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TEACHERS' INTERVENTION STRATEGIES AND SOCIAL INTERACTION AMONG LEARNERS WITH EMOTIONAL AND BEHAVIOURAL DISORDERS IN SELECTED PRIMARY SCHOOLS, NAIROBI CITY COUNTY, KENYA

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Abstract:
This study aimed to explore the impacts of music therapy on the speech development of children at Nakuru Hills Special School, Nakuru, Kenya. The theoretical framework of the study included cognitive behavior theory and social-pragmatic theory. A quasi-experimental design was used to group the participants into two groups: the comparison group and the experimental group. The comparison group of learners with speech development disorders or problems received standard care or intervention, while the experimental group of learners with speech development disorders or problems received music therapy. The research population included special education teachers, special schools' music teachers, and caregivers, as well as speech and language pathologists working at Nakuru Hills Special School and Kenyatta University. The sample consisted of 20 participants randomly selected from the sample population. The study utilized a mixed research approach to achieve and answer research objectives and questions, respectively. The qualitative and quantitative research approaches were applicable in the mixed methodology. Interview and survey instruments were used for data collection. Piloting of the research instruments was done at Njoro Special School because it has similar characteristics and is situated in the neighboring Sub-County of Njoro. Descriptive and inferential statistical analysis, was conducted in IBM SPSS version 26 using particulars gathered during the survey. Thematic analysis was used to analyze the interview data. Data collected from caregivers and speech therapists indicated significant

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progress in children's speech abilities following music therapy interventions. Key findings from the qualitative data revealed that caregivers observed noticeable enhancements in their children's articulation and vocabulary. The analysis using paired samples t-tests showed important changes in the scores from before and after the tests in different areas of speech development, such as saying single words, saying words in sentences, talking in conversations, writing sounds, and rhythm. Singing, instrument playing, and movement activities are key strategies in speech development. The study concludes that music therapy significantly enhances speech development in children with speech disorders at Nakuru Hills Special School. The study recommended that the Ministry of Education should establish explicit policies to incorporate music therapy into speech therapy programs in institutions with special needs, acknowledging its potential to improve speech development through child-centered and engaging approaches.

Keywords: children with speech disorders, music therapy, special school, speech development

1. Introduction

Speech and language development in typical children refers to how they progressively obtain and refine communication skills, including the capacity to understand and speak a language (Glaspey *et al.*, 2022). This process was crucial for a child's overall growth, including the cognitive, social, and emotional aspects. Language skills are closely linked to cognitive development. Children must have the capacity to comprehend and apply a language, as it enhances their learning, problem-solving, and academic achievement. Effective communication is fundamental for building relationships and participating in social activities. Language skills contribute to the development of empathy and cooperation (Kent, 2023). Language allows children to express their feelings and understand the emotions of others. Such communication is crucial for emotional development and mental well-being. Music therapy is a branch of knowledge that has experienced constant and rapid global development, necessitating that countries increasingly communicate and collaborate professionally as they interact (Steiner-Brett, 2023).

Globally, the extension of music therapy skills to education and their subsequent adoption has helped overcome challenges when learning, boost emotional management, and help learners develop essential social skills (Marcos *et al.*, 2023). Music therapy has been shown to produce positive effects on speech development in children, as evidenced by observations in clinical and research settings; therefore, it is acknowledged as a meaningful intervention in various therapeutic contexts (Steiner-Brett, 2023). Music therapy often involves listening to and discerning different sounds and tones. Engaging in activities that focus on auditory discrimination can enhance a child's ability to process and distinguish speech sounds, contributing to improved speech perception and

language development. Music therapy often emphasizes rhythmic activities, such as clapping, tapping, or playing percussion instruments. These rhythmic exercises can enhance a child's timing and coordination, which are foundational skills for speech production (Pingle & Ragha, 2023).

In the United Kingdom, public awareness about music therapy spread vastly among the citizens and the National Health. The extensive awareness of music therapy among these two was considered the primary factor that would increase its use in dementia care, considering that virtually one-quarter (23%) thought training and development could help enhance provision. Since then, music therapists in the United Kingdom have yet to conduct a survey as large as the one in dementia practice. It significantly impacts recruitment, professional development, the advancement of the speciality and research (Schneider, 2023). Music therapy has the potential to support emotional regulation. When children engage in musical activities, they may experience a range of emotions. Learning to express and regulate these emotions through music can contribute to improved emotional regulation, which may, in turn, positively impact speech development (Adagbada, 2023).

In South Africa, most citizens use traditional and Western medical services simultaneously. The Health Professions Council of South Africa regulates its professional use in the country, even though it is largely aligned with Western healthcare techniques. Regardless of the little recognition for traditional health practitioners due to alignment with Western approaches, traditional healers have acknowledged and applied music therapy extensively. In East Africa, there is an appalling deficiency of speech-language specialists (Alighieri *et al.*, 2022). This problem primarily arises from insufficient educational programs focusing on speech-language pathology. Furthermore, speech-language pathologists often encounter diverse cultural and ethical obstacles when offering therapy services to East African children with speech dysfunctions.

In Kenya, speech development is a vital and significant process of development in the formative years. Children experiencing problems in developing their verbal communication and delayed speech development tend to be at greater risk of acquiring other school-related emotional, social, and cognitive problems (Nthiga & Nyamasyo, 2022). Delayed speech development makes it challenging for children to produce speech sounds, which causes interference with social communication, occupational achievement, and academic achievement or performance (Law, 2019). Thus, there is a need to adapt interventions to address speech development difficulties in children (Bauman-Wangler & Garcia, 2020). Children with speech development problems require specialized interventions, such as speech or language therapies and music therapy, that will help them enhance their speech development and promote the acquisition of language skills (Bauman-Wangler & Garcia, 2020; Williams *et al.*, 2021).

The Kenyan government has expanded Educational Assessment and Resource Center programs in all sub-counties, with support from NGOs such as DANIDA. The expansion has created tremendous progress in ensuring the country can provide

intervention services for children with special needs and disabilities. Despite the growing recognition of music therapy as a potential intervention for speech-related issues, there is a notable gap in empirical research, particularly in the context of Nakuru Hills Special School. Understanding the probable benefits and shortcomings of music therapy in this specific population is crucial for informing research-based solutions and improving the overall quality of care for children diagnosed with speech disorders.

1.1 Objectives of the Study

- To explore the impacts of music therapy on the speech development of children in Nakuru Hills Special School, Nakuru, Kenya.

1.2 Research Question

- How does music therapy affect speech development in children in Nakuru Hills Special School, Nakuru, Kenya?

2. Literature Review

2.1 Theoretical Review

Two theories inform this study: the Cognitive Behavior Theory and the social-pragmatic approach. The key tenets of behaviorists' theory involve stimulus-response associations, reinforcement, and shaping behaviors. Applying these principles to the prolonged speech technique in treating speech disorders reveals the following insights: Stimulus-Response Associations: - Behaviorists posit that behaviors are a response to stimuli in the environment. For instance, specific sounds, words, or situations may act as stimuli triggering disfluent speech. Behaviorist theory suggests that behaviors are strengthened or weakened based on consequences. Utilizing positive reinforcement in speech therapy encourages the occurrence of desired behaviors, such as fluent speech, whereas negative reinforcement discourages them. Prolonged speech therapy commonly employs this approach to incentivize and reinforce fluent speech patterns. Therapists provide positive feedback, encouragement, or rewards when individuals successfully use the prolonged speech technique, reinforcing the desired fluency.

Shaping behaviors involves reinforcing successive approximations toward the target behavior. Therapists apply shaping by starting with simpler speech patterns using the prolonged speech technique and gradually increasing complexity. By reinforcing incremental progress, individuals build toward achieving fluent speech in more challenging situations. Therapists may focus on praising individuals for using the prolonged speech technique effectively, creating a positive association with fluent speech. Behaviorists suggest that individuals can learn by observing and imitating others. Therapists may model the prolonged speech technique, demonstrating the desired speech pattern. Individuals then imitate the modeled behavior, reinforcing the learning process through observation and repetition (Skinner, 1991). The behaviorists' theory is

applied to prolonged speech therapy by identifying stimuli triggering diffluent speech, using reinforcement to encourage fluent speech, shaping behaviors through incremental progress, employing operant conditioning to strengthen desired speech patterns, utilizing modeling for observational learning, and incorporating systematic desensitization to reduce anxiety associated with stuttering (Kalinowski & Sultukloragu, 2006). This application helps individuals modify their speech behaviors and achieve improved fluency.

2.2 Empirical Review

Music therapy often involves listening to and discerning different sounds and tones. Engaging in activities that focus on auditory discrimination can enhance a child's ability to process and distinguish speech sounds, contributing to improved speech perception and language development (Mendes & Rossinol, 2022). Music therapy often emphasizes rhythmic activities, such as clapping, tapping, or playing percussion instruments. Singing and vocalization are common elements of music therapy. Engaging in singing activities encourages children to practice different vocalizations and articulations (Torppa & Huotilainen, 2019).

In the United States, Lopez (2023) conducted a descriptive study to determine the current methods that board-certified music therapists use to instruct or provide music lessons to clients during their professional practice. The results indicated that the most recognized advantages and common objectives of music therapy include the development and advancement of clients' cognitive, musical, and fine motor skills. Johnson (2022) investigated the advantages of music-based solutions to speech treatment outcomes. Johnson gathered data from the client's speech therapy sessions to evaluate the application of song and musical instruction as auditory stimulation. Notably, the musical interventions helped the client enjoy the therapy sessions and increased their morale significantly. The increase in these response areas projected a relative increase in progress toward achieving the client’s speech treatment goals.

Vidal (2019) used a three-step randomized study that involved a test, training, and retest conducted on 49 naturally developing children between 3 and 4 years old. Vidal used a phonological awareness test in study 1 and a phonetic and phonological test (study 3). Vidal applied these tests both before and after a school year. The research included preschool students who were assessed prior to and following a full school year of participating in Music Classes on a weekly basis for the experimental group and Visual Arts Classes for the control group. The findings suggest that music instruction has a notable impact on the phonological awareness of children, demonstrating a direct link between music education and phonological awareness from the age of 3. In Studies 2, 3, and 4, there was no noteworthy difference between the groups during the post-assessment period. The resulting data may indicate that children with atypical development require more intensive music training or that a particular music curriculum

needs to be adjusted to address their linguistic rhythm (and possibly pitch) processing deficits.

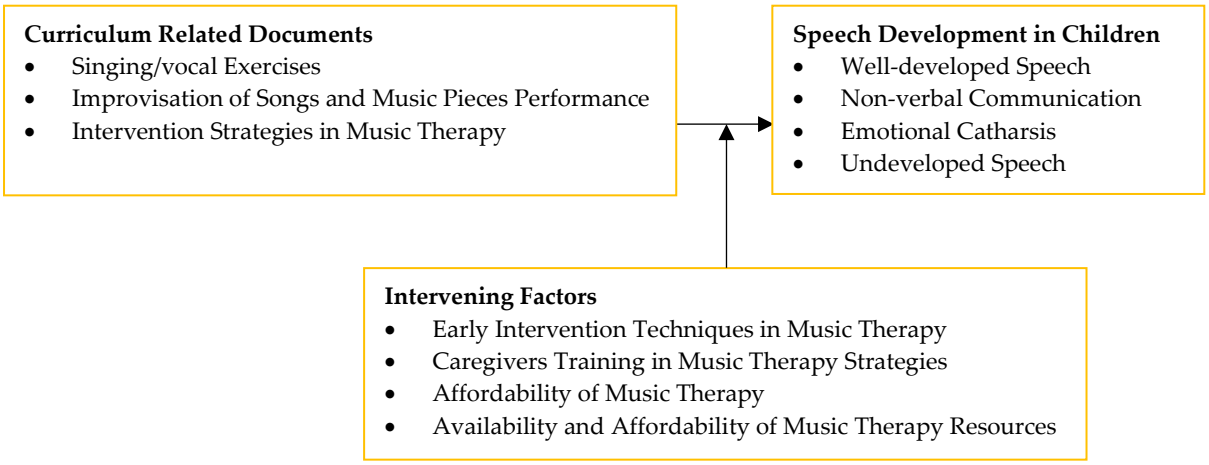
Mayer-Benarous *et al.* (2021) found that music therapy, such as educational music therapy, has significant impacts on enhancing speech development in children with delayed speech. Music therapy is essential in facilitating the development of speech and enhancement of speech sound skills within the shortest time possible (Sammler & Elmer, 2020). Music therapy increases phonological capacity or abilities, as well as helps students comprehend speech and improves the development of speech sounds in children (Fiveash *et al.*, 2021). Furthermore, music therapy enhances speech or action patterns and cognitive structures in children, particularly in early childhood development stages (Bieleninik *et al.*, 2017). These research findings suggest that therapy helps children who have trouble speaking or forming sounds, including issues like articulation disorders. Moreover, music therapy has a significant effect on children's development of speech and prosodic abilities (Mayer-Benarous *et al.*, 2021).

Children in refugee camps in Kenya incorporate music activities into their extracurricular activities after school. Singing and dancing helped promote the mental health of the children. This initiative aims to support the psychosocial development, entertainment, and treatment of traumatized children in refugee camps, helping them regain their ability to speak (Akombo, 2000). Music acts as a motivator for the proper articulation process. Music also serves as a memory tactic (for instance, the ABC song and snakes in the grass that help emphasize the sounds /sh/ and /s/). Music therapists also work with a multidisciplinary team including professionals like occupational and physical therapists that enable the children to gain from music therapy. In addition to that, in later stages, group-based music therapy could aid in socialization and enjoyment with peers while learning at the same time (American Music Association, 2005).

2.3 Conceptual Framework

Figure 1 presents the Diagrammatic Illustration on the Relationship between School Factors and Implementation of CBC.

Figure 1: Conceptual Framework (CLTC Knowledge hub, 2018)



3. Methodology

3.1 Study Area

The study was conducted at the Nakuru Hills Special School in Nakuru County, Kenya. The school has children of varied ages with an array of speech disorders exhibited. Established in 1978, the school provides general rehabilitative services through its caregivers and therapists.

3.2 Research Design

The study used a quasi-experimental research design to evaluate how music therapy affects the speech development of children with speech disorders at Nakuru Hills Special School in Nakuru County, Kenya. This design was chosen because it is good for comparing existing groups and looking at the effects of an intervention without changing who is in each group (Creswell & Creswell, 2018).

3.3 Study Population

The research population includes children with speech disorders, healthcare workers, and Speech and Language Pathologists at Nakuru Hills Special School. The target population consists of 30 children with speech disorders and their teachers.

3.4 Sampling Procedure and Sample Size

This study purposively sampled 10 caregivers and a speech and language pathologist using music therapy in the selected school. Kumar (2014) describes purposive sampling as a design in which the researcher identifies a population whose characteristics meet the purpose of the study. This study intentionally utilized children with speech disorders studying in Nakuru Hills Special School.

3.5 Tools and Techniques for Data Collection

Goldman-Fristoe Test of Articulation (GFTA). The GFTA is designed to assess articulation skills and identify speech sound disorders in children. The GFTA is designed to assess the articulation of consonant sounds in words and sentences in children aged 2 years, 0 months to 21 years, 11 months. As stated by Kumar (2014), observation is a deliberate, organized, and selective method of observing and participating in an interaction process. The researcher engaged in verbal conversations with children experiencing language development disorders, subsequently documenting their speech behaviors. The investigator determined the percentage of unclear syllables (%SS), speaking rate (in syllables per minute, SPM), and articulatory rate (in syllables per minute, SPM). This process was conducted again two months after the treatment.

3.6 Piloting of the Research Tools

Piloting of the research instruments was done in Njoro Special School because it has similar characteristics and is in the neighboring sub-county of Njoro, where 4 children with speech disorders were purposively picked and their speech was recorded and observed, and then they went through the post-treatment for one month. After one month of treatment, they were again speech recorded and observed. The researcher validated the observations and testing tools by conducting a pilot study and gathering feedback from supervisors, colleagues, and various experts, with a particular focus on speech and language therapists. The test-retest method was used to enhance the reliability of the observations and test tools by administering the same questions to the sampled 4 children with speech disorders. Correlation coefficients for the two scores were obtained using Pearson's product-moment formula.

3.7 Data Analysis

The researcher employed thematic analysis in order to categorize data based on shared characteristics in relation to particular research inquiries, as well as similar findings gathered under overarching themes and assigned codes. The organization and synthesis of both quantitative and qualitative data involved summarization, quantitative content analysis, tabulation, and the creation of tables and pie charts for additional examination. A thematic analysis and coding helped evaluate textual data from the interviews to arrive at a conclusion. Quantitative data were coded and then run through the SPSS (version 26.0) analysis tool. The analyzed data were summarized using inferential statistics and presented using tables and graphs. Research questions were answered through descriptive statistics and a one-sample t-test from the collected data. Additionally, chi-square tests and correlation analyses were performed, and the results were used to answer the research questions. Qualitative data was analyzed using the content analysis technique, in which words, themes, patterns, and concepts within the texts were determined and arranged as per the study objective.

3.8 Ethical Considerations

Prior to commencing data collection, approval was sought from Kenyatta University, and a research permit was obtained from the National Commission for Science, Technology, and Innovation (NACOSTI) to conduct the research. In addition, the researcher obtained consent from the management of Nakuru Hills Special School. It is imperative that the school is fully informed about the research objectives and the type of information that was gathered during data collection. The researcher also discussed the possible risks that could occur during the research and the potential benefits the school participants would gain. Participation was voluntary, and the research guaranteed strict anonymity, ensuring all participants gave prior consent to having the data used for analysis and public dissemination.

4. Findings and Discussions

4.1 Demographic Information

The demographic characteristics of the participants were analyzed and discussed in terms of age, gender, grade, and the highest level of education. The data is presented in Table 1.

Table 1: Demographic Data of the Children with Speech Disorders

Demographic data		**Frequency**	**Percentage**
Distribution of Children by Gender	Male	6	60.0%
	Female	4	40.0%
	Total	**10**	**100.0%**
Distribution of Children by Age	2years	2	20.0%
	3 years	4	40.0%
	4 years	2	20.0%
	5 years	1	10.0%
	6 years	1	10.0%
	Total	**10**	**100.0%**

The demographic data shows that the majority of children in the sample were male (60%), with a notable representation of females (40%). The age distribution indicates that most children were aged 3 years (40%), with fewer participants in the other age categories. This information suggests a focus on early childhood, which is critical for speech development interventions. The higher number of male participants aligns with existing literature indicating that speech disorders are often more prevalent in males than females (Law, 2019).

4.2 Music Therapy and Speech Development of Children with Speech Disorders

This study compared the same group of children's speech development scores before and after the music therapy sessions, a paired samples t-test was used to effectively evaluate

the differences in scores. This method allows you to measure the impact of the therapy directly.

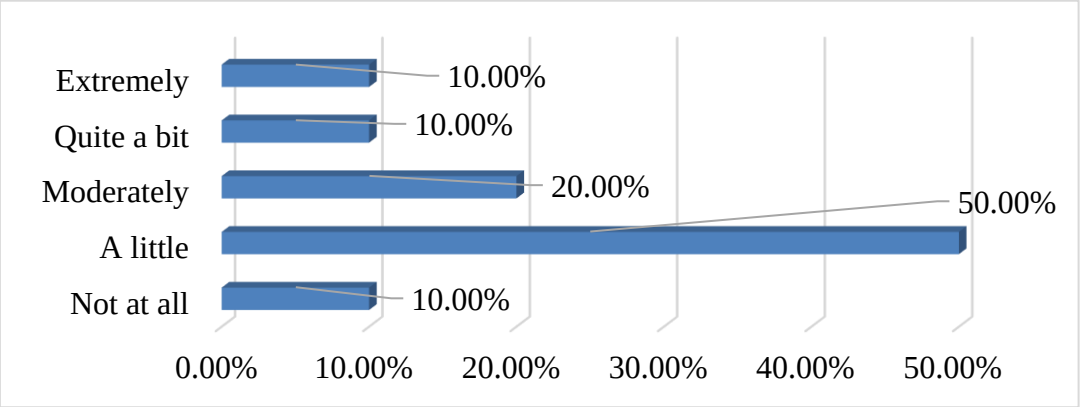


Figure 2: Caretakers' Rating of Music Therapy on Its Effect on Communication Skills

Caretakers' ratings reveal a mixed perception of the effectiveness of music therapy, with 50% indicating only a little impact on communication skills. However, a small proportion (20%) rated it as moderate, while 20% perceived significant improvements. These findings highlight that a substantial number of caregivers see some benefits from music therapy, but many may have lower expectations or not fully recognize the subtle improvements. This conclusion resonates with the findings of Johnson (2022), who noted that enjoyment during therapy can positively influence the perception of progress. Conversely, such results could contradict Vidal (2019), who observed more consistent improvements across different therapy settings, indicating that factors like caregiver involvement may influence perceived outcomes.

4.2.1 Paired Sample T-test

This study compared the same group of children's speech development scores before and after the music therapy sessions, a paired samples t-test was used to effectively evaluate the differences in scores. This method allows you to measure the impact of the therapy directly.

Table 2: Paired Samples Correlations: Pretest vs Post-test

Item		N	Correlation	Sig.
Pair 1	Single word Score Pretest scores & Single word Score Post-test	10	.535	.111
Pair 2	Word articulation in Sentences- Pretest scores & Word articulation in Sentences- Post Test	10	.645	.044
Pair 3	Conversational Speech Pre-test scores & Conversational Speech Post-test scores	10	.868	.001
Pair 4	Phonetic Transcription Pretest scores & Phonetic Transcription Post-test scores	10	-.103	.778
Pair 5	Prosody Pretest scores & Prosody Post-test scores	10	.458	.184

The paired samples t-test conducted in this study aimed to assess the impact of music therapy on various aspects of speech development among children with speech disorders by comparing their scores before and after the intervention. This statistical method is particularly effective in evaluating changes within the same group over time, allowing for a more precise measurement of therapy effects. The analysis revealed a moderate positive correlation of 0.535 between the pre-test and post-test scores for single-word articulation, though this result was not statistically significant ($p = 0.111$). This study suggests that while there may have been some improvement in the ability to articulate single words, it was not robust enough to definitively conclude that music therapy had a significant impact. Mendes & Rossinol (2022) emphasize the role of auditory discrimination in enhancing language skills, which may explain the lack of significant change in this area, as single-word articulation may require more focused and repetitive practice. In contrast, the results showed a strong positive correlation of 0.645, with a significance level of 0.044 for word articulation in sentences. This evidence indicates that music therapy had a positive influence on the children's ability to articulate words within sentences. This finding corroborates Johnson (2022), who found that structured music activities can enhance verbal expression in therapeutic settings. The integration of music likely encourages children to practice articulation within a contextual framework, thereby aiding their ability to construct sentences.

Notably, the test revealed an exceptionally strong correlation of 0.868 for conversational speech, with a highly significant p-value of 0.001. This indicates that music therapy significantly improved conversational speech skills among the children. This finding aligns with Mayer-Benarous *et al.* (2021), who noted that music therapy can facilitate not just individual sounds but broader communicative abilities. The engaging nature of music likely provided a non-threatening environment for children to experiment with language and enhance their conversational skills. Conversely, the analysis for phonetic transcription showed a negative correlation of -0.103 and a high p-value of 0.778, indicating no relationship between pretest and post-test scores. The result suggests a lack of statistically significant improvement. This finding is intriguing and somewhat contradictory to Gallagher *et al.* (2019), who posited that phonetic awareness could improve through rhythmic and melodic exposure in music therapy. It may imply that phonetic transcription requires different pedagogical strategies or tools that music therapy alone does not sufficiently address. Finally, the correlation for prosody yielded a moderate positive result of 0.458, but the significance level was 0.184, indicating no clear evidence that music therapy impacted this aspect of speech. This finding contrasts with Fiveash *et al.* (2021), who discussed music's role in enhancing the prosodic features of speech.

Table 3: Paired Samples Test- Paired Differences

Paired t-test items		95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
		Lower	Upper			
Pair 1	Single-word Score Pretest Scores & Single-word Score Post-test	-1.182829	-.217171	-3.280	9	.010
Pair 2	Word Articulation in Sentences-Pretest Scores & Word Articulation in Sentences-Post Test	-1.2524314	-.3475686	-4.000	9	.003
Pair 3	Conversational Speech Pre-test Scores & Conversational Speech Post-test Scores	-2.107937	-.892064	-5.582	9	.000
Pair 4	Phonetic Transcription Pretest Scores & Phonetic Transcription Post-test Scores	-1.756439	-.043561	-2.377	9	.041
Pair 5	Prosody Pretest Scores & Prosody Post-test Scores	-3.057813	-1.542187	-6.866	9	.000

The results presented in Table 3 illustrate the paired samples t-test outcomes comparing the pretest and post-test scores for various aspects of speech development among children receiving music therapy. Each item reveals insights into the effectiveness of music therapy and highlights significant areas of improvement. The t-value for the single-word score comparison was -3.280, with a significance level of 0.010. The 95% confidence interval ranged from -1.182829 to -0.217171. This result indicates a statistically significant improvement in the articulation of single words following music therapy. The negative value of the t-test suggests that post-test scores were higher than pre-test scores, confirming that music therapy had a positive impact on this aspect. These findings are in line with Mendes & Rossinol (2022), who emphasized that music can enhance auditory discrimination, which is essential for improving single-word articulation.

The analysis for word articulation in sentences yielded a t-value of -4.000 with a significance level of 0.003. The confidence interval ranges from -1.2524314 to -0.3475686, indicating a strong positive change. This finding supports the conclusion that music therapy is particularly effective in enhancing the ability to articulate words within sentences. Johnson (2022) corroborates this by highlighting the benefits of music-based interventions in developing expressive language skills. The ability to form coherent sentences is a critical component of language development, and this result suggests that music therapy facilitates this process effectively. The t-value for conversational speech was -5.582, with a significance level of 0.000, demonstrating a highly significant improvement post-intervention. The confidence interval, ranging from -2.107937 to -0.892064, confirms that children showed marked enhancement in their conversational abilities. This result aligns with Mayer-Benarous *et al.* (2021), who noted that music therapy can foster greater confidence in verbal expression, allowing children to engage more effectively in conversations. The strong correlation here suggests that music therapy acts as a supportive mechanism, encouraging children to practice and improve their conversational skills in a low-pressure environment.

For phonetic transcription, the t-value was -2.377, with a significance level of 0.041, indicating a statistically significant improvement as well. The confidence interval ranged from -1.756439 to -0.043561. While this finding suggests some positive impact, it is less

pronounced than that observed in other areas. This could indicate that phonetic transcription requires a more focused approach or additional strategies to fully benefit from music therapy, as Gallagher *et al.* (2019) suggest that specific phonetic training may be needed in conjunction with music therapy to achieve optimal outcomes. The results for prosody showed a t-value of -6.866 and a significance level of 0.000, indicating a highly significant improvement. The confidence interval ranges from -3.057813 to -1.542187. This finding underscores the effectiveness of music therapy in enhancing prosodic features of speech, which are crucial for expressing emotion and intent in communication. This result supports findings from Fiveash *et al.* (2021) that discuss how music therapy can improve not only articulation but also the musicality of speech, which is often overlooked in traditional speech therapies.

Further, correlation analysis was conducted to examine the strength and direction of the relationship between music therapy strategies (predictors) and observable changes in speech development (binary dependent variable). In this case, the outcome was measured as "Improved Speech Development" (yes/no), as presented in Table 4.

Table 4: Correlations between Music Therapy Strategies and Speech Development

Independent variables (music therapy strategies)		**Improvement in Speech Development after treatment**
Cumulative hours of therapy received	Pearson Correlation	.189
	Sig. (2-tailed)	.007*
	N	10
Singing	Pearson Correlation	.584
	Sig. (2-tailed)	.002*
	N	10
Playing instrument	Pearson Correlation	.748
	Sig. (2-tailed)	.006*
	N	10
Movement activities	Pearson Correlation	.756
	Sig. (2-tailed)	.012*
	N	10
Rhythm games	Pearson Correlation	.218
	Sig. (2-tailed)	.545
	N	10
Song writing	Pearson Correlation	.356
	Sig. (2-tailed)	.012*
	N	10
*.Correlation is significant at the 0.05 level (2-tailed).		

Table 4 shows the results of a study that looked at how different music therapy strategies (predictors) relate to changes in speech development, measured as "Improved Speech Development" (yes/no). The analysis focuses on the strength and direction of these relationships, offering helpful details about the efficacy of different music therapy techniques. The correlation coefficient for cumulative hours of therapy received is 0.189,

with a significance level of 0.007**.** This positive correlation suggests that as the cumulative hours of music therapy increase, the likelihood of improved speech development also increases. However, the correlation is relatively weak, indicating that while more hours of therapy are beneficial, they are not the sole determinant of improvement. This finding aligns with Lopez (2023), who noted that while increased therapy time can lead to better outcomes, the quality and type of intervention are equally crucial.

The correlation for singing is notably strong at 0.584, with a significance level of 0.002. This suggests a significant positive relationship between singing and improvements in speech development. The findings corroborate those of Gallagher *et al.* (2019), who emphasized that singing facilitates vocal practice, which can enhance articulation and expressive language skills. The use of melodies in singing may help children internalize speech patterns, thereby contributing to improved communication abilities.

The correlation for playing instruments is 0.748, with a significance level of 0.006. This strong positive correlation indicates that engaging in instrumental play is closely associated with enhanced speech development outcomes. This finding resonates with Pesnot Lerousseau *et al.* (2020), who argue that playing musical instruments enhances cognitive and motor skills, which are essential for effective speech production. The physical act of playing instruments may reinforce auditory processing and speech sound production, thereby benefiting children with speech disorders.

The correlation coefficient for movement activities stands at 0.756, with a significance level of 0.012. This indicates a strong positive correlation, suggesting that incorporating movement into music therapy sessions significantly aids in speech development. The interactive nature of movement activities may provide a multisensory experience that fosters language acquisition, as noted by Mendes & Rossinol (2022). Movement can enhance engagement and create a joyful learning environment, which is critical for children with speech challenges.

The correlation for rhythm games is 0.218, but it is not statistically significant ($p = 0.545$). This indicates that rhythm games do not have a meaningful relationship with improvements in speech development in this sample. This finding contrasts with the literature; while rhythm is often considered important for language development (Torppa & Huotilainen, 2019), it may not have been effectively implemented in this specific context. Future studies might explore different types or modalities of rhythm activities that could yield more significant results.

The correlation for songwriting shows a coefficient of 0.356, with a significance level of 0.012. This indicates a moderate positive correlation, suggesting that engaging in songwriting can contribute to improvements in speech development. This finding aligns with Mayer-Benarous *et al.* (2021), who highlight that creative expression through music not only enhances language skills but also boosts confidence in verbal communication. The act of writing songs requires children to think about language structure, rhymes, and rhythm, which can directly impact their speech capabilities.

The results of the correlation analysis reveal that specific music therapy strategies, particularly singing, playing instruments, and movement activities, are significantly associated with improvements in speech development. These findings support the existing literature, which underscores the therapeutic benefits of music in facilitating language skills among children with speech disorders. The weak connection found for the total hours of therapy shows that just having more therapy time might not be enough; the specific methods used in these sessions are important for getting good results. Furthermore, the non-significant relationship observed with rhythm games indicates that there must be careful implementation and possibly reassessment of how rhythm is utilized in therapy settings.

4.3.2 Qualitative Data Analysis

In an interview, caregivers reported significant improvements in their children's speech abilities since starting music therapy. Many noted enhancements in articulation and vocabulary, which contributed to better overall communication skills. The qualitative data collected from caregivers and a speech therapist offers profound conclusions about the impact of music therapy on the speech development of children with speech disorders. The statements made by caregivers and the therapist highlight key areas of improvement, particularly in articulation and vocabulary, as well as the overall communication skills of the children.

Caregivers reported noticeable improvements in their children's speech abilities since the initiation of music therapy. One of the respondents (C1) remarked,

> *"I've seen my child articulate words much clearer. Before therapy, he struggled with 'dog,' and now he says it without hesitation."* (Female Caregiver 1, aged years)

This statement reflects a specific enhancement in phonetic clarity. The mention of a previously challenging word being articulated clearly after therapy underscores the practical benefits of music therapy in addressing articulation difficulties. This aligns with the literature reviewed, which suggests that music therapy effectively facilitates articulation through rhythmic and melodic engagement. As Mendes and Rossinol (2022) noted, engaging in musical activities can enhance auditory discrimination and phonetic processing, which are essential for clear speech production. The caregiver's observation shows that music therapy can help improve speech clarity, proving that children can tackle certain speech difficulties when they use fun and engaging methods.

Another respondent (C2) stated,

> "*Her vocabulary has increased significantly; she uses new words every day that she didn't know before."* (Female Caregiver 2, aged 31 years).

This comment not only reflects a retention of vocabulary but also the ability of the child to integrate new words into daily conversations. The significance of vocabulary enhancement highlights the cognitive impacts of music therapy. Research has shown that music can improve language processing skills, enabling children to expand their linguistic repertoire and use language in context (Torppa & Huotilainen, 2019). The capacity to employ newly learned words in conversation illustrates the active role music therapy plays in language acquisition and cognitive development.

A speech therapist reported significant improvements in children's articulation in an interview. The participant (T1) acknowledged that,

> *"I've witnessed incredible progress in their ability to pronounce words clearly. The rhythm and melody seem to help them articulate better."* (Female therapist 2, aged 41 years).

This observation reinforces the idea that the structured patterns found in music can enhance the ability to form words confidently. The therapist's comment echoes findings from Pesnot Lerousseau *et al.* (2020), which indicate that music training positively influences auditory-motor interactions, thereby facilitating clearer speech production. Furthermore, the therapist highlighted that music therapy improves articulation and enhances overall communication skills, allowing children to express themselves more freely. The statement, "Children who were once hesitant to speak are now eager to communicate," illustrates the transformative effect of music therapy on the children's willingness to engage verbally. This sentiment aligns with the conclusions drawn by Mayer-Benarous *et al.* (2021), who indicated that the interactive and non-judgmental nature of music therapy provides a safe space for children, which can alleviate anxiety often associated with traditional speech therapy. The notion that music creates a "safe space" is crucial; it suggests that the engaging nature of musical activities reduces the pressure children may feel during conventional speech sessions, thus promoting a more favorable environment for verbal expression. This aligns with the broader literature indicating that the emotional and social aspects of music can create a more inviting atmosphere for children to practice and enhance their communication skills (Akombo, 2000; American Music Association, 2005).

5. Conclusion

In conclusion, the findings of this study affirm that music therapy significantly enhances speech development in children with speech disorders at Nakuru Hills Special School. The study successfully met its objective of exploring how music therapy impacts speech development, as both qualitative and quantitative data illustrate substantial improvements in articulation, vocabulary, and overall communication skills. Caregivers and professionals noted clear advancements in children's abilities to articulate words and use expanded vocabulary in everyday contexts. These findings substantiate the

assumption that music therapy serves as an effective intervention for fostering speech development, bridging gaps where traditional speech therapy may fall short.

5.1 Recommendations

1) The Ministry of Education should establish explicit policies to incorporate music therapy into speech therapy programs in institutions with special needs, acknowledging its potential to improve speech development through child-centered and engaging approaches.
2) The Kenya Institute of Curriculum Development (KICD) should revise and enhance the training curricula to include modules on music therapy for speech therapists, thereby providing them with the necessary skills for effective implementation.

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Conflict of Interest Statement

The authors declare no conflicts of interest.

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