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Comparative Study : Structured Motor Skill Training and Unstructured Motor Skill Training in Improving Children's Movement Ability

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Abstract: *This study aims to compare the effectiveness of structured motor skill training and unstructured motor skill training in improving movement skills in children. The movement skills in question include coordination, balance, strength, and agility. This study used an experimental design with a control group and a treatment group. The group of children was divided into two groups: one group did structured motor skill training and the other group did unstructured motor skill training. The population of this study was children aged 6-8 years. The sample was randomly drawn and consisted of 40 children divided into two groups, each group consisting of 20 children. The exercises were conducted for 6 weeks with a frequency of 2 times per week. Each training session lasted for 40 minutes. Based on the results of data analysis, there is a significant difference between structured motor skill training and unstructured motor skill training in improving motor skills. The group that followed structured motor skill training had an average improvement of 19.75, while the group that followed unstructured motor skill training had an average improvement of 12.85. The mean difference between the two groups was 6.90, indicating that structured motor skill training provided better results. A t-value of 7.71 and a significance value of 0.00 indicated that this difference was highly statistically significant. In addition, the percentage difference between the two types of exercises was approximately 53.7%, indicating that structured motor skill trainingprovided greater improvement compared to unstructured motor skill training. A planned and structured exercise program can result in more significant improvements in children's coordination, balance, strength and agility. These findings support the use of structured motor skill training programs in the development of children's movement skills in schools or physical education environments.*
Keywords: *Physical Activity, Motor Skill Training, Movement Ability, Children.*

Introduction

Motor training plays an important role in the development of children's movement abilities, which include gross and fine motor skills. Gross motor skills involve the use of large muscles, such as running, jumping and climbing (Farida, 2016), while fine motor skills focus on more detailed movements, such as grasping small objects or tying shoelaces (Khadijah & Amelia, 2020). Various forms of motor exercises can help children develop these two aspects optimally, which in turn supports their physical, social and cognitive development. Good motor practice involves a variety of activities that challenge children's bodies to move in different ways. By stimulating varied movements, motor exercises help strengthen muscles, improve flexibility, and develop balance and coordination (Sudirjo & Alif, 2018). Activities such as jumping, kicking or catching a ball train a child's sensorimotor skills, integrating information from the nervous system and muscles to produce efficient and controlled movements. It also helps improve a child's awareness of his or her own body, known as proprioception, or the ability to sense body position and movement.

Children's motor development falls into two main types of approaches: structured motor skill training and unstructured motor skill training. These two methods have different characteristics and impacts on children's movement abilities. Comparative studies examining the effectiveness of these two approaches provide an important foundation for educators, coaches and parents in selecting optimal motor development strategies. Structured motor skill training is an approach in which children are engaged in systematically designed activities, with clear goals and rules (Jafar et al., 2023). These activities are usually guided by an instructor or teacher, and are designed to develop specific motor skills such as balance, coordination, strength and flexibility. Examples of structured motor skill traininginclude

gymnastics classes, formal sports training, or organized physical activities at school. The advantage of structured motor skill training is that it allows for close control and supervision of the child's progress, ensuring that they develop basic motor skills according to the expected stages of development (Gallahue & Donnelly, 2007). Studies show that children who engage in structured motor skill trainingtend to experience more significant improvements in specific motor skills (Tortella et al., 2016), as the exercises are designed to target specific abilities. In addition, this approach also helps build discipline, focus and perseverance in children.

In contrast, free motor practice gives children the freedom to explore and move without strict rules or instructions. These activities often occur spontaneously in unstructured play environments, such as running in the park, climbing trees, playing ball without rules, or simply running around with friends. Unstructured motor skill training emphasizes freedom of movement exploration, creativity and improvisation (Hanson, 1992). Research shows that free motor practice plays an important role in developing children's creativity and ability to find more diverse movement solutions. By participating in free motor activities, children learn to organize their movements naturally and independently, which can improve their body understanding and foster confidence in their physical abilities. Free motor activities also contribute to children's mental health as they are more relaxed and fun (Darmadi & MM, 2018). This study was conducted because of the debate about which is more effective in improving children's movement skills. Experts suspect that structured exercises may provide more targeted and rapid results in the development of specific skills, while free exercises may be more beneficial in providing a more holistic and flexible experience in motor development. Through this study, the researchers sought to answer the question of which approach is more optimal in developing children's motor abilities, especially in the context of education and child health. Another factor underlying this study is the increasing awareness of the importance of physical activity amidst the global trend of sedentary lifestyles that reduce children's opportunities to be active (Hills et al., 2007). By understanding the different benefits of these two types of exercises, the results of this study are expected to provide recommendations for parents, teachers and coaches to integrate appropriate methods in children's physical exercise programs, so as to support optimal motor development.

Materials and Methods

Study Participants.

This study used a quasi-experimental design with a pre-test and post-test approach in two independent groups. The first group was given structured motor skill trainings, while the second group underwent unstructured motor skill training. The duration of the study was 6 weeks, with a frequency of training 2 times per week.

The sample of this study was 40 children aged 7-10 years who were purposively selected from several elementary schools in Makassar city. With the criteria of not having significant motor or health disorders. The sample was randomly divided into two groups:

1. Group A (Structured Motor Skill Training): 20 children.
2. Group B (Unstructured Motor Skill): 20 children.

Study organization.

In this study, the instruments used to measure children's motor skills were the Test of Gross Motor Development (TGMD-2) as well as qualitative observations. The TGMD-2 is a standardized test designed to assess gross motor skills of children aged 3 to 10 years (Logan et al., 2014). The test consists of two main subtests, i.e:

1. Locomotor Skills: Measures a child's ability in movements that involve body displacement, such as running, jumping, stepping, and sprinting.
2. Object Manipulative Skills: Measures a child's ability to interact with objects, such as throwing, catching, and kicking a ball.

The use of the TGMD-2 is because this test has been validated to measure gross motor skills in the pediatric population (Valentini, 2012), especially in the context of sports or physical activity. In addition, the TGMD-2 provides quantitative scores that can be used to analyze differences in pre- and post-intervention outcomes, making it easier to see the effects of structured and unstructured motor skill training. Meanwhile, qualitative observations are important because they provide a more in-depth perspective on how children respond to unstructured motor skill trainingenvironments, which tend to be more spontaneous and varied compared to structured exercises.

Test Procedures.

- **Preparation Stage:**

1. Identify and recruit 40 child participants aged 7-10 years old.
2. Informed parents or guardians about the purpose and methods of the study.
3. Randomized division of children into two groups: Group A (Structured motor skill training) and Group B (Unstructured motor skill training).
4. Pre-Test: Prior to the implementation of the exercise program, a pre-test was conducted on all participants using the TGMD-2 instrument. This measurement served as a baseline to compare the changes that occurred after the intervention.
5. Intervention:

- **Group A (Structured Motor Skill Training):** The children follow exercise sessions designed with strict instructions and supervision. Each session involves specific activities such as zig-zag running, rope jumping, ball throwing and catching, and muscle strengthening activities with predetermined repetitions and duration.
- **Group B (Unstructured Motor Skill):** Children are given the freedom to play in an environment filled with various physical play tools such as balls, jump ropes, cones and climbing structures. No specific instructions are given, and the children are allowed to move as they wish.

6. Both groups trained for 6 weeks, with a frequency of 2 times a week, and each session lasting 45 minutes.
7. Post-Test: After 6 weeks of intervention, a post-test was conducted using the same TGMD-2 instrument as the pre-test. The results of the post-test will be used to measure changes in motor skills in both groups.

The study was approved by the ethics committee by ensuring that all participants and their guardians gave informed consent. The safety and comfort of the children were prioritized during the study.

Statistical analysis.

In this study, the statistical test used to analyze the difference in effectiveness between structured motor skill training and unstructured motor skill training in improving children's movement skills is the ANOVA (Analysis of Variance) test. The ANOVA test was chosen because this method can identify whether there are significant differences between more than two or more groups on the variable being measured, in this case, children's movement ability as influenced by the type of exercise. The ANOVA test process begins by formulating the null hypothesis (H_0) which states that there is no significant difference in movement ability between the groups of children who participated in structured motor skill training, unstructured motor skill training, and the control group if any. Conversely, the alternative hypothesis (H_1) states that there is at least one group that is significantly different in terms of improvement in movement ability.

In this analysis, data from each exercise group (structured and unstructured) was measured before and after the exercise period. Next, the variance in the movement ability results is measured to determine whether the between-group variability is greater than the within-group variability. The ANOVA test will produce an f-statistic value comparing the ratio of between-group and within-group variances. The p-value resulting from this test will indicate whether the observed differences are significant enough to reject the null hypothesis. If the ANOVA test results show a p value that is smaller than the set significance level (e.g., $p < 0.05$), then it can be concluded that there is a significant difference in movement ability between the different groups.

Results

Descriptive Data

Table 1. *Descriptive Statistics*

Group Data		Mean	Std. Deviation	Variance	Minimum	Maximum
Structured Motor Skill Training	Pre-test	57.70	1.92	3.69	54	61
	Post-test	77.45	3.60	12.99	71	84
Unstructured Motor Skill Training	Pre-test	55.45	2.50	6.26	52	60
	Post-test	68.30	4.23	17.90	62	75

This table presents a summary of descriptive statistics for pre-test and post-test results for the two research group data. in the structured motor skill training group, the Pre-test mean value was 57.70 with a standard deviation of 1.92 and a variance of 3.69, with a minimum score of 54 and a maximum of 61. And the Post-test mean was 77.45 with a standard deviation of 3.60 and a variance of 12.99, with scores ranging from 71 to 84. Then in the unstructured motor skill training group, the Pre-test mean value was 55.45 with a standard deviation of 2.50 and a variance of 6.26, with a minimum score of 52 and a maximum of 60. And the Post-test mean value was 68.30 with a standard deviation of 4.23 and a variance of 17.90, with a minimum score of 62 and a maximum of 75.

Normality Test

The Kolmogorov-Smirnov statistical test results in the structured motor skill training and unstructured motor skill training groups showed that the data were normally distributed.

Table 2. *Kolmogorov-smirnov Normality Test*

Group Data		Statistic	df	Sig.	Ket.
Structured Motor Skill Training	Pre-test	0.11	20	.200*	Normal
	Post-test	0.10	20	.200*	Normal
Unstructured Motor Skill Training	Pre-test	0.12	20	.200*	Normal
	Post-test	0.11	20	.200*	Normal

In the structured motor skill training group, the statistical value for the Pre-test was 0.11 with a df (degree of freedom) of 20 and a significance value of 0.200, indicating normal distribution. For the Post-test, the statistical value was 0.10 with a df of 20 and a significance of 0.200, also indicating a normal distribution. Similarly, in the unstructured motor skill training group, the Pre-test statistical value was 0.12 with df 20 and a significance of 0.200, indicating a normal distribution. The post-test had a statistical value of 0.11 with a df of 20 and a significance value of 0.200, which also indicated that the data was normally distributed. All significance values are above the 0.05 threshold, so both groups of data can be said to have a normal distribution.

Homogeneity Test

The results of the levene test analysis showed the homogeneity value of structured motor skill training and unstructured motor skill training.

Table 3. *Test Of Homogeneity of Variances*

Group Data	Levene Statistic	Sig.	Ket.
Structured Motor Skill Training	5.33	0.26	Homogen
Unstructured Motor Skill Training	7.67	0.38	Homogen

In the structured motor skill training group, the levene statistic value was 5.33 with a significance value (sig.) of 0.26, indicating that the variance between groups was homogeneous. Likewise, in the unstructured motor skill training group, the levene statistic value was recorded as 7.67 with a sig. value of 0.38, which also indicated homogeneity. 0.38, which also indicated homogeneity of variance. All significance values were ≥ 0.05, thus, both groups of data met the assumption of homogeneity.

Hypothesis Test

1. First Hypothesis test

Based on the results of statistical tests, it shows that there is a significant difference between the Pretest and Posttest scores after the implementation of structured motor skill training.

Table 4. *Summary of The First Hypothesis Test Data (Paired Samples Test)*

Structured Motor Skill Training	Paired Differences			t	Sig. (2-tailed)	Ket.
	Mean	Std. Deviation	Std. Error Mean			
PreTest - PostTest	19.75	2.86	0.64	30.84	0.00	Sig.

The mean difference between the Pretest and Posttest was 19.75, indicating a considerable improvement. The t-value of 30.84 confirms a significant difference between the two scores, and the significance value (Sig. 2-tailed) of 0.00 confirms that this difference is statistically significant. Since the significance value is smaller than 0.05, we can conclude that the structured motor skill training had a positive and significant impact on improving the participants' motor performance.

2. Second Hypothesis Test

The statistical test results for unstructured motor skill training showed an improvement between the Pretest and Posttest scores.

Table 5. *Summary of The Second Hypothesis Test Data (Paired Samples Test)*

Unstructured Motor Skill Training	Paired Differences			t	Sig. (2-tailed)	Ket.
	Mean	Std. Deviation	Std. Error Mean			
PreTest - PostTest	12.85	2.79	0.62	20.55	0.00	Sig.

The mean difference between the Pretest and Posttest scores was 12.85, indicating an improvement in motor performance after the implementation of unstructured motor skill training. The t-value of 20.55 shows that the difference between the Pretest and Posttest scores, with a significance value (Sig. 2-tailed) of 0.00. Since this significance value is smaller than 0.05, it can be concluded that the difference between the Pretest and Posttest is significant.

3. Third Hypothesis Test

The results of the Independent T-test showed a significant difference between structured motor skill training and unstructured motor skill training in improving motor skills.

Table 6. *Summary of The Second Hypothesis Test Data (Independent T-Test)*

Group Data	N	Mean	Std. Deviation	t	Mean Difference	Sig. (2-tailed)	Ket.
Structured Motor Skill Training	20	19.75	2.86	7.71	6.90	0.00	Sig.
Unstructured Motor Skill Training	20	12.85	2.79				

The group that followed structured motor skill training had an average improvement of 19.75 with a standard deviation of 2.86, while the group that followed unstructured motor skill training had an average improvement of 12.85 with a standard deviation of 2.79. The mean difference between the two groups was 6.90, indicating that structured motor skill training provided better results.

The t-value of 7.71 and the significance value of 0.00 indicate that this difference is highly statistically significant. In addition, the percentage difference between the two types of training was approximately 53.7%, indicating that structured motor skill training provided greater improvement compared to unstructured motor skill training. Thus, it can be concluded that the structured motor skill training method is significantly more effective in improving motor performance than unstructured motor skill training.

Discussion

The results of studies on Structured motor skill training and Unstructured motor skill training show significant differences in their impact on children's movement abilities, with each approach offering unique benefits.

Structured motor skill training offers a number of advantages, especially when it comes to developing specific motor skills. This approach involves a well-planned program, where children follow a set of predetermined and directed movements to achieve specific goals. Past research studies have shown that children who participated in structured exercises experienced improvements in gross and fine motor skills, such as coordination and balance (Dapp et al., 2021). This is because structured exercises usually involve repetition of movements that focus on specific techniques, allowing children to build a strong foundation of motor skills. Furthermore, research by (Wilson et al., 2020) showed that children with developmental coordination disorder (DCD) showed significant improvements in motor skills through structured exercises. This suggests that structured approaches are not only beneficial for children with normal motor development but also for those who require specialized interventions. These exercises usually include clear instructions, continuous feedback, and regular assessment of progress, which helps children to understand and master specific motor skills more effectively.

This is supported by field observations showing that children who participated in structured motor skill training programs mastered specific motor skills such as jumping rope, running with correct technique, and hand-eye coordination faster (Sepriadi, 2023). For example, in structured gymnastic exercise programs, observations show improvements in children's ability to follow instructions with precision and perform movements with better control. These exercises often include clear instructions, ongoing feedback and regular progress assessments, which help children understand and master specific motor skills more effectively.

Unstructured motor skill training, on the other hand, provides benefits in terms of creativity and movement adaptability. In free practice, children are given the freedom to explore their own movements, which can encourage the development of creativity and innovation in physical activity. Free play supports the development of adaptation and problem-solving skills, which are important for cognitive and social development (Pellegrini, 2009). Other research suggests that free play also supports emotional and social development by providing opportunities for children to interact with their environment and practice social skills in a more natural context (Ginsburg et al., 2007).

However, while free motor practice has many benefits, this approach can have limitations in terms of focus and structure. Children may not always explore movements that are specifically required for the development of certain motor skills without clear direction. Without clear direction, these children may not develop specific motor skills in a systematic way (Goodway et al., 2013). In some cases, observations suggest that without adequate guidance, children may get stuck in ineffective or less varied movement patterns. Therefore, unstructured motor skill training are often more effective when used as a complement to structured exercise programs. Unstructured motor skill training can provide opportunities for children to apply the skills they have learned in a freer and more creative context, as well as assist them in developing adaptation and exploration skills that are not always covered in structured exercise. this research emphasizes the importance of integrating these two approaches. This research emphasizes the importance of integrating these two approaches. This is supported by other research showing that a combination of structured and free practice allows children to benefit from both: the development of specific motor skills through structured practice, and the development of creativity and flexibility through free practice (Dapp et al., 2021). This integration supports a more holistic approach to children's motor development, where children not only learn the necessary techniques but are also given the space to innovate and explore movements independently. In addition, the play approach is very supportive in children's motor development and thinking (Susanto et al., 2022), (Susanto et al., 2024).

Overall, although structured and unstructured motor skill training each have their advantages and disadvantages, a combination of both approaches can provide optimal benefits in children's motor development. Structured approaches ensure that basic motor skills are well developed, while free practice allows children to apply and explore those skills in more creative and adaptive contexts. In this way, a balanced exercise program can maximize children's motor development and support their cognitive, social and emotional aspects.

Conclusion

Comparative studies between structured motor skill trainingand unstructured motor skill training show that while both approaches have their benefits, structured motor skill training often yield more significant results in the development of children's motor skills. Structured exercises, with an organized plan and clear instructions, allow children to focus on mastering specific motor skills such as coordination, balance and strength. Research by (Hollis et al., 2016) and (Van Dyck et al., 2022) shows that this approach effectively improves gross and fine motor skills, and

provides a beneficial intervention for children with developmental coordination disorders. The advantage of structured motor skill training lies in its ability to provide a solid foundation in motor skills through planned repetition and consistent feedback. These programs are designed to achieve specific goals by providing clear directions, which facilitates the learning of motor skills more efficiently. This makes structured exercise a highly effective approach to developing basic motor skills required for daily activities and sports.

However, a combination of both approaches, structured and free practice can provide comprehensive benefits. However, a heavy emphasis on structured practice is essential to ensure that children acquire solid basic motor skills. A well-designed exercise program should integrate structured exercises to build a strong foundation of skills and free exercises to support creativity and exploration. In this way, we can maximize children's overall motor development, balancing between mastery of specific skills and the ability to adapt and innovate in movement.

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