



**MUSIC THERAPY STRATEGIES FOR  
IMPROVING COMMUNICATION SKILLS IN  
CHILDREN WITH AUTISM SPECTRUM DISORDERS  
NAIROBI CITY COUNTY, KENYA**

**Clinton Onaya<sup>1i</sup>,**

**Mathew Karia Kinyua<sup>2</sup>,**

**Cleniece Owino<sup>3</sup>**

<sup>1</sup>Masters Student,

Speech and Language Pathology,

Kenyatta University,

Department of Early Childhood and Special Needs Education,

Kenyatta University,

P.O Box 43844-00100, Nairobi,

Kenya

<sup>2</sup>Lecturer (PhD),

Speech and Language Pathology

Kenyatta University

Department of Early Childhood and Special Needs Education,

Kenyatta University,

P.O Box 43844-00100, Nairobi,

Kenya

<sup>3</sup>Lecturer (PhD),

Kenyatta University,

Department of Music and Dance,

Kenyatta University,

P.O Box 43844-00100, Nairobi,

Kenya

**Abstract:**

The purpose of this study was to evaluate the impact of music therapy strategies on autistic children's communicative abilities (ASD). The study focused on how music therapy strategies affected the expressive and receptive abilities of children with Autism Spectrum Disorders. Additionally, it looked into how music therapy strategies affected how well children with autism spectrum disorders paid attention together. The study also evaluated the impact of tools and assistance used in music therapy on the communicative abilities of children with Autism Spectrum Disorders. At the Kenya Community Centre for Learning (KCCL) in Nairobi County, the researcher gathered data from the accessible population, which included the head teacher, classroom teachers, and

<sup>i</sup> Correspondence: email [clintononaya@yahoo.com](mailto:clintononaya@yahoo.com)

students with ASD. The School of the Nations in Nairobi County hosted the pilot research. This study was based on B.F Skinner's Behaviorism theory of the mid-20th century, which centered on the observable behaviors of individuals interacting with the environment. To gather data for analysis, the researcher employed an experimental study design that triangulated observation, interviews, and questionnaires. This study comprised 15 participants selected purposively consisting of 1(one) head teacher, 4(four) classroom teachers, and 10 (ten) learners with ASD. A descriptive-analytic approach was used to examine the study's data. It was the use of music therapy strategies and the therapist himself to influence the change of behavior where music could be used as a reinforcer, as a contingent interruption, and as a reward. Descriptive statistics such as mean, variance, and standard deviation. Inferential statistics were used to summarize data in terms of mean differences at the significance level of  $p=0.05$ . Qualitative data from interviews and observations were first transcribed to determine what to choose, interpret, and present. These data were then organized, coded, and categorized based on responses and comments. Findings showed that the pre-test baseline assessment revealed varying levels of receptive skills among children with ASD, with the experimental group showing moderate abilities in following verbal instructions but lower comprehension of simple prepositions compared to other skills assessed. Music therapy strategies had a positive impact on improving expressive skills among children with Autism Spectrum Disorder. The t-test conducted before the test showed no significant statistical difference between the control and experimental groups ( $p = 0.77 > 0.05$ ). However, after the test, there was a significant difference between the control and experimental groups, with the experimental group showing higher average scores ( $p = 0.001 < 0.05$ ). The study concluded that while music therapy strategies may offer some benefits in enhancing certain aspects of social skills among children with ASD, additional interventions and support may be necessary to address the complex challenges associated with social skill development in this population. The study recommended promoting collaboration between researchers, clinicians, and educators to ensure that music therapy interventions are evidence-based and tailored to the specific needs of individuals with ASD. The Government should implement multidisciplinary interventions that combine music therapy with other evidence-based approaches, such as behavioral interventions and social skills training, to address the diverse needs of children with ASD.

**Keywords:** autism spectrum disorders, communication disorder, communication skills, controlled group, experiment, expressive language skills, music therapy, non-verbal communication, receptive language skills and verbal communication

## 1. Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition characterized by persistent challenges in social interaction, communication, and behavioral patterns. According to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5), individuals

with ASD often experience difficulties with both verbal and nonverbal communication, social reciprocity, and adaptive behaviors that are essential for effective interaction in daily life (American Psychiatric Association, 2013). These challenges can manifest in various ways, including restricted speech development, poor eye contact, limited social awareness, and difficulties in maintaining attention during interactions (Janzen & Thaut, 2018). As children with ASD grow older, these communication barriers can further hinder their ability to form relationships, understand social cues, and participate meaningfully in their communities (Thaut, 2015).

Music therapy is recognized as an effective treatment modality in several countries, particularly in Western contexts. In the United States, for instance, research has demonstrated that MT can significantly enhance the social and communicative abilities of children with ASD. For example, Hong *et al.* (1998) found that MT can help children with ASD develop critical social skills, such as turn-taking, responding to peers, and engaging in shared play. Additionally, MT has been shown to help regulate emotional responses, reduce impulsivity, and promote self-regulation in children with ASD (Layman *et al.*, 2002). MT can also serve as a platform for enhancing pre-linguistic communication skills such as vocalization and shared attention, which are foundational for the development of more complex language abilities (Janzen & Thaut, 2018). Studies suggest that MT, through its structured rhythms and melodies, supports children in recognizing and responding to verbal and nonverbal cues, thereby stimulating both cognitive and sensory development (Staum, 2006).

Further, recent studies have highlighted the role of MT in facilitating the development of imitation skills, which are often deficient in children with ASD (Thaut, 2015). Music's rhythmic and repetitive nature provides an ideal environment for practicing these skills, which can be transferred to other communication contexts. In a study by Kern *et al.* (2020), music interventions were shown to foster greater imitation and engagement in children with ASD, enhancing both social and cognitive functioning. In the African context, the use of music as a therapeutic tool for children with communication challenges, including those with ASD, has historical and cultural significance. Traditional healing practices in many African cultures have incorporated music, dance, and rhythm as integral components of therapeutic interventions. In Nigeria, for instance, Mereni (2007) documented the use of Sarije, a ritual music-dance therapy, to address a wide range of health conditions, from emotional disturbances to physical ailments. This cultural practice laid the foundation for the introduction of formal music therapy in Nigeria in the 1980s, offering a rich potential for integrating indigenous music practices with clinical therapy for children with ASD.

In Kenya, music therapy is gaining recognition as a therapeutic tool for children with ASD and other developmental disabilities. Institutions such as Magoso School in Nairobi have been using music therapy to support orphans and street children with traumatic experiences, helping them process emotions and develop communication skills. Similarly, Mater Hospital in Nairobi has implemented a music therapy program within its Department of Arts in Medicine, where children engage with musicians to

reduce anxiety, calm emotional states, and improve social interaction (Mater Hospital, 2021). Programs like Red Fourth Butterfly Music and Music in Color, which were launched in Nairobi in early 2021, focus on using music to support children with ASD, as well as those with Down syndrome, by providing a fun, non-threatening environment to practice communication and social skills.

Despite these encouraging developments, the use of music therapy in Kenya and broader sub-Saharan Africa remains in its infancy, with few formal studies or evidence-based research to substantiate its effectiveness. Furthermore, there are challenges related to the accessibility of trained music therapists, the lack of established frameworks for integrating music therapy into formal education or healthcare settings, and the scarcity of funding and resources for specialized programs (Kofi & Asante, 2023). There is a clear need for more empirical studies to examine the specific outcomes of MT on communication skills in children with ASD in African settings.

This research adds to the body of knowledge on language acquisition for children with ASD through music therapy and speech-music therapy partnerships in special schools. The analysis of music therapy methods for improving ASD children's communication abilities as well as the effectiveness of tools and aids used in music therapy, are other new research directions presented in this study. MT enhances pre-linguistic communication abilities, early vocalizations shared attention, and social interactions. Music therapy is an essential intervention for kids with ASD.

## **1.2 Statement of the Problem**

While music therapy has shown promise in supporting the communication skills of children with ASD globally, several critical gaps in the literature and practice still need to be addressed. Music therapy has demonstrated its potential in enhancing communication skills in children with ASD globally. On the other hand, there is a significant gap in research and application within the African context, particularly in Kenya. Much of the research on music therapy for ASD has been conducted in Western contexts, where cultural and social dynamics differ significantly from those in African countries. There is a need for more studies that explore how MT can be adapted to fit local cultural practices, particularly in countries like Kenya, where music and dance are integral to community life.

Most studies on music therapy focus on short-term outcomes, with limited research on the long-term effectiveness of MT in improving communication skills in children with ASD. Longitudinal studies that track the progress of children receiving MT over several years would provide valuable insights into the sustainability of its effects.

There is limited research on the effectiveness of combining music therapy with other interventions, such as speech therapy, occupational therapy, or Applied Behavior Analysis (ABA). Studies that explore the synergy between these therapies could provide more comprehensive treatment models for children with ASD.

A significant barrier to the widespread adoption of MT in many African countries, including Kenya, is the lack of certified music therapists. This is compounded by the fact

that music therapy as a profession is not yet fully recognized in many African healthcare systems. Addressing this gap through education and certification programs for music therapists is essential to ensure high-quality interventions.

This study aims to fill this gap by exploring the effectiveness of music therapy in improving communication abilities in children with ASD in Kenyan special schools. By examining the methods, tools, and aids used in music therapy, this research will contribute to the growing body of knowledge on the potential of music as a therapeutic intervention for children with communication challenges. The findings of this study will not only inform local practices in Kenya but also offer insights that may be applicable to other African countries, thus expanding the global understanding of music therapy's role in communication development for children with ASD.

### **1.2.1 Purpose of the Study**

The goal of the study was to ascertain the impact of music therapy strategies for improving communication skills in children with Autism Spectrum Disorders in Nairobi City County.

### **1.2.2 Objectives**

- 1) Examine the effects of music therapy strategies on the receptive skills of children with Autism Spectrum Disorders.
- 2) Examine the effects of music therapy strategies on the expressive skills of children with Autism Spectrum Disorder.
- 3) Examine the impact of music therapy strategies on the social communication skills of children with Autism Spectrum Disorder.
- 4) Determine the effectiveness of music therapy equipment/aids on communication skills in children with ASD.

## **1.6 Theoretical and Conceptual Framework**

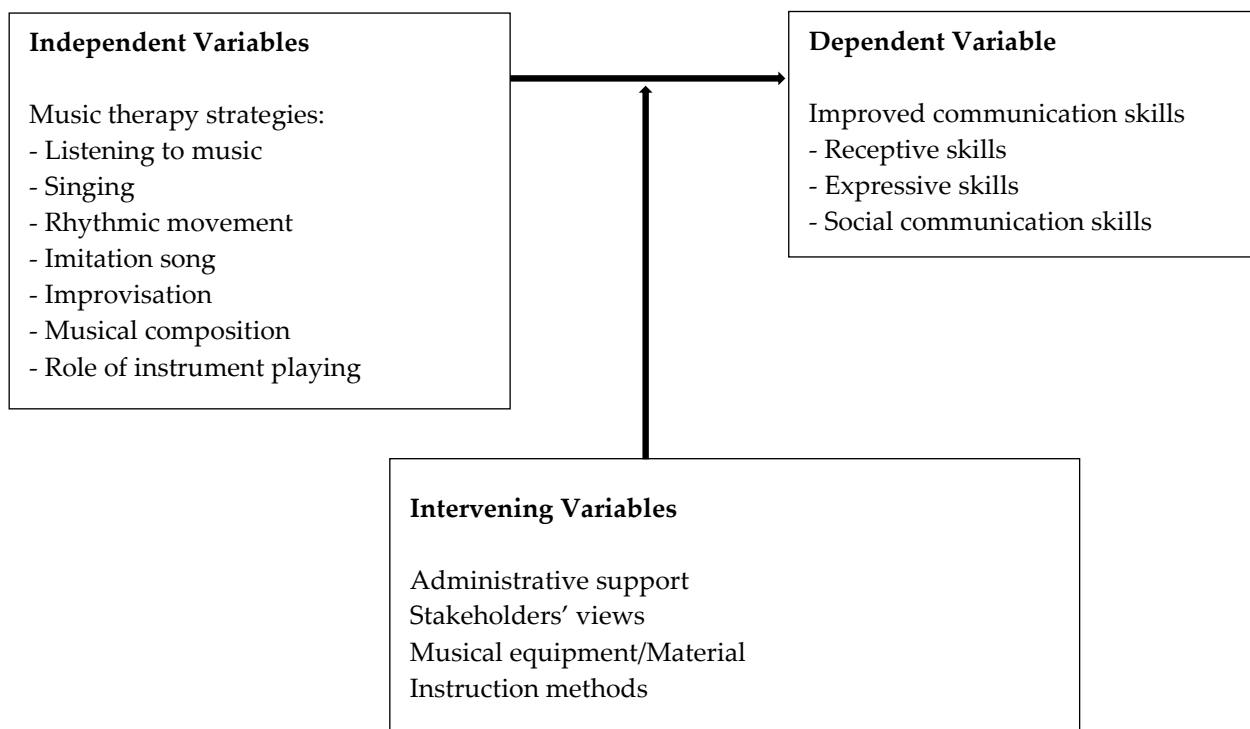
### **1.6.1 Theoretical Framework**

This research is grounded in B.F. Skinner's Behaviorism theory, developed in the mid-twentieth century, which emphasizes the study of observable behaviors resulting from an individual's interactions with their environment. Skinner's laboratory experiments led to the formulation of the stimulus-response model, which highlights how external stimuli influence behavior. The behavioral approach to music therapy is based on the idea that music can be used scientifically to address behavioral, developmental, and medical conditions. In this approach, both the therapist's presence and the use of music play a significant role in shaping the client's behavior. Music can function in various ways: as a reinforcer, as a tool to interrupt unwanted behaviors (e.g., tics), as a cue to guide attention—especially joint attention and as a reward. Additionally, it can serve as a structure for timing and physical movement.

In this context, music is used to elicit observable changes in behavior. The approach follows a rigorous experimental methodology to assess how behavior responds

to specific environmental stimuli, such as music. Music therapy is particularly effective for children with Autism Spectrum Disorder (ASD), helping them improve social interactions, build rapport, and communicate their needs. It also enhances their ability to express themselves and sustain attention. As a "reinforcer," music serves to motivate children with ASD, encouraging them to engage in target behaviors, such as appropriate social interactions. Music therapy is often instrumental in fostering the development of essential skills like turn-taking, joint attention, and the ability to listen and respond to others. Additionally, it helps children with ASD recognize and appropriately express emotions.

### 1.6.2 Conceptual Framework



**Figure 1.1:** Conceptual Framework

From the diagram presented, the independent variables are the music therapy strategies, which include aspects of listening, singing, rhythmic movement, and imitation, which have a positive impact on the dependent variable, which is the communication skills development of Autistic Spectrum Disorders children which include the receptive and expressive skills.

## 2. Literature Review

### 2.1 Characteristics of ASD and How They Affect Expressive and Receptive Skills

ASD is a neuro-developmental condition, and the children affected vary on the spectrum (DSM-V, 2013). ASD is linked with communication issues, social interaction issues, and

indications of repetitive behaviors (Janzen & Thaut, 2018). Children with ASD experience difficulties in vocalizing sounds at an early age, developing pre-linguistic skills, and inability to sustain joint attention and maintain eye contact, which they tend to even struggle more as they age (Vries *et al.*, 2015). When working with ASD children, communication, social, and emotional skills should be prioritized. The most severe deficits for children with ASD are in these three categories of competencies (DSM-V).

## **2.2 The Role of Music Therapy Strategies in Enhancing Expressive Skills of Children with Autism Spectrum Disorder**

Music therapy, which is the clinical and research-supported application of music interventions to achieve personalized objectives, has demonstrated a beneficial impact on the expressive abilities of children with ASD. Studies suggest that music therapy can create a nurturing atmosphere that facilitates communication, enhances social engagement, and supports emotional regulation (Bruder *et al.*, 2019).

Research indicates that improvisation as a music therapy strategy can foster spontaneous communication. A study by LaGasse (2017) found that children who participated in improvisational music sessions exhibited increased verbal expression and non-verbal communication skills. The spontaneous nature of improvisation allows children to explore vocalization without the pressure of structured language. Engaging children in music improvisation helps them express themselves in a non-verbal manner, facilitating emotional expression and creativity (Thompson *et al.*, 2020). He further examined the impact of improvisational music therapy on children with ASD. The study found that participants showed marked improvements in spontaneous speech and the ability to initiate communication, attributing these advancements to the non-judgmental nature of musical expression.

Collaborative songwriting as a strategy encourages children to articulate their thoughts and feelings, enhancing both verbal expression and social interaction (Sussman *et al.*, 2021). Engaging children with familiar songs and encouraging them to create new lyrics has been shown to facilitate expressive language skills. According to a study by Duffy (2021), children with ASD who participated in lyric analysis sessions demonstrated a significant increase in vocabulary use and sentence complexity, indicating an enhancement in expressive language. Sussman *et al.* (2021) explored the benefits of songwriting as a therapeutic tool. Their results indicated that children who engaged in songwriting exhibited enhanced vocabulary usage and a greater willingness to communicate, underscoring the role of music in language development.

## **2.3 The Effect of Music Therapy Strategies on Receptive Communication Skills of Children with Autism Spectrum Disorder (ASD)**

Receptive communication refers to the ability to understand and process incoming verbal and nonverbal messages (Bond, 2019). It entails the comprehension of spoken language, nonverbal cues, and social signals, all of which can be improved through music therapy interventions (Kern, 2020). While traditional therapies, such as Applied Behavior

Analysis (ABA) and speech therapy, have long been used to address communication challenges in children with ASD, music therapy (MT) has gained increasing attention as an effective strategy for improving receptive communication skills in recent years. This literature review examines the latest research on the impact of music therapy strategies on the receptive communication skills of children with ASD, identifying relevant strategies, highlighting their effectiveness, and addressing gaps in the existing literature. A key strength of MT lies in its ability to engage children with ASD in a multisensory experience, fostering attention, listening, and processing skills that are foundational for receptive communication.

Research has shown that the rhythmic and melodic strategy of music therapy significantly improves receptive communication skills in children with ASD. Thaut *et al.* (2020) demonstrated that rhythmic interventions, such as tapping along to a beat or engaging in structured musical patterns, can help children with ASD increase their attention span and focus on auditory stimuli. These interventions create a predictable auditory environment, which is beneficial for children who struggle with sensory processing and attention regulation. Additionally, the rhythm of music provides a clear structure for processing and anticipating patterns in language, a key component of receptive communication (Kim *et al.*, 2021).

#### **2.4 The Effect of Music Therapy Strategies on Improving Social Communication Skills of Children with Autism Spectrum Disorders (ASD)**

Social communication involves both verbal and nonverbal components, including the ability to understand and produce speech, interpret body language, and engage in shared social experiences (Lord *et al.*, 2020). Music therapy, through its multisensory nature, provides a unique avenue for children with ASD to enhance these abilities by engaging them in structured, enjoyable, and non-threatening activities. Recent studies have demonstrated the efficacy of various music therapy strategies in promoting social communication in children with ASD, including rhythm-based interventions, song-based interventions, and interactive music-making activities.

Rhythm-based intervention is a fundamental element of music that has been shown to play a crucial role in enhancing social communication skills in children with ASD. Rhythm-based music therapy involves activities such as clapping, tapping, or playing instruments in sync with a beat, which can help improve attention, motor coordination, and social synchronization. Thaut *et al.* (2020) reported that rhythm-based interventions enhanced joint attention and turn-taking in children with ASD by providing a structured framework for social interaction. By engaging in rhythmic activities, children learn to coordinate their actions with others, a foundational skill for social communication. Tamez *et al.* (2021) further highlighted that rhythm-based interventions help children with ASD regulate their attention and improve their ability to respond to social cues during interactions. The predictability and structure of rhythm-based activities also help children with ASD process auditory and visual information more efficiently, contributing to improved social engagement. Studies show that rhythm-



based and song-based interventions can improve joint attention by providing structured, engaging activities that encourage children to focus on the same task or object as their therapist or peers (Thaut *et al.*, 2020).

## **2.5 Effectiveness of Music Therapy Equipment/Aids on Communication Skills of Children with Autism Spectrum Disorders**

The use of music therapy equipment aids children with ASD by providing structured, engaging stimuli that facilitate the development of both verbal and nonverbal communication skills. Recent studies have demonstrated that various types of music equipment, such as rhythm instruments, sound-producing devices, and music technology, can enhance different aspects of communication, including joint attention, speech production, emotional expression, and social interaction.

Musical instruments, such as drums, xylophones, and keyboard instruments, have been widely used in music therapy for children with ASD to improve communication skills. Thaut *et al.* (2020) emphasized the role of rhythmic instruments in promoting joint attention and turn-taking, essential elements of social communication. Playing instruments in a group setting encourages children to focus on the same activity, fostering cooperation and shared attention. For instance, when children with ASD play drums in sync with others, they learn to recognize and respond to social cues, such as waiting for a turn or following a rhythm together, which can translate to improved social interactions in daily life.

A study by Robinson *et al.* (2019) highlighted that musical instruments can support speech development in children with ASD. Instruments that involve vocalizations, such as singing or playing vocalized instruments like the keyboard, help children practice their vocalization, pronunciation, and rhythm. Such activities have been shown to improve speech clarity, phonation, and expressive language, facilitating better communication with peers and caregivers (Robinson *et al.*, 2019).

## **2.6 Improvisational Music Therapy (IMT)**

This is a relationship-based, client-driven developmental strategy for children with ASD to enhance focus and turn-taking during communication. In this instance, the music is improvised or modified to concentrate on the child's area of interest and to pay attention to establishing ties during a relationship, relatedness, and communication (Carpente, 2017). Because the music is so easily predictable, it allows for flexibility and social interaction.

This strategy manifests itself in stages 1 through 3 when being used by the therapist and consists of Stage 1, which involves identifying and following the child's musical-emotional lead, Stage 2, which involves musical play in both directions, and Stage 3 involves affect synchrony in a musical play (Carpenter, 2017). The three stages aid in the development of non-verbal communication, joint attention to and from interaction, engagement, initiation, and response to various musical ideas in the kid with ASD (Carpente, 2017). With the help of music, children with ASD have the chance to

begin discourse through music, making up for a mutually beneficial uncommunicative link (Vries *et al.*, 2015). ASD children learn to converse and enhance their interactions with family, peers, and other children. When a youngster responds to music, eye contact, a crucial component of communication, is directly impacted (Vries *et al.*, 2015).

## **2.7 Summary of Literature Review**

In conclusion, it's clear from the literature reviews the significance of using MT strategies for ASD children. Although music therapy has been shown to be effective in improving expressive, receptive communication and social communication skills, there are gaps that need further exploration to optimize music therapy interventions for enhancing receptive communication skills in children with ASD. There is limited research on how music therapy can be integrated with other established therapies, such as speech-language therapy or ABA, to create a comprehensive treatment plan. Future research should investigate the synergistic effects of combining MT with other therapeutic strategies and explore the best methods for integration. Another gap in the research is the limited exploration of individualized treatment plans that consider the unique profiles of children with ASD. Most studies group children with ASD together, assuming a uniform response to music therapy. However, given the diverse nature of ASD, it is likely that different children respond to music therapy in unique ways based on their sensory preferences, developmental stage, and specific communication challenges. More research is needed to develop and evaluate individualized music therapy interventions that can cater to the varied needs of children with ASD (Kern, 2020).

Most studies on music therapy for children with ASD have been conducted in Western contexts, with limited attention given to the cultural relevance of music therapy interventions in non-Western settings. Research in African contexts, for example, is sparse, despite the historical use of music for healing in many African cultures. Understanding how cultural factors influence the acceptance and effectiveness of music therapy could provide insights into tailoring interventions to local contexts and needs. While many studies have demonstrated the short-term benefits of music therapy on receptive communication skills, few longitudinal studies have tracked the long-term impact of music therapy. Long-term studies are needed to assess whether improvements in receptive communication are sustained over time and how music therapy can be integrated into ongoing therapeutic programs for sustained outcomes.

## **3. Material and Methods**

### **3.1 Research Design**

A research design is a plan used by researchers to answer research questions or test a research hypothesis (Gay, 2016). Therefore, it could be summarized as a strategy outlining how a specific study would be carried out. The research design for this study was an experimental research design triangulating with questionnaires, observations, and interviews as research tools of choice in gathering data for examination. Under

experimental design, it involved two categories; the controlled and experiment group, to show the variables' cause and effect relationship, which should be accurate for casual validity. The design was appropriate for this study since it was accurate and helped the researcher find out the difference in results on communication skills between the two groups.

### **3.2 Variables**

As defined by Cherry (2009), a variable is an aspect of interest that the researcher would like to control, assess, or alter during the course of the investigation. Independent and dependent variables describe the two key factors. While a dependent variable is impacted or modified by one or more other variables, an independent variable affects or causes a change in another variable (Mugenda & Mugenda, 2012). The independent and dependent factors in this study are discussed.

#### **3.2.1 Independent Variables**

The independent variables in this study were the music therapy strategies, including listening, singing, rhythmic movement, music composition, and imitation.

#### **3.2.2 Dependent Variable**

The Study's dependent variable is the communication skills of children with ASD, which include receptive and expressive skills.

### **3.3 Location of the Study**

Kenya Community Centre for Learning (KCCL), Nairobi City County in Kenya, was the locale for the study. KCCL is a community school registered as a non-profit entity that admits learners between the ages of 6 (six) and 12 (twelve) with different learning difficulties. The school is good at offering alternative education through assessment and therapy services. This was a suitable study locale because of its well-established and supportive educational programs aimed at helping children with communication disorders, developmental disorders, learning difficulties, and emotional and behavioral problems. KCCL also has a present club, Muziki Changa, which is a Kiswahili word that means music for the young. The club is designed for ASD children, providing a great opportunity for the researcher to conduct the study. Lastly, KCCL has quite a favourable number of learners with ASD that are slightly above ten (10) which could work in favour of the researcher in using them as control and experimental groups separately.

### **3.4 Target Population**

The intended audience was children with ASD at KCCL, the head teacher, and their classroom teachers. Thus, the study worked with the accessible population of 15 participants comprising 10(ten) learners with ASD, 1(one) head teacher, and 4(four) classroom teachers from KCCL. These were trained teachers in special needs education

and registered with TSC (MOE, 2014). The head teacher was part of the study since she is responsible for the overall administration.

### **3.5 Sampling Techniques and Sample Size**

#### **3.5.1 Sampling Techniques**

Sampling is the practice of choosing a limited number of research subjects from the target audience. According to Mugenda and Mugenda (2009), both a basic random sample and intentional/purposive sampling will be used in the investigation. According to Biggam (2008), simple random sampling guarantees that each member of the chosen group has an equal probability of being selected to take part in the study. Learners with ASD were picked randomly to participate in the initial assessment on the identification, imitation, and matching of objects on flashcards. In purposive sampling, the researcher had a say on the subject to be included in the study based on his or her views (Ary, Jacobs, Sorensen, & Walker, 2014). In this case, ten (10) learners from the bigger population with a score above 40% were selected to participate in the experimental design. The selected learners formed two groups of five (5) participants, one being the control and the other being the experiment. One of the groups received speech therapy interventions alone, while the other received speech therapy and music therapy interventions. The selection of four teachers and the head teacher was purposively done.

#### **3.5.2 Sample Size**

A sample is a part of a larger population collected for research (Desu, 2012). This study comprised 15 participants selected purposively consisting of 1(one) head teacher, 4(four) classroom teachers, and 10 (ten) learners with ASD. The representation of the gender of teachers in the sample size depended on their respective proportional representation.

### **3.6 Research Instruments**

A schedule for observations and a guide for conducting interviews served as the major research instruments in this study. Data from the experimental sessions was gathered using a schedule of observations, where two groups will be studied. One was subjected to speech therapy with music therapy, while the other was on speech therapy alone. On the other hand, data from interviews with the head teacher and teachers were gathered using the interview guide. The interviews consisted of structured question guides to gather more in-depth information for the study.

### **3.7 Pilot Study**

According to Mugenda (2009), the purpose of pilot testing is to give the researcher the ability to identify any unclear questions that participants would refuse to answer. A pre-test of the interview guide was conducted using a sample of special needs teachers and a head teacher from The School of the Nation in Nairobi City County before starting data collection for the study. The School of the Nation had almost a similar program that accommodated learners with ASD and exposed them to Music. Pre-testing was necessary

hence providing the researcher with an opportunity to enable the researcher to change or amend, remove vague items, and make criticisms and recommendations for improving the research instruments. Learners with ASD at the School of the Nation were also subjected to a pilot study to identify how they behaved and interacted with the environment during therapy sessions. This helped the researcher note the common trends and adjust the therapy tools and interventions for an effective outcome.

### **3.7.1 Validity**

This is how thorough a test is to accurately assess the intended outcome (Kothari, 2014). Therefore, a research instrument is said to be valid when it accurately performs the activities it is intended to do and measures what it is designed to measure (Patten, 2009). To ascertain the accuracy, content, and face validity of material used in the therapy session and the interview guide for the head teacher and teachers, the course supervisors from the Department of Special Needs Education, Department of Music and Dance, and any other expert the course supervisors recommend will be consulted for their professional opinions.

### **3.7.2 Reliability**

Pilot studies are pre-testing techniques used to gather preliminary data on the functionality of new research tools. A research tool is said to be reliable if it consistently produces similar results when used repeatedly (Heale & Twycross, 2015). The instrument must be able to generate comparable results across trials in order to be considered dependable. As a result, if an instrument's measurements are consistent, it is regarded to be dependable (Wrench *et al.*, 2008). The researcher tested and retested the same interview guide with the same group of respondents at intervals of two weeks and then compared the outcomes. The researcher then calculated the genuine score variance for the traits able to calculate the genuine score variance for the traits that the instruments were used to measure. During therapy sessions in a controlled environment, the researcher dedicated much quality time to the sessions, taking sessional notes and observing keenly how the participants interacted with the environment and therapy material. The researcher probed deeper during the interview session to gather as much information as possible. A reliability test was performed using Cronbach's Alpha to determine the internal consistency of the questionnaire's items. Cronbach's Alpha was used as a reliability test to evaluate the internal consistency of the questionnaire's items. This was taken into account because it was practical for both large amounts of data and multiple-choice questions. Acceptable dependability coefficients were those of 0.7 and higher (Cooper & Schindler, 2011). The internal consistency of the instruments was believed to be sufficiently reflected and determined by this dependability coefficient.

## **3.8 Data Collection Techniques**

It is a kind of information gathering that is used to support or illustrate certain facts (Kombo & Tromp, 2006). It focused on primary data, which was gathered from

participation in therapy sessions through observation and administering interviews with the sample population. The researcher expected to spend about six weeks in the field gathering data. Therapy sessions were held over the first five weeks under a controlled environment on the selected aspects of communication, and the last week was used to conduct the interviews. In this instance, two groups of children with ASD were used in the researcher's investigation. One of the groups received speech therapy combined with music therapy, while the other group received speech therapy alone. For interviews, the questions were formulated and asked in a structured way where the researcher listened and recorded the responses. Three research assistants were involved in the data collection process to ensure the study's success. Two were music teachers, and one was a music therapist. The selection of the research assistant was influenced by the fact that the research used a musical instrument and hence needed an expert to support it, and the three assistants tended to spend most of the time with the learners. The research assistants received a day of training on using field research equipment before starting data collection. Training research assistants to gather unbiased and trustworthy information from participants was advisable (Mugenda & Mugenda, 2003). The research assistants will be useful in helping to administer therapy sessions, helping in behavior management of the children, and playing musical instruments.

### **3.9 Data Analysis**

To examine the study's objectives one through four, both qualitative and quantitative descriptive analysis were used where different statistical techniques were employed to organize and summarize the set of data. Data for objectives one, two, and four were collected from therapy sessions through observation, whereas data from interviews answered objectives three and four. According to Orodho (2009), researchers could present data in a clear, well-organized way using descriptive statistics. According to the author, descriptive statistics enabled researchers to display the typical score and the range of scores in a sample by using one or more numbers, such as mean, variance, and standard deviation. Inferential statistics were used to summarize data in terms of mean differences at a significance level of  $p=0.05$ .

Qualitative data from interviews and observations were first transcribed to determine what to choose, interpret, and present. These data were then organized, coded, and categorized based on responses and comments. The data were sorted and sifted to extract meaningful categories of similarity, patterns, themes, and disparities, and indicate personal thoughts and other observations noted in the margins. Quantitative data were reported and outlined into statistical data for analysis, which were presented in tables and figures. This enabled the researcher to draw conclusions, recommendations, and ideas for additional research that should be conducted.

### **3.10 Logistical and Ethical Considerations**

Regarding logistical and ethical considerations, according to Mugenda and Mugenda (2003), researchers were required to obtain a permit from the appropriate authority

before carrying out the study. In support of this, Orodho (2009) noted that the chosen institution or government agency had to grant the researcher permission to conduct the study by providing an approval letter. To obtain research permission from the Ministry of Education through the NACOSTI, the researcher first obtained an introductory letter from the Dean of the School of Graduate Studies at Kenyatta University. Ethical clearance was needed from the relevant body for the study. Lastly, the consent form was signed by the head teacher, and preliminary contacts were made to brainstorm on the need for conducting the study, thus creating harmony with them. According to Orodho (2009), a researcher needs to respect, get to know, and build a strong working relationship with the community of respondents.

Confidentiality and protection of the information submitted by the respondents were granted by the researcher. The researcher's failure to adhere to confidentiality and mishandling of information in any way could lead to some physical or psychological torture of the respondent (Mugenda & Mugenda, 2003).

## **4. Results and Discussion**

### **4.1 Introduction**

This chapter presents the analysis, interpretation, and discussion of the findings of this study. The study aimed to investigate the effect of music therapy strategies on enhancing the communicative abilities of children with Autism Spectrum Disorders (ASD) in Nairobi County, Kenya. The analysis of the results was based on the following research objectives:

- 1) Examine the effects of music therapy strategies on the receptive skills of children with Autism Spectrum Disorders.
- 2) Examine the effects of music therapy strategies on the expressive skills of children with Autism Spectrum Disorder.
- 3) Examine the impact of music therapy strategies on the social communication skills of children with Autism Spectrum Disorder.
- 4) Determine the effectiveness of music therapy equipment/aids on communication skills in children with ASD.

The chapter contains summarized demographic information of the sampled respondents. It also contains information showing the influence of music therapy strategies on communication skills among learners with ASD in selected primary schools in Nairobi County. It was also important to assess the response rate before analysis of the data collected. The findings are presented in tables, graphs, and charts.

### **4.2 General Information**

Both response rate and demographic information were established and presented under the following sub-sections. The study sought to characterise the respondents based on their demographic attributes such as gender, age, teaching experience, and duration of service for administrators in their current administration positions.

### 4.2.1 Response Rate

The research tools were administered to a total sample of 15 respondents. Interestingly, all 10 (ten) learners with ASD, 1(one) head teacher, and 4(four) classroom teachers turned out to take part in the study, translating to a response rate of 100 %, which was ideal for the study. Because of the small sample, the researcher managed to reach the participants within the scheduled time. The composition of the response rate is presented in Table 4.1.

**Table 4.1:** Sample Size

Category	Initial sample size	Final respondents	Percentage
Headteacher	1	1	100%
Teachers	4	4	100%
Learners	10	10	100%
<b>Total</b>	<b>15</b>	<b>15</b>	<b>100%</b>

### 4.2.2 Performance of learners with ASD for pre-test and post-test

Using a test, the sampled children were asked to identify and imitate the sounds produced by the animals including pig, cow, dog, duck, goat, horse, hen, and sheep, and match them appropriately. The tests for the experimental and control groups were marked and scored out of 40 marks, as presented in Tables 4.2 and 4.3 for the pre-test and post-test, respectively.

**Table 4.2:** Pre-test scores for learners with ASD

N=5	Experimental group (scores=X/40)	N=5	Control group (scores=X/40)
Learner 1	24	Learner 6	25
Learner 2	34	Learner 7	31
Learner 3	21	Learner 8	22
Learner 4	16	Learner 9	18
Learner 5	17	Learner 10	13
<b>Mean score</b>	<b>22.4</b>		<b>21.8</b>

In examining the pre-test scores of children with Autism Spectrum Disorder (ASD) in identifying and imitating animal sounds, distinct performances between the experimental and control groups are shown in Table 4.2. In the experimental group, comprising five participants, the mean score was 22.4 out of 40, with individual scores ranging from 16 to 34. Conversely, the control group, also consisting of five participants, had a slightly lower mean score of 21.8 out of 40, with scores ranging from 13 to 31. These initial scores provide a baseline indication of the participants' receptive skills before any intervention.



**Table 4.3:** Post-test scores of learners with ASD

N=5	Experimental group (scores=X/40)	N=5	Control group (scores=X/40)
Learner 1	34	Learner 6	26
Learner 2	37	Learner 7	30
Learner 3	27	Learner 8	24
Learner 4	24	Learner 9	19
Learner 5	26	Learner 10	14
<b>Mean score</b>	<b>29.6</b>		<b>22.6</b>

Following the implementation of music therapy strategies as shown in Table 4.3, the post-test scores exhibited notable improvements in both groups. Specifically, the experimental group displayed a considerable enhancement in their ability to identify and imitate animal sounds, with a mean score of 29.6 out of 40. Individual scores ranged from 24 to 37, showcasing a substantial increase from their pre-test scores. Conversely, while the control group also demonstrated improvement, their mean post-test score of 22.6 out of 40 remained notably lower than that of the experimental group. Individual scores in this group ranged from 14 to 30.

These findings underscore the positive impact of music therapy strategies on the receptive skills of children with ASD in the context of communication development. The significant improvement observed in the experimental group suggests that music therapy interventions effectively facilitate the enhancement of receptive skills, particularly in tasks involving auditory discrimination and imitation. In contrast, the more modest improvement in the control group indicates that while there may be some inherent developmental progress over time, targeted interventions such as music therapy can expedite and amplify these gains. The findings from the study align with existing literature on music therapy (MT) and its efficacy in addressing the communication challenges faced by individuals with Autism Spectrum Disorder (ASD). MT, as defined by Crane (2016) and the American Music Therapy Association (AMTA, 2005), involves the use of musical interventions by trained professionals to achieve specific therapeutic goals within a structured environment. These interventions encompass a range of musical styles and formats tailored to address individuals' intellectual, social, physical, and emotional needs.

Overall, these results provide empirical support for the efficacy of incorporating music therapy strategies into interventions aimed at enhancing communication skills in children with ASD. By fostering a conducive environment for sensory engagement and social interaction, music therapy emerges as a promising avenue for addressing the unique communication challenges faced by individuals on the autism spectrum. In the context of the study, the music therapy strategies implemented involved activities such as singing songs, composing and creating music, and dancing to and listening to music, as outlined by Jemison (2010), LaGasse (2014), and Arab *et al.* (2015). These strategies are designed to engage individuals with ASD in sensory experiences that promote communication and social interaction.

### 4.3 The Effects of Music Therapy Strategies on the Receptive Skills of Children with ASD

The first objective of this study sought to examine the effects of music therapy strategies on the receptive skills of children with Autism Spectrum Disorders at the Community Centre for Learning (KCCL), Nairobi County in Kenya. To accomplish this objective, participants were asked to provide the music interventions used to address specific communication needs/goals of children with ASD. The results were presented as shown in Table 4.4.

**Table 4.4:** Music interventions employed in addressing specific communication needs

Music interventions		Freq	%	Mean	Standard Deviation
Creativity through improvising and coming up with original melodies and rhythmic patterns.	Yes	3	75.0%	1.25	.500
	No	1	25.0%		
	Total	4	100.0%		
Rhythm keeping with speech like keeping up with the rhythm.	Yes	3	75.0%	1.25	.500
	No	1	25.0%		
	Total	4	100.0%		
Rhythmic patterns and melodies in music	Yes	1	25.0%	1.75	.500
	No	3	75.0%		
	Total	4	100.0%		
Performing songs with lyrics to introduce words e.g. names of animals.	Yes	3	75.0%	1.25	.500
	No	1	25.0%		
	Total	4	100.0%		
Instruments can be used to teach turn-taking.	Yes	2	50.0%	2.00	.816
	No	2	50.0%		
	Total	4	100.0%		
Simple songs can be used to teach sounds.	Yes	2	50.0%	1.50	.577
	No	2	50.0%		
	Total	4	100.0%		
Songs can be used to teach simple concepts.	Yes	4	100.0%	1.00	.000
	No	0	0.0%		
	Total	4	100.0%		

Findings in Table 4.4 revealed that 75% of respondents reported using creativity through improvising: with a mean score of 1.25 (SD=0.5); Rhythm keeping with speech at 75% reported using this technique, with a mean score of 1.25 (SD=0.5), Rhythmic patterns and melodies in music at 25% of respondents, with a mean score of 1.75 (SD=0.5), performing songs with lyrics at 75% reported using this intervention, with a mean score of 1.25 (SD=0.5) and Using songs to teach simple concepts and all respondents (100%) reported using this intervention, with a mean score of 1.00 (SD=0.0).

Further, a standardized assessment scale for confirming the presence of Receptive skills was rated based on the context of what is appropriate for the age of the child based on a scale of 1=Never; 2=Rarely, 3=Sometimes; 4=Very Often; 5=Always. Table 4.5

summarizes the analysis based on mean and standard deviation as per the time of the test (pre-test and post-test).

**Table 4.5:** Receptive skills of children with ASD for pre-test

Receptive skills		Control Group				Intervention Group			
		F	%	M	SD	F	%	M	SD
Ability to follow verbal instructions.	N	2	50.0%	2.25	1.500	1	25.0%	2.50	1.291
	R	0	0.0%			1	25.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			1	25.0%		
	A	0	0.0%			0	0.0%		
Understanding of basic commands.	N	3	75.0%	1.50	1.000	1	25.0%	2.50	1.291
	R	0	0.0%			1	25.0%		
	S	1	25.0%			1	25.0%		
	VO	0	0.0%			1	25.0%		
	A	0	0.0%			0	0.0%		
Response to non-verbal cues such as gestures.	N	2	50.0%	2.50	1.915	1	25.0%	2.50	1.291
	R	0	0.0%			1	25.0%		
	S	1	25.0%			1	25.0%		
	VO	0	0.0%			1	25.0%		
	A	1	25.0%			0	0.0%		
Recognition of familiar objects or pictures when named.	N	3	75.0%	1.50	1.000	1	25.0%	2.50	1.291
	R	0	0.0%			1	25.0%		
	S	1	25.0%			1	25.0%		
	VO	0	0.0%			1	25.0%		
	A	0	0.0%			0	0.0%		
Understanding of simple questions.	N	3	75.0%	1.75	1.500	2	50.0%	2.25	1.500
	R	0	0.0%			0	0.0%		
	S	0	0.0%			1	25.0%		
	VO	1	25.0%			1	25.0%		
	A	0	0.0%			0	0.0%		
Ability to identify body parts when named.	N	1	25.0%	2.50	1.291	3	75.0%	1.50	1.000
	R	1	25.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			0	0.0%		
	A	0	0.0%			0	0.0%		
Comprehension of basic concepts (e.g., big/small, hot/cold).	N	1	25.0%	2.50	1.291	3	75.0%	1.50	1.000
	R	1	25.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			0	0.0%		
	A	0	0.0%			0	0.0%		

**Key:** N = Never, R = Rarely, S = Sometimes, VO = Very Often, A = Always, M = Mean, SD = Standard Deviation

The pre-test results, summarized in Table 4.5, indicated that the control group and intervention group were assessed on various aspects of receptive skills using a standardized assessment scale. The means and standard deviations were recorded for each category. For the ability to follow verbal instructions: the intervention group

showed a slightly higher mean (m=2.50) compared to the control group (m=2.25); understanding of basic commands, the intervention group had a higher mean (m=2.50) compared to the control group (m=1.50) and response to non-verbal cues such as gestures showed that both groups had similar mean scores (m=2.50), indicating comparable levels of response. Further, for recognition of familiar objects or pictures when named, the intervention group exhibited a higher mean (m=2.50) compared to the control group (m=1.50). It could be noted that there was a slight difference in the mean for both control and intervention groups at the pre-test stage.

**Table 4.6:** Receptive Skills of Children with ASD for Post-test

Receptive skills		Control Group				Intervention Group			
		F	%	M	SD	F	%	M	SD
Ability to follow verbal instructions.	N	2	50.0%	3.50	.577			3.75	.500
	R	0	0.0%			1	25.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			1	25.0%		
	A	0	0.0%			1	25.0%		
Understanding of basic commands.	N	3	75.0%	3.75	.957	1	25.0%	4.00	.816
	R	0	0.0%			1	25.0%		
	S	1	25.0%			1	25.0%		
	VO	0	0.0%			1	25.0%		
	A	0	0.0%			0	0.0%		
Response to non-verbal cues such as gestures.	N	2	50.0%	4.00	.816	1	25.0%	4.00	.816
	R	0	0.0%			1	25.0%		
	S	1	25.0%			1	25.0%		
	VO	0	0.0%			1	25.0%		
	A	1	25.0%			0	0.0%		
Recognition of familiar objects or pictures when named.	N	3	75.0%	3.50	.577	1	25.0%	3.50	.577
	R	0	0.0%			1	25.0%		
	S	1	25.0%			1	25.0%		
	VO	0	0.0%			1	25.0%		
	A	0	0.0%			0	0.0%		
Understanding of simple questions.	N	3	75.0%	3.50	.577	2	50.0%	3.50	.500
	R	0	0.0%			0	0.0%		
	S	0	0.0%			1	25.0%		
	VO	1	25.0%			1	25.0%		
	A	0	0.0%			0	0.0%		
Ability to identify body parts when named.	N	1	25.0%	3.75	.500	3	75.0%	3.75	.957
	R	1	25.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			0	0.0%		
	A	0	0.0%			0	0.0%		
Comprehension of basic concepts (e.g., big/small, hot/cold).	N	1	25.0%	4.00	.816	3	75.0%	3.25	.957
	R	1	25.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			0	0.0%		
	A	0	0.0%			0	0.0%		

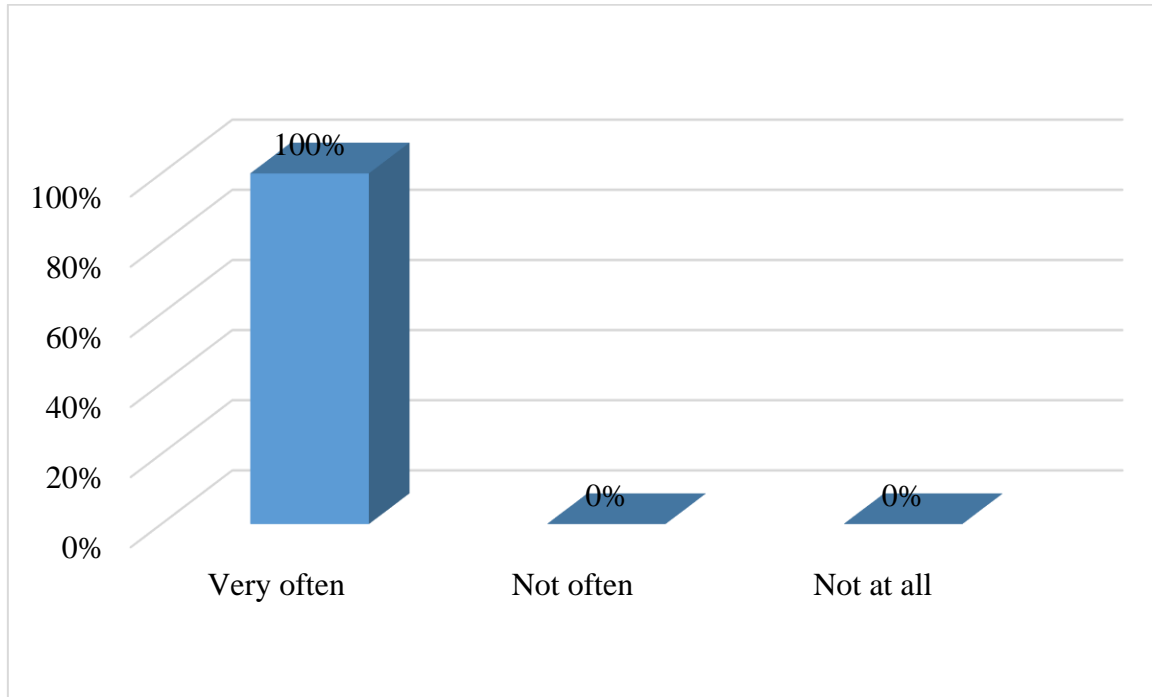
**Key:** N = Never, R = Rarely, S = Sometimes, VO = Very Often, A = Always, M = Mean, SD = Standard Deviation

The post-test results, as presented in Table 4.6, reflect the changes in receptive skills following the implementation of music therapy strategies: In the post-test, the highest mean score was observed in the experimental group for the "Understanding of basic commands" (Mean = 4.00, SD = 0.816). This indicates a significant improvement in the ability of children in the experimental group to understand and follow basic commands after participating in music therapy sessions. The lowest mean score in the post-test remained consistent with the pre-test findings, with the experimental group scoring lowest in "Comprehension of basic concepts" (Mean = 3.25). Transitioning to the post-test stage in Table 4.6, the intervention group continued to demonstrate improvement in receptive skills compared to the control group. Notably, in categories such as the ability to follow verbal instructions and understand basic commands, the intervention group showed substantial increases in mean scores from pre-test to post-test, with mean scores of 3.75 and 4.00, respectively, surpassing the control group's mean scores of 3.50 and 3.75. However, it is worth mentioning that in some categories, such as comprehension of basic concepts, the intervention group's mean scores slightly decreased from pre-test to post-test, albeit remaining relatively higher compared to the control group.

The pre-test and post-test results indicate the impact of music therapy (MT) interventions on the receptive skills of children with Autism Spectrum Disorder (ASD) (Table 4.5 and Table 4.6). Notably, the pre-test revealed baseline levels of receptive skills among participants, with varying mean scores across different categories. Following the intervention, the post-test demonstrated changes in these skills, particularly in understanding basic commands, comprehension of basic concepts, and responding to their name being called (Table 4.6).

The literature review supports these findings by highlighting the challenges faced by children with ASD in communication and social interaction, emphasizing the importance of interventions targeting these areas (Janzen & Thaut, 2018; Vries *et al.*, 2015). Music therapy emerges as a promising intervention due to the similarities between music and language, as well as its ability to stimulate communication-related brain regions in children with ASD (Johnston, 2018). Studies cited indicate that music therapy facilitates pre-linguistic communication, encourages verbal and nonverbal interaction, and enhances the ability to understand and follow instructions (Sharma *et al.*, 2018; Crane, 2016).

During an interview, music and classroom teachers were asked to give the rate the frequency at which Music Therapists working with children with ASD addressed communication goals and the results were presented in Figure 4.1.



**Figure 4.1:** Rate of Music Therapist Addressing the Communication Goals

#### 4.4 Effects of Music Therapy Strategies on the Expressive Skills of Children with ASD

The second objective of this study was to examine the effects of music therapy strategies on the expressive skills of children with Autism Spectrum Disorder at the Community Centre for Learning (KCCL), Nairobi County in Kenya. To accomplish this objective, teachers were required to rate the expressive skills of children with ASD based on a scale (where 1=Never; 2=Rarely, 3=Sometimes; 4=Very Often; 5=Always). Findings for the pre-test and post-test were presented in the following subsections:

##### 4.4.1 Expressive Skills of Children with ASD at Pre-test

The findings for expressive skills of children with ASD at the pretest were analyzed and presented in Table 4.7 below.

**Table 4.7:** Descriptive Statistics for Expressive Skills of Children with ASD at Pre-test

Expressive skills		Control Group				Intervention Group			
		F	%	M	SD	F	%	M	SD
The child demonstrates the ability to initiate and maintain eye contact during communication.	N	1	25.0%	3.00	1.826	3	75.0%	1.50	1.000
	R	3	75.0%			1	25.0%		
	S	0	0.0%			0	0.0%		
	VO	0	0.0%			0	0.0%		
	A	0	0.0%			0	0.0%		
The child utilizes a variety of vocalizations to express wants, needs, and emotions.	N	2	50.0%	2.25	1.500	3	75.0%	2.75	1.258
	R	0	0.0%			1	25.0%		
	S	1	25.0%			0	0.0%		
	VO	1	25.0%			0	0.0%		
	A	0	0.0%			0	0.0%		
	N	3	75.0%	2.50	1.291	1	25.0%	1.50	1.000

Clinton Onaya, Mathew Karia Kinyua, Cleniece Owino  
MUSIC THERAPY STRATEGIES FOR IMPROVING COMMUNICATION SKILLS IN  
CHILDREN WITH AUTISM SPECTRUM DISORDERS NAIROBI CITY COUNTY, KENYA

The child demonstrates an understanding of nonverbal cues such as gestures and facial expressions during communication.	R	0	0.0%	2.50	1.291	3	75.0%	2.25	1.500
	S	1	25.0%			0	0.0%		
	VO	0	0.0%			0	0.0%		
	A	0	0.0%			0	0.0%		
The child exhibits an increase in verbal output, including the use of words and phrases to convey messages.	N	2	50.0%	2.50	1.291	2	50.0%	2.25	1.500
	R	0	0.0%			1	25.0%		
	S	1	25.0%			1	25.0%		
	VO	0	0.0%			0	0.0%		
	A	1	25.0%			0	0.0%		
The child demonstrates the ability to express thoughts and ideas coherently and sequentially.	N	2	50.0%	2.50	1.291	25.0%	25.0%	1.50	1.000
	R	1	25.0%			25.0%	25.0%		
	S	1	25.0%			25.0%	25.0%		
	VO	0	0.0%			25.0%	25.0%		
	A	0	0.0%			0.0%	0.0%		
The child shows improvement in articulation and pronunciation of sounds and words.	N	3	75.0%	2.50	1.291	2	50.0%	2.25	1.500
	R	0	0.0%			2	50.0%		
	S	0	0.0%			0	0.0%		
	VO	1	25.0%			0	0.0%		
	A	0	0.0%			0	0.0%		
The child demonstrates an increased use of functional language for various purposes (e.g., requesting, labeling, commenting).	N	2	50.0%	2.50	1.291	1	25.0%	1.50	1.000
	R	0	0.0%			2	50.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			0	0.0%		
	A	0	0.0%			0	0.0%		
The child exhibits flexibility in communication, such as adjusting language according to the listener's understanding.	N	3	75.0%	2.50	1.291	1	25.0%	1.50	1.000
	R	0	0.0%			2	50.0%		
	S	1	25.0%			1	25.0%		
	VO	0	0.0%			0	0.0%		
	A	0	0.0%			0	0.0%		

**Key:** N = Never, R = Rarely, S = Sometimes, VO = Very Often, A = Always, M = Mean, SD = Standard Deviation

The pre-test analysis of expressive skills among children with Autism Spectrum Disorder (ASD), as shown in Table 4.7, revealed notable differences between the control and experimental groups. In terms of initiation of social interaction with peers, the control group had a higher mean score (3.00) compared to the experimental group (1.50), indicating that children in the control group were more likely to initiate social interactions. Similarly, the control group exhibited higher mean scores in participation in group activities, ability to take turns during interactions or games, response to social cues, demonstrating empathy towards others' emotions, ability to engage in cooperative play, understanding of personal space boundaries, response to social prompts, and ability to engage in reciprocal conversation compared to the experimental group.

#### 4.4.2 Expressive Skills of Children with ASD at Post-Test

The findings for expressive skills of children with ASD at the post-test were analysed and presented in Table 4.8 below.

**Table 4.8:** Descriptive Statistics for Expressive Skills of Children with ASD at Post-test

Expressive skills		Control Group				Intervention Group			
		F	%	M	SD	F	%	M	SD
The child demonstrates the ability to initiate and maintain eye contact during communication.	N	1	25.0%	1.75	.500	0	0.0%	1.25	.500
	R	3	75.0%			0	0.0%		
	S	0	0.0%			1	25.0%		
	VO	0	0.0%			2	50.0%		
	A	0	0.0%			1	25.0%		
The child utilizes a variety of vocalizations to express wants, needs, and emotions.	N	2	50.0%	2.25	1.500	0	0.0%	2.00	.816
	R	0	0.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			1	25.0%		
	A	0	0.0%			2	50.0%		
The child demonstrates an understanding of nonverbal cues such as gestures and facial expressions during communication.	N	3	75.0%	1.50	1.000	0	0.0%	1.75	.500
	R	0	0.0%			1	25.0%		
	S	1	25.0%			1	25.0%		
	VO	0	0.0%			1	25.0%		
	A	0	0.0%			1	25.0%		
The child exhibits an increase in verbal output, including the use of words and phrases to convey messages.	N	2	50.0%	2.50	1.915	0	0.0%	1.75	.957
	R	0	0.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	0	0.0%			3	75.0%		
	A	1	25.0%			0	0.0%		
The child demonstrates the ability to express thoughts and ideas coherently and sequentially.	N	2	50.0%	1.75	.957	0	0.0%	2.50	1.291
	R	1	25.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	0	0.0%			1	25.0%		
	A	0	0.0%			2	50.0%		
The child shows improvement in articulation and pronunciation of sounds and words.	N	3	75.0%	1.75	1.500	0	0.0%	1.50	.577
	R	0	0.0%			0	0.0%		
	S	0	0.0%			1	25.0%		
	VO	1	25.0%			2	50.0%		
	A	0	0.0%			1	25.0%		
The child demonstrates an increased use of functional language for various purposes (e.g., requesting, labeling, commenting).	N	2	50.0%	2.25	1.500	0	0.0%	2.00	.816
	R	0	0.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			2	50.0%		
	A	0	0.0%			1	25.0%		
The child exhibits flexibility in communication, such as adjusting language according to the listener's understanding.	N	3	75.0%	2.50	1.50	0	0.0%	2.00	.816
	R	0	0.0%			0	0.0%		
	S	1	25.0%			1.000	25.0%		
	VO	0	0.0%			2	50.0%		
	A	0	0.0%			1	25.0%		

**Key:** N = Never, R = Rarely, S = Sometimes, VO = Very Often, A = Always, M = Mean, SD = Standard Deviation

In the post-test analysis, results in Table 4.8 indicate that in the control group, there was a decrease in mean scores across various categories compared to the pre-test. For instance,



in initiating and maintaining eye contact, the mean score decreased from 3.00 to 1.75. Conversely, in the intervention group, there were improvements in mean scores in several areas, such as utilizing a variety of vocalizations, understanding nonverbal cues, increasing verbal output, expressing thoughts coherently, improvement in articulation, use of functional language, and flexibility in communication. Particularly, the intervention group showed enhancements in expressive skills, indicating the effectiveness of music therapy strategies.

The findings from the pre-test and post-test analyses align with previous literature indicating the challenges faced by children with ASD in expressive skills, particularly in social interaction and communication (Table 4.7 and Table 4.8). Music therapy strategies have shown promise in improving expressive skills by providing a structured and engaging environment for children with ASD to practice social interaction and communication skills (Sharma *et al.*, 2018; Crane, 2016). However, the results also suggest that more targeted and comprehensive interventions may be needed to address the complex nature of expressive skills in children with ASD.

During an interview, the head teacher was asked to explain how music therapy influences the expressive and receptive language skills of children with ASD. The participant said that;

*"...music therapy influences self-expressiveness, confidence, and communication, improves their speech, ability to receive signals through music therapy following emulating sounds, playing musical instruments.... Also, music allows children with ASD to express themselves non-verbally through singing and the use of gestures, among others. Music therapy has a calming effect on children, and this puts them in an ideal situation to express themselves or listen successfully."*

Further, the head teacher gave the function music plays in helping children with ASD develop their communication skills. The participant remarked:

*"...Music serves as a powerful tool in helping children with ASD develop their communication skills. It provides a non-verbal means of expression and engagement, allowing them to communicate in ways that are comfortable and enjoyable for them."*

The head teacher emphasized the role of music as a non-verbal mode of communication that facilitates engagement and expression for children with ASD, suggesting its potential as a therapeutic tool in enhancing communication skills.

#### **4.5 Impact of Music Therapy Strategies on the Social Skills of Children with ASD**

The third objective of this study was to establish the impact of music therapy strategies on the social skills of children with Autism Spectrum Disorder at the Community Centre for Learning (KCCL), Nairobi City County in Kenya. To accomplish this objective, teachers were required to rate the social skills of children with ASD based on a scale

(where =Never; 2=Rarely, 3=Sometimes; 4=Very Often; 5=Always). The findings for expressive skills of children with ASD at post-test were analyzed and presented in Table 4.9 below.

**Table 4.9:** Descriptive Statistics for Social Skills of Children with ASD at Pre-test

Social skills		Control Group				Intervention Group			
		F	%	M	SD	F	%	M	SD
Participation in group activities.	N	1	25.0%	2.75	1.258	2	50.0%	2.25	1.500
	R	0	0.0%			0	0.0%		
	S	2	50.0%			1	25.0%		
	VO	1	25.0%			1	25.0%		
	A	1	25.0%			0	0.0%		
Ability to take turns during interactions or games.	N	1	25.0%	2.50	1.291	3	75.0%	1.50	1.000
	R	1	25.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			0	0.0%		
	A	0	0.0%			0	0.0%		
Sharing of objects or materials with others.	N	1	25.0%	Control	2.50	2	50.0%	2.25	1.500
	R	1	25.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			1	25.0%		
	A	0	0.0%			0	0.0%		
Response to social cues such as eye contact or facial expressions.	N	1	25.0%	2.50	1.915	3	75.0%	1.75	.957
	R	1	25.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			0	0.0%		
	A	0	0.0%			0	0.0%		
Demonstrating empathy towards others' emotions.	N	1	25.0%	2.50	1.291	2	50.0%	2.25	1.500
	R	1	25.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			1	25.0%		
	A	0	0.0%			0	0.0%		
Ability to engage in cooperative play	N	1	25.0%	2.50	1.291	3	75.0%	1.50	1.000
	R	1	25.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			0	0.0%		
	A	0	0.0%			0	0.0%		
Understanding of personal space boundaries.	N	1	25.0%	2.50	1.291	2	50.0%	2.25	1.500
	R	1	25.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			1	25.0%		
	A	0	0.0%			0	0.0%		
Response to social prompts (e.g., invitations to join activities).	N	1	25.0%	2.50	1.291	3	75.0%	1.50	1.000
	R	1	25.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			0	0.0%		
	A	0	0.0%			0	0.0%		

**Key:** N = Never, R = Rarely, S = Sometimes, VO = Very Often, A = Always, M = Mean, SD = Standard Deviation

Results in Table 4.9 show the pre-test analysis of social skills among children with Autism Spectrum Disorder (ASD) revealed differences between the control and experimental groups. Notably, the control group had higher mean scores in various social skills compared to the intervention group. For instance, in participation in group activities, the control group had a mean score of 2.75, while the intervention group had a mean score of 2.25. Similarly, the control group showed higher mean scores in other areas, such as the ability to take turns during interactions, sharing of objects, response to social cues, demonstrating empathy, ability to engage in cooperative play, understanding personal space boundaries, and response to social prompts compared to the intervention group.

Further, the findings for expressive skills of children with ASD at the post-test were analyzed and presented in Table 4.10 below.

**Table 4.10:** Descriptive Statistics for Social skills of Children with ASD at Post-test

Social skills		Control Group				Intervention Group			
		F	%	M	SD	F	%	M	SD
Participation in group activities.	N	1	25.0%	3.25	.957	0	0.0%	3.25	.957
	R	1	25.0%			1	25.0%		
	S	1	25.0%			0	0.0%		
	VO	1	25.0%			0	0.0%		
	A	0	0.0%			0	0.0%		
Ability to take turns during interactions or games.	N	1	25.0%	3.50	.577	2	50.0%	4.00	.816
	R	1	25.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			1	25.0%		
	A	0	0.0%			0	0.0%		
Sharing of objects or materials with others.	N	1	25.0%	3.75	.957	3	75.0%	4.00	.816
	R	1	25.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			0	0.0%		
	A	0	0.0%			0	0.0%		
Response to social cues such as eye contact or facial expressions.	N	1	25.0%	4.00	.816	2	50.0%	3.75	.957
	R	1	25.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			1	25.0%		
	A	0	0.0%			0	0.0%		
Demonstrating empathy towards others' emotions.	N	1	25.0%	3.75	.500	3	75.0%	4.00	.816
	R	1	25.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			0	0.0%		
	A	0	0.0%			0	0.0%		
Ability to engage in cooperative play.	N	1	25.0%	3.75	.500	2	50.0%	3.75	.957
	R	1	25.0%			0	0.0%		
	S	1	25.0%			1	25.0%		

	VO	1	25.0%			1	25.0%		
	A	0	0.0%			0	0.0%		
Understanding of personal space boundaries.	N	1	25.0%	4.00	.816	3	75.0%	3.75	.957
	R	1	25.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			0	0.0%		
	A	0	0.0%			0	0.0%		
Response to social prompts (e.g., invitations to join activities).	N	1	25.0%	4.00	.816	3	75.0%	3.25	.957
	R	1	25.0%			0	0.0%		
	S	1	25.0%			1	25.0%		
	VO	1	25.0%			0	0.0%		
	A	0	0.0%			0	0.0%		
	A	0	0.0%			0	0.0%		

**Key:** N = Never, R = Rarely, S = Sometimes, VO = Very Often, A = Always, M = Mean, SD = Standard Deviation.

From Table 4.10 for the post-test analysis, improvements in social skills were observed in both the control and experimental groups. In the control group, there were slight improvements in mean scores in some areas, such as participation in group activities, ability to take turns during interactions, sharing of objects, response to social cues, demonstrating empathy, ability to engage in cooperative play, and understanding personal space boundaries. However, these improvements were not significant. In contrast, the intervention group showed more noticeable improvements in mean scores across various social skills. For instance, in participation in group activities, the mean score increased from 2.25 to 3.25, indicating a significant improvement. Similarly, significant enhancements were observed in other areas, such as the ability to take turns during interactions, sharing of objects, responding to social cues, demonstrate empathy, ability to engage in cooperative play, understanding personal space boundaries, and responding to social prompts.

The findings from the pre-test and post-test analyses suggest that music therapy strategies may have a limited impact on improving social skills among children with ASD. While some improvements were observed in certain aspects of social skills in the experimental group following music therapy interventions, the control group generally maintained higher mean scores across most social skills categories. This aligns with previous literature suggesting that social skill development in children with ASD is complex and may require targeted and comprehensive interventions beyond music therapy alone (Sharma *et al.*, 2018; Crane, 2016).

#### 4.5.1 Multivariate Analysis for Receptive, Expressive and Social Skills

Multivariate analysis of covariance was used to examine the effect of music interventions on communications using experimental group (music therapy) along with the control group (physical therapy) on the components of communication skills (receptive, expressive and social skills). The results for the regression of pre-test-post-test of

experimental and control groups are presented in stages: univariate and multivariate analyses as shown under the following sub-sections.

**Table 4.11:** Univariate Analysis of Variance between Experimental and Control Group

Component	Group	Mean	Mean difference	Standard error	F-statistics	P-value	Effect size
Receptive skills	Experimental	7.42	2.38	0.29	66.76	0.001*	.74
	Control	5.04					
Expressive skills	Experimental	6.20	1.26	0.40	0.42	0.007*	.32
	Control	5.46					
Social skills	Experimental	8.66	-0.40	0.30	1.74	0.20	0.07
	Control	10.13					

\*Sig. at p=0.05

The univariate analysis reveals significant differences between the experimental (music therapy) and control (physical therapy) groups in terms of receptive, expressive, and social skills. For receptive skills, the experimental group had a significantly higher mean score (7.42) compared to the control group (5.04), with a mean difference of 2.38 ( $p = 0.001$ , effect size = 0.74). Similarly, in expressive skills, the experimental group had a significantly higher mean score (6.20) compared to the control group (5.46), with a mean difference of 1.26 ( $p = 0.007$ , effect size = 0.32). However, no significant difference was found in social skills between the two groups ( $p = 0.20$ ).

**Table 4.12:** ANCOVA Analysis of the Difference and Control Group in Communication Behaviour

Source	Sum of Squares	df	Mean of squares	F-Statistics	Sig Level	Effect size
Pre-test	1093.98	1	1093.98	645.63	0.001	0.96
Group participation	14.50	1	14.50	8.56	0.007	0.24
Error	45.75	0.9	1.69			

The analysis of covariance (ANCOVA) further examines the differences between the experimental and control groups in communication behaviors while controlling for the pre-test scores. The pre-test scores significantly contributed to the differences in communication behaviors ( $p = 0.001$ , effect size = 0.96). Additionally, group participation also significantly influenced communication behaviors ( $p = 0.007$ , effect size = 0.24).

**Table 4.13:** Multivariate Analysis of Covariance Test between Control and Experimental Group in Components of Communication Behaviour

Test	value	Df1	Df2	p	F-Statistics	Effect size
Pillai's trace	0.78	1.56	2	.21	0.001	0.78
Wilks' lambda	0.22					
Hotelling's trace	3.53					
Roy's largest root	3.53					

The multivariate analysis of covariance (MANCOVA) test evaluates the overall effect of music therapy interventions on the components of communication behaviors. The results indicate a significant difference between the control and experimental groups across the components of communication behaviors, as evidenced by Pillai's trace ( $p = 0.001$ , effect size = 0.78), Wilks' lambda, Hotelling's trace, and Roy's largest root.

During an interview, the administrator (head teacher) was asked to elaborate on how music therapists work within a treatment team to address the communication needs/goals of children with ASD. A participant said,

*"...Music therapists design specific music-based interventions to meet goals that may include speech therapy. They further create musical activities that can help to address and enhance needs like speech therapy as well as expression and particularly coming up with an individualized plan about music therapy."*

The findings suggest that music therapy strategies have a significant positive impact on both receptive and expressive skills in children with Autism Spectrum Disorder (ASD), as demonstrated by the higher mean scores in these domains compared to the control group. This aligns with previous literature highlighting the effectiveness of music therapy in enhancing communication skills in children with ASD (Sharma *et al.*, 2018; Crane, 2016). However, the lack of significant difference in social skills between the experimental and control groups indicates that additional interventions or longer-duration music therapy sessions may be needed to effectively address social communication deficits in children with ASD.

#### **4.6 Effectiveness of Music Therapy Equipment/aids on Communication Skills in Children with ASD**

The fourth objective of this study was to determine the effectiveness of music therapy equipment/aids on communication skills in children with Autism Spectrum Disorder at the Community Centre for Learning (KCCL), Nairobi City County in Kenya. Teachers were asked to rate each item attributed to the effectiveness of music therapy equipment/aids on communication skills in children with ASD on a scale of Not at all; 2=Smaller extent, 3=Medium extent; 4=Large extent; 5=Very Large extent. The data set was measured using central tendency measures, including mean and standard deviation presented in Table 4.14.

**Table 4.14:** Effectiveness of Musical Aids in  
Communication Skills in Children with ASD at Pre-test

Communication Skills Variables		Control Group				Intervention Group			
		F	%	M	SD	F	%	M	SD
Use of alternative communication methods.	NAA	1	25.0%	2.50	.645	0	0.0%	2.50	.645
	SE	1	25.0%			1	25.0%		
	ME	1	25.0%			0	0.0%		
	LE	1	25.0%			0	0.0%		
	VLE	0	0.0%			0	0.0%		
Use of gestures or signs to communicate needs or preferences.	NAA	1	25.0%	2.50	.645	2	50.0%	2.25	.750
	SE	1	25.0%			0	0.0%		
	ME	1	25.0%			1	25.0%		
	LE	1	25.0%			1	25.0%		
	VLE	0	0.0%			0	0.0%		
Ability to effectively use communication aids or equipment.	NAA	1	25.0%	2.50	.645	3	75.0%	1.50	.500
	SE	1	25.0%			0	0.0%		
	ME	1	25.0%			1	25.0%		
	LE	1	25.0%			0	0.0%		
	VLE	0	0.0%			0	0.0%		
Adaptation of communication strategies based on the listener's understanding.	NAA	1	25.0%	2.50	.645	2	50.0%	2.25	.750
	SE	1	25.0%			0	0.0%		
	ME	1	25.0%			1	25.0%		
	LE	1	25.0%			1	25.0%		
	VLE	0	0.0%			0	0.0%		
Use of visual supports to aid communication (e.g., picture schedules).	NAA	1	25.0%	2.50	.645	3	75.0%	1.50	.500
	SE	1	25.0%			0	0.0%		
	ME	1	25.0%			1	25.0%		
	LE	1	25.0%			0	0.0%		
	VLE	0	0.0%			0	0.0%		
Ability to initiate communication in different contexts.	NAA	1	25.0%	2.50	.645	2	50.0%	2.25	.750
	SE	1	25.0%			0	0.0%		
	ME	1	25.0%			1	25.0%		
	LE	1	25.0%			1	25.0%		
	VLE	0	0.0%			0	0.0%		
Demonstrating understanding of the function of communication (e.g., to request, to comment).	NAA	1	25.0%	2.50	.645	3	75.0%	1.50	.500
	SE	1	25.0%			0	0.0%		
	ME	1	25.0%			1	25.0%		
	LE	1	25.0%			0	0.0%		
	VLE	0	0.0%			0	0.0%		
Use of appropriate volume and tone of voice during communication.	NAA	1	25.0%	2.50	.645	3	75.0%	1.50	.500
	SE	1	25.0%			0	0.0%		
	ME	1	25.0%			1	25.0%		
	LE	1	25.0%			0	0.0%		
	VLE	0	0.0%			0	0.0%		

**Key:** NAA = Not at all, SE = Smaller Extent, ME = Medium Extent, SE = Some Extent, VLE = Very Large Extent, M = Mean, SD = Standard Deviation

As shown in Table 4.14, among the various communication skills assessed, the mean scores for the experimental group (music therapy) were consistently lower than those of the control group (physical therapy) across most items. Across most communication skills variables, the control group (physical therapy) had higher mean scores compared to the intervention group (music therapy). For instance, in the use of alternative communication methods, the control group had a mean score of 2.50, while the intervention group had the same mean score. Similarly, in other areas, such as the use of gestures or signs to communicate needs, effectively using communication aids or equipment, demonstrating understanding of communication functions, and using appropriate volume and tone of voice during communication, the control group had higher mean scores than the intervention group.

**Table 4.15:** Effectiveness of Musical Aids in  
Communication Skills in Children with ASD at Post-test

Communication skills		Control Group				Intervention Group			
		F	%	M	SD	F	%	M	SD
Use of alternative communication methods	NAA	1	25.0%	3.25	.957	3	75.0%	3.25	.957
	SE	1	25.0%			0	0.0%		
	ME	1	25.0%			1	25.0%		
	LE	1	25.0%			0	0.0%		
	VLE	0	0.0%			0	0.0%		
Use of gestures or signs to communicate needs or preferences.	NAA	1	25.0%	3.50	.577	2	50.0%	4.00	.816
	SE	1	25.0%			0	0.0%		
	ME	1	25.0%			1	25.0%		
	LE	1	25.0%			1	25.0%		
	VLE	0	0.0%			0	0.0%		
Ability to effectively use communication aids or equipment.	NAA	1	25.0%	4.00	.816	3	75.0%	3.75	.957
	SE	1	25.0%			0	0.0%		
	ME	1	25.0%			1	25.0%		
	LE	1	25.0%			0	0.0%		
	VLE	0	0.0%			0	0.0%		
Adaptation of communication strategies based on the listener's understanding.	NAA	1	25.0%	4.00	.816	2	50.0%	3.25	.957
	SE	1	25.0%			0	0.0%		
	ME	1	25.0%			1	25.0%		
	LE	1	25.0%			1	25.0%		
	VLE	0	0.0%			0	0.0%		
Use of visual supports to aid communication (e.g., picture schedules).	NAA	1	25.0%	3.75	.500	3	75.0%	4.00	.816
	SE	1	25.0%			0	0.0%		
	ME	1	25.0%			1	25.0%		
	LE	1	25.0%			0	0.0%		
	VLE	0	0.0%			0	0.0%		
Ability to initiate communication in different contexts.	NAA	1	25.0%	3.75	.500	2	50.0%	3.75	.957
	SE	1	25.0%			0	0.0%		
	ME	1	25.0%			1	25.0%		
	LE	1	25.0%			1	25.0%		
	VLE	0	0.0%			0	0.0%		
	NAA	1	25.0%	4.00	.816	3	75.0%	4.00	.816



Clinton Onaya, Mathew Karia Kinyua, Clenciece Owino  
MUSIC THERAPY STRATEGIES FOR IMPROVING COMMUNICATION SKILLS IN  
CHILDREN WITH AUTISM SPECTRUM DISORDERS NAIROBI CITY COUNTY, KENYA

Demonstrating understanding of the function of communication (e.g., to request, to comment).	SE	1	25.0%			0	0.0%		
	ME	1	25.0%			1	25.0%		
	LE	1	25.0%			0	0.0%		
	VLE	0	0.0%			0	0.0%		
Use of appropriate volume and tone of voice during communication.	NAA	1	25.0%	4.00	.816	3	75.0%	3.25	.957
	SE	1	25.0%			0	0.0%		
	ME	1	25.0%			1	25.0%		
	LE	1	25.0%			0	0.0%		
	VLE	0	0.0%			0	0.0%		

**Key:** N = Not at all, SE = Smaller Extent, ME = Medium Extent, LE = Large Extent, VLE = Very Large Extent

In the post-test, as presented in Table 4.15, changes were observed in both the control and intervention groups regarding the effectiveness of music therapy equipment/aids on communication skills. In the control group, there were slight increases in mean scores across most communication skills variables. However, these increases were not significant. Conversely, the intervention group showed more significant improvements in mean scores in various communication skills areas. For example, in the use of gestures or signs to communicate needs, the mean score increased from 2.25 to 4.00, indicating a substantial improvement. Similarly, significant enhancements were observed in other areas, such as effectively using communication aids or equipment, adaptation of communication strategies based on the listener's understanding, use of visual supports to aid communication, ability to initiate communication in different contexts, demonstrating understanding of communication functions, and using appropriate volume and tone of voice during communication.

Further, a sample t-test was conducted to establish the values of t and mean difference. A T-test was conducted to assess whether there were statistical differences in the results scores between the control group and the results of the experimental group, as presented in Table 4.16.

**Table 4.16:** T-test for Control and Experimental Groups before the Test

Groups	N	Average	T	Mean difference	Significance (p<5%)
Control group	10	24.40	0.33	1.64	0.77
Experimental group	10	22.76			

The data in Table 4.16 revealed that there was little difference in the results of the average score between the average grade of the control group and the experimental group. The results showed that there was no significant statistical difference in the results of the control group and the experimental group because the significance score (p) was more than 0.05 ( $p=0.77>0.05$ ).

**Table 4.17: T-test for Control and Experimental Groups after the Test**

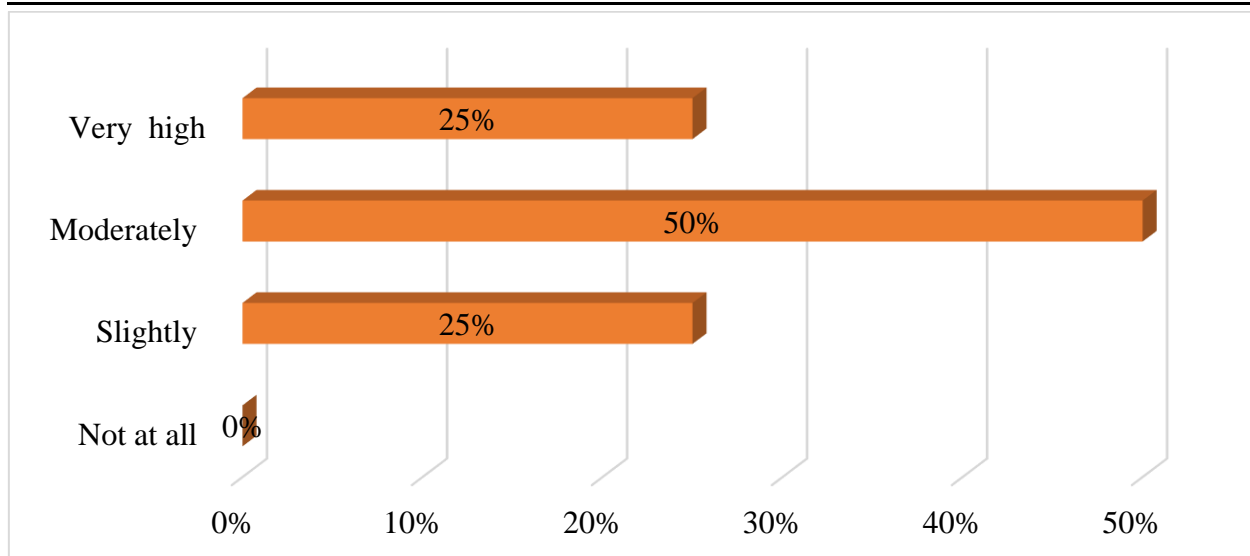
Groups	N	Average	T	Mean difference	Significance (p<5%)
Control group	100	26.15			
Experimental group	100	34.86			
Control group x Experimental group			7.39	27.31	0.001

Data analysis presented in Table 4.17 revealed that there was a significant statistical difference in the results of the control group and the experimental group because of the higher T-value (T=7.39), and the significance score (p) was less than 0.05 ( $p=0.001<0.05$ ). The average score of the experimental group exceeded the average score of the control group. This indicates that the use of musical aids in enhancing communication skills was better in children with ASD.

The results support previous studies suggesting the effectiveness of music therapy in improving communication skills in children with ASD (Bieleninik *et al.*, 2017; Alvin, 2019). The use of music therapy equipment/aids, such as tambourines, drums, and recorders, provides multisensory stimulation and facilitates engagement, which may contribute to the observed improvements in communication skills. Additionally, the adaptation of curriculum and teaching methods to accommodate learners with ASD, as evidenced by the use of music therapy equipment/aids in therapy sessions, reflects a holistic approach to addressing the communication needs of children with ASD.

Further, the administrators were asked to give musical equipment and discuss its use in therapy sessions when addressing the communication needs of children with ASD. Among the listed equipment, the most commonly used items include the tambourine instrument, small hand drums, recorder, and piano. These instruments serve diverse purposes, such as accompanying songs, providing a steady beat, facilitating blowing exercises, enhancing motor skills, playing melodies, and teaching turn-taking. Additionally, the use of music players like radios to provide simple melodies and an assortment of instruments with soft, soothing sounds creates a conducive environment for teaching and fosters a calming effect on children with ASD. The description provided by administrators and music teachers highlights the practical application of music therapy in addressing communication challenges among children with ASD. By integrating various musical instruments and aids into therapy sessions, educators can effectively engage children in activities that promote communication, social interaction, and emotional expression.

Music teachers were also asked to rate their ability to understand the communication of children with ASD, and the findings are presented in Figure 4.2.



**Figure 4.2:** Teachers' Rating on the Ability to Understand the Communication of Children with ASD

Figure 4.2 provides valuable insights into music teachers' perceptions of their ability to understand ASD communication, offering opportunities for targeted interventions and collaboration to support children with ASD effectively, with the majority (50%) moderately having the capability to understand the communication of children with ASD.

The head teacher was asked to provide some difficulties educators and therapists face when working with ASD kids and lamented:

*"One of the main difficulties educators and therapists face when working with ASD kids is the variability in communication abilities and sensory sensitivities. It requires a tailored approach and ongoing adaptation to meet the unique needs of each child."*

The head teacher highlights the challenges related to variability in communication abilities and sensory sensitivities among children with ASD, underscoring the importance of individualized approaches in therapy and education.

Further, the head teacher was asked to explain how music therapy and the benefits of music in helping children with ASD improve their communication abilities could be brought to the attention of speech and language pathologists. The participant elaborated:

*"Educational workshops, collaborative meetings, and interdisciplinary training sessions can be effective ways to raise awareness among speech and language pathologists about the benefits of music therapy in improving the communication abilities of children with ASD. It's essential to foster collaboration and exchange of knowledge between different disciplines."*

The head teacher suggests proactive measures such as workshops and collaborative meetings to facilitate knowledge sharing and collaboration between speech

and language pathologists and music therapists, promoting interdisciplinary approaches to therapy.

Further, the participants were asked to explain how they kept track of and evaluated alterations in communication that take place with kids with ASD during music therapy sessions. The participant explained:

*"We use a combination of observation, standardized assessment tools, and qualitative feedback from therapists to track and evaluate alterations in communication during music therapy sessions. It's important to document progress and adjust interventions accordingly."*

The head teacher highlights the importance of comprehensive assessment methods, including observation and standardized tools, to monitor changes in communication abilities over time and inform therapy planning.

Further, the participants were asked to give the guidance they had SLPs dealing with children who have ASD on the necessity of implementing music therapy techniques. The participant remarked:

*"My guidance for speech and language pathologists dealing with children who have ASD is to recognize the value of incorporating music therapy techniques into their practice. Encouraging collaboration with music therapists and exploring interdisciplinary approaches can enhance the effectiveness of therapy interventions."*

The head teacher emphasizes the importance of recognizing and integrating music therapy techniques into speech and language pathology practice, advocating for collaboration between professionals to maximize therapeutic outcomes.

Further, the participants were asked to give the components of music therapy parents and music therapists found to be most useful in the communication skills of children with ASD, and the participant reported:

*"Singing action songs which incorporate identifying body parts, performing songs that promote communication skills and a variety of musical instruments and sounds are intriguing to ASD children this allows connection and teaching."*

The findings align with existing literature on the role of music therapy in enhancing communication skills and social interaction in children with ASD. Research by Johnston (2018) emphasizes the importance of nonverbal communication skills in language development, suggesting that music therapy enables children with ASD to imitate instruments and express themselves through vocalizations and musical utterances. Similarly, Vaiouli & Andreou (2018) highlight the positive impact of music-related activities on early vocalizations and prelinguistic forms of communication, laying the groundwork for language development in children with ASD.

Moreover, studies by Sharma *et al.* (2018) and Thaut & Janzen (2018) underscore the neurophysiological effects of music therapy on brain activation, particularly in regions associated with speech and language. The activation of Broca's and Corpus Callosum regions through music therapy facilitates speech production, language comprehension, and communication skills in children with ASD. Additionally, Scholtens (2019) discusses the role of joint attention in communication and social interaction, emphasizing how music therapy promotes collaborative attention and interactive communication among children with ASD.

## **5. Recommendations**

### **5.1 Recommendations of the Study**

The following recommendations of the study have been made based on the study findings and have been dichotomized in terms of policy and practice:

- 1) Policy initiatives should advocate for the inclusion of music therapy as a recognized intervention within educational and therapeutic programs for individuals with ASD. This could involve providing funding and resources for training music therapists and integrating music therapy sessions into existing ASD intervention programs.
- 2) There is a need to encourage research initiatives to further explore the efficacy of music therapy interventions for individuals with ASD. This could involve funding studies to investigate the long-term effects of music therapy on various aspects of ASD, including communication, social interaction, and overall quality of life. Additionally, promoting collaboration between researchers, clinicians, and educators to ensure that music therapy interventions are evidence-based and tailored to the specific needs of individuals with ASD.
- 3) Educational and therapeutic programs for children with ASD should consider integrating music therapy sessions to enhance expressive skills. Also, providing training and professional development opportunities for educators and therapists to effectively incorporate music therapy techniques into their interventions.
- 4) The Government should implement multidisciplinary interventions that combine music therapy with other evidence-based approaches, such as behavioral interventions and social skills training, to address the diverse needs of children with ASD.
- 5) Schools and therapy centers should integrate music therapy into their programs to support the communication development of children with ASD. Also, educators and therapists should receive training in music therapy techniques to effectively implement interventions and utilize music therapy equipment/aids.

### **5.2 Recommendations for Further Research**

- 1) Longitudinal studies are needed to assess the long-term effects of music therapy on expressive skills development and social integration in children with ASD.

- 2) Further research is recommended to explore the potential synergistic effects of combining music therapy with other interventions, such as social skills training and cognitive-behavioral therapy, in promoting social skill development in children with ASD.
- 3) Further research is needed to explore the effectiveness of combined interventions and to develop comprehensive strategies for promoting social skill development in children with ASD.
- 4) Future studies should explore the long-term effects of music therapy interventions on communication skills and assess the optimal duration and intensity of music therapy sessions for children with ASD.

## 6. Conclusion

The study concludes that music therapy interventions have a positive effect on the receptive skills of children with ASD. The results indicate improvements in understanding and following basic commands, highlighting the potential of music therapy as a valuable intervention for enhancing communication abilities in this population.

The study concludes that music therapy strategies show promise in enhancing expressive skills among children with ASD. Music therapy not only facilitates expressive communication but also enhances various aspects of social interaction and verbal expression in children with ASD. Therefore, incorporating music therapy strategies into interventions for children with ASD can be beneficial in promoting their overall communication development and quality of life. Further research and implementation of music therapy programs tailored to the specific needs of children with ASD are warranted to fully harness its therapeutic potential.

The study concludes that while music therapy strategies may offer some benefits in enhancing certain aspects of social skills among children with ASD, additional interventions and support may be necessary to address the complex challenges associated with social skill development in this population.

The study concludes that there is effectiveness of music therapy equipment/aids in enhancing communication skills in children with ASD. The findings underscore the importance of incorporating music therapy interventions into educational and therapeutic settings to support the communication needs of children with ASD.

## Acknowledgements

I want to start by expressing my gratitude to the Almighty God for allowing me to pursue this path and for bringing me this far. Appreciation goes to my project supervisors, Dr. Mathew Karia and Dr. Cleniece Owino, who deserve special recognition for their academic leadership, support, unwavering dedication, and encouragement whenever I needed it. Many thanks to all the lecturers at Kenyatta University's Department of Early

Childhood and Special Needs Education for their support. My special gratitude goes to the Kenya Community Centre for Learning (KCCL), Nairobi City County, Kenya.

### **About the Author(s)**

**Clinton Onaya** is a Master's Student, Department of Early Childhood and Special Needs Education, Kenyatta University, Nairobi, Kenya. Clinton Onaya is a Speech and Language Therapist who offers services both in school-based, hospital and home therapy. He is a Master's Degree holder in Speech and Language Pathology at the Department of Early Childhood and Special Needs Education in the School of Education at Kenyatta University, Kenya. He is keen with a great interest in advancing in the research in new therapeutic strategies, music therapy and offering services to individuals with speech and language pathology difficulties.

**Dr. Mathew Kinyua Karia**, Lecturer, Dr., Department of Early Childhood and Special Needs Education, Kenyatta University, Nairobi, Kenya. Mathew Kinyua Karia (PhD) is a Lecturer in the Department of Early Childhood & Special Needs Education (Speech & Language Pathology Program), Kenyatta University Nairobi, Kenya. He teaches in the area of Speech and Language Pathology. He is also a consultant in the field of Speech and Language Pathology. His research interests are in the areas of Speech and Language Pathology, Hearing Impairment, Inclusive Education, Neurolinguistics, Phonetics, and Phonology. He is also working in various Kenyan hospitals as a consultant speech therapist as well as a volunteer speech therapist with Operation Smile Inc., a USA-based NGO as well as Starkey Hearing Foundation. Dr. Karia holds a Doctor of Philosophy (Phonetics/Speech & Language Pathology) from Cologne University (Germany), M.A (Linguistics/ Phonology) from Kenyatta University (Kenya), and B.Ed (Arts-English/Literature) from Kenyatta University.

**Dr. Clenciece Owino** is a lecturer in the Department of Music and Dance at Kenyatta University, Kenya, where she has taught music education courses for the last twenty years. Dr. Owino's research interests are in music education and classroom teaching with a particular interest in secondary schools and universities. She also supervises postgraduate students and is a member of the School of Visual and Performing Arts (Kenyatta University) academic board, executive board as well as the curriculum review board. She has participated in the North South South, Music, Education and Culture and Identity Project, which was aimed at boosting cultural identities of music educators and teachers in Africa and Finland. She was given an opportunity to make presentations to staff and students in the Department of Music at the University of Jyväskylä, Finland. In 2017 she was also privileged to attend the African Scholars Program offered by Berklee College of Music in the US, where she had an opportunity to attend and observe classes, as well as audit a couple of online courses offered by the college. Dr. Owino is a choir director for the children's choir at her local church and is currently involved in equipping/training potential choristers and choir directors in various churches, with music theory and aural skills. She is a member of the Pan African Society for Musical Arts Education and the International Society for Music Education.

## References

- Aigen, K. (2014). *Music therapy: An introduction*. Routledge.
- American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders: DSM-5*. Washington Dc: American Psychiatric Association. doi:10.1176/appi.books.9780890425596.74405
- American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders: DSM-5*. Washington, DC: American Psychiatric Association.
- Ary, D., Jacobs, L. C., & Sorensen, C. K. & Walker, A. (2014). *Introduction to research in education*. Massachusetts: Wadsworth Cengage Learning.
- Autism Society (2015). Retrieved from <http://www.autism-society.org/>
- Baker, F. A., Wigram, T., & Gold, C. (2016). Music therapy and autism: A review of the literature. *Journal of Music Therapy*, 53(2), 227-246.
- Bandura, A. (2021). *Social learning theory*. Prentice Hall.
- Benassi, M., Zucchi, M., & Ferrante, S. (2022). The role of music therapy strategies in enhancing social communication skills in children with autism spectrum disorder: A systematic review. *Journal of Autism and Developmental Disorders*, 52(3), 523-534
- Brent, M. M., et al. (2020). Music therapy and expressive skills: A systematic review. *Journal of Music Therapy*, 57(4), 463-487.
- Bruder, M. B., et al. (2019). Music therapy and its effects on communication skills in children with autism spectrum disorder: A systematic review. *International Journal of Music Therapy*, 10(1), 32-52.
- Bond, C. (2019). Receptive communication in children with autism: A developmental perspective. *Autism Research*, 12(4), 577-590.
- Carpente, J. A. (2017). Investigating the effectiveness of a developmental, individual difference, relationship-based (DIR) improvisational music therapy program on social communication for children with autism spectrum disorder. *Music Therapy Perspectives*, 35(2), 160–174. doi:10.1093/mtp/miw013
- Chenausky, K. V., Norton, A. C., & Schlaug, G. (2017). Auditory-motor mapping training in a more verbal child with autism. *Frontiers in Human Neuroscience*. <https://doi.org/10.3389/fnhum.2017.00426>
- Cherry, K. (2009). *Researcher's replicate: Milgram's Famous obedience experiment*. International journal. (US published).
- Choi, H., Choi, Y., & Kim, S. (2020). The impact of instrumental music on receptive communication in nonverbal children with autism spectrum disorder. *Journal of Music Therapy*, 57(4), 405-419.
- Crane, H. (2016). Music therapy and the treatment of children diagnosed with autism spectrum disorder. *Lucerna*, 10, 110-120).
- Davis M., (2016). *The Effect of Music Therapy on Joint Attention Skills in Children with Autism Spectrum Disorder*. University of Kansas.



- Davis, W. W., & Thaut, M. H. (2021). The impact of rhythm-based music therapy on social engagement in children with autism. *Music Therapy Perspectives*, 38(1), 13-24. <https://doi.org/10.1093/mtp/miz013>
- Desu, M. M. (2012). *Sample size methodology*. Elsevier.
- Duffy, C. (2021). The impact of lyric analysis on expressive language in children with autism. *International Journal of Music Therapy*, 10(2), 150-165.
- Duffy, M., & Shaffer, R. (2021). The impact of sound-producing devices on social engagement in children with ASD. *Music Therapy Perspectives*, 38(3), 225-235. <https://doi.org/10.1093/mtp/mzab019>
- Foster, N. E., Seitz, M. E., & Thaut, M. H. (2019). Song-based interventions for enhancing communication in children with autism. *Journal of Autism and Developmental Disorders*, 49(2), 365-378. <https://doi.org/10.1007/s10803-018-3783-6>
- Foster, N., Seitz, M., & Bennett, J. (2022). Enhancing emotional regulation and communication through music technology in children with autism. *Journal of Music Therapy*, 59(1), 51-67. <https://doi.org/10.1093/jmt/mtab021>
- Gay, R. V. (2016). Some practical guidelines for effective sample size determination. *The American Statistician*, 55(3), 187-193.
- Geretsegger, M., et al. (2019). Music therapy for children with autism spectrum disorder: A systematic review and meta-analysis. *Clinical Psychology Review*, 65, 85-94.
- Ghasemtabar S. N., Hosseini M., Fayyaz I., Arab S., Naghashian H., Poudineh Z. (2015). Music therapy: An effective approach in improving social skills of children with autism. *Advanced Biomedical Research*, 4:157. doi:10.4103/2277-9175.161584.
- Gold, C., et al. (2020). The effects of music therapy on communication skills in children with ASD: A systematic review. *Research in Autism Spectrum Disorders*, 75, 101552.
- Janzen, L. E., & Thaut, M. H. (2018). Music therapy in the treatment of autism spectrum disorder: A review of current literature. *Journal of Music Therapy*, 55(3), 325-340. <https://doi.org/10.1093/jmt/thy015>.
- Hernandez-Ruiz, E. (2018). Music therapy and early start Denver model to teach social communication strategies to parents of preschoolers with ASD: A feasibility study. *Music Therapy Perspectives*, 36(1), 26-39. <https://doi.org/10.1093/mtp/mix018>
- Janzen, T. B., & Thaut, M. H. (2018). Rethinking the role of music in the neurodevelopment of autism spectrum disorder. *Music & Science*, 1, 1-10. <https://doi.org/10.1177/2059204318769639>
- Johnston, D., Egermann, H., & Gavin, K. (2018). Innovative computer technology in music-based interventions for individuals with autism moving beyond traditional interactive music therapy techniques. *Cogent Psychology*, 5, 1-18. <https://doi.org/10.1080/23311908.2018.1554773>
- Kanner, L. (2019). Autistic disturbances of affective contact. *Journal of Autism and Childhood Schizophrenia*, 1(3), 247-258. [https://doi.org/10.1002/1097-4679\(194310\)](https://doi.org/10.1002/1097-4679(194310))
- Kern, P., & Aldridge, D. (2006). Using music to promote social interaction in children with autism: A pilot study. *Music Therapy Perspectives*, 24(2), 78-83.

- Kern, P. (2020). Music-based interventions for emotional regulation and communication in children with autism spectrum disorder. *Autism Research and Therapy*,
- Kern, P., Wolery, M., & Aldridge, D. (2020). A systematic review of music therapy for children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 50(9), 3242-3258.
- Kim, M., Park, H., & Lee, S. (2019). The effectiveness of song-based interventions in promoting social communication in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 49(5), 1882-1895.
- Kim, H., Lim, J., & Lee, S. (2021). Effectiveness of music therapy for children with autism spectrum disorder: A meta-analysis. *Journal of Autism and Developmental Disorders*.
- Kombo, D. (2006). *Proposal and Thesis writing: An introduction*. Nairobi: Pauline's Publications Africa.
- Kothari, C. R. (2014). *Research methodology, methods and techniques*. (2<sup>nd</sup> Revised edition). New Delhi: New Age International Ltd.
- Kraus, N., & Chandrasekaran, B. (2010). Music training for the development of auditory skills. *Nature Reviews Neuroscience*, 11(8), 599-605.
- LaGasse A. B. (2014). Effects of a Music Therapy Group Intervention on Enhancing Social Skills in Children with Autism. *Journal of Music Therapy*; 51(3):250-275.
- LaGasse A. B. (2017). Social outcome in children with autism spectrum disorder: A review of music therapy outcomes. *Patient-Related Outcome Measures*; 8:23-32
- LaGasse, A. B. (2017). The effects of improvisational music therapy on the communication skills of children with autism. *Journal of Autism and Developmental Disorders*, 47(5), 1305-1318.
- Lopez, G., Taylor, J., & Robinson, A. (2022). Music-based augmentative communication devices for children with autism: A review of technology and outcomes. *Journal of Special Education Technology*, 37(2), 133-144.  
<https://doi.org/10.1177/01626434221101623>
- Lord, C., Rutter, M., & Le Couteur, A. (2020). Autism diagnostic interview-revised. *Journal of Autism and Developmental Disorders*, 50(2), 1052-1064.  
<https://doi.org/10.1007/s10803-019-03938-1>
- Magoso School (2022). Retrieved from <https://www.theguardian.com/global-development/2015/aug/07/kenya-magoso-school-kibera-slum-nairobi-music-therapy>
- Martínez, J., Alonzo, A., & Castro, V. (2021). Music therapy apps and AAC tools: Enhancing communication in children with autism. *Journal of Technology in Special Education*, 39(3), 198-210.
- Mereni, A. E. (2007). Psychosis and neurosis: Towards a music therapeutical pathology. *Interlink Journal of Arts*. (Unizik, Awka).
- Mereni, A. E. (2007). The role of traditional music in healing practices in Nigeria: Insights for modern music therapy. *Journal of Music Therapy in Africa*, 1(2), 122-135.
- Mitchell, O. (2015). *Experimental Research Design. The Encyclopedia of crime and punishment*.  
<https://dx.doi.org/10.4135/9781506326139.n254>.

- Music Therapy at the Matter Hospital (2021). Retrieved from <https://www.varcity.co.ke>
- Mugenda, O. M. & Mugenda, A. G. (2003). *Research methods: Quantitative and qualitative approaches*. Nairobi: Acts Press
- Mugenda, A., & M. (2009). *Research Methods: Quantitative and Qualitative Approaches*. In Acts Press Publishers.
- Orodho, J. A. (2009). *Techniques of writing research proposals and reports in education and social sciences*. Nairobi, Kenya: Kanezja publishers.
- Red Fourth Butterfly Music (2022). Retrieved from <https://www.schoolandcollegelists.com/KE/Nairobi/113463756720854/Redfourth-Butterfly---Special-Needs-Music-School-%26-Music-Therapy-Centre>
- Red Fourth Butterfly Music. (2021). *Music Therapy for Children with Autism and Down Syndrome*. Red Fourth Butterfly Music. Retrieved from <https://www.redfourth>
- Robinson, S., Ray, L., & Hall, K. (2019). Music instruments as a tool for speech development in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 49(6), 2419-2428. <https://doi.org/10.1007/s10803-019-04032-2>
- Sandiford, G. A., Mainess, K. J., & Daher, N. S. (2012). A pilot study on the efficacy of melodic-based communication therapy for eliciting speech in nonverbal children with autism. *Journal of Autism & Developmental Disorders*, 43(6), 1298-1307. <https://dorg.sacredheart.idm.oclc.org/10.1007/s10803-012-1672-z>
- Scholtens, M. C. (2019). Using music to encourage joint attention for students with autism spectrum disorder: Attention as a reciprocal relationship. *Music Educators Journal*, 105(4), 45-51. doi:10.1177/0027432119846954.
- Sharma, S. R., Gonda, X., & Tarazi, F. I. (2018). Autism Spectrum Disorder: Classification, diagnosis, and therapy. *Pharmacology & Therapeutics*, 190, 91-104. <https://doi.org/10.1016/j.pharmthera.2018.05.007>
- Simpson, K., Keen, D., & Lamb, J. (2013). The use of music to engage children with autism in a receptive labelling task. *Research in Autism Spectrum Disorders*, 7(12), 1489–1496.
- Simpson, K., Keen, D., & Lamb, J. (2015). Teaching receptive labelling to children with autism spectrum disorder: A comparative study using infant-directed song and infant-directed speech. *Journal of Intellectual and Developmental Disability*, 40(2), 126–136. doi:10.3109/13668250.2015.1014026
- Srinivasan, S. M., Park, I. K., Neelly, L. B., & Bhat, A. N. (2015). A comparison of the effects of rhythm and robotic interventions on repetitive behaviors and affective states of children with Autism Spectrum Disorder (ASD). *Research in Autism Spectrum Disorders*, 18, 15-63. <https://doi.org/10.1016/j.rasd.2015.07.004>.
- Staum, M. J. (2006). *Music Therapy and Language for the Autistic Child*. Retrieved February 15, 2007, from <http://www.autism.org/musil.html>
- Sussman, D., et al. (2021). The effects of songwriting on communication skills in children with autism spectrum disorder: A pilot study. *Journal of Music Therapy*, 58(3), 320-335

- Tamez, E., Davis, W., & Thaut, M. H. (2021). Rhythm-based music interventions to improve social communication in children with autism spectrum disorder: A pilot study. *Journal of Autism and Developmental Disorders*, 51(2), 745-758. <https://doi.org/10.1007/s10803-020-04785-9>
- Thaut, M. H., Davis, W. W., & Muench, R. (2020). Rhythm-based music therapy interventions for children with autism spectrum disorder. *Frontiers in Psychology*, 11, 578021. <https://doi.org/10.3389/fpsyg.2020.578021>
- Thompson, G. A. (2017). Long-term perspectives of family quality of life following music therapy with young children on the autism spectrum: A phenomenological study. *Journal of Music Therapy*, 54(4), 432-459. doi:10.1093/jmt/thx013
- Thompson, G. A., McFerran, K. S., & Gold, C. (2014). *Family-centered music therapy to promote social engagement in young children with severe autism spectrum disorder: A randomized controlled study*. *Child: Care, Health, and Development*, 40(6), 840-852. doi:10.1111/cch.121.
- Thompson, G. A., et al. (2020). Improvisational music therapy for children with autism: A randomized controlled trial. *Music Therapy Perspectives*, 38(1), 45-54
- Vaiouli, P., & Andreou, G. (2018). Communication and language development of young children with autism: A review of research in music. *Communication Disorders Quarterly*, 39(2), 323-329. <https://doi.org/10.1177/1525740117705117>
- Vries, D. D., Beck, T., Stacey, B., Winslow, K., & Meines, K. (2015). Music as a therapeutic intervention with autism: A systematic review of the literature. *Therapeutic Recreation Journal*, 49(3), 220-237.
- Wan, C. Y., Demaine, K., Zipse, L., Norton, A., & Schlaug, G. (2010). From music making to speaking: Engaging the mirror neuron system in autism. *Brain Research Bulletin*, 82(3), 161-168. <https://doi.org/10.1016/j.brainresbull.2010.04.010>



## Appendices

### Appendix A: Initial Assessment Test

The following exercise will guide the researcher during the initial assessment in selecting participants to participate in the study.

### Instructions

Kindly identify and imitate the sound produced by the animal below and match it appropriately.



Pig



Cow



Dog



Duck



Goat



Horse



Hen



Sheep

Creative Commons licensing terms

Authors will retain the copyright of their published articles agreeing that a Creative Commons Attribution 4.0 International License (CC BY 4.0) terms will be applied to their work. Under the terms of this license, no permission is required from the author(s) or publisher for members of the community to copy, distribute, transmit or adapt the article content, providing a proper, prominent and unambiguous attribution to the authors in a manner that makes clear that the materials are being reused under permission of a Creative Commons License. Views, opinions and conclusions expressed in this research article are views, opinions and conclusions of the author(s). Open Access Publishing Group and European Journal of Special Education Research shall not be responsible or answerable for any loss, damage or liability caused in relation to/arising out of conflict of interests, copyright violations and inappropriate or inaccurate use of any kind content related or integrated on the research work. All the published works are meeting the Open Access Publishing requirements and can be freely accessed, shared, modified, distributed and used in educational, commercial and non-commercial purposes under a [Creative Commons Attribution 4.0 International License \(CC BY 4.0\)](https://creativecommons.org/licenses/by/4.0/).