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EFFECT OF AUDIOLYFE STIMULATION ON COGNITIVE DEVELOPMENT (INTELLIGENCE, MEMORY, AND CHILD LEARNING ENTHUSIASM) IN BANDA ACEH

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ABSTRACT

Cognitive development is a crucial aspect of a child's growth, encompassing thinking skills, memory, and learning motivation. This study aims to analyze the impact of Audiolyfe stimulation on the cognitive development of children aged 0-12 years in Banda Aceh, focusing on enhancing intelligence, memory, and learning enthusiasm. A quasi-experimental method was employed with 20 children as participants. Data were collected through observation and questionnaires and analyzed descriptively. The results revealed that Audiolyfe significantly influenced children's cognitive development. Children who received this stimulation demonstrated increased intelligence, sharper memory, and higher learning motivation compared to the control group. The effectiveness of Audiolyfe is attributed to the impact of sound waves on neurological activity in the auditory cortex and memory areas of the brain. Additionally, Banda Aceh's local culture, such as the tradition of listening to stories and traditional music, reinforced children's positive responses to this stimulation. This study concludes that Audiolyfe is an innovative and effective approach to supporting children's cognitive development. It is recommended that Audiolyfe be integrated into formal and informal education programs in Banda Aceh to improve children's learning quality optimally.

KEYWORDS *Stimulation, Audiolyfe, Cognitive Development, Intelligence, Memory, Children's Passion for Learning.*

INTRODUCTION

Cognitive development is one of the main aspects of a child's development that plays an important role in learning, thinking and problem solving. Understanding children's cognitive development, especially in early life, is crucial. Research in this area can provide valuable insights into how children develop knowledge, solve challenges, and interact with their environment (Hasibuan et al., 2024). The cognitive system itself can be understood as a complex mechanism in

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humans that helps process information through the acquisition, storage, processing, and transmission of information (Basri, 2018).

Cognitive aspects are closely related to individual success in various areas of life. These cognitive abilities lay the foundation for the development of other skills, including communication, motor, social, emotional and adaptive skills. The direct relationship between the development of cognitive skills and other skills suggests that success in the development of this aspect can have a significant impact on individual achievement in various fields (Darouich, 2017). Therefore, the learning process that children go through, including cognitive development, is an important aspect that needs serious attention.

This research was conducted in Banda Aceh, a region with rich local culture and a strong tradition of community-based education (Nurhayati & Rizal, 2021). As one of the growing regions in terms of education and technology, Banda Aceh presents a unique opportunity to integrate innovative approaches such as Audiolyfe in supporting children's cognitive development (Hasibuan et al., 2024). The strong listening habits of folklore, traditional music, and oral-based activities in Banda Aceh culture are important factors that influence children's response to audio-based stimulation (Syahputra, 2020).

Developing and strengthening cognitive skills from an early age is a strategic step to support individual success in life. During the growth period, the stimulation given to children is a determining factor in increasing intelligence, memory, and enthusiasm for learning. Therefore, parents and educators have a great responsibility to provide appropriate stimulation from an early age to support the optimal development of children (Ilhami, 2022).

Along with the development of technology in the modern era, various methods of learning and cognitive stimulation have made significant progress. One of the latest innovations to attract attention is Audiolyfe, a sound wave-based technology designed to stimulate neurons in the brain with the aim of improving children's cognitive abilities. Audiolyfe works through sound wave therapy designed to strengthen the integration between the left and right brain. This integration is thought to be important in supporting various cognitive functions, including memory, concentration, and motivation to learn.

Previous research has shown that audio stimulation has great potential in supporting children's cognitive development. This method is associated with improved memory, focusing ability, and motivation to learn more effectively. For example, research by Mesiono et al. (2020) revealed that in Dwi Utama Kindergarten, there was an increase in the average score of children's cognitive development before and after being given audio-based treatment. Another study by Muliyil and Dhiksha (2022) stated that audio-based training can improve children's attention and working memory. Audio is considered to be interesting for children, so they feel happy listening to it. In addition, audio-based interventions in schools have many advantages, such as helping relaxation while supporting cognitive development. The results of the study showed that audio training can improve concentration, reading accuracy, and overall cognitive development.

Another study conducted by Ardi and Fauziyah (2018) highlighted the link between audio stimulation and memory improvement. This research shows that the

use of audio in the learning process can stimulate areas of the brain associated with information storage and retrieval, such as the hippocampus and prefrontal cortex. Audio stimulation with certain rhythmic patterns is known to increase alpha and gamma brainwave activity, which plays an important role in the process of memory consolidation and integration of new information. In addition, calming audio can decrease activity in the limbic system, particularly the amygdala, which plays a role in the stress response. This decrease in activity helps to create more optimal conditions for cognitive functions, including memory. Thus, the interaction between audio stimulation and brain function provides a strong scientific basis for the use of audio as a tool to improve memory and support cognitive performance, especially in children undergoing the learning process.

However, while technologies like Audiolyfe have great potential, their effectiveness in supporting children's cognitive development still requires further research. Further research is needed to thoroughly understand its impact on aspects such as intelligence, memory and enthusiasm for learning. Through this research, it is hoped that findings can be generated that make an important contribution to the development of more effective stimulation methods, so as to support optimal education and cognitive growth of children in Indonesia. The results of this study can contribute not only to provide new insights for educators, but also to guide parents and educational program developers in designing more appropriate interventions to support children's development. Thus, the main objective in the study was to further explore the effect of Audiolyfe stimulation on children's cognitive development, with a focus on improving intelligence, memory, and enthusiasm for learning.

RESEARCH METHOD

This study uses quantitative methods with an experimental approach to evaluate the effect of Audiolyfe stimulation on children's cognitive development. Quantitative research methods involve the use of number-based data and aim to test certain theories or hypotheses, so as to support or reject them (Ali, 2022). This approach aims to develop mathematical models, theories, and hypotheses related to the phenomenon being studied, especially to determine the relationship between variables in the targeted population. The population in this study were children aged 4-12 years who experienced various challenges in their cognitive development, such as delays in thinking, difficulty remembering, and low enthusiasm for learning. The research sample was selected using purposive technique with a total of 22 children.

Data were obtained through direct observation in Banda Aceh of the children and completion of questionnaires by their daily caregivers, thus providing an in-depth picture of the children's baseline conditions before stimulation was provided. Data were analyzed using descriptive and inferential statistics. Descriptive statistics were used to describe the children's initial conditions and the changes that occurred after the treatment, while inferential statistics were applied to test the effect of Audiolyfe stimulation on children's cognitive abilities. This analysis process was designed to determine whether there was a significant difference between the

groups before and after treatment. This study proposed two main hypotheses, namely:

H0: There is no significant effect of Audiolyfe stimulation on the development of cognitive abilities in children, which includes increasing children's intelligence, memory, and enthusiasm for learning.

H1: There is a significant effect of Audiolyfe stimulation on the development of cognitive abilities in children which includes increasing children's intelligence, memory, and enthusiasm for learning.

RESULT AND DISCUSSION

Research Results

The purpose of this study was to analyze cognitive development including improving children's intelligence, memory, and enthusiasm for learning. Data collection was carried out with a pre-test filled out by parents or influences to measure the cognitive development of children who were the subject of the study. The initial test was conducted before audiolyfe stimulation. After stimulation with audiolyfe, then a post-test was conducted to measure children's cognitive development which was again filled in by parents or caregivers. The results of both tests were analyzed to see the differences in children's development including improving intelligence, memory, and enthusiasm for learning. The following are the descriptive statistical results of the research conducted.

Table 1. Descriptive Statistics Results

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pretest	22	56	77	68.23	6.102
Posttest	22	80	92	85.55	3.764
Valid N (listwise)	22				

Source: Author's Data

Table 1 shows the results of descriptive statistics for the pretest and posttest conducted on 22 participants. For the pretest, the recorded scores ranged from 56 to 77, with a mean of 68.23 and a standard deviation of 6.102. This higher standard deviation indicates greater variation among participants' pretest scores. This could indicate that at the initial stage, there was a more significant difference in participants' ability or knowledge prior to the intervention or teaching.

Meanwhile, in the posttest, there was a clear improvement in children's cognitive development scores. The range of posttest scores was between 80 and 92, with a higher mean of 85.55 and a smaller standard deviation of 3.764. This decrease in standard deviation indicates that the posttest results were more centered on the mean, meaning participants had a higher level of consistency following the process. This increase in mean score and decrease in standard deviation indicates a significant improvement after the intervention between the pretest and posttest.

Thus, it can be concluded that participants experienced a clear improvement in the understanding or skills measured in the test.

These results show that Audiolyfe stimulation is effective in improving cognitive development including increasing children's intelligence, memory, and enthusiasm for learning. Although there is an increase in the average, further analysis is needed to ascertain whether this difference is truly statistically significant or merely coincidental. Before conducting a Paired Sample T-Test to test the research hypothesis, the first step is to test the normality of the data.

Normality test is a statistical method used to determine whether a data or sample follows a normal distribution (Gaussian distribution) (Permana & Ikasari, 2023). This is important because many statistical tests, such as the T-test, assume that the data used has a normal distribution. If the data is not normally distributed, then the results of the statistical tests performed can be invalid. The results of the normality test conducted are as follows.

Table 2. Normality Test Results

Tests of Normality

Pretest					
Posttest					

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Source: Author's Data

The research sample size was less than 50 so the Shapiro-Wilk Test was more appropriate to use than other tests in the normality test analysis. This test is recommended for small samples because it is more effective in determining whether the data follows a normal distribution. The results of the normality test with the Shapiro-Wilk test showed that the pretest and posttest data had a normal distribution because the significance value (Sig.) for both was greater than 0.05. For the pretest, the Shapiro-Wilk statistical value is 0.939 with a significance of 0.189, while for the posttest, the Shapiro-Wilk statistical value is 0.948 with a significance of 0.290. Since both have a significance value greater than 0.05, it can be concluded that the pretest and posttest data are normally distributed.

After the data is proven to be normally distributed, the next step is to conduct a Paired Sample T Test to determine whether there is a significant difference between the pre-test and post-test results after the intervention in the form of Audiolyfe stimulation. Determination of significant influence on variables, the test criteria is based on the significance value (Sig.). If the significance value (Sig.) (2-tailed) is smaller than 0.05, then the null hypothesis (H0) is rejected and the alternative hypothesis (Ha) is accepted, which means that Audiolyfe stimulation has a significant effect. Conversely, if the significance value is greater than 0.05, then the null hypothesis (H0) is accepted and the alternative hypothesis (Ha) is rejected, which indicates that there is no significant effect of the intervention (Usmadi, 2020). The results of the paired sample t test are as follows.

Table 3. Paired Sample t Test Results

Paired Samples Test

		Paired Differences					t	df	Significance	
					95% Confidence Interval of the Difference					
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			One-Sided p	Two-Sided p
Pair 1	Pretest Posttest	-17.318	7.882	1.681	-20.813	-13.823	-10.305	21	<.001	<.001

Source: Author's Data

Paired Samples Test is used to compare two sets of data that come from the same group or the same subject at two different points in time. Tests were conducted between pretest and posttest results to measure differences that occurred after the intervention. The results of the analysis showed that the mean difference between the pretest and posttest was -17.318 with a standard deviation of 7.882, as well as a standard error of the mean of 1.681. The 95% confidence interval for the difference was between -20.813 to -13.823, indicating that the change was substantial and consistent.

The p values for both the two-sided test (<.001) and the one-sided test (<.001) were much smaller than 0.05, indicating that the differences found between the pretest and posttest were highly statistically significant. This indicates that the Audiolyfe intervention had a significant effect on cognitive development, including improving children's intelligence, memory, and enthusiasm for learning. Thus, Audiolyfe successfully had a significant positive impact on changes in cognitive abilities as measured through the *pretest* and *posttest*.

Discussion

Based on the results of the study, it was found that Audiolyfe successfully had a significant positive impact on changes in cognitive abilities, which was reflected in a significant difference between pretest and posttest results. The results of paired samples test analysis showed that this intervention successfully improved children's intelligence, memory, and enthusiasm for learning, with very low p values (<.001) in both two-sided and one-sided tests, indicating that these changes did not occur by chance and had a strong influence on participants' cognitive development.

Audiolyfe stimulation is an intervention designed to improve children's cognitive abilities through audio-based stimulation. In this study, audiolyfe

stimulation focuses on improving intelligence, memory, and enthusiasm for learning by using audio methods specifically designed to stimulate children's brains in the learning process. This stimulation uses structured sounds and appropriate frequencies to optimize children's cognitive and emotional processes, with the aim of supporting brain development and improving children's overall learning performance.

Audiolyfe stimulation also helps develop children's cognitive abilities by utilizing audio elements designed to optimally stimulate the brain. This is supported by Alfira & Siregar's research (2024) which states that listening practices help children train focus by engaging their attention on the sounds heard. This activity trains the brain to maintain concentration on a single stimulus, which in turn improves the child's ability to filter relevant information and ignore distractions. With focus trained through listening, children can improve memory, deepen understanding of material, and be more engaged in the learning process, which supports their overall cognitive development.

Through the use of structured sounds, AudioLyfe can help improve children's focus and concentration, two important factors in the learning process. Research by Mufid et al. (2022) showed that when children are able to maintain attention effectively, they are more likely to absorb information efficiently, which in turn can contribute to the development of intelligence. This is consistent with the theory that optimal focus and concentration allows the brain to better process and store information in areas such as the prefrontal cortex and hippocampus.

Zega's research (2022) also highlights the importance of audio-based stimulus to support children's cognitive development. Sound-based stimulation can stimulate creativity, improve active listening skills, and expand a child's language processing abilities that occur in their brain.

In addition, Hijrani & Nuraeni's (2023) research confirms that audio methods involving active interaction can significantly improve children's linguistic intelligence. By engaging children in listening experiences combined with interactions with their parents, it not only trains children's ability to focus and understand information but also encourages them to think critically and respond verbally. These interactions provide opportunities for children to practice communication skills naturally, thereby increasing their confidence in communicating.

Thus, the research results supported by several previous studies show that audio-based stimulation has a positive impact in improving children's cognitive development. The use of AudioLyfe, through structured sound design and appropriate frequencies, can stimulate various aspects of a child's intelligence, such as linguistic intelligence, critical thinking skills, and memory. Scientifically, AudioLyfe works by stimulating activity in several important areas of the brain that are critical to a child's cognition.

First, audio stimulation can increase activity in the prefrontal cortex, which is responsible for executive functions such as problem-solving, decision-making and

attention control. Secondly, structured and purposeful sounds help stimulate the hippocampus, an area that plays an important role in long-term memory consolidation and learning. In addition, certain audio frequencies can also influence the limbic system, especially the amygdala, to regulate emotions and reduce stress, thus creating optimal conditions for learning.

AudioLyfe-based stimulation also enhances brainwave synchronization, such as alpha waves associated with relaxation and focus, and gamma waves associated with high-level information processing. Through the brainwave entrainment mechanism, AudioLyfe can help children maintain better attention and process information with greater efficiency. This approach is not only fun and engaging, but also increases children's motivation to learn, as it is designed to create an immersive and pressure-free learning experience.

With consistent application of audio methods, AudioLyfe is able to support the development of children's overall cognitive skills. This stimulation provides a long-term positive impact by helping children increase their brain capacity to learn, understand and remember information better, thus supporting their development in various aspects of life.

CONCLUSION

Audiolyfe stimulation has been statistically proven to have an effect on the development of cognitive abilities in children, including increased intelligence, memory, and enthusiasm for learning. This link between audio stimulation and cognitive development can be explained through brain mechanisms, where audio waves play a role in influencing activity in areas of the brain related to information processing, such as the auditory cortex and areas responsible for memory. Children who received audio stimulation showed clear improvements in some of these areas, including improved thinking skills, better memory, and higher enthusiasm for learning. The results of this study support the idea that audio stimulation can be an effective way to support children's optimal cognitive development. The findings indicate that Audiolyfe stimulation is an effective tool in supporting children's cognitive development and can be used as a strategy in education to improve the quality of learning, particularly in Banda Aceh, to strengthen the competitiveness of education in the area.

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