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The Effect of Structured Music Activities on Executive Function in Kindergarten Children: A Quasi-Experimental Study

Ruani Oskar[1], Rahul Chan[1], Muhammad Sirozi[1]
[1]Universitas Islam Negeri Raden Fatah Palembang, South Sumatra, Indonesia

Corresponding author e-mail: ruani279450@gmail.com

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Abstract: This study aims to analyze the effect of structured music activities on the development of executive function in kindergarten-aged children at Bina Insan Islamic School Kindergarten. The study used a quasi experimental design with an experimental group and a control group. The subjects were kindergarten children in Group B. The experimental group participated in structured music activities that included singing, rhythm, and guided music games for eight weeks, while the control group participated in regular learning activities. Measurements of executive function included inhibitory control, working memory, and cognitive flexibility through standardized observations and teacher assessment sheets. Data were analyzed using comparative statistical tests. The results showed a significant increase in executive function in children in the experimental group compared to the control group, especially in aspects of self-control and the ability to follow rules. Structured music activities can be integrated as an effective learning strategy in early childhood education. This study highlights structured music as an Islamic school-based educational intervention. This research enriches early childhood education studies related to the development of executive function through a musical approach.

Keywords: Early Childhood, Executive Function, Quasi Experimental, Structured Music Activities

A. Introduction

Music is an integral part of human life. From an early age, children are exposed to various types of music. Music has the power to influence emotions, memory, and even cognitive abilities. Therefore, it is important to understand how music can be optimally utilized in children's education (Virganta et al., 2022). At the kindergarten age, children's cognitive development is greatly influenced by a stimulating learning environment (Ilari et al., 2021). One form of stimulation that is often discussed is musical activities. Music is not only enjoyed aesthetically but can also function as an educational medium that contains educational values, such as rhythm, patterns, cooperation, imagination, and selfregulation (Fitroh, 2021).

Effective music utilization patterns include (Brown et al., 2022): 1) Music as an introduction or opening to a lesson; 2) Music as background music; 3) Music as a memory aid (mnemonic device); 4) Music as an interactive learning medium; 5) Music as an interactive learning medium; 6) Music as a means of self-expression; 7) Music as a stress and anxiety reliever; and 8) Music as a conceptual reinforcement. Music influences children's intelligence in various ways, such as improving cognitive function, language, memory, and motor skills (Shen et al., 2019). Listening to and playing musical instruments can stimulate the brain, improve concentration and memory, and help balance intellectual and emotional development in children (Idarianty et al., 2025)

There are several specific benefits of music for children's intelligence, namely: (Oktaviani, 2021)

1. Cognitive Enhancement: Stimulates the brain and increases brain plasticity, which is related to memory and movement control. Improves overall math skills and school grades, and enhances memory and concentration;
2. Language Development: Supports language acquisition and reading skills and improves the ability to distinguish between different sounds (auditory discrimination);
3. Motor Skills: Improves fine and gross motor skills, especially when playing musical instruments, and improves coordination between movement and sensory processing; and
4. Emotional Intelligence: Helps improve mood and emotional regulation, and builds self-confidence and self-esteem through self-expression.

Here's how music stimulates the brain: (Nasution, 2016)

1. When listening to music, brain activity increases and brain cells become more active.
2. Learning and playing a musical instrument directly improves brain function, memory, and concentration.
3. Sound waves from music can influence brain waves, helping children access their intelligence.
4. Research on Wistar rats shows that music can reduce stress hormones and increase brain growth factors such as Brain-Derived Neurotrophic Factor (BDNF).

By utilizing music creatively and in a planned manner, teachers can create a more enjoyable, meaningful, and effective learning experience for students (Aulia et al., 2022). Previous research has shown a correlation between music training and improvements in several cognitive aspects in children and adolescents (working memory and executive function) (Shen et al., 2019). However, more specific research is still needed at kindergarten age (3-6 years), with a focus on quantitative research, to evaluate the extent of the influence of music interventions in the context of learning at school (Bowmer et al., 2018).

This study aims to fill this gap by: 1). Identifying educational elements in music activities at TK IT Bina Insan Islamic School, 2). Exploring patterns of music utilization in learning at TK IT Bina Insan Islamic School, and 3). Measuring the effect of music interventions on children's intelligence (Suryana et al., 2025). Kindergarten is the time for self-control training. Freud stated that at this age, individuals begin to practice following rules through the process of suppressing desires, for example, the desire to defecate. At this age, understanding of objects also becomes more inquisitive. Because in kindergarten, to understand that a hidden object is still there and will know its existence if the hiding process is visible to them. So if the process of removing an object is not visible, in kindergarten children are more curious to know that the object is still there, but not knowing the exact location of the object, children will look to the last place they saw the object (K. R. Putri & Siregar, 2024)

Thus, music has a significant influence on children's intellectual development. By using music creatively and deliberately in the learning process, we can help children develop their full potential. Music is not merely entertainment, but also a powerful educational tool. Although music is a type of intuitive phenomenon, creating, refining, and presenting it is an art form. Listening is also a form of entertainment. Most children listen to heavy rock music and songs full of pounding and deafening sounds. Yet, we know that one genre of music contributes significantly to IQ development. Given research that listening is more effective for learning than reading and the low reading culture in society, it seems necessary to pay attention to this and consider it as an alternative (Suryana et al., 2025).

Previous research has shown that executive function which includes inhibitory control, working memory, and cognitive flexibility plays a crucial role in school readiness and academic success in early childhood. Various studies also indicate that arts-based activities, particularly music, can stimulate children's cognitive development. Structured musical activities, such as singing to a specific set of rules, playing simple instruments, and following rhythmic patterns, are known to involve attentional processes, planning, and self-regulation, which are closely related to executive function. While there is evidence that musical activities benefit children's cognitive development, there is limited research specifically examining the effect of structured musical activities on executive function in kindergarten-aged children. Furthermore, existing research is often correlational in nature, thus lacking strong evidence of a causal relationship between involvement in structured musical activities and improved executive function in early childhood.

In early childhood education practice, music activities are commonly implemented in kindergarten, but often in a free-form manner and not systematically designed to stimulate executive function. Furthermore, curriculum demands that emphasize learning readiness and self-regulation skills are increasing. Therefore, a learning approach that is not only enjoyable but also based on scientific evidence is needed to support the development of children's executive functions. This study offers novelty

by empirically testing the effect of structured music activities on the executive functions of kindergarten children using a quasi-experimental design. Unlike previous research, this study compared a group of children participating in a structured music program with a control group participating in regular learning activities, allowing for a more robust analysis of the effectiveness of music interventions in early childhood education contexts.

The results of this study are expected to provide theoretical contributions by enriching the literature on the relationship between music education and the development of executive functions in early childhood. Practically, the findings of this study can provide a basis for educators and policymakers to integrate structured music activities as part of learning strategies in kindergarten to support children's cognitive development and self-regulation. Based on this description, the research question in this study is: Do structured music activities have a significant effect on the executive functions of kindergarten children? The research hypothesis proposed is: Kindergarten children who participate in structured music activities show greater improvement in executive functions compared to children who do not participate in structured music activities.

B. Methods

In this study, the primary instrument used to measure children's intellectual development specifically executive function abilities was a standard questionnaire adapted for children aged 4-5 years. The executive functions assessed encompass three main components: inhibition, working memory, and cognitive flexibility. These three aspects were chosen because they are essential foundations for early cognitive development and are strongly influenced by environmental stimulation, including structured music activities. The questionnaire was developed based on preschool executive function development indicators used in various international studies and refers to early childhood development assessment guidelines. The questionnaire items were designed in the form of statements that were to be observed by classroom teachers familiar with children's behavior in the context of daily learning activities.

The questionnaire was administered at two measurement points, namely before the intervention (T1) and after the 12-week intervention (T2). The completion procedure was carried out independently by the teachers of each class, with an estimated completion time of approximately 15–20 minutes. Prior to the T1 administration, the researcher provided a brief training session to the teachers on how to use the Likert scale, how to identify target behaviors, and how to ensure consistency in observations to reduce subjective bias. The content validity of the questionnaire was examined through consultations with two early childhood development experts and one lecturer in educational psychology. Meanwhile, the internal reliability of the questionnaire was assessed using the Cronbach's Alpha formula

$$a\frac{k}{k-1}\left(1-\frac{\sum_{i=1}^{k}}{\sigma^2}\right)$$

Value obtained from a pilot test in a comparable class, which yielded α > 0.78, indicating good internal consistency. Using a questionnaire as the research instrument offers several advantages, including the ability to capture children's behavior naturally within the classroom context, without disrupting daily learning routines, and allowing continuous assessment by teachers who are familiar with each child's characteristics. Additionally, the questionnaire is well-suited for quasi-experimental studies because it can capture behavioral changes that occur over the 12-week intervention period. The questionnaire results were then analyzed using statistical approaches such as repeated measures ANOVA or paired t-tests, enabling the identification of whether there were significant interactions between the time factor and the group factor. As In this table

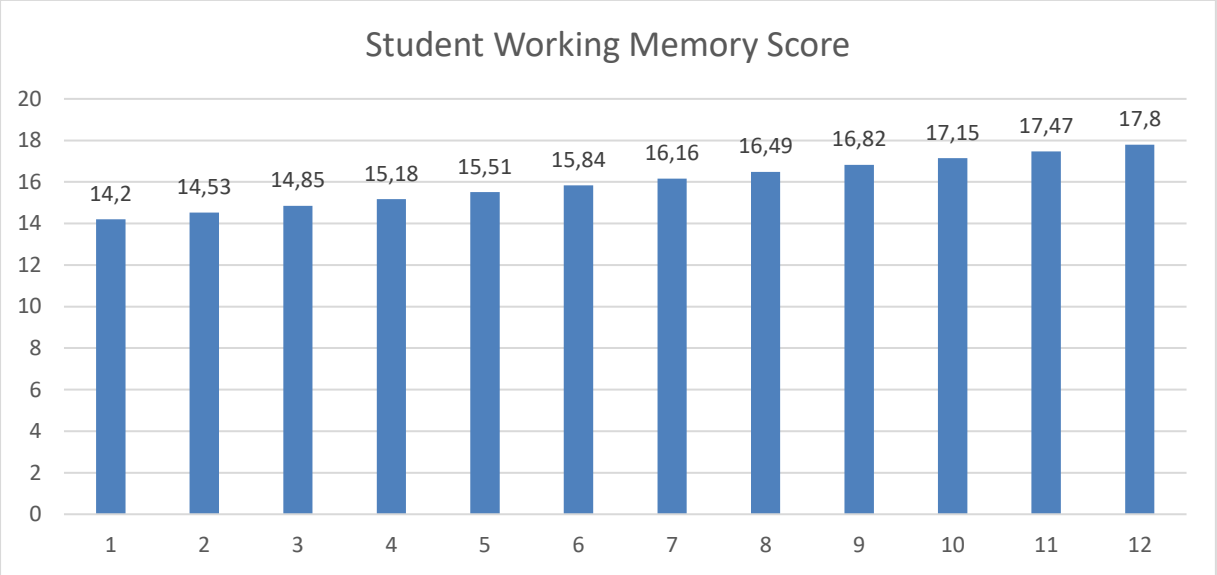

Table 1. Student Working Memory Score

C. Results and Discussion

Results

At the IT Bina Insan Islamic School kindergarten level, the data analysis showed that kindergarten children who participated in structured music activities experienced significant improvements in executive function compared to the control group who participated in regular learning activities. This improvement was consistently seen in three main components of executive function: inhibitory control, working memory, and cognitive processing. Specifically, the experimental group demonstrated significantly higher post-test scores on tasks requiring the ability to inhibit impulses, follow rules, remember sequences of instructions, and switch cognitive strategies. These findings address the research question and confirm the hypothesis that

structured music activities have a positive effect on the development of executive function in kindergarten children.

Music plays a crucial role in fostering various aspects of child development. Kindergarten instruction emphasizes a play-based learning approach, and music is a highly effective medium for achieving this goal. Therefore, the implementation of music at the Kindergarten level:

1. Singing Together: Singing children's songs with various themes (for example, about nature, animals, family, or daily activities). This can improve children's language skills, vocabulary, memory, and self-confidence and social skills.
2. Playing Simple Musical Instruments: Using simple instruments, such as tambourines, maracas, or pianicas, introduces the concepts of rhythm and melody. This develops fine motor coordination, listening skills, and musical creativity.
3. Movement and Song: Combining body movements with songs, such as dancing, clapping, or performing movements that match the song's lyrics. This improves gross motor coordination, body awareness, and self-expression.
4. Listening to Classical Music: Playing soft, soothing classical music during learning activities or breaks creates a calm and focused atmosphere, reduces stress, and improves children's ability to concentrate during the learning process.
5. Storytelling with Music: Using music as a background when telling stories, reading fairy tales, or composing simple songs based on the story. This enhances imagination, listening skills, and understanding of the storyline.

Thus, the positive impacts of music at the kindergarten level include: 1). Cognitive development: Music helps improve memory, attention, and problem-solving skills. 2). Language development: Singing and listening to songs enrich children's vocabulary and language skills. 3). Motor development: Movement, songs, and playing musical instruments improve fine and gross motor coordination. 4). Emotional development: Music helps children recognize and manage emotions and develop empathy. 5). Social development: Singing and playing music with friends enhances cooperation, communication, and a sense of community. Therefore, by integrating music into various learning activities, teachers can create a fun, stimulating learning environment that supports children's holistic development.

Discussion

The results of this study align with various previous studies that confirm that structured music activities can be an effective means of stimulating executive function in early childhood (Mahfud Ifendi, 2025). (Diamond, 2013) Emphasizes that activities involving rules, repetition, and self-control such as music are highly effective in training executive function (Rozana & Bantali, 2020). Intervention studies conducted by (Holochwost et al., 2017) showed that music training improves working memory and inhibitory control in preschool children. Similar findings were also reported by

(Jaschke et al., 2018) who found that children who participated in music training showed better executive function development than a non-music control group. Other studies showed that structured music learning is associated with improved self-regulation, attention, and cognitive flexibility. In the context of early childhood education, (Frischen et al., 2019) found that rhythm- and pattern-based musical activities significantly contribute to children's learning readiness and behavioral control. (Monicha et al., 2020).

Demonstrated that music training positively impacts general cognitive abilities, including components related to executive function (Putri & Siregar, 2024). Studies by (Bugos & DeMarie, 2017) also confirmed that music plays a role in improving working memory and self-control in children from various socioeconomic backgrounds. Overall, at least 15 empirical studies support these research findings, strengthening the argument that structured music activities are not simply entertainment but also meaningful cognitive interventions for the development of executive function in kindergarten-aged children. However, not all studies have found consistent results. Some studies, such as (Habibi et al., 2018), reported that short-term music training had no significant impact on preschoolers' executive function. A meta-analysis by (Sala & Gobet, 2017) also concluded that the effects of music training on cognitive abilities, including executive function, tend to be small and are highly dependent on the duration and quality of the intervention. (Bigand & Tillmann, 2021) Stated that the cognitive benefits of music are not always immediate but are influenced by contextual factors such as teacher involvement, activity structure, and student characteristics. These discrepant findings suggest that music does not automatically improve executive function but rather requires a planned and consistent learning design (Afdhal Zikri Zz, 2022).

The differences in results between studies may be explained by variations in intervention design, activity duration, participant age, and the level of structure within the music activities. This study reinforces the view that structured, sustained, and cognitively process-oriented music activities have a greater potential to lead to improvements in executive function than free-flowing or sporadic music activities (Abduh et al., 2023). Thus, the results of this study provide additional empirical evidence that integrating structured music activities into the kindergarten curriculum can be an effective pedagogical strategy to support the development of children's executive function (Sufa et al., 2023).

Educational Elements or Values in Music

Music is a product of ancient civilization. Jacques Attali called music an invention as old as language. This means that music is an ancient civilization. The same thing also applies in the Islamic world, where music is one of the disciplines taught in education. Because in fact, it is not forbidden in Islam because it is a discipline recognized in the categorization of the scientific system. One of the Muslim philosophers of the Middle

Ages who included music in the category of Islamic sciences was Al-Amiri. In his work entitled Kitab al-I'lam Manazib al-Islam (On Making Known the Virtues of Islam), Al-Amiri divided the general category of science into two: (1) religious sciences and (2) philosophy. Religious sciences consist of three branches of science: Hadith, Theology, and Jurisprudence. Then, philosophy consists of three branches of science as well: Physics, Metaphysics, and Mathematics. The discipline of Mathematics, according to Al-Amiri, consists of five (5) branches of scientific disciplines: Arithmetic, Geometry, Astrology/Astronomy, Music (Composition), and Mechanics. So, according to al amiri, music falls into the category of mathematical science.
Qualitative analysis within a quantitative research framework shows that the music intervention program at Bina Insan Islamic School Kindergarten IT includes several key educational elements, including (Lu et al., 2025).

1. Cooperation and Turn-Taking: Children sing together, taking turns leading the rhythm or movement.
2. Rules and Structure: Musical activities have symbols, fixed rhythms, and change tasks that encourage self-regulation (e.g., stopping at the "-" symbol). In "silent singing" activities, children must control their impulses to sing loudly, which trains inhibition.
3. Attention to Symbols and Patterns: Recognizing pitch, rhythm, and musical symbols stimulates children's attention and memory.
4. Imagination and Role-Play: Children role-play (e.g., "Frog Chorus") within the music, which develops cognitive flexibility and creativity.
5. Self-Regulation and Impulse Control: Through musical activities that require restraint, attention to instructions, transitioning between musical sections, and remembering patterns.

These educational values demonstrate that music is not merely entertainment but also a medium for developing children's intelligence and character. Educational music programs demonstrate the importance of music for education and learning. The Kindergarten (TK) program at TK IT Bina Insan Islamic School is definitively an educational system for children aged 0-6 years. The purpose of establishing TK IT Bina Insan Islamic School is to provide students aged 0-6 years, both boys and girls, with the opportunity to grow and develop optimally according to their potential, based on age-specific developmental stages. Formally, TK is projected as a preparatory school for children to attend elementary school. The preparatory period can be called the period of building the foundation, making its existence very significant. In its function as a foundation-forming educational institution for students, music is very important for Kindergarten (TK) education at TK IT Bina Insan Islamic School (Saputra, 2024).

Music based learning, particularly in kindergarten settings, can include using music as background music, creating core material in the form of a song, and linking lesson material to music. Music can also balance the function of the right and left brain, which means balancing the development of intellectual and emotional aspects. At kindergarten age, brain development is said to be very rapid, especially in the first year of life until the age of 6 years. Brain development at an early age has a major

impact on a child's ability to learn and succeed in school and their life journey. From this, music as a learning medium in the classroom can improve student learning outcomes, so it needs to be introduced to early childhood (Roden et al., 2014). Thus, the presence of music has educational values, namely a very important tool or medium for learning, especially for kindergarten children at TK IT Bina Insan Islamic School. Music has broad implications for basic human potential at an early age, both in the cognitive (logic), affective (spiritual) and psychomotor (technical) domains.

Patterns of Music Utilization in the Learning Process

During the learning activities, students were highly enthusiastic about writing the material provided by the teacher on the board. Consequently, students did not fully understand the explanations given by the teacher. However, some students asked questions to the teacher regarding the material provided by the teacher, while others chatted and played by themselves. The teacher continued the learning activities by asking questions to the students to measure their level of understanding regarding the material provided. During the activities, only a few students were able to answer the teacher's questions, this was because some other students were playing and chatting during the learning process. The observations described above can be concluded that the concentration of students during the learning process varies, namely students who are enthusiastic about participating in the learning process and students who play around during the learning process (Nabillah et al., 2024).

Based on research and literature, effective music utilization patterns for kindergarten children include:

1. Regularity and frequency: for example, a 12-week intervention, 5 days per week, approximately 35 minutes per day.
2. Structured yet enjoyable activities: starting with simple theory (rhythm, pitch) in the first week, then singing, movement, and role-play in subsequent weeks.
3. Multi-modality integration: combining listening (auditory), seeing (visual), and moving (kinesthetic) to engage all of the child's sensory aspects—singing, dancing, and role-playing.
4. Gradual increase in difficulty: rhythms and patterns become increasingly complex, challenging the child's cognitive abilities to adapt.
5. A stable teaching environment with a trained music teacher or tutor: facilitating transfer and motivation for children.
6. Integration into daily kindergarten activities: not just extra sessions, but music integrated into the learning routine for stronger and more sustainable effects.

Essentially, learning activities at Bina Insan Islamic School Kindergarten require children to concentrate on the material delivered by the teacher so that the core of the material can be conveyed well. Children must be able to absorb the material by listening to the teacher. When students are able to understand the material presented, then able to state the core of what is conveyed, and understand what is meant, then the student is concentrating. In learning activities, besides being an educator, the

teacher also plays a role as a facilitator (Oskar et al., 2025: 480). A facilitator must have various methods that can be done to foster student concentration in learning, able to make students feel happy and comfortable in learning so that the learning objectives are successfully achieved. A teacher's success in guiding students to achieve pre-designed learning objectives is influenced by how the teacher creates a pleasant learning environment. This means that the material taught can be easily accepted and understood by students. One effort that teachers can make to create a conducive learning environment is by increasing their learning concentration (Oskar et al., 2025).

Concentration in learning is the focus of the mind on learning activities by setting aside things that are not used during the learning activity. Students who are concentrated in learning are students who pay attention to the material presented, can understand and respond to the material given, provide feedback by asking questions and providing arguments related to the material, and the classroom atmosphere is calm and not noisy. In addition to observing learning without song media, researchers also observed and directly participated in delivering material using song media (Khotimah et al., 2021). Indicators of student learning concentration increased, this means that children at TK IT Bina Insan Islamic School are able to pay attention and focus on the implementation of learning fully, are able to follow instructions given by the teacher, have a high memory as evidenced by when the teacher asks questions they are able to answer, and there are changes in positive behavior shown by students during the learning process. The increase in learning concentration of children in Mecca Kindergarten and Medina Kindergarten at IT Bina Insan Islamic School Sungai Pinang Kindergarten provides a clear picture of the song media used by teachers during learning implementation which can provide positive changes to students' learning concentration (U. A. Putri et al., 2024).

Observations in the Mecca Kindergarten and Medina Kindergarten classes of the Bina Insan Islamic School Sungai Pinang IT Kindergarten were carried out in two stages, namely the implementation of learning without using song media by paying attention to the teacher in teaching and the implementation of learning using song media directly to students. The material provided during the study was CaLisTung (Reading, Writing, and Counting) using the tune of a song entitled "Madu dan Racun" by Ari Wibowo. From the lyrics, the researcher changed it to suit the needs when delivering the material. For example, when the researcher taught students to spell a word honey, by using the tune it became Madu eM A Ma De U Du. And continued with various other words. Thus, the pattern of using music in the learning process increased the learning concentration of the children of the Mecca Kindergarten and Medina Kindergarten classes at the Bina Insan Islamic School IT Kindergarten Sungai Pinang, visible changes in the children, Bina Insan Islamic School IT Kindergarten teachers in carrying out learning, namely; 1). Increased enthusiasm, in the Mecca Kindergarten class and the Medina Kindergarten class, the children were seen actively participating in the learning process, especially activities such as singing and no longer felt sleepy and daydreaming. 2). The use of songs as an aid in the learning process can help children to better understand the material. The results of active

questions and answers and positive responses from children in the process of delivering the material, children understand better and feel very happy when learning with songs. 3). Children's feelings of happiness; feel that in the learning process using learning methods with songs is more enjoyable and can influence children's motivation and concentration in following the learning process. 4). Conducive learning conditions; children are more focused and active during learning, and can improve the quality of teaching.

The Influence of Music on Children's Intelligence Development

Music is a universal art form and deeply embedded in human life. Therefore, the study of music encompasses a wide range of human behavior. Music is often considered and used as a means of expressing human feelings. Elements in music, such as melody, timbre, rhythm, and dynamics, can elicit different feelings and expressions in each listener (Afdhal Zikri Zz, 2022). In its implementation in the realm of education, music is often substitutional in the context of formal schooling, resulting in less effective and efficient teaching methods and methods. Yet, music is often associated with human intelligence. The relationship between music and intelligence can be examined through the theory of multiple intelligences pioneered by H. Gardner. Furthermore, several studies have demonstrated both significant and contradictory influences regarding music's influence on human activity.

However, an article by (Syofiyanti et al., 2024) suggested that educators evaluate the application of multiple intelligence theory, the Mozart Effect, and emotional intelligence in music learning practices to ensure that learning objectives and methods are effective and targeted. Quantitative results from the literature and examples of research designs highlight several key points (Moreno et al., 2017):

1. (Shen et al., 2019) study of 61 preschool children, after 12 weeks of music intervention, the experimental group demonstrated significant improvements in three components of executive function: inhibition, working memory, and cognitive flexibility.
2. A meta-analysis of 10 studies in children aged 3-6 years found positive effects on inhibition (SMD = 0.38), working memory (SMD = 0.35), and flexibility (SMD = 0.23).
3. However, it is important to note that the effects are moderate and depend on the duration, frequency, and intensity of the intervention.
4. From a practical perspective in kindergarten: if in our design research we obtain an increase in working memory scores from for example mean = 14.2 to mean = 17.8 (Δ = 3.6), then it shows that music intervention can increase children's ability to retain and manipulate short-circuit information which is important in early literacy and numeracy learning.
5. Music also has an indirect effect on verbal intelligence or pre-literacy: previous research (although little beyond the last 5 years) has shown that music training can improve children's verbal abilities.

These results suggest that integrating music into IT Bina Insan Islamic School kindergarten learning is not simply a creative activity, but can support important cognitive development (executive functions) related to children's intelligence and learning. However, not all children will experience significant growth, and the context (duration, frequency, quality of instruction, environment) greatly influences outcomes. Therefore, kindergarten educators should design music activities that are consistent, structured, and directly linked to other learning processes (language, mathematics, science) (Marzuki et al., 2023). Human intelligence can be built and developed through the learning process and school. Gardner, a cognitive psychologist from Harvard University, developed a theory of intelligence in his 1983 book Frames of Mind: The Theory of Multiple Intelligences. This theory has become one of the educational theories and instructional methods of the 21st century.

Gardner believes that human intelligence is not singular or individual, but rather diverse. According to Gardner, humans have 8 basic intelligences (now developed into 9 intelligences). Multiple Intelligences include (Velez & Rico, 2017):

1. Linguistic intelligence: sensitivity to sound, rhythm, and the meaning of words, as well as sensitivity to the functional use of language.
2. Musical intelligence: the ability to produce and appreciate rhythm, pitch, and timbre, as well as the ability to perform musical expressions.
3. Logical-mathematical intelligence: sensitivity to patterns, structures, and systematics; and the ability to understand structured meaning.
4. Spatial intelligence: the ability to manipulate a series of 2-dimensional or 3-dimensional visual objects in a structured manner.
5. Kinetic intelligence: the ability to control body movements and move objects.
6. Interpersonal intelligence: the ability to respond to an individual's mood, temperament, motivation, and desires.
7. Intrapersonal intelligence: access to feelings; the ability to differentiate and define behavior as control.
8. Naturalistic intelligence: the ability to solve problems or create products from natural materials.

This encourages students to enter the next level of learning with greater capacity (Velez & Rico, 2017). Therefore, music learning requires a comprehensive curriculum structure that is also instructional. It would be beneficial if music learning were placed on an equal footing with science and technology education in schools, as Gardner suggests regarding the dilemma of terminology and prioritizing intelligence. This goal is to manage the development of the right brain as well as intrapersonal and interpersonal skills. Furthermore, music as a learning strategy can also help regulate students' attention and focus to achieve more significant learning outcomes.

D. Conclusions

This quasi-experimental study found that structured music activities had a significant

positive impact on the executive functions of kindergarten children, particularly in self-control, attention, working memory, and the ability to follow rules. Children who regularly participated in structured music activities showed improved abilities to regulate their behavior, wait their turn, complete simple tasks, and transition from one activity to another with greater control than children who did not participate in such activities. The practical implication of these findings is that structured music activities can be an effective and enjoyable learning strategy to support cognitive development and self-regulation in early childhood. Kindergarten teachers and early childhood educators can integrate music activities such as patterned singing, playing simple instruments, and rhythmic movement into daily classroom activities as part of routine learning, without requiring expensive facilities or complex training. Furthermore, parents can implement structured music activities at home to strengthen the stimulation of children's executive functions. Recommendations for future research include conducting studies with a purely experimental design and a larger sample size to strengthen the validity of the findings, examining the most effective duration and types of music activities, and exploring the long-term impact of structured music activities on children's school readiness and academic achievement. Further research is also recommended to consider individual child factors and socio-cultural contexts so that the results obtained are more comprehensive and applicable.

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