoms with Autistic Disorder in the lack of social reciprocity, and restricted, repetitive patterns of behavior, interests, and activities (Wing, 1989). Particularly in the area of social interaction, individuals with Asperger's Disorder may demonstrate "one-sided" social interaction with others such as initiating conversation with others, yet are not emotionally or socially engaged. In other words, they disregard the other person's reaction or feelings because of cognitive deficiencies (APA, 2003).

Rett's Disorder

Rett's Disorder was first reported by Rett in 1966. It is clinically uncommon (Siege, 1996), and this Disorder has been diagnosed only in females. According to APA (2003), the onset of symptoms in Rett's Disorder is as early as 5 months. The symptoms that characterize an individual with Rett's Disorder include: head growth tends to be decelerated, previously acquired purposeful hand skills are gradually lost, gait and trunk movement are poorly coordinated, social engagement is lost in early months (although social interaction develops later), expressive and receptive language development are severely impaired, and retardation in the psychomotor area (APA, 2003).

Childhood Disintegrative Disorder

Individuals diagnosed with Childhood Disintegrative Disorder are typically male. Onset of the symptoms usually happens between 3 and 4 of age. There is normal development in age appropriate verbal and nonverbal communication, social relationships, play, and adaptive behavior. Nonetheless, after the first two years of life, the child's acquired skills are significantly lost in two of the following areas: expressive or receptive language, social skills or adaptive behavior, bowel or bladder control, play, and motor skills. Additionally, there are at least two areas that are abnormal in functioning: impairment in social interaction, impairment in communication, and restrictive, repetitive, and stereotyped motor patterns of behaviors, interests, and activities (APA, 2003).

Pervasive Developmental Disorder, Not Otherwise Specified

Children with Pervasive Developmental Disorder, Not Otherwise Specified (PDD, NOS) exhibit fewer and less severe symptoms of PDDs. They tend to have less severe cognitive impairment than children diagnosed with Autistic Disorder (APA, 2003). Using DSM-IV-TR as the diagnostic criteria is ambiguous because some of the symptoms that are displayed by children with PDDs are common in children with related problems such as developmental language disorders (Siegel, 1996).

While DSM-IV-TR of the American Psychiatric Association maintains its own standards, the publication sponsored by the World Health Organization, ICD-10, *International Classification of Disease, Tenth Edition*, is another diagnostic manual with an alternative set of medical terminology. ICD became the newest international standard when it appeared in 1994 with the new criteria for diagnosing autism spectrum disorders. The content of DSM-IV and ICD-10 are quite similar. According to Siegel (1996), there was a large international study of about 1,000 children completed to ensure that the two sets of diagnostic criteria would identify the same individuals. Thus, it is common to find a child who is diagnosed with autism spectrum disorders by DSM-IV who also matches the criteria of ICD-10.

Etiology

The etiology of autism spectrum disorders is not yet well understood. There have been a great numbers of theories which assumed that infants, who were later diagnosed with autism spectrum disorders, were normal at birth yet developed symptoms due to poor nurturing such as diminished parental caring. However, in

1978, McAdoo and DeMyer completed a literature review on parents and they concluded that parents whose children were diagnosed with autism 1) display no more signs of mental or emotional disorders than parents who have children with or without psychosis, 2) do not have extreme personality traits such as coldness, obsessiveness, social anxiety or rage, and 3) do not possess specific deficits in infant and child care. Since research has indicated that psychological or social stressors do not cause autism, biological factors are now considered. Thaut (1999) reported that since the 1960s accumulated research evidence has suggested that autism spectrum disorders result from developmental brain malfunctions which deeply impact a variety of perceptual, cognitive, and motor areas. Seifert (1990) also described organic lesions in the central nervous system that may result in withdrawal and little affect of individuals with autism spectrum disorders.

The search for biological factors has revealed that autism spectrum disorders may be related to other organic conditions such as prenatal and obstetric complications. In addition, Bailey (1995) reviewed autism spectrum cases and found that twin and family studies show clear evidence for a genetic component although no specific gene has been identified as a potential figure for autism. No matter what the original causes of autism, it seems to be linked to behavior through abnormalities in brain structure and function. Therefore, it is suggested that most major brain structure may be associated with particular patterns of behavior observed in individuals with autism spectrum disorders.

Social and Communicative Behaviors of Children with Autism Spectrum Disorders
and Typically Developing Children

Social Interaction and Communication

Children with autism spectrum disorders have impairments in social, communication, and cognitive areas which may be accompanied by repetitive and rigid patterns of interests and activities (Wing, 1981). These three areas of impairment are related to each other so closely that when a child with autism has deficits in socialization, there will inevitably be related impairments in communication and cognition.

According to Wikipedia Dictionary (2007), the definition of “social interaction” is “a dynamic, changing sequence of social actions between individuals (or groups) who modify their actions and reactions according to the actions by their interaction partner(s). In other words, they are events in which people attach meaning to a situation, interpret what others are meaning, and respond accordingly” (§1). According to this definition, “changing sequence of social action” is actually a sense of “communication.” The definition of communication is “a process that allows organisms to exchange information by several methods. Communication requires that all parties understand a common language that is exchanged with each other” (Wikipedia Dictionary, 2007, §1). In communication, the methods of conveying meaning have two types: auditory and physical. Communication in auditory means is speaking, singing, and sometimes tone of voice. Communication through physical means include body language, sign language, paralinguistic (vocal features that go

along with speech for communication but are not formally used in language system, as quality of voice, tempo, and volume of the voice), touch, eye contact, or writing (Wikipedia Dictionary, 2007). The exchange between communication and social interaction acts like two sides of a coin. Therefore, the initiation of communication plays a vital role in social interaction, and vice versa.

Kanner (1943) found interpersonal deficits in children with autism were displayed through extreme aloofness, ignoring anything coming from the outside world. This social isolation may impede their social and communication skills. Children with autism spectrum disorders are not able to modify their actions and reactions according to the actions of their interaction partners. They cannot attach meaning to a situation; thus losing the ability to interpret another person's meaning. Social meaning is related to the product of one's cognition (Seifer, 1990), and is an essential element for social interaction and communication between people. Since most children with autism spectrum disorders are not able to identify this "meaning" in social interaction, natural communication may not be able to develop between them and their typically developing peers.

Early Social Development in Typically Developing Children and Children with Autism Spectrum Disorders

The following section presents and compares the social and communication development between typically developing children and children with autism spectrum disorders. It is noted that there is limited knowledge about the gaze patterns,

sounds/vocalizations, and gestural imitation in children with autism spectrum disorders.

Gaze patterns

Rheingold (1961) suggested that gaze, in terms of visual contact, is the basis of human sociability. By three months of age, it is observable that the gaze patterns form a kind of “non-verbal communication” between parent and infant. Infant gaze appears to serve as 1) a signal that indicates readiness to engage in interaction, 2) convey interaction in later development, and 3) a means for a controlling perception and arousal (Stern, 1977). On the other hand, the use of eye gaze in children with autism is abnormal, yet the nature and cause of the abnormal gaze patterns are uncertain. However, one finding is that the amount of eye contact and social responsiveness exhibited by children with autism spectrum disorders is related to the complexity of the social stimuli. In 1980, Ferrara and Hill found that children with autism looked at and played with social toys more than nonsocial toys when the toys were both less complex. Moreover, the children with autism preferred to play with the less complex toys while the typical developing children preferred to play with more complex toys. A similar study by Hermelin and O’Conner (1963) indicated that the complexity of a social encounter affected the social responsiveness of children with autism. However, Dawson and Adams (1984) found that the social responsiveness and eye contact increased when the children with autism were presented with an imitation task that was appropriate for the child’s developmental level. Thus,

withdrawal in response to novel and complex stimuli appears to be related to the child's level of cognitive development.

Sounds/Vocalization

Vocalizations also play an important role in early interactions. As early as 3 days of age, typically developing infants are more likely to vocalize in the presence of maternal vocalization than in its absence (Rosenthal, 1982). However, the absence of spoken language in young children is the first thing most parents worry about. Parents report that their children with autism did not babble as young infants and when they grew older had little or no prelinguistic babbling. When vocalizations are present, they are often unusual (Cox, 1993; Siegel, 1996).

Gestural imitation

Siegel (1996) stated that babies, in early development, receive external information through imitation. As babies imitate behaviors, they are actually practicing what they see. For example, an adult demonstrates one behavior and then the baby imitates, or sometimes the baby demonstrates one behavior and then the adult imitates. These reciprocal interactions may reinforce the baby's behavior and he (the baby) will likely do it again, because the baby is aware his behavior or imitation is being acknowledged. Thus, it is important to understand that imitation is a basic form of communication in human society. Yet, according to Siegel, imitation is a nonverbal means of information-processing in which an action or movement seen by the baby is used to shape his own behavior in a similar way.

One form of gestural imitation is “pointing” and is a means of social communication behavior. Infants at the age of eight to 10 months usually begin to point. Pointing can be considered a form of communication. By pointing with the index finger, the child refers to an object to be found in the direction the finger is pointing (Siegel, 1996). However, children with autism spectrum disorders develop behavior, called “hand-leading”. This means that the child takes an adult’s hand and places the hand on the object that best serves his or her interest. The hand of the adult then becomes a tool that is used to help him or her obtain an object or to engage in a preferred activity (e.g. play a toy, watch tv, or go outside).

Dawson and Galpert (1986) cited Wing and Gould’s study (1979) and stated that “there is relationship between imitation ability and social relatedness” (p. 247). There are studies that have documented that children with autism lack spontaneous gestural imitation which influenced their social relatedness. Dawson and Galpert (1986) cited the work of DeMyer (1976) and Dawson and Adams (1984) which found that a lack of motor imitation in a child with autism is the primary obstacle for learning and responding to social relationships. Because of their limitations in imitation, children with autism spectrum disorders may face aversive consequences that are caused by not being able to imitate and understand the social differences engaged in joint play activities, and were not being able to interpret social interaction that was initiated by typically developing children (DiSalvo & Oswald, 2002; Wolfberg & Schuler, 1993.)

Involving typically developing children in interventions with children with autism spectrum disorders may be beneficial and meaningful due to the higher frequency of correct social-communicative responses that are modeled by typically developing peers. Peer-mediated intervention is one treatment intervention that may provide opportunities for children with autism spectrum disorders to learn social and communicative responses. In addition, music therapy may also be a treatment intervention for improving skills in these areas. The following section details these two treatments for children with autism spectrum disorders.

Peer-Mediated and Music Therapy Interventions

Peer-Mediated Intervention

Peer-mediated intervention involves using peers to promote learning skills in children with special needs. This intervention has been used to promote social interaction skills and to facilitate communication exchange and skills in children with autism spectrum disorders (Goldstein, et al., 1992; Harper, et al., 2007; Kamps, et al., 1994; Kamp, et al., 1997; Laushey & Haflin, 2000). Peer-mediated intervention practice is essential for children with autism spectrum disorders in preschool inclusion because it is necessary for these children to have opportunities to be exposed to the natural environment to interact with peers rather than just parents, paraprofessionals, and special education teachers. Robertson et al. (2003) stated that the rationale for inclusion is so young children with special needs could learn skills that pertain to educational development by participating in activities with their

typically developing peers and so that children with special needs may learn socially acceptable behaviors and skills that are critical for their survival in the world.

The ability to interact successfully with peers and significant adults is an important aspect of young children's development regardless of whether or not they have disabilities. Kupersmidt, Coie, and Dodge (1990) suggested that children have to establish and maintain appropriate social interaction, be accepted by peers, and avoid harmful social relationships, as these are pertinent to children's social competence. These abilities may also influence their psychological and social adjustment. The process of training typically developing peers to interact with their peers who have disabilities is important for the success of gaining meaningful social-communicative responses, such as initiating and maintaining pro-social and reciprocal interactions in order to lead to positive social interaction outcomes.

Training typical peers to promote interaction with children who have disabilities

One step in promoting reciprocal interactions of children with disabilities is peer training. In this condition, typically developing children are trained to increase the frequency of interactions with their peers who have disabilities (Kamps, et al., 2002). They may also be trained to be a role model for their peers with disabilities in learning specific academic or social skills (Garfinkle & Schwartz, 2002; Laushey & Heflin, 2000). These typically developing children may be trained in a separate room then returned to the classroom to utilize these skills to interact with their peers who have disabilities. Specifically, the training may include social skills modeling such as

requesting, sharing, or prompting (Goldstein, Kaczmarek, Pennington, & Shafer, 1992).

In order to help children gain social competence and adequate long term psychological and social adjustment in inclusive settings, Kohler and Strain (1990) listed four types of peer-mediated interventions that have been established in the early childhood literature: 1) peers provide suggestions, encouragement, and related forms of support for one another's behaviors; 2) peers model appropriate responses for a child with special needs to imitate; 3) peers act as tutors and provide instructions and feedback to teach specific academic or developmental skills; and 4) peers participate in cooperative activities and group-oriented reinforcement contingencies with other children. Robertson et al. (2003) reviewed the literature and suggested that research has indicated effectiveness of these four interventions for preschoolers with disabilities.

Studies showed that typically developing children at the age of 36 months can learn and demonstrate social and communication strategies with children who have disabilities (Goldstein & Wickstrom, 1986; Strain, Danko, & Kohler, 1995). Numerous studies also indicated that peers' use of facilitative strategies can produce improvements in the social interaction and play skills of preschoolers with special needs (Coe, Matson, Craigie, & Grossen, 1991; Odom et al., 1999). Goldstein et al. (1992) investigated the effects of a peer-mediated intervention on the social interaction of five groups comprised of preschoolers with autism and typically developing peers. Interaction with several strategies was selected based on analyses

of a descriptive data base. Typically developing peers were trained to attend to, comment on, and acknowledge the behavior of their classmates with autism spectrum disorders. Results showed that an improvement of social interaction during play was associated with the peer intervention for four of the five children with autism.

In addition to training typically developing peers to help children with disabilities with social interaction, we may also train children with disabilities to initiate and maintain pro-social, reciprocal interactions with their classmates. Children with autism spectrum disorders may initially encounter difficulty following directions such as imitating appropriate social behaviors. Therefore, it is necessary for them to learn how to imitate before they can imitate their typically developing peers. According to Laushey and Heflin (2000), systematic instruction can be a useful way to teach children with autism spectrum disorders to imitate. In addition, Laushey and Heflin also suggest that direct instruction may be used for teaching particular social skills in children with autism spectrum disorders, because they tend to respond less to incidental learning than their peers.

Due to the fact that peer-directed prompts lead to short-term gains that are not easily generalizable across time or activity, Hundert and Houghton (1992) proposed training children with disabilities to initiate interactions by using a peer-mediated or teacher-mediated approach. In this study, the researchers implemented a social skills program to promote social interaction of children with disabilities in natural preschool settings. All class members in this study were trained to initiate interaction through instructions on specific behaviors (e.g. sharing), modeling of a social skill by

a puppet, rehearsal and feedback, teacher prompting and praise during free-play sessions, token contingencies for interactions and teacher evaluation and self-evaluation on children's use of appropriate social behaviors.

Research indicates that peer-mediated intervention may very effective in improving the social-communicative responses of children with autism spectrum disorders. Peer-mediated intervention within a music therapy session may create further opportunities for social interaction between children with autism spectrum disorders and their typically developing peers. The following section describes functions of music in music therapy as an intervention.

Music Therapy

Music is an important part of human life and it has marked motivating effects on children and adults. Merriam (1964) stated that music itself can be a tool for communication (as cited in Radocy & Boyle, 1997). Tracing back through history, music was created by humans in different places and cultures for healing illness, ritual, or aesthetic purposes. Today, the role of music not only serves these purposes, but also serves as a medium for emotional expression, entertainment, and communication. Therefore, music has become a functional tool in human society where music is created and manipulated for a variety of purposes by humans. In the relationships between music and humans, humans are able to communicate through music as a form of non-verbal communication. This supports the premise that "music is an essential and necessary function of man" (Gaston, 1968, p. 15).

In music therapy, *music* is used as a medium in the therapy while *therapy* is a means of assisting or helping a person with physical or mental problems (Gfeller & Davis, 1999). According to Gfeller and Davis (1999), music therapy is defined as “a behavioral science concerned with changing unhealthy behaviors and replacing them with more adaptive ones through the use of musical stimuli” (p. 13). Music therapy may serve as a supportive and an effective intervention for children with autism spectrum disorders, because it may change their behaviors that may interfere with their daily lives. Moreover, music therapy may provide an unthreatening and structured environment which supports the children’s preference for sameness and desire for predictable events.

Sensory consideration for children with autism spectrum disorders

Children with autism spectrum disorders respond to sensory stimuli differently. Some may demonstrate a strong curiosity toward the sensory stimulus, while others may display strong aversive responses toward specific sensory input. Therefore, it is important for a music therapist to gather information about preferred and less preferred sensory stimuli of children with autism spectrum disorders from their caregivers or teachers or through assessment.

Children with autism spectrum disorders have the tendency of attending only to a narrowed range of available information, so-called “stimulus overselectivity.” This phenomenon occurs when an individual who encounters multiple sensory stimuli responds to only one stimulus while ignoring other complex stimuli. In the study by Kolko et al. (1980), children with autism spectrum disorders were taught to

discriminate the presence or absence of a compound auditory-visual stimulus. The impact of three conditions, visual slides (visual), music (auditory), and the compound stimulus of light with white noise (visual and auditory) were systematically measured. Results revealed that the children only attended to one aspect of the compound stimulus at a time with no difference between visual and auditory preference found. Thaut (1987) also reported similar findings. In his study, he examined perceptual preferences of children with autism. In the experiment, each participant was asked to operate one of two press-buttons. One button activated a slide and the other button activated the music. During the experiment, Thaut compared children's responses to auditory musical and visual stimuli. Results indicated that children with autism tended to activate the music button and paid attention to the musical stimuli. Although the data were not statistically significant, it is worth considering for further research.

Music Therapy as a Treatment

Music consists of six elements: rhythm, pitch, melody, timbre, harmony and texture (Berger, 2001). The combination of these musical elements makes music therapy a functional tool to facilitate social-communicative behaviors. For example, teaching children with autism spectrum disorders to sing a greeting song to encourage social interaction (Braithwaite & Sigafos, 1998), singing music to facilitate learning in educational context (Hairston, 1990), and using music to facilitate sign and speech imitation (Buday, 1995). As children with autism spectrum disorders gain social-communicative skills through music and begin to apply them independently, music

can be gradually faded, and then the children may be able to execute these learned skills independently without the facilitation of music.

Benenzon (1981) suggested that music therapy may facilitate reciprocal behaviors which pertain to the social-communicative development of children with autism spectrum disorders. Literature has indicated the effectiveness of music therapy on social-communicative behaviors for individuals with autism spectrum disorders (Buday, 1995; Edgerton, 1994; Hairston, 1990; Kern, Wolery, & Aldridge, 2007; Staum & Flowers, 1984; Thaut, 1984; Ulfarsdottir & Erwin, 1999). For example, Kern et al. (2007) used two customized songs tailored for two children with autism spectrum disorders in the morning routine (e.g. entering the school and greeting teacher and peers). Each song indicated the steps of the greeting routine and the children's teachers were taught how to sing the song in the morning routine to the target children. Results indicated that the songs assisted the children in completing the morning routines (e.g. greeting the teachers and peers). Hairston (1990) investigated the effectiveness of music therapy and art therapy on behavior, communication, socialization, and preacademic development in children with autism who have severe to profound retardation and those without autism who had severe to profound retardation. The children received five-weeks of developmental therapy then five-weeks of art and music therapy. The two therapies were seven minutes each (art therapy first and then music therapy) and conducted in one session daily. Results indicated an increased positive social interaction during both interventions.

Berger (2001) suggested that music therapy can train the brain systems of children with autism spectrum disorders. Through training, music can serve as repetitive stimuli to help children with autism spectrum disorders to code sensory information correctly (e.g. implementing a melody into the daily routines and the melody is familiar to or repeatedly sang to the child). Ricks and Wing (1975) reported that repetitive music helped children with autism spectrum disorders to recall simple patterns of sounds accurately. In addition, when stimuli were paired with melodic pattern, they were remembered better if the original musical pattern was recalled first. In music therapy session, working with young children, it is important to repeat music activities and routines (Humpal, 2002). Kaplan and Steele (2005) reported that forms of interactive singing and providing choices are frequently used in music therapy session for training social-communicative behaviors of children with autism spectrum disorders. Repetitive practice of these two types of music interventions may provide children with autism spectrum disorders a variety of social-communicative opportunities.

Interactive singing and providing choices

“Interactive singing” is “Use of singing to promote social interaction or communication between the therapist and client or between clients and/or peers” (Kaplan & Steele, 2005, p. 10). Melody is the essential element in this type of music making experience. When a melody of a song incorporates a “call-and-response (a succession of two separate phrases played by different people, where the second phrase repeats the first phrase), interactive singing is then established. Interactive

singing provides children with autism spectrum disorders the opportunity to produce and practice sounds, words, and phrases.

The role of music in interactive singing can function in the following areas: 1) communication and 2) social interaction. Music functions as communication because it is similar to spoken language. For instance, music has pitch, timbre, rest, and rhythm. Spoken language exhibits pitch when a person speaks with high and low vocal fluctuation, timbre through different quality of voice, and rest when a person pauses after speaking a phrase of words and then continues speaking the other phrase of the words in order to make a sentence distinguishable. Prosody consists of rhythm, stress, and pitch in speech. The three prosodic rules create rhythmic successions which the duration is repeated, short, and/or long. When a child with autism spectrum disorders practices speech language for communication through music, he/she may also learn more vocabulary for his/her social-communicative repertoire. Thus, music therapy may facilitate communication and social interaction, through language initiation with others. Moreover, gesture may be added while singing in order to convey additional symbolic information such as singing a hello song and incorporating waving hands to others.

Tracing back through history, children with developmental disabilities did not have a lot of chances to make choices because of their limitations and awkwardness in expressive language (Sansosti & Powell-Smith, 2006). More recently, the awareness of giving choice control to children with developmental disabilities has grown. Choice making means the process of allowing a child to choose an object or

activity among an array of other choices (Sansosti & Powell-Smith, 2006). Choice making is associated with preference for an object or activity that a child wants to have or engage in because it has a rewarding quality for the child. Sansosti et al. (2006) suggested that placing preferences into choice making situations may decrease inappropriate behaviors (e.g. self-stimulating behaviors) of children with autism spectrum disorders that are associated with anxiety.

“Making choices” is a manner of choice making and is an opportunity for client to select desired objects, such as books and instruments (Kaplan & Steele, 2005). Presenting an array of objects in front of children with autism spectrum disorders in a structured manner gives them the chance to choose the preferred object. First, the objects are placed in front of the children, second, the children need to eliminate the external and unnecessary stimuli such as objects that are not part of the current situation (e.g. lights on the ceiling, people passing by the classroom window, noises from play ground, etc.), third, they need to focus on the displayed objects in front of them and focus on the one that fits their interest. Being able to make choices may provide the child with a sense of control over the situation, reduce distraction from unrelated stimuli and engage in inappropriate self-stimulating or repetitive behaviors. In addition, as problematic behaviors decrease, engagement in social context may increase (Peterson, Caniglia, & Royster, 2001; Vaughn & Horner, 1997).

Observational Learning in Music Therapy for Children with Autism Spectrum Disorders

Observational learning (Bandura, 1977) plays a vital role in peer-mediated interventions. It has been used to teach children with disabilities various skills such as language (Egel, Richman, & Koegel, 1981), safety (Christensen, Lignugaris-Kraft, & Fiechtl, 1996), and discrimination (Keel & Gast, 1992). Observational learning, also called social learning, was described by Albert Bandura in 1962. Bandura (1962, 1977, & 1999) believed that behavior can be learned through observation. This learning occurs when an observer's behavior changes after viewing the behavior of a model. Learning by observation involves four separate processes (Bandura, 1977): *attention, retention, motor reproduction, and motivation.*

1. *Attention:* A person must attend to and perceive accurate features that are modeled by another person.
2. *Retention:* When an observer attends to the modeled behavior, the observer must remember the modeled behavior.
3. *Motor reproduction:* The observer must convert symbolic representations into actions. For example, beating a drum with a mallet cannot be effectively learned by observing if a child does not have the ability to hold a mallet by palmar grasping.
4. *Motivation:* The observer must be motivated to do the action they have observed and memorized which results in outcomes they value. (p. 23-29)

Children with autism spectrum disorders tend to be less engaged and less responsive to their outside world and attend only to the stimuli that best interested them due to their “overselectivity.” Thaut’s research (1987) found that children with autism tended to respond to auditory stimuli (discussed in *Sensory Consideration for Children with Autism Spectrum Disorders* of this chapter), therefore, music may be used to arouse their attention. Once music stimuli arouse their attention, the first stage of observational learning may occur. For example, an appropriate level of stimuli through singing or playing an instrument in a group music therapy intervention may catch their attention.

Repetition may be the best way to facilitate entering the second stage of observational learning. According to Nelson, Anderson, and Gonzales (1984), children with autism spectrum disorders prefer certain kinds of music stimuli because of the repetitiousness and concreteness of the stimuli. In addition to this preferred stimuli of children with autism spectrum disorders, music may serve as a “carrier of nonmusical information,” in which songs and chants can be utilized for teaching skills and concepts in an educational or developmental setting (Thaut, 1999). As children with autism spectrum disorders enter the first two stages of observational learning, they usually do not have problems executing the modeled behavior in action (*motor reproduction*) if 1) their physical development is not impeded, 2) the modeled behavior matches their age development, and 3) they have the acquired ability to act on the behavior.

The last stage of observational learning, motivation, is essential for children with autism spectrum disorders to have the desire to repeat the behavior if the presence of reinforcement is in favor of their interest. Bandura (1977) addressed that in observational learning, “responses must be reinforced in order to be learned” (p. 36) which is based on the mechanism of operant conditioning. This explains the importance of reinforcement in observational learning. For example, a therapist played the tambourine in a group music therapy setting, and the participants (children with autism spectrum disorders and typically developing children) were attracted by the sound. One of the typically developing children found playing the tambourine was fun and he wanted to play it. However, the therapist asked him to look at the person that he was talking to, to verbally request what he wanted, and to point to where the tambourine was before he could be allowed to take the tambourine. When the child did what the therapist asked him to do (e.g. looked at the therapist, asked “May I play the tambourine,” and pointed at the tambourine on the floor), the therapist allowed him to take the tambourine. Subsequently, the child was able to play the tambourine because he had complied with the appropriate request. If one child with autism spectrum disorders in this group saw how his peer was allowed to play the tambourine, and he also wanted to play, he would have to do an “appropriate request” in order to be allowed to play the tambourine. So, when the child complied with the “appropriate request” and was reinforced by being allowed to play the tambourine, he might have the motivation and would likely request to have his desired object or to engage in this desired activity in the future. In summary, peer-mediated intervention

and the preferred stimuli of music may play an important role in the observation learning in improving appropriate social communicative behaviors.

Music Therapy Treatments for Social Interaction and Communication

A study conducted by Nelson, Anderson, and Gonzales (1984) indicated that many children with autism respond positively to musical stimuli. Several studies (Braithwaite & Sigafoos, 1998; Kern & Aldridge, 2006; Stevens & Clark, 1969) have shown that music therapy may improve social behaviors, eye contact, and social interchange and reciprocity. Stevens and Clark (1969) assessed some generalized social effects of music therapy, in which music therapy provided effective techniques for the improvement of prosocial behaviors in children with autism. Five boys with autism, five to seven years of age, participated in instrument playing, singing, and movement. After eighteen weeks of music therapy interventions, results showed that four of the five children had improved prosocial behavioral changes in three areas: relationship to an adult as a person, communication, and drive for mastery.

One study (Kern & Aldridge, 2006) that examined music therapy in the inclusive classroom used embedded music therapy interventions to improve peer interactions and meaningful play on the playground for four boys with autism. In this intervention, an outdoor music center and original songs that were composed for each participant were integrated into the playground. There were four implemented conditions involved in the study: 1) baseline condition; 2) music adaptation of the playground: a teacher guided a target child entering the playground and prompted the child to play in the adapted music playground; 3) teacher-mediated intervention: each

target child chose a peer to play on the playground, and then the teacher guided them entering the playground, initiated play, sang individualized composed song and played instruments in the adapted music playground, and modeled the song content, continued playing in the adapted music playground; and 4) peer-mediated intervention: procedure was similar to 3), but the teacher, who was less involved in this phase, gave minimal physical and verbal prompts. Results of this study revealed that the musical adaptations of the playground did not significantly improve social interactions of the target children. However, the target children were attracted by the sounds of adapted music playground which motivated them to engage in the play with their peers. Although this study showed that the musical adaptation facilitated children with autism spectrum disorders' involvement in play with peers, it did not indicate that children with autism spectrum disorders' social-communicative behaviors (e.g. eye contact, verbalization/vocalization, and gestural imitation) increased when they were involved in the social situations with their peers.

Using music to promote social- communicative behavior has been studied. Braithwaite and Sigafos (1998) compared communication responses of children with developmental disabilities in social (non-musical) and musical conditions. In both conditions, the teacher gave students opportunities to greet, name objects, and request objects. Results indicated that three of five children responded with higher percentages of appropriate communication responses in musical condition, while the other two children displayed approximately equal percentages in the two conditions. Braithwaite and Sigafos concluded that embedded music stimuli in communication

opportunities may increase appropriate communication responses for some children with developmental disabilities. However, this study is unclear if the children would increase the social-communicative behaviors with their typical developing peers.

Purpose Statement and Research Question

The purpose of this study was to examine the effect of music therapy on the social-communicative behaviors (eye contact, vocalization/verbalization, and gesture imitation) of children with autism spectrum disorders.

The research question was:

Is there a difference in the following social-communicative behaviors of children with autism spectrum disorders between music therapy and non music therapy sessions?

- Eye contact,
- Vocalization/verbalization,
- Gestural imitation.

CHAPTER III

METHOD

Participants

Five participants were recruited from a daycare center in a mid-western city. The age range of the participants was from two to four years of age. Two target students, SAU1 who was three-year-old and SAU2 who was two-and-half-years-old, were boys and had tentative diagnosis of autism spectrum disorders. Three students were typically developing students: TDS1 was a four-year-old boy, and two girls, TDS2 and TDS 3 who were also four-years-old. The three typically developing children were chosen by the teacher of the daycare center. The teacher selected the typically developing children who met the following criteria as suggested by Ostrosky, et al. (1993), “they demonstrate age-appropriate language and social skills, 2) they are familiar with the target participants, and interact positively with the target participants in natural settings, and 3) they would like to follow adult direction and are willing to help their peers with disabilities” (p. 170).

Design

An ABAB reversal design was used to examine the difference in the social-communicative behaviors between baseline A, which was a social-communicative condition, but with no music involved, and music therapy intervention (treatment B), which was a social-communicative condition with music. Each condition lasted for three consecutive school days. Each session was 20 minutes in length. This study was conducted across 14 days which included two days of peer training phase (session a

was a social-communicative practice without music and session b was a social-communicative practice with music) and followed by 12 days of intervention phase (Figure 1) where the ABAB design was implemented for this study.

Figure 1. Session days and conditions of training phase and intervention phase.

Session Number	a & b		1 to 3	4 to 6	7 to 9	11 to 12
Phases	Peer Training Phase		Intervention Phase			
Baseline or Treatment			A	B	A	B
Conditions	Non-Music	Music	Non-Music	Music	Non-Music	Music

Each session included four sections. During intervention phase, baseline A (non-music condition) included 1) *greeting*, 2) *choice making*, 3) *interactive reading*, and 4) *goodbye*; treatment B (music condition) had 1) *greeting*, 2) *choice making*, 3) *interactive singing*, and 4) *goodbye* (Figure 2). The length of each section (*greeting*, *choice making*, *interactive reading/singing*, and *goodbye*) was approximately 3, 4, 10, and 3 minutes respectively.

Figure 2. Procedures of this study

Phases	Training Phase		Intervention Phase	
Condition	Social-communicative practice without music	Social-communicative practice with music	<u>Baseline A</u> Social-communicative sessions without music	<u>Treatment B</u> Social-communicative sessions with music
Procedure				
1	Greeting	Greeting	Greeting	Greeting
2	Choice Making	Choice Making	Choice Making	Choice Making
3	Interactive Reading	Interactive Singing	Interactive Reading	Interactive Singing
4	Choice Making	Choice Making	Choice Making	Choice Making
5	Interactive Reading	Interactive Singing	Interactive Reading	Interactive Singing
6	Goodbye	Goodbye	Goodbye	Goodbye

Independent Variables

Non-music condition versus music condition

The independent variables were social-communicative session without music (non-music condition) and social-communicative session with music (music condition). In *greeting*, *interactive reading/singing*, and *goodbye* sections of baseline A and treatment B, the researcher made eye contact, said/sang words or phrases, and made gestures related to the context of the words or phrases (e.g. sign language of animals and colors) to the participant, and the participant echoed back or responded according to the context of the communication. *Choice making* was when the researcher showed two books to the participant and asked him to choose one either by pointing and/or verbalizing indicating that he/she wanted to read or sing.

Dependent Variables and Operational Definitions

The dependent variables were the social-communicative behaviors demonstrated by the SAU during each session across baseline conditions and treatment conditions. These behaviors were eye contact, vocalization/verbalization, and gestural imitation. The operational definitions are below.

Eye contact

Eye contact was defined as the SAU and researcher looking at each other's eyes, or SAU looking in the direction of the researcher, or peers' face for at least two seconds.

Vocalization/Verbalization

Vocalization/Verbalization was defined as the SAU vocalizing or verbalizing words in response to the researcher and/or peers' greeting, requests or questions. For instance, in the *greeting* of music therapy or non-music interventions, the researcher greeted the SAU, he responded by saying and/or singing "Hello," "Hi," and/or "I am fine." In *choice making*, SAU vocalized/verbalized "This" or the name of the book of his choice in response to a request. In *interactive reading/singing*, SAU verbalized/vocalized words in the book or responses to questions asked about the book.

Gestural imitation

Gestural imitation was recorded when the SAU exhibited 1) waving hand or shaking hands in the *greeting* and *goodbye*, 2) pointing at or taking a book presented in the *choice making*, and 3) imitating movements, such as sign language of animals and colors, in the manner of the researcher and/or the peers during *interactive reading/singing*.

Procedure

First, the researcher submitted an application for project approval to the Human Subjects Committee-Lawrence. When the project was approved, the researcher contacted the facility, which had the students with tentative diagnosis of autism spectrum disorders in inclusive classrooms, and sought approval for the researcher to conduct the study in that facility. The teachers chose two SAU and three TDS who were familiar with the SAU, displayed appropriate social competencies

such as age-appropriate language and social skills, and were compliant with adult direction and seemed to be willing to help their peers with autism spectrum disorders. The researcher provided two sets of Parent-Guardian Consent forms (Appendix A) to the parents or guardians of the SAU and TDS participants. When parent consent forms were received, the study began. However, before conducting each session, the researcher asked each participant if he or she wanted to participate in the study. When minor assent was obtained, the study started immediately. The potential functional outcomes of this study were: 1) students would increase social-communication skills such as making eye contact and responding to questions by vocalizing/verbalizing and signing during social encounters, and 2) indicating their needs and desires in educational settings.

Peer Training Phase

Only TDS participated in the peer training phase. The training phase was used to build rapport between the participants and the researcher and to provide an opportunity for participants to be familiar with the procedures of the study and the materials (e.g. books and music) to be used in the intervention phase. The researcher instructed them how to greet, make choices, participate in book reading/singing, and say goodbye with music and without music. The typically developing peers were trained in the group to model appropriate responses for the target students with autism spectrum disorders to imitate.

Intervention Phase

The intervention phase occurred in the same setting as the peer training phase. The design for the intervention phase was an ABAB reversal design. In each session, two SAU and two TDS participated, or one SAU and one TDS participated. The TDS was asked to demonstrate appropriate social-communicative responses first and then the SAU was given an opportunity.

Social-communicative practice/sessions without music (Baseline A) protocol

1. The researcher led the students to sit on the floor to form a circle, and started the *greeting* section.
2. In *greeting* section (Appendix B), the researcher greeted the participants individually by making eye contact, waving hand, and saying: “*Hello! (Name of the participant)! Hello! (Name of the participant)! How are you? Hello! (Name of the participant)!*” After the researcher said “*Hello! (Name of the participant)*” and “*How are you,*” she waited five seconds for the participant’s response, such as making eye contact, verbalizing/vocalizing, or waving hands. When each participant was greeted, the researcher moved on to the second section, *choice making*.
3. In *choice making* (Appendix B), the researcher presented two books, “*In the Small, Small Pond*” and “*Panda Bear, Panda Bear, What Do You See,*” and held them in front of the participants. The researcher asked one TDS to choose a book to read, “*(Name of the participant) choose a book to read. (Name of the participant) choose a book to read. (Name of the*

participant) choose a book to read.” When the researcher asked “*(Name of the participant) choose a book to read,*” the researcher waited 5 seconds for the participant’s response (e.g. say, sign, or point at the book).

4. In *interactive reading* section (Appendix B), the researcher read the book and provided each participant two opportunities to interact with the researcher (e.g. show where the animal was on the book; indicate the color of the animal or the name of the animal either through word or sign).

While the participant was interacting with the researcher, the others sat and observed. Detailed procedures:

- 1) The researcher opened the book and read 1st verse of the “Contents of the book.”
- 2) While reading 1st verse of the “Contents of the book,” the researcher used sign language to indicate the animal or the color of the animal of the particular verse.
- 3) After reading and signing the script of the “Interactive reading,” the researcher asked two questions to the TDS. First question was, “Where is the object?” Second question was, “What is the animal” or “What color is the animal?” Between each question, the researcher waited five seconds for the participant’s response (e.g. pointing where the animal is, and saying or signing the name or color of the animal).
- 4) After the TDS’s modeling, the researcher read 1st verse of the “Contents of the book,” followed by “Interactive reading,” and asked

the same questions to SAU. Five seconds of responding time for each question was provided.

5. Repeated Step 3 in which one SAU chose a book to read, and then followed by Step 4. When every participant had a turn in Step 4, the researcher moved on to *goodbye* section.
6. In *goodbye* section, the researcher said goodbye script to each participant: “*Goodbye! (Name of the participant)! Goodbye! (Name of the participant)! See you next time. Goody bye! (Name of the participant)!*” Between each word or a phrase of the *goodbye* script, the researcher waited five seconds for the participant’s response.

Social-communicative practice/sessions with music (Treatment B) protocol

Social-communicative practice with music of peer training phase and social-communicative sessions with music of intervention phase (Treatment B) were identical to baseline A. The only difference was music was included in each section (Appendix C). The books used in treatment B were “*In the Tall, Tall Grass*” and “*Brown Bear, Brown Bear, What Do You See?*” The contents and length of these books are similar to the books, “*In the Small, Small Pond*” and “*Panda Bear, Panda Bear, What Do You See,*” that were used in baseline A.

1. The researcher led the students to sit on the floor to form a circle, and started the *greeting* section.
2. In *greeting* section (Appendix C), the researcher greeted the participants individually by making eye contact, waving hand, and singing: “*Hello!*”

(Name of the participant)! Hello! (Name of the participant)! How are you? Hello! (Name of the participant)!" After the researcher sang "*Hello! (Name of the participant)"* and *How are you,"* she waited five seconds for the participant's response, such as making eye contact, verbalizing/vocalizing, or waving hands. When each participant was greeted, the researcher moved on to the second section, *choice making*.

3. In *choice making* (Appendix C), the researcher presented two books, "*In the Tall, Tall Grass*" and "*Brown Bear, Brown Bear, What Do You See,*" and held them in front of the participants. The researcher asked one TDS to choose a book to sing, "*(Name of the participant) choose a book to read. (Name of the participant) choose a book to read. (Name of the participant) choose a book to read.*" When the researcher sang "*(Name of the participant) choose a book to read,*" the researcher waited 5 seconds for the participant's response (e.g. say, sing, sign, or point at the book).
4. In *interactive singing* section (Appendix C), the researcher sang the book and provided each participant two opportunities to interact with the researcher (e.g. show where the animal was on the book; indicate the color of the animal or the name of the animal either through word or sign). While the participant was interacting with the researcher, the others sat and observed. Detailed procedures:
 - 1) The researcher opened the book and sang 1st verse of the "Contents of the book."

- 2) While singing 1st verse of the “Contents of the book,” the researcher used sign language to indicate the animal or the color of the animal of the particular verse.
- 3) After singing and signing the “Interactive reading,” the researcher asked two questions to the TDS. First question was, “Where is the object?” Second question was, “What is the animal” or “What color is the animal?” Between each question, the researcher waited five seconds for the participant’s response (e.g. pointing where the animal is, and saying, singing, or signing the name or color of the animal).
- 4) After the TDS’s modeling, the researcher sang 1st verse of the “Contents of the book,” followed by “Interactive singing,” and asked the same questions to SAU. Five seconds of responding time for each question was provided.
5. Repeated Step 3 in which one SAU chose a book to sing, and then followed by Step 4. When every participant had a turn in Step 4, the researcher moved on to *goodbye* section.
6. In *goodbye* section, the researcher sang *goodbye song* to each participant: “*Goodbye! (Name of the participant)! Goodbye! (Name of the participant)! See you next time. Goody bye! (Name of the participant)!*” Between each word or a phrase of the *goodbye song*, the researcher waited five seconds for the participant’s response.

Materials

The social-communicative practice/session without music used these two books, “*In the Small, Small Pond*” and “*Panda Bear, Panda Bear, What Do You See*” (Appendix B) for each participant to choose and read. In social-communicative practice/sessions with music, “*In the Tall, Tall Grass*,” and “*Brown Bear, Brown Bear, What Do You See?*”(Appendix C) were used. One DVD camcorder was used to record peer training, and intervention phases (including baseline and treatments). Data sheets were provided for the observers (Appendix D).

Data Collection

One video recorder was set up four feet away from the group and right behind the researcher in order to have a clear view to observe each participant’s behavior (e.g. eye contact, voice, and imitative behavior). After each session, two observers (one independent observer and the researcher) watched the recorded session together in a room which had a TV set and a DVD player. While watching the videotapes, there was no conversation between the observers. Data sheets (Appendix D) for recording responses for each participant was provided to each observer while watching the DVD. Time sampling that recorded target behaviors in 10 second intervals was used to gather data for each session. There was five seconds for observers to record the data on the data sheet between each 10-second observe interval. A taped “observe, record” cue was used during video-watching.

Observer Training and Inter-observer Agreement

The researcher and an independent observer observed and recorded the behaviors of SAU during each phase. The researcher trained the observer by watching the DVD recorded from the peer training phase. The observer was familiar with the operational definitions of the dependent variables (eye contact, vocalization/verbalization, and gestural imitation) to be measured. Training was concluded when inter-observer agreement was at least 80%. During the study, inter-observer agreement checks occurred for 100% of the observations for each session and target participant (Kennedy, 2005). The percentage of agreement was calculated using the point-by-point method (Tawney & Gast, 1984). The number of agreements was divided by the number of agreement plus disagreements with the quotient multiplied by 100 to determine the percentage of reliability.

CHAPTER IV

RESULTS

Background and Assessment of SAU1

The first student (SAU1) is a three-year-old boy who has a tentative diagnosis of autism spectrum disorder. He attends a preschool class at a daycare center in a mid-western city. SAU1 demonstrates delays in social-communicative behaviors. He does not initiate conversation with his peers or teachers. SAU1 does not maintain eye contact with his peers, teachers, or the researcher. In some occasions, when the researcher talks to him, he looks in a different direction, does not speak, and seems to not hear the researcher. When the researcher gives SAU1 verbal or physical prompts, such as calling his name and tapping his shoulder, he makes a brief eye contact with the researcher. SAU1 imitates gestural behaviors such as waving his hand and pointing at an object with his fingers when given verbal prompts after the demonstration of the researcher or his peers. SAU1 exhibits delays in speech language and speaks indistinctly. He does not make coherent conversation with others. When the researcher asks him a question, his answer is not relevant to the content.

Background and Assessment of SAU2

SAU2 is a two-and-half-year-old boy with a diagnosis of autism spectrum disorder. He attends the toddler class in the same daycare center as SAU1. SAU2 exhibits a number of autistic characteristics. He needs more time to process new information and to engage in a new task or activity as compared to typically developing children. SAU2 occasionally has a tantrum when the routine is changed.

SAU2 also engages in a repetitive behavior of sitting near the window and continuously opening and closing the window.

The characteristics of autism spectrum disorders are also evident in SAU2's social-communicative behaviors. SAU2 does not engage in social play with his peers either during in-door classes or outdoor activities, he primarily plays by himself. SAU2 exhibits inconsistent eye contact. For instance, when the researcher asks him questions, he lowers his head, looks at the researcher, yet neither speaks nor shows facial expressions. However, sometimes SAU2 does not maintain eye contact and he engages in his own play when the researcher talks to him. SAU2 is verbal; however he does not initiate conversation with others. SAU also demonstrates echolalia. When the researcher poses a question to him, he repeats the question instead of answering the question. He also repeats words from the conversation between peers and the researcher. SAU2 does not demonstrate gestural imitative behaviors. For example, when the researcher demonstrates sign language of animals to him, he looks at the researcher, but he does not attempt to imitate the signs.

Implementation Procedures

The baseline conditions (A) and the treatment conditions (B) were conducted once a day in the mornings from session 1 to 7, and in the afternoons from session 8 to session 12 due to changes in the daycare center's scheduled activities. Session 1 to 3 were non-music sessions, session 4 to 6 were music sessions, session 7 to 9 were non-music sessions, and session 10 to 12 were music sessions. Along with the two SAU, there were three typically developing students (TDS 1, TDS2, and TDS 3)

regularly participating in this study. The age range of the three TDS was from 3 to 4. TDS1 was a boy, and TDS2 and TDS3 were girls. They were all in the preschool class of the same daycare center and they all know SAU1 and SAU2. The researcher randomly picked one or two of the three TDS depending on the number of the SAU who would participate in the sessions. If both SAU were in a session, two TDS participated; if only one SAU was in a session, only one TDS participated. In the baseline conditions, the researcher conducted *greeting*, *choice making*, *interactive reading*, and then *goodbye* applications. In the treatment conditions, the researcher conducted *greeting*, *choice making*, *interactive singing*, and then *goodbye* applications.

In session 5 during the first treatment condition, and session 8 and 9 during the return to baseline condition, the SAU were separated and the sessions were conducted individually where only one SAU and one TDS in each session due to scheduling conflicts. Therefore, the data of both SAU in session 5, 8, and 9 were collected separately. In session 10 and session 11 of the return to treatment condition, SAU2 participated only during the first half of the sessions and then left early due to his unstable emotions. In session 12 of the return to treatment condition, only SAU1 and one TDS participated, because the researcher did not obtain consent from SAU2 to participate in the session.

Results of the Participants

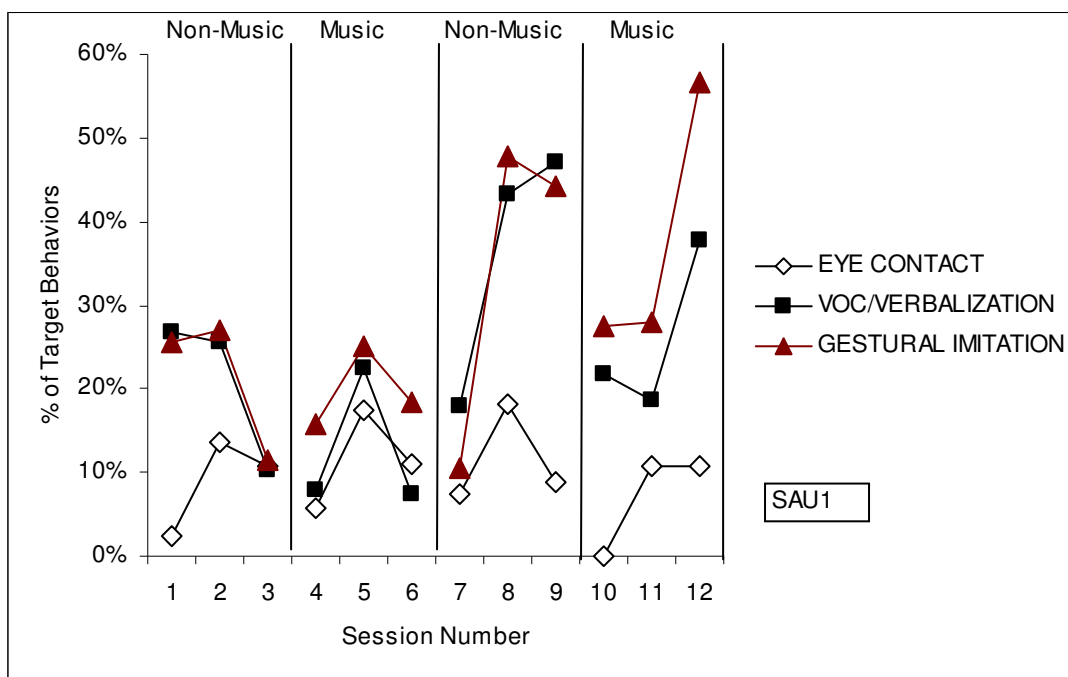
The target behaviors, eye contact, vocalization/verbalization, and gestural imitation, were recorded by two observers. Time sampling that recorded social-communicative behaviors in a given interval, was used to collect data throughout each session. There were five seconds for observers to record the data on the data sheet between each 10-second observe interval. The observers watched each video and used the data sheet (Appendix D) to record the occurrence of the target behaviors. The overall mean interobserver agreement across the participants on the frequency of social-communicative behaviors was 93% (range: 81 % - 100 %) for eye contact, 93.5% (range: 88 % - 100 %) for vocalization/verbalization, and 92.5% (range: 82 % - 90 %) for gestural imitation. To calculate the data for graphic analysis, the researcher used the percentage of time intervals that had at least one occurrence of the target behaviors. This percentage was used for calculating each data point was: the number of intervals that have an occurrence of the target behavior divided by the total number of intervals then multiplied by 100.

Results of SAU1

Figure 3 shows percentage of intervals of target behaviors across baseline (non-music) and treatment (music) conditions for SAU1. Visual analysis of the graphed data shows that there was no apparent difference between the first baseline condition (non-music) and the first treatment condition (music). However, there was an increase in data points of vocalization/verbalization and gestural imitation during the return to baseline (non-music) and the return to treatment condition (music). The

data points for eye contact do not have much change across the study. This target behavior was lower than vocalization/verbalization and gestural imitation across all conditions, except during session 6 of the first treatment condition (music).

Figure 3. Percentage of intervals of target behaviors across baseline (non-music) and treatment (music) conditions for SAU1.



The data points of vocalization/verbalization and gestural imitation in both music conditions show a somewhat parallel relationship, in which whenever vocalization/verbalization increases, gestural imitation also increases, except between session 1 and 2, and between session 8 and 9 of baseline conditions. In examining the data points of vocalization/verbalization and gestural imitation, there is a large change

from session 7 to session 8 of the return to baseline condition. Although the data points of the vocalization/verbalization and the gestural imitation decrease at session 10 of the return to treatment condition, a rapid increase of vocalization/verbalization and gestural imitation occurs again from session 11 to session 12.

Table 1 displays the detailed percentage and means of intervals of social-communicative behaviors during each session of baseline and treatment conditions for SAU1. Comparing each target behavior across the sessions, the mean of gestural imitation, which is 28, is higher than the verbalization/vocalization which is 24. The mean of the lowest target behavior across the sessions is the eye contact which is only 10.

Table 1

Detailed percentage and means of intervals of social-communicative behaviors during each session of baseline and treatment conditions for SAU1

Conditions	First Baseline (Non-music)			First Treatment (Music)			Return to Baseline (Non-music)			Return to Treatment (Music)			Total Mean
	1	2	3	4	5	6	7	8	9	10	11	12	
Session Number	1	2	3	4	5	6	7	8	9	10	11	12	Total Mean
Behaviors													
Eye Contact	2	14	11	6	18	11	7	18	9	0	11	11	10
(Mean)	(9)			(11)			(11)			(7)			
Vocalization/ Verbalization													
Verbalization	27	26	10	8	23	7	18	43	47	22	19	38	24
(Mean)	(21)			(13)			(36)			(26)			
Gestural Imitation	26	27	11	16	25	18	10	48	44	28	28	57	28
(Mean)	(21)			(20)			(34)			(37)			
Mean (by sessions)	18	22	11	10	22	12	12	36	33	16	19	35	
Mean (by conditions)	17			15			27			24			

The means of the percentage of intervals of target social-communicative behaviors in each condition is 17, 15, 27, and 24 respectively (Table 1). It does not show a trend across the study. Concerning the vocalization/verbalization, the means are higher in baseline conditions, which are 21 and 36, as compared to treatment conditions, which are 13 and 26. However, it is obvious that the mean this target behavior of the return to treatment condition is improved from the first treatment condition. The means of the gestural imitation gradually increase from the first baseline condition to the return to treatment condition which is from 21 to 37. Yet, the occurrence of the gestural imitation reaches the highest occurrence, which is 57, in session 12 of the return to treatment condition.

Results of SAU2

Figure 4 illustrates the percentage of intervals of target behaviors across baseline (non-music) and treatment (music) conditions for SAU2. The data point in session 12 is not indicated due to the absent of SAU2. Visual analysis of the graphed data shows that there is a high variability on the target behaviors between each condition, especially in the first treatment condition. To observe across the sessions, the data points of the eye contact do not change much. However, this target behavior reaches the highest occurrence in session 5 of the first treatment condition as compared to session 1 of the first baseline condition, which shows almost zero at that point. In terms of vocalization/verbalization, it has dramatic changes during the first two baseline conditions and the first treatment condition. This target behavior changes minimally during the return to treatment condition. The data point of gestural

imitation has a rapid change across the treatment condition. However, it begins to steadily increase across the return to baseline condition. In session 10 of the treatment condition, this target behavior rapidly decreases, but it tends to go upward in session 11 of the same condition. Figure 4 also shows that the gestural imitation in each first session of both conditions (session 4, 7, and 10) always decrease from the last session of both conditions (session 3, 6, and 9).

Figure 4. Percentage of intervals of target behaviors across baseline (non-music) and treatment (music) conditions for SAU2.

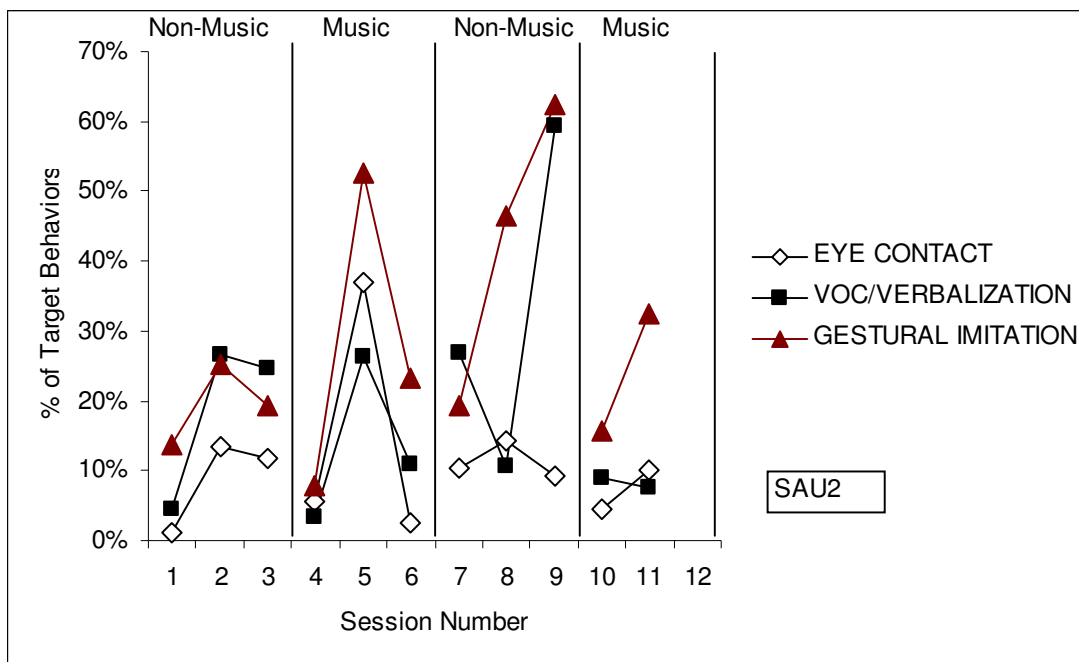


Table 2 represents the detailed percentage and means of intervals of social-communicative behaviors during each session of baseline and treatment conditions for SAU2. To note that the data of session 12 in the return to treatment condition is indicated as dash due to the absent of the participant. The researcher used the average of session 10 and 11 to represent the mean for the target behaviors for the return to treatment condition. Therefore, the mean is not sufficient to determine if the target behaviors increase or decrease during this treatment condition as compared to baseline conditions and the first treatment conditions.

Comparing each target behavior across the sessions, the mean of gestural imitation, which is 29, is higher than the verbalization/vocalization which is 18. The mean of the lowest target behavior across the session is the eye contact which is only 11. However, the mean of eye contact that was observed in the first treatment condition, which is 15, is higher than in baseline conditions, which was 9 and 11 respectively.

The mean of the gestural imitation increases from the first baseline condition across to return to baseline condition. However, this target behavior decreases in the return to treatment condition. Regarding the means of vocalization/verbalization, the means are higher in the baseline conditions as compared to the treatment conditions.

Table 2

Detailed percentage and means of intervals of social-communicative behaviors during each session of baseline and treatment conditions for SAU2

Conditions	First Baseline			First Treatment			Return to Baseline			Return to Treatment			Total Mean
	(Non-music)			(Music)			(Non-music)			(Music)			
Session Number	1	2	3	4	5	6	7	8	9	10	11	12	
Behaviors													
Eye Contact	1	13	12	6	37	2	10	14	9	4	10	--	11
(Mean)	(9)			(22)			(11)			(12)			
Verbalization/													
Vocalization	5	27	25	3	26	11	27	11	59	9	8	--	18
(Mean)	(19)			(14)			(32)			(8)			
Gestural Imitation	14	25	19	16	53	30	19	46	63	16	33	--	29
(Mean)	(19)			(28)			(43)			(24)			
Mean	6	22	19	6	39	12	19	24	44	10	17	--	
Total Mean	16			19			29			13			

CHAPTER V

DISCUSSION

The purpose of this study was to examine the effect of music therapy on the social-communicative behaviors (eye contact, vocalization/verbalization, and gesture imitation) of children with autism spectrum disorders. In order to compare the responses of the target participants, SAU1 and SAU2, they engaged in two conditions: 1) social-communicative sessions without music (baseline condition), and 2) social-communicative sessions with music (treatment condition). In the baseline condition, the target participants engaged in four social-interactive applications without music, *greeting, choice making, interactive reading, and goodbye*. In the treatment condition, the target participants engaged in four social-interactive applications with music, *greeting, choice making, interactive singing, and goodbye*. One or two typically developing students (TDS) participated in each session with the target participants.

In this study, sessions 1 through 3 were social-communicative sessions without music (baseline condition), sessions 4 through 6 social-communicative sessions with music (treatment condition), sessions 7 through 9 were a return to baseline condition, and sessions 10 through 12 were a return to treatment condition. Two SAU and two TDS participated in the study in the format of a group session, except session 5, 8, 9, and 12 in which only one SAU and one TDS participated in the format of an individual session due to scheduling issues. All participants engaged in all sessions, except SAU2 who left the group early during sessions 10 and 11, and did not participate at all during session 12.

Findings of Eye Contact

The eye contact in this study was defined as the SAU and the researcher looking at each other's eyes, or SAU looking in the direction of the researcher, or peers' face for at least two seconds. Results indicated that the eye contact of SAU1 did not change much between the baseline condition and the treatment condition or across the study. In both conditions, SAU1 made eye contact with the researcher in *greeting* and *goodbye* sections; however, he did not maintain eye contact consistently and had short attention span during *interactive reading* and *interactive singing* sections. When he did not make eye contact, he looked in different directions and did not respond to the researcher's verbal redirection. In session 10 of the return to treatment condition, he did not make eye contact as he was distracted by SAU2 who left the group and sat by himself in a corner of the session room.

As for SAU2, his eye contact also did not change much across sessions. However, he exhibited more eye contact in session 5 of the first treatment condition (music), which was an individual session format in which one SAU and one TDS participated. In this session, SAU2 looked at the researcher's eyes during *greeting* and *goodbye* sections, and he also looked at the researcher doing signs of animals during *interactive singing* section.

Findings of Vocalization/Verbalization

Vocalization/Verbalization was defined as the SAU vocalizing or verbalizing words in response to the researcher and/or peers' greeting, requests or questions. For instance, in the *greeting* sections of music or non-music interventions, the researcher

greeted SAU, and he responded by saying and/or singing “Hello,” “Hi,” and/or “I am fine.” In *choice making* sections, SAU vocalized/verbalized “this” or the name of the book of his choice in response to a request. In *interactive reading/singing* sections, SAU verbalized/vocalized words in the book or responses to questions asked about the book.

The findings indicated that both target participants demonstrated more vocalization/verbalization during the baseline condition than in the treatment conditions. As for SAU1, the occurrence of this behavior was higher in sessions 8 and 9 of the return to baseline condition and session 12 of the return to treatment condition. These sessions were all conducted in the individual session format. Across sessions, SAU1 said “Hello,” “I am fine” during *greeting* section, said, “This,” in *choice making* sections, and said some contents of the books in *interactive reading* and *interactive singing* sections.

As for SAU2, his vocalization/verbalization responses were low in session 1 of baseline condition, and in session 4, which was the first session of treatment condition. He did not speak nor respond to the researcher’s questions very much when new materials were introduced to him during these sessions (session 1 and 4). However, he started to respond to the researcher’s questions in session 2 of the baseline condition and session 5 of the first treatment condition. Perhaps SAU2 needed some level of familiarity to feel comfortable. SAU2 tended to exhibit more vocalization/verbalization in baseline conditions as compared to treatment conditions. In baseline condition, he asked, “What color is it,” during *interactive reading* section.

This may be evidence of one possible characteristic of autism spectrum disorders, echolalia. Another vocalization/verbalization behavior observed during the baseline condition was that SAU2 said, “Goodbye” and “See you next time,” during *goodbye* section. In the treatment condition, he only responded during *interactive singing* section, such as saying the names of the animals in the books (“Kitty” and “White dog”). During the return to treatment condition, he had less responses of vocalization/verbalization due to his unstable emotions and subsequent absence.

Findings of Gestural imitation

The operational definition for gestural imitation was when the SAU exhibited 1) waving hand or shaking hands in the *greeting* and *goodbye* sections, 2) pointing at or taking a book presented in the *choice making* sections, and 3) imitating movements, such as sign language of animals and colors, in the manner of the researcher and/or the peers during *interactive reading/singing* sections.

The findings indicated that the gestural imitation of SAU1 was not different between the first baseline condition and the first treatment condition, and between the return to baseline condition and the return to treatment condition. However, SAU1’s gestural imitation improved across sessions, and it seems that there may have been a carry-over effect in which SAU1 gradually learned to use the gestures. In both conditions, SAU1 demonstrated waving hand and shaking hands with the researcher to indicate “Hello” or “Goodbye” during *greeting* and *goodbye* sections. He also pointed his finger to indicate his choice during *choice making* sections. In addition, he pointed where the animals were in the books, and showed signs of animals such as

tadpoles, turtles, birds, crabs, raccoons, muskrats during *interactive reading* section, and signs of moles, beetles, tongues, bunnies, and bats during *interactive singing* section.

For SAU2, he exhibited more gestural imitation in the first treatment condition than the first baseline condition; however, he had more gestural imitation in the return to baseline condition than in the return to treatment condition. The behavior seemed to increase from the first baseline condition to the return to baseline condition, but it decreased in the return to treatment condition due to his unstable emotions during these sessions. SAU2 did not respond much with gestural imitation in the beginning of the study, but gradually he waved his hand to indicate “Hello” and “Goodbye” during *greeting* and *goodbye* sections, and pointed his finger to indicate his choice in *choice making* section. SAU2 also signed colors to indicate the color of the animals (e.g. red) and showed more pointing with his finger to indicate where the animals were in the book than SAU1 had during *interactive reading* and *interactive singing* sections of the both conditions.

Additional Observations of SAU1

Besides the findings of the three target behaviors, several other behaviors were observed in SAU1 during this study. These behaviors were 1) an increase in clarity of articulation, and 2) an increase in interaction.

Across sessions, there was an increase in clarity of articulation for SAU1. In the beginning of the study, SAU1 interacted with the researcher only by pointing with his finger or indistinctly verbalizing words to respond to the questions (e.g. “Ha-o”

instead of “Hello;” “Thee” instead of “This.”) However, it was noticeable that SAU1 verbalized more distinctly during the return to baseline condition until the last session of the return to treatment condition. For instance, SAU1 distinctly responded to the researcher’s greeting in both conditions, such as saying or singing “Hello, (researcher’s name),” during *greeting* sections. He also specifically said, “This” and pointed at the book he chose when the researcher asked him which book he wanted to read or sing in *choice making* sections.

The other behavior observed in SAU1 during the study was an increase in interaction. SAU1 demonstrated minimal eye contact with the researcher and a short attention span during the study; however, from the time the sessions started to the return to treatment sessions, SAU1 exhibited more positive interactions. For instance, when the researcher interacted with him during the *interactive singing* section by tickling him and singing the contents of the book, he giggled and touched the hand of the researcher to stop tickling him.

Additional Observations of SAU2

There were also other behaviors that were observed in SAU2 during this study. The behaviors observed were 1) a response to positive reinforcement, and 2) increased need for processing time.

An example of the response to positive reinforcement observed in SAU2 was the use of “high-five.” Whenever SAU2 had a correct response, the researcher raised her hand and said “high-five,” he smiled and leaned forward to give the researcher a

high-five with his hand. Interestingly, this reaction was also observed in session 10 and session 11 before his early excuse from the sessions.

The other interesting observation of SAU2 in this study was that he needed extra time to process new information and this is one possible characteristic of autism spectrum disorders. For instance, whenever it was SAU2's turn, he did not respond; however when his turn passed, he interacted with the researcher when it was another participant's turn (e.g. by pointing and verbalizing the animals in the book or saying goodbye during *goodbye* sections). Moreover, after dismissing session 6 of first treatment condition (music), SAU2 held one of the books, *In the Tall, Tall Grass*, that was used for this study, and started singing some of the sections by himself. In addition, during session 7 of the return to baseline condition (non-music), SAU2 held the book, *Panda Bear, Panda Bear, What Do You See*, and sang the melody used in the music condition.

In the previous description of SAU2, he was singing the melody while reading the book by himself. This observation particularly supported Berger's (2001) description that music can serve as repetitive stimuli to help children with autism spectrum disorders to code sensory information correctly by implementing a melody that is familiar to or repeatedly sung to the child. This suggested that music could be a facilitator for training SAU2 to respond to incoming stimulus and ultimately to respond to the incoming stimulus immediately; in other words, to shorten the gap of responding time.

Observations between SAU and TDS

In this study, positive interactions between children with autism spectrum disorders and their typically developing peers were observed. This study not only provided the three TDS opportunities to practice and model target social-communicative behaviors for their peers, but also elicited a positive interaction between them and their peers with autism spectrum disorders. For instance, when SAU2 did not respond to the researcher's greeting, TDS2 whispered to him, "It's your turn now. You are supposed to say 'Hi.'" And then SAU2 responded appropriately. This suggested that there was positive engagement and interaction between the target participant and the peers.

Limitations

In reflection, the researcher found there were several limitations with this project. The limitations included 1) difficulties with enrolling subjects, 2) scheduling issues within the facility, 3) variation in treatment environment, 4) inconsistency of the number of participants throughout the study, 5) unclear operational definition for eye contact, and 6) the challenge of obtaining minor consent from one of the target participants.

The first limitation was the difficulties with enrolling subjects. This limitation made this study have a small number of students with autism spectrum disorders involved. This study was conducted during summer time in which the access to children with autism spectrum disorders in the school district was limited. With the

small number of target participants, the results of this study can not be assumed to represent the population with autism spectrum disorders.

The second limitation was the scheduling issue within the facility. The inconsistency of the session schedule due to daycare center's scheduled activities may influence the behaviors of the participants. For instance, if the participant had an outdoor activity prior to the session, he did not want to leave for the session at the scheduled time. In addition, due to the necessity of obtaining minor consent from the participants, if one target participant declined attending the session, the researcher re-sought the minor consent from the particular participant and rescheduled the session time for a make-up session.

The third limitation was the variation in treatment environment. The problem of the inconsistency of session rooms may disrupt the quality of the sessions. The sessions were conducted in a meeting room of the facility from session 1 to session 4. The meeting room had many distractions such as chairs, desks, and books. Because of the distractions, the target participants left the group to sit on one of the chairs and crawled under the desks. From session 5, the personnel of the facility provided a spacious classroom which was a carpeted floor with few distractions. The toys and books in the classroom were appropriately stored in a specific area where the children could not reach, so the target participants stayed in the group more than in the meeting room.

The fourth limitation was the inconsistency of the number of participants throughout the study which may bias the results. This issue especially impacted the data collected in session 5 of the first treatment condition, and session 8 and 9 of the return to baseline condition. Session 5, 8, and 9 were in the individual session format, in which only one SAU and one TDS in these sessions as opposed to the group sessions, in which two SAU and two TDS in the other sessions. Although the target participants were engaged in both individual sessions and group sessions throughout the study, it was interesting to see that the participants demonstrated more target behaviors in the individual sessions than in the group sessions.

Fifth, the operational definition for eye contact was not clear and also limited data collection. In each session, about 85% of the time was spent reading or singing the contents of the book. While the researcher was reading or singing to and asking the participants questions about the content of the book, they all looked at the direction of the book while responding, in which they were establishing on-task eye contact with the materials used in this study. However, this on-task eye contact was not indicated in the operational definition of the study, subsequently when the participants were looking at the books, this behavior was not recorded in the data sheets while viewing the tapes.

The sixth limitation of this study was the challenge of obtaining minor consent from one of the target participants because of his young age with autism spectrum disorders. For instance, SAU2's class was either doing out-door activities or art classes when the researcher went to pick him up to attend the study. With the

cooperation from the classroom teacher, the researcher was permitted to take SAU2 for the session from the on-going classroom activities; however, SAU2 insisted on staying for these activities. Moreover, during sessions 10 and 11 of the return to treatment condition, the researcher obtained SAU2's minor consent and took him for the session, but he only participated in the first half of the intervention and left early. Before SAU2 left the sessions, the sessions were interrupted because SAU2 was upset and expressed wanting to go back to his class to continue his previous class activities, thus the data were incomplete for these sessions. In addition, SAU2 declined attending the twelfth session, the last session of the return to treatment, thus there was missing data, which impacted the results for this condition. SAU2 exhibited typical characteristics of a child with autism spectrum disorders including desiring restricted schedule, refusal to change attentions, and exhibiting insecure behaviors once the routine changes.

Suggestions for Future Research

Suggestions for future research based on this method may strengthen this study in replication. The suggestions involve 1) the use of books, 2) addition of instruments, 3) consistency of environment issues, 4) inclusion of follow-up observation, and 5) consistency of number of participants.

The first suggestion is to use one book instead of two in the *interactive reading* and *interactive singing* section of the baseline and treatment conditions. The attention span of young children is typically short. The researcher noticed the participants with autism spectrum disorders and the typically developing children

well engaged in the first book. However, their attention decreased during the second book and they did not pay as close attention to the researcher. For a future replication of this research, the use of only one book may maintain the young participants' engagement and sustain their attention.

The second suggestion is the addition of instruments. During the treatment condition of the current study, the researcher did not use an instrument to accompany the singing in the applications, so whenever the researcher sang a phrase and waited for the participant's response, there was no music to back up the cue for the participants to respond. For a future replication of this research, the addition of harmonic instruments to accompany the melodies sung in this study may color the atmosphere of the singing and draw more attention from the participants.

The third suggestion is to have a consistency of environment issues. As mentioned in the third limitation of this chapter, this study was not conducted in a consistent environment which may have impacted the behaviors of the participants and the results of this study. Future research should be directed to limit variables such as to reducing distractions in the environment and also to conduct the sessions in a consistent setting.

The fourth suggestion is to conduct follow-up sessions or observations for the target participants. This study did not conduct the follow-up session due to the original proposal of the study and the limited schedule of the facility. For future research, the addition of follow-up or observation sessions might be beneficial for obtaining the data of target participants' generalization and maintenance skills.

The fifth suggestion is the consistency of number of participants throughout the study. Due to the fourth and sixth limitations that are mentioned in this chapter (scheduling and minor consent issues), this study was conducted in two formats: one was the individual session which one SAU and one TDS participated, and the other one was the group session which two SAU and two TDS participated. It remains unclear if the individual or group sessions contributed to results. It is possible that under this study's procedures, greater acquisition could be obtained if the sessions were conducted in an individual session format. Although the group session format provided opportunities for observational learning, it is suggested that quality learning has to be observed from a competent individual (Bandura, 1977; DiSalvo & Oswald, 2002). For instance, it could be considered to have more TDS and only one SAU in the session. Laushey and Heflin (2000) indicated that fewer typically developing children involved in a learning environment may not help children with disabilities to generalize their social-communicative interactions with different people with different characteristics.

Conclusion

Even with the limitations and recommendations for further research, the two protocols of the study demonstrated that the social-communicative sessions with or without music (baseline and treatment conditions) may be efficient ways to increase gestural imitation for children with autism spectrum disorders. In addition, social interactions occurring between children with autism spectrum disorders and their typically developing peers, may extract the best outcomes when social-

communicative exchanges and provide the structure to strengthen their success. Finally, throughout the study, the two interventions elicited positive more functional outcomes from both target participants. For instance, SAU1 was able to more distinctly articulate and to exhibit positive interactions with the researcher, and SAU2 had a response to the positive reinforcement and responded to questions when cued by the TDS.

It is noted every child with autism spectrum disorders is unique and has his/her own strengths and needs, so one child may find the interventions especially beneficial while another child may experience no positive behavioral change at all by using the same intervention. Nonetheless, the results of the study indicate that both the social-communicative sessions without and with music may promote gestural imitation responses in some children with autism spectrum disorders.

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APPENDICES

APPENDIX A
CONSENT FORMS

Consent Form A for Children with Autism Spectrum Disorders

The effect of music therapy and peer-mediated interventions on social-communicative responses of children with autism spectrum disorders

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 this study will be to examine the effect of music therapy on the social-communicative behaviors (eye contact, vocalization/verbalization, and gesture imitation) of children with autism spectrum disorders.

PROCEDURES

Your child will be involved in this study for 12 consecutive school days in which music therapy and peer mediation will be used. Peer mediation means using peers to promote learning skills in children with special needs. This intervention has been used to promote social interaction skills and to facilitate communication exchange and skills in children with autism spectrum disorders. In this current study, the typically developing peers will model social-communicative behaviors for your child, and your child will respond and act on the observed behaviors by interacting with the researcher. In each section of each non-music intervention and music therapy intervention session, the typically developing children, children with autism, and the researcher will stay in the same room and form a circle. The researcher will interact with the typically developing child first and then the child with autism. The typically developing child models the behaviors while interacting with the researcher, at the same time, the child with autism is observing in the group. After the typically developing child models the behaviors, the researcher will then interact with the child with autism. After the researcher interacts with the child with autism, the researcher will interact with another typically developing child, and then the researcher will interact with another child with autism.

There will be two treatments conditions in this study: A) non-music intervention and B) music therapy intervention. Each treatment has six sessions in the following order. First is A) non-music intervention for three days, followed by B) music therapy intervention for another three days, followed by three more days of A) non-music intervention, and finally followed by three more days of B) music therapy

intervention. Your child will therefore be asked to participate in a total of 12 30-minute intervention sessions. There will be four sections in each non-music treatment session: *greeting*, *choice-making*, *reading and playing*, and *goodbye*. There will be also four sections in each music therapy treatment session: *greeting*, *choice-making*, *singing and playing*, and *goodbye*.

In *greeting* and *goodbye* sections of the interventions, your child will interact with the researcher by making eye contact, waving hands, and verbalizing/vocalizing the greeting and goodbye song. In *choice-making*, your child will be asked to choose a book by making eye contact, vocalizing/verbalizing, and pointing at the book. In *reading/singing and playing*, your child will interact with the researcher by reading/singing the book and imitating movements demonstrated by the researcher.

Time allocation of each section in each treatment condition is: *Greeting*- 3 minutes; *Choice-making*- 4 minutes; *Reading/Singing and Playing*- 10 minutes; *Goodbye*- 3 minutes. There will be no breaks between each section in each treatment condition. However, your child may request to take a break or to discontinue participating at any time.

RISKS

The content of the study will not put the participants in dangerous or risky situations.

BENEFITS

The use of music therapy intervention and peer-mediated intervention in this study may help your child develop social-communicative skills, such as eye contact, vocalization/verbalization, and gestural imitation.

PAYMENT TO PARTICIPANTS

This study is not sponsored by any affiliations, thus no payment will be granted to the participants.

PARTICIPANT CONFIDENTIALITY

The information collected related to your child, such as collected research data from this study, will be used in the master thesis conducted by Yi-Fen Chou, and the information will be disclosed to individuals at The University of Kansas, Lawrence Campus, including Dr. Colwell, who is the graduate student's faculty advisor, and Dr. Dena Register and Dr. Alicia Clair, who are the committee of this graduate student who review and monitor such projects. With your permission, the information gathered in this study by the researcher, Yi-Fen Chou, could be shared with the teachers in your child's school. The purpose would be to discuss possible benefits or future suggestions of using music therapy to improve the special needs of children with autism in inclusion settings. You have the right to choose to share or not to share the gathered information with the school personnel. Please check "X" in one of the

boxes below to indicate if you wish or do not wish to share the gathered information with school personnel.

Wish to share gathered information with school personnel.

Do not share gathered information with school personnel.

Permission granted on this date to use and disclose your information remains in effect indefinitely. By signing this form you give permission for the use and publication of the information as a research study, excluding your child's name or any other identifying information, for purposes of this study at any time in the future.

The researcher will record all sessions using a DVD camcorder. The DVDs will be viewed by the researcher and authorized observers of this research project. Authorized observers include Dr. Cynthia Colwell, the faculty advisor and a graduate student in music therapy who will serve as a reliability observer. The DVDs will be stored in a secure location in School of Music in University of Kansas. Only the researcher and faculty advisor will have access to the location where the DVDs are stored. When the research is completed and the thesis document has been defended, the DVDs will be erased by the researcher.

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

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 information collected about your child, in writing, at any time, by sending your written request to: Yi-Fen Chou 1710 Ellis Dr. Apt 12, Lawrence, KS 66044. If you cancel permission to use your child's information, the researchers will stop collecting additional information about your child. However, the researcher may use and disclose information that was gathered before they received your cancellation, as described above to the researcher's faculty advisor, Dr. Cynthia Colwell, and committee members, Dr. Alicia Clair and Dr. Dena Register.

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 or write the Human Subjects Committee Lawrence Campus (HSCL), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7563, email dhann@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 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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Consent Form B for Typically Developing Children

The effect of music therapy and peer-mediated interventions on social-communicative responses of children with autism spectrum disorders

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 this study will be to examine the effect of music therapy on the social-communicative behaviors (eye contact, vocalization/verbalization, and gesture imitation) of children with autism spectrum disorders.

PROCEDURES

Your child will be involved in this study for 14 consecutive school days in which music therapy and peer mediation will be used. Peer mediation means using typically developing peers to promote learning skills in children with special needs. This intervention has been used to promote social interaction skills and to facilitate communication exchange and skills in children with autism spectrum disorders. In this current study, the typically developing peers will model social-communicative behaviors for their peers with autism spectrum disorders.

There will be two phases in this study: peer training phase and intervention phase. In peer training phase, only your child and other typically developing children will participate. There will be one day of non-music practice and one day of music therapy practice. Each practice will be 30 minutes in length.

In the intervention phase, typically developing children and children with autism will participate. There will be two treatment conditions in this study: A) non-music intervention and B) music therapy intervention. Each treatment has six sessions in the following order. First is A) non-music intervention for three days, followed by B) music therapy intervention for another three days, followed by three more days of A) non-music intervention, and finally followed by three more days of B) music therapy intervention. Your child will therefore be asked to participate in a total of 12 30-minute intervention sessions. There will be four sections in each non-music treatment session: *greeting, choice-making, reading and playing, and goodbye*. There will be

also four sections in each music therapy treatment session: *greeting*, *choice-making*, *singing and playing*, and *goodbye*.

In each section of each non-music intervention and music therapy intervention session, the typically developing children, children with autism, and the researcher will stay in the same room and form a circle. The researcher will interact with the typically developing child first and then the child with autism. The typically developing child models the behaviors while interacting with the researcher, at the same time, the child with autism is observing in the group. After the typically developing child models the behaviors, the researcher will then interact with the child with autism. After the researcher interacts with the child with autism, the researcher will interact with another typically developing child, and then the researcher will interact with another child with autism.

In *greeting* and *goodbye* sections of the interventions, your child will interact with the researcher by making eye contact, waving hands, and verbalizing/vocalizing the greeting and goodbye song. In *choice-making*, your child will be asked to choose a book by making eye contact, vocalizing/verbalizing, and pointing at the book. In *reading/singing and playing*, your child will interact with the researcher by reading/singing the book and imitating movements demonstrated by the researcher.

Time allocation of each section in each treatment condition is: *Greeting*- 3 minutes; *Choice-making*- 4 minutes; *Reading/Singing and Playing*- 10 minutes; *Goodbye*- 3 minutes. There will be no breaks between each section in each treatment condition. However, your child may request to take a break or to discontinue participating at any time.

RISKS

The content of the study will not put the participants in dangerous or risky situations.

BENEFITS

The use of music therapy intervention and peer-mediated intervention in this study may help your child develop appropriate social-communicative skills, such as eye contact, vocalization/verbalization, and gestural imitation. In addition, this study may strengthen your child's self-esteem, confidence, and compassion as helping and modeling for their peers with special needs.

PAYMENT TO PARTICIPANTS

This study is not sponsored by any affiliations, thus no payment will be granted to the participants.

PARTICIPANT CONFIDENTIALITY

The information collected related to your child, such as collected research data from this study, will be used in the master thesis conducted by Yi-Fen Chou, and the information will be disclosed to individuals at The University of Kansas, Lawrence Campus, including Dr. Colwell, who is the graduate student's faculty advisor, and Dr. Dena Register and Dr. Alicia Clair, who are the committee of this graduate student who review and monitor such projects. With your permission, the information gathered in this study by the researcher, Yi-Fen Chou, could be shared with the teachers in your child's school. The purpose would be to discuss possible benefits or future suggestions of using music therapy to improve the special needs of children with autism in inclusion settings. You have the right to choose to share or not to share the gathered information with the school personnel. Please check "X" in one of the boxes below to indicate if you wish or do not wish to share the gathered information with school personnel.

- Wish to share gathered information with school personnel.
 Do not share gathered information with school personnel.

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The researcher will record all sessions using a DVD camcorder. The DVDs will be viewed by the researcher and authorized observers of this research project. Authorized observers include Dr. Cynthia Colwell, the faculty advisor and a graduate student in music therapy who will serve as a reliability observer. The DVDs will be stored in a secure location in School of Music in University of Kansas. Only the researcher and faculty advisor will have access to the location where the DVDs are stored. When the research is completed and the thesis document has been defended, the DVDs will be erased by the researcher.

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cancel permission to use your child's information, the researchers will stop collecting additional information about your child. However, the researcher may use and disclose information that was gathered before they received your cancellation, as described above to the researcher's faculty advisor, Dr. Cynthia Colwell, and committee members, Dr. Alicia Clair and Dr. Dena Register.

QUESTIONS ABOUT PARTICIPATION

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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 or write the Human Subjects Committee Lawrence Campus (HSCL), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7563, email dhann@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 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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APPENDIX B
SCRIPTS FOR SOCIAL-COMMUNICATIVE PRACTICE/SESSION WITHOUT
MUSIC (BASELINE A)

Scripts for Social-Communicative Practice/Session without Music (Baseline A)

1. Greeting

Procedures:

- 1) The researcher will say:

*Hello! (Name of the participant)!**Hello! (Name of the participant)!**How are you?**Hello! (Name of the participant)!*

- 2) After the researcher say “
- Hello! (Name of the participant)*
- ” and “
- How are you,*
- ” she will wait five seconds for the participant’s response, such as making eye contact, verbalizing/vocalizing, or waving hands.

2. Choice Making

Procedures:

- 1) The researcher will present two books, “
- In the Small, Small Pond*
- ” and “
- Panda Bear, Panda Bear, What Do You See,*
- ” and hold them in front of the participants.
-
- 2) The researcher will ask two participants in each day to choose “
- (Name of the participant) choose a book to read. (Name of the participant) choose a book to read. (Name of the participant) choose a book to read.*
- ”
-
- 3) When the researcher asks “
- (Name of the participant) choose a book to read,*
- ” the researcher will wait 5 seconds for the participant’s response (e.g. say, sign, or point at the book).

(CONTINUE TO NEXT PAGE)

3. Interactive Reading

Procedures:

- 5) The researcher will open the book and read 1st verse of the “Contents of the book.”
- 6) While reading 1st verse of the “Contents of the book,” the researcher will use sign language to indicate the animal or the color of the animal of the verse.
- 7) After reading and signing the script of the “Interactive reading,” the researcher will ask two questions to the TDS. First question is, “Where is the object?” Second question is, “What is the animal” or “What color is the animal?” Between each question, the researcher will wait five seconds for the participant’s response (e.g. pointing where the animal is, and saying or signing the name or color of the animal.)
- 8) After the TDS’s modeling, the researcher will read 1st verse of the “Contents of the book,” followed by “Interactive reading,” and ask the same questions to SAU. Five seconds of responding time for each question is provided.

In the Small, Small Pond				
Contents of the book (Each verse repeat once)	1	Wiggle, jiggle, Wiggle, jiggle, tadpoles wriggle	Interactive Reading	Where is the (object)? [Wait for the participant’s response] What is the animal? [Wait for the participant’s response]
	2	Waddle, wade, Waddle, wade, geese parade		
	3	Hover shiver, Hover shiver, wings quiver.		
	4	Drowse, doze, Drowse, doze, eyes close.		
	5	Lash, lunge, Lash, lunge, herons plunge.		
	6	Splitter, splatter, Splitter, splatter, minnows scatter.		
	7	Circle. Swirl, Circle. Swirl, whirligigs twirl.		
	8	Sweep, swoop, Sweep, swoop, swallows scoop.		
	9	Click, clack, Click, clack, claws crack		
	10	Dabble dip, Dabble dip, tails flip		
	11	Splish, splash, Splish, splash paws flash.		
	12	Pile, pack, Pile, pack, muskrats stack.		

Panda Bear, Panda Bear, What Do You See				
Contents of the book (Each verse repeat once)	1	Panda bear, panda bear, what do you see? I see a bald eagle soaring by me.	Interactive Reading	Where is the (animal)? [Wait for the participant's response] What is the color? [Wait for the participant's response]
	2	Bald eagle, bald eagle, what do you see? I see a water buffalo charging by me.		
	3	Water buffalo, water buffalo, what do you see? I see a spider monkey swinging by me.		
	4	Spider monkey, spider monkey, what do you see? I see a green sea turtle swimming by me.		
	5	Green sea turtle, green sea turtle, what do you see? I see a Macaroni penguin strutting by me.		
	6	Macaroni penguin, Macaroni penguin, what do you see? I see a lion seal splashing by me.		
	7	Lion seal, lion seal, what do you see? I see a Red wolf sneaking by me.		
	8	Red wolf, red wolf, what do you see? I see a Whooping crane flying by me.		
	9	Whooping crane Whooping crane, what do you see? I see Black panther strolling by me.		
	10	Black panther, black panther, what do you see? I see a dreaming child watching over me.		
	11	Dreaming child, dreaming child, what do you see? I see a panda bear looking at me.		
	12	Panda bear, panda bear, what do you see? I see a water buffalo looking charging by me.		

4. Goodbye.

1) The researcher will say:

Goodbye. (Name of the participant)

Goodbye. (Name of the participant)

See you next time.

Goodbye. (Name of the participant)

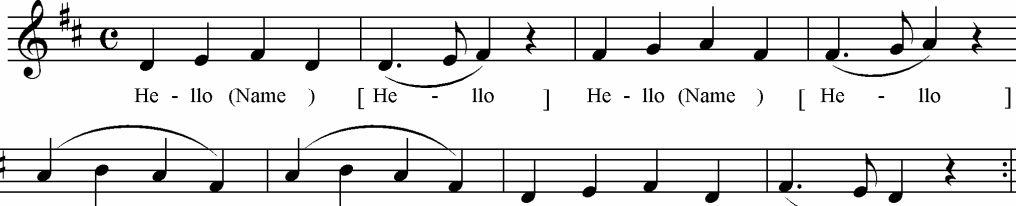
2) When the researcher says one word or a phrase, she will wait five seconds for the participant's response.

APPENDIX C
MUSIC INTERVENTIONS FOR SOCIAL-COMMUNICATIVE
PRACTICE/SESSION WITH MUSIC (TREATMENT B)

MUSIC INTERVENTIONS

* [] means wait for participant's response (e.g. making eye contact, pointing, verbalizing/vocalizing and/or imitating).

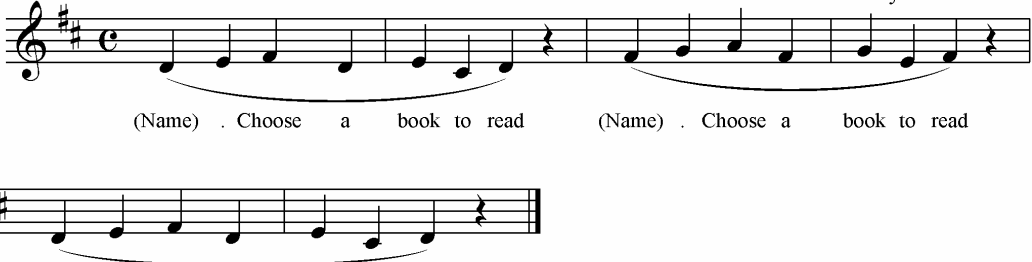
Greeting Song by Yi-Fen Chou



He - llo (Name) [He - llo] He - llo (Name) [He - llo]
 How are you - [*I am fine -] He - llo (Name) [He - llo]

Detailed description: The musical notation for the Greeting Song is written on two staves in treble clef with a key signature of one sharp (F#) and a common time signature (C). The melody consists of quarter and eighth notes. The lyrics are placed below the notes, with brackets indicating where a participant's response is expected.

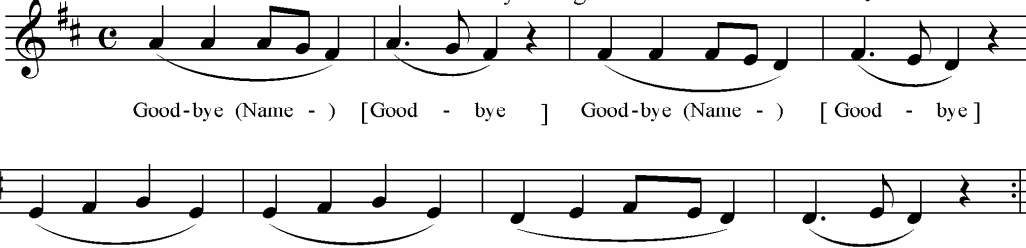
Choice Song by Yi-Fen Chou



(Name) . Choose a book to read (Name) . Choose a book to read
 (Name) . Choose a book to read

Detailed description: The musical notation for the Choice Song is written on two staves in treble clef with a key signature of one sharp (F#) and a common time signature (C). The melody consists of quarter notes. The lyrics are placed below the notes, with brackets indicating where a participant's response is expected.

Goodbye Song by Yi-Fen Chou



Good-bye (Name -) [Good - bye] Good-bye (Name -) [Good - bye]
 See - you next time - [See you next time -] Good - bye (Name -) [Good - bye]

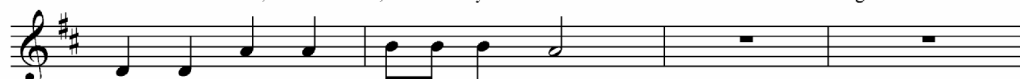
Detailed description: The musical notation for the Goodbye Song is written on two staves in treble clef with a key signature of one sharp (F#) and a common time signature (C). The melody consists of quarter and eighth notes. The lyrics are placed below the notes, with brackets indicating where a participant's response is expected.

Brown Bear, Brown Bear, What do you see?

Lyrics: Bill Martin Jr & Eric Carle



Contents of the book:	1. In the forest,	What do you see?	I see a bear	looking at me.
	2. Brown bear, brown bear,	What do you see?	I see a red bird	looking at me.
	3. Yellow duck, yellow duck,	What do you see?	I see a blue horse	looking at me.
	4. Blue horse, blue horse,	What do you see?	I see a green frog	looking at me.
	5. Green frog, green frog,	What do you see?	I see a purple car	looking at me.
	6. Purple cat, purple cat,	What do you see?	I see a white dog	looking at me.
	7. White dog, white dog,	What do you see?	I see a black sheep	looking at me.
	8. Black sheep, black sheep,	What do you see?	I see a gold fish	looking at me.
	9. Gold fish, gold fish,	What do you see?	I see a teacher	looking at me.
	10. Teacher, teacher,	What do you see?	I see children	looking at me.
	11. Children, children,	What do you see?	I see a bear	looking at me.
	12. Children, children,	What do you see?	I see a red bird	looking at me.



Interactive Singing: Where is (animal -) Can you show me? [Wait for the participant's response]



What is the color? Can you tell me? [Wait for the participant's response]

In the Tall Tall Grass

Lyrics: Denise Fleming

Music: Yi-Fen Chou



Book Contents:	1:Crunch	munch	crunch	munch	ca - ter - pi - llars	lunch.
	2:Dart	dip	dart	dip	hu - mming	birds - sip.
	3:Strum	drum	strum	drum	bee - - -	hum.
	4:Crack	snap	crack	snap	Wings - - -	flap.
	5:Pull	tug	pull	tug	ants - - -	lug.
	6:Slip	slide	slip	slide	snakes - - -	glide
	7:Ritch	ratch	ritch	ratch	moles - - -	scratch.
	8:Skitter	sscurry	skitter	scurry	beetles - - -	hurry.
	9:Zip	sap	sip	sap	tongues - - -	snap.
	10:Hip	hop	hip	hop	ears - - -	flop.
	11:Stop	go	stop	go	Fi - re - flies	go.
	12:Lunge	loop	lunge	loop	bats - - -	swoop.



Interactive Singing: What is the animal? Can you tell me ? [Wait for the participant's response]

APPENDIX D

DATA SHEET

Participant []
Treatment: A1 B1 A2 B2
Session # of Each Treatment: 1 2 3

Eye contact is when SAU and the researcher and/or peers look at each other's eyes or when SAU is looking in the direction of the researcher and/or peer's face for at least two seconds.

Vocalization/Verbalization is when SAU vocalizes or verbalizes words in response to the researcher and/or peers' greeting, requests or questions. For instance, in *greeting* of music or non-music interventions, as the researcher greets SAU, SAU will respond by saying and/or singing "hello," "hi," and/or "I am fine." In *choice-making*, SAU will verbalize/vocalize the object in response to a request. In *reading and playing* or *singing and playing*, SAU will verbalize/vocalize words in the book.

Gestural imitation is when SAU exhibits 1) waving hand in *greeting* or *goodbye* of each intervention, 2) pointing at an object presented in the *choice-making* of each intervention, and 3) imitating movements in the manner of the researcher and/or the peers during *reading and playing* and/or *singing and playing*. Frequency count will be used to measure SAU's gestural imitation.

Please use the following form to complete the data.

+ Activity Code Approximate minute		* Please circle one or more that applies to the participant's behavior. E= Eye contact V= Verbal/Vocalization G= Gestural Imitation + In the row of Activity Code, please print "g" to indicate <i>greeting</i> , "c" to indicate <i>choice-making</i> , "p" to indicate <i>reading/singing and playing</i> and "b" to indicate <i>goodbye</i> .							
		1	2- Record	3	4- Record	5	6- Record	7	8- Record
		1 – 10 second	11 – 15 second	16 – 25 second	26 – 30 second	31 – 40 second	41 – 45 second	46 – 55 second	56 – 60 second
	0		E V G		E V G		E V G		E V G
	1	Observe	E V G		E V G		E V G		E V G
	2		E V G		E V G		E V G		E V G
	3		E V G	Observe	E V G		E V G		E V G
	4		E V G		E V G		E V G		E V G
	5		E V G		E V G		E V G		E V G
	6		E V G		E V G		E V G		E V G
	7		E V G		E V G		E V G		E V G
	8	Observe	E V G	Observe	E V G		E V G		E V G
	9		E V G		E V G		E V G		E V G
	10		E V G	Observe	E V G		E V G		E V G
	11		E V G		E V G		E V G		E V G
	12		E V G		E V G		E V G		E V G
	13	Observe	E V G	Observe	E V G		E V G		E V G
	14		E V G		E V G		E V G		E V G
	15		E V G		E V G		E V G		E V G
	16		E V G		E V G		E V G		E V G
	17		E V G		E V G		E V G		E V G
	18	Observe	E V G	Observe	E V G		E V G		E V G
	19		E V G		E V G		E V G		E V G
	20		E V G	Observe	E V G		E V G		E V G
	21		E V G		E V G		E V G		E V G
	22		E V G		E V G		E V G		E V G
	23	Observe	E V G	Observe	E V G		E V G		E V G
	24		E V G		E V G		E V G		E V G
	25		E V G		E V G		E V G		E V G
	26		E V G		E V G		E V G		E V G
	27		E V G		E V G		E V G		E V G
	28		E V G		E V G		E V G		E V G
	29		E V G		E V G		E V G		E V G
	30		E V G		E V G		E V G		E V G