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FUTSAL TRAINING BASED ON FUNDAMENTAL MOVEMENT AGILITY FOR CHILDREN AGED (9-11) YEARS

ABSTRAK

This study aimed to determine the effect of basic movement agility-based futsal training on improving the agility of children aged 9–11 years at the Tiga Muda Borneo Academy.

The study was conducted due to the low agility levels observed in children aged 9–11 years, attributed to factors such as insufficient physical activity, excessive gadget use, and parenting styles that tend to indulge children—leading to a reluctance to exercise—as well as the fact that existing futsal training programs were monotonous and lacked proper structure.

A quantitative research method with a one-group pretest-posttest design was employed.

The study sample consisted of 15 children aged 9–11 years participating in futsal training at the Tiga Muda Borneo Academy.

The research process began with a pretest, followed by the implementation of a training intervention comprising zigzag runs, shuttle runs, rapid changes of direction, footwork coordination, and balance exercises.

The results demonstrated an improvement in the children's agility following the intervention, evidenced by average times of 6.02 seconds for the pretest and 4.75 seconds for the posttest.

Normality testing using the Kolmogorov-Smirnov test yielded results of 0.064 (>0.05) for the pretest and 0.056 (>0.05) for the posttest, indicating that the data were normally distributed.

These improved results suggest that basic movement agility-based training helps children become more agile in changing direction during futsal play.

It is concluded that basic movement agility-based futsal training positively influences the agility skills of children aged 9–11 years and serves as an effective training program to support motor skill development in the context of futsal.

Keyword: Futsal Training, Preadolescent, Motor Skills, Physical Literacy

Futsal is a team sport played by five players per side on the court (Bernhardin & Fauzi, 2022).

It is an indoor sport (Purnomo & Irawan, 2023).

Futsal has grown rapidly and is popular among various demographics, particularly children and adolescents (Hamzah & Hadiana, 2023).

It is a favorite sport worldwide and in Indonesia, especially in urban areas (Ati Suci Dian Martha & Abidin, 2023; Imansyah & Hananingsih, 2024).

The rapid development of futsal in Indonesia is evident in the national team's rankings; the Indonesian national futsal team is ranked fourth in Asia and fourteenth globally (Hera, 2022).

Futsal demands rapid changes of direction, responsiveness, and agility within a confined playing space (Andika et al., 2023).

However, the high level of interest in futsal has not been matched by optimal development of children's agility skills (Fadillah Siregar et al., 2024).

Children aged 9–11 years generally possess fairly good fundamental movement skills, but their agility skills are still relatively low (Ridwan, 2024).

One common issue that causes children to be reluctant to move is a lack of parental involvement in encouraging them to engage in outdoor activities and exercise (Andika et al., 2023).

Environmental factors also contribute to children's reluctance to engage in outdoor activities or sports (Jeki et al., 2025).

Parents should encourage children to participate in outdoor activities from an early age to foster the habit (Lubis et al., 2025).

Parents are also a major reason why children are reluctant to move or exercise (Nur Amanah et al., 2024).

Many parents overindulge their children, making them reluctant to exercise (Fakhri Ilham & Rini, 2024).

Children become reluctant to engage in activities because parents don't encourage them to be active outside the home (Pajar & Fernando, 2024).

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Dense urban environments, limited play space, and high activity levels are factors that contribute to children's limited opportunities for active movement (Asikin et al., 2024).

Children aged 9–11 in urban areas tend to have low physical activity patterns due to changes in modern lifestyles (Ni Komang Theda Febrina Subagia et al., 2024).

Agility is essential for children aged 9–11, especially during exercise (Amaliah et al., 2024).

Futsal is a sport closely related to basic agility movements (Adam & Alviani Sum, 2023).

Futsal is a sport that significantly requires agility (Cahayani et al., 2023).

Agility training for children in futsal is especially important for those aged 9–11 (Novianti & Winarno, 2023).

Children aged 9–11 should already possess good agility (Cahayani et al., 2023).

Futsal training programs for children aged 9–11 have not been systematically designed to improve agility (Putra & Prabowo, 2022).

Agility training is often provided spontaneously and not programmed into a single training program (Mega et al., 2022).

This lack of clear stages results in the lack of clear training stages, making it difficult to monitor children's agility development and not achieving optimal results (Kurniawan & Roepajadi, 2022).

Another problem is the monotony and lack of variety in futsal training (Alwan et al., 2025).

Coaches often use the same training patterns in every session, such as jogging and basic technique drills, without varying activities that require changes in direction and speed (pandia et al., 2022).

This monotonous training results in limited stimulation of children's agility and slow development (Litardiansyah & Hariyanto, 2022).

Futsal training for early childhood ages 9–11 years is still not optimal in supporting the development of children's agility skills (Yusuf & Zainuddin, 2020).

Training tends to focus on play activities and mastery of basic techniques, without being balanced with agility training appropriate to the characteristics of futsal (Prasetyo & Rudiana, 2021).

As a result, the training provided is unable to supply children's overall movement needs, especially the agility aspect that is essential in futsal (Andika et al., 2023).

The main problem found in futsal training for early childhood is that it does not fully focus on developing agility based on fundamental movements (Herlambang et al., 2022).

The training provided often does not refer to basic movement patterns such as running, stopping, turning, and jumping in a planned manner (Dewi et al., 2023).

In fact, this ability is the basis for children to be able to move agilely and responsively in futsal game situations (Tiwi & Rahmadani, 2023).

The lack of variety and planning in agility training results in low levels of active participation during training (Safitri Laela, 2022).

The problem is that children tend to get bored quickly and lack motivation to move optimally (Nasem et al., 2022).

This condition results in futsal training not being able to provide sufficient stimulation to develop children's ability to change direction and reaction speed in futsal (Hidayat et al., 2022).

The impact of these futsal training problems is evident in children's still low ability to change direction, accelerate, and decelerate quickly during futsal (Wigunawangsa et al., 2022).

Children often have difficulty adapting body movements to dynamic game situations (Munir & Sukma, 2025).

This suggests that problems in implementing futsal training contribute to the low agility skills of children aged 9–11 years (Kristiana, 2022).

The lack of agility training with fundamental movements in early childhood futsal training is a contributing factor to children's difficulty in developing (Sandewa et al., 2023).

Children who lack a strong foundation of movement tend to experience difficulties during agility training (Haryesa & Hariyoko, 2023).

Furthermore, the lack of integration of fundamental movements in agility training impacts the overall low effectiveness of futsal training (Indra Fahlefi et al., 2022).

Agility and fundamental movements are interrelated components in futsal (Nasuki et al., 2023).

Yet, mastering fundamental movements plays a crucial role in increasing the effectiveness of agility training and supporting children's performance in futsal (Purnomo & Irawan, 2024).

This study aims to examine and analyze the agility skills of children aged 9–11 years in futsal training, specifically related to the implementation of fundamental movement agility training.

This study is directed at developing a futsal training program that can support children's agility development and the implementation of agility training.

It also examines the relationship between mastery of fundamental movements and agility skills in futsal. This study also aims to provide a basis for formulating futsal training that is more systematic, varied, and appropriate to the characteristics of children aged 9–11 years. This can help improve the effectiveness of training

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and support the optimal development of children's agility skills, especially in the Pontianak City environment.

METHOD

The method used in this study was quantitative with an experimental method (Homsombat & Tunintaraarj, 2025). This study aimed to determine changes in the agility of children aged 9-11 years when performing fundamental movement agility exercises (Himawan et al., 2025). The design used in this study was a one-group pretest–posttest design, which involves one group of subjects who are given an initial test (pretest), then given treatment in the form of futsal exercises based on fundamental movement agility (treatment), and ended with a final test (posttest) (Rina Wijayanti et al., 2025). This study used a one-group pretest and posttest design because it is more appropriate to field conditions and research objectives. In addition, the limited number of samples and the use of total sampling make the division of the control group less effective (Herlambang et al., 2022). The one-group pretest and posttest design was chosen because it is more practical, efficient, and appropriate to the conditions at the academy (Tiwi & Rahmadani, 2023). This design aims to train and improve the agility skills of children aged 9-11 years (Muh. Syafiq et al., 2025).

The steps for conducting the pretest, posttest, and treatment are as follows:

The children performed the test by dribbling a ball through cones.
The children lined up behind the cones set up by the researcher.
The children then dribbled the ball through the cones.
The researcher then recorded the time from the first cone to the last cone using a stopwatch (Oktadinata et al., 2023).
The distance from the start line or cone to the first cone is 1 meter; the distance spanning the five cones is 3 meters, with 75 cm between each cone; and the distance from the fifth cone to the finish line or cone is 1 meter.

Figure 1.
Conduct of the research

Treatment

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	Session		Training Model		Training Menu		Duration		Sets		Reps		Interval		Distance / Equipment	
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| Day 1 | Sprint & Acceleration | Shuttle sprints | 20 minutes | 4 | 3 / sets | 1 menit | 2 cones, 5 m apart |

| | | Running in place and sprinting | 20 minutes | 4 | 3 / sets | 1 menit | 2 cones, 10m sprint distance |

| | Total Core Workout | 40 minute | | | | |

| Day 2 | Change of Direction | Figure-eight running | 20 minutes | 4 | 3 / sets | 1 minute rest | 2 cones, 1.5 m apart |

| | | Zig-zag running without the ball | 20 minutes | 4 | 2 / sets | 1 minute rest | 5 cones, 60 cm spacing, total distance of 5 meters |

| | Total Core Workout | 40 minute | | | | |

| Day 3 | Agility & Sprint | Triangular forward-backward runs and sprints | 20 minutes | 4 | 2 / sets | 1 minute rest | 4 cones, 1m triangle, 5m sprint |

| | | Shuffle left and right, and sprint.
| 20 minutes | 4 | 2 / sets | 1 minute rest | 3 cones, 1 m spacing, 10 m sprint |

| | Total Core Workout | 40 minute | | | | |

| Day 4 | Change of Direction & Jumping | Letter N run | 20 minutes | 3 | 2 / sets | 1 minute rest | 4 cones, 5 m apart |

| | | Jumping over markers, alternating feet | 20 minutes | 3 | 2 / sets | 1 minute rest | 6 markers, 0.5 m spacing |

| | Total Core Workout | 40 minute | | | | |

| Day 5 | Ladder Agility & Plyometric | Four ladder drill: lateral in & out, one foot in, in & out, out & in | 20 minutes | 3 | 2 / sets | 1 minute rest | Ladder agility |

| | | Two-footed jump with a shift, followed by a sprint.
| 20 minutes | 3 | 2 / sets | 1 minute rest | 10 markers + 1 cone |

| | Total Core Workout | 40 minute | | | | |

| Day 6 | Reaction Agility & Sprint | Crossover run and sprint | 20 minutes | 3 | 2 / sets | 1 minute rest | 5 cones, 5 m apart |

| Day 7 | | Run towards the cone on the whistle signal and sprint.
| 20 minutes | 3 | 2 / sets | 1 minute rest | 7 cones, 1 m spacing, 5 m sprint |

| | Total Core Workout | 40 minute | | | | |

| | Agility with Ball | Zig-zag running with the ball | 20 minutes | 4 | 1 / sets | 1 minute rest | 5 cones, 0.5 m spacing + ball |

| | | Dribble the ball past the cones.
| 20 minutes | 4 | 1 / sets | 1 minute rest | 4 cones, 2 m distance + ball |

| Day 8 | Total Core Workout | 40 minute | | | | |

| | Combination Agility | Mixed drill: side jumps, zig-zags, and sprints.
| 20 minutes | 3 | 2 / sets | 1 minute rest | 2 markers + 5 cones |

| | | Comprehensive combined drill: lateral movement, zig-zag dribble, pivot, and sprint.
| 20 minutes | 3 | 2 / sets | 1 minute rest | 3 markers + 5 cones + ball |

| | Total Core Workout | 40 minute | | | | |

Table 2.
Treatment Fundamental Movement Agility

STAGES	ACTIVITY	TIME
WARM-UP	Light jogging, static and dynamic warm-ups	10 minutes
CORE EXERCISE 1	First workout routine	20 minutes
CORE EXERCISE 1	Second workout routine	20 minutes
COOL-DOWN	Leisurely walk and stretching	10 minutes
TOTAL		60 minutes

Table 3.
Time structure of each meeting

The training consists of eight sessions; in each session, the children perform two movements, with a total duration of 60 minutes per session.

Based on the pretest and posttest results diagram above, there is a change in the average value between before and after the treatment.

The average pretest value is 6.0240 and the average posttest value is 4.7507, this indicates that after being given treatment, there is a change in the respondents' values towards a better direction in accordance with the researcher's objectives.

In addition, the diagram also shows the results of the pretest and posttest percentages of 55.91% and 44.09% with a difference of 11.82%, with these results it can be concluded that there is a change after being given treatment. With the smaller results from the data above, it strengthens that the results of the statistical analysis of the treatment given have an effect on changes in respondents' values.

These results are in line with the t-test which shows a significant difference between the pretest and posttest values.

	Sample 15 people		Pretest		Posttest	
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6	0240	4	7507
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Fifteen children served as the research sample because there were only 15 children aged 9–11 at the Borneo Muda Academy.

	Data		Shapiro-Wilk		Significance Value		Information	
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Pretest	0	064	0	05	Normal
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Posttest	0	056	0	05	Normal
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A normality test was conducted to determine whether the agility ability data in the pretest and posttest were normally distributed.

The normality test in this study used the Kolmogorov-Smirnov test.

Based on the normality test using the Kolmogorov-Smirnov test, the pretest and posttest results were 0.064 (>0.05) and 0.056 (>0.05), meaning that the results were normally distributed.

	Data		Statistic Levent's		Information	
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	Pretest		0,602		Homogen	
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	Posttest		0,475		Homogen	
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Table 7.
Homogeneity test (levene's test)

Based on the homogeneity test above, it can be concluded that the Levene's statistical value in the pretest data is 0.602 and in the posttest data is 0.475, which is greater than the significance value > 0.05, stating that the results of the data are homogeneous.

Variabel	Mean Selish	Mean pretest	Mean posttest	Sig.
Tailed	Information			

Pretest 1 27 6 02 4 75 0 001 signifikansi

Posttest

Table 8.
Paired t-test

Based on the paired hypothesis test table (t-test), the average pretest mean value and the average posttest mean value were 6.02 and 4.75, with a difference of 1.27, indicating that there was a change in value after the treatment was given.

The t-test results showed a significance value ($0.001 < 0.05$), so it can be concluded that there is a difference between the pretest and posttest values, regarding changes before and after the treatment was given.

The effectiveness of the eight-session training program—comprising zigzag running, shuttle runs, and foot coordination exercises—is evidenced by a reduction in average completion time from 6.02 seconds in the pre-test to 4.75 seconds in the post-test, indicating an improvement in fundamental movement agility among children aged 9–11 (Wigunawangsa et al., 2022).

Zigzag and shuttle run exercises provide stimuli involving repeated acceleration, deceleration, and changes of direction, while foot coordination drills enhance the ability to control body positioning and manage foot movements more efficiently (Lestari & Herawati, 2024).

Physiologically, the repetitive nature of the eight-session program fosters neuromuscular adaptation, specifically by improving the nervous system's capacity to activate and coordinate muscles more rapidly and precisely during directional changes (Alwan et al., 2025).

Furthermore, progressive training enhances muscle efficiency, inter-muscular coordination, balance, and the ability to maintain body control during acceleration and deceleration (Herlambang et al., 2022).

These adaptations enable children to execute movements that are faster, more coordinated, and more efficient, thereby reducing the time required to complete the test (Gurton et al., 2025).

Consequently, this eight-session training regimen—combining zigzag running, shuttle runs, and foot coordination exercises—proves effective in delivering physiological and neuromuscular stimuli that align with the movement demands of futsal, particularly the ability to change direction quickly and under control (da Silva Rodrigues et al., 2025).

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The results of the t-test $0.001 < 0.05$, which means the results are significant, so it can be concluded that there is a difference between the pretest and posttest scores (Ahmad-Shushami & Abdul-Karim, 2020).

During the pretest, most participants still showed agility abilities that were still considered low (Mendes et al., 2022).

This is due to the still low motor skills and development of basic movement coordination and the lack of structured training (Castillo et al., 2022).

After being given training that focuses on fundamental movements such as zigzag running, rapid changes of direction, and foot coordination and balance exercises, the posttest results showed a significant increase (Aguilar-Navarro et al., 2026).

This improvement shows that specifically designed training is able to improve children's agility abilities, especially in the context of futsal games which require quick and responsive changes in direction (Carvalho et al., 2026).

The low pretest results are inseparable from the abilities of children aged 9–11 years who are still in the motor development phase (Kizilca et al., 2026).

In this phase, children are still in the process of maturing motor coordination, balance, and good body control (Lo Russo et al., 2025).

The lack of structured and specific training for futsal is also a factor causing low agility abilities in children (Krishnan et al., 2025).

Children tend to only play without receiving appropriate basic movement stimulation, so the development of agility and motor skills is not well directed (Mema et al., 2025).

The role of coaches also greatly influences children's motor development, in addition to the role of parents is also very important in terms of supporting children to continue exercising (Ezhilarasan et al., 2025).

After receiving treatment in the form of a training program focused on fundamental movements, there was a significant improvement in posttest results (Kansanoja et al., 2026).

The training program generally included zigzag running, shuttle runs, rapid changes of direction, and foot coordination and balance exercises (da Silva Rodrigues et al., 2025).

These exercises were designed to improve children's motor skills, especially agility, so they could control body movements more effectively and efficiently (Raeder et al., 2024).

Repeated training also helped accelerate the body's adaptation process to certain movement patterns (Jensen et al., 2026).

The improvement in posttest results showed that children began to be able to perform movements with greater agility and direction, and they became quicker in responding to both the movement of the ball and opponents in futsal (Muriyedath et al., 2025).

The ability to change direction also appears to be better with more stable and controlled movements, indicating that the development of fundamental movements has a direct contribution to increasing agility, especially in futsal (Engel et al., 2025).

In futsal, agility is a crucial component that significantly impacts player performance (Sellami et al., 2024).

Futsal requires players to move quickly in tight spaces, accelerate and contribute suddenly, and change direction quickly (Jose & Sathyaraja, 2026).

Children with good fundamental movement skills will more easily develop the agility needed in the game, fundamental movement being a key factor in developing good agility (Aliani et al., 2025).

Fundamental movement training also impacts children's abilities, such as decision-making and game-savvy reading (Liu et al., 2025).

Training involving changes in direction and reactions trains children to think quickly and adapt their movements to the conditions they face.

This is crucial in futsal, where players must be able to make decisions quickly and quickly (Hirono et al., 2025).

Effective training programs for children aged 9–11 years are presented in a fun and varied format.

Game-based training is one of the most suitable methods for early childhood (Núñez-Merino et al., 2024).

With fun training, children will be more active and subconsciously develop their fundamental agility movement skills (Schültken et al., 2025).

This type of training will make children more interested in participating without feeling tired (Zambrano Palencia et al., 2025).

Varied training will prevent children from getting bored (Gurton et al., 2025).

The role of the trainer in varying training is crucial because varied training encourages children to participate ((Hironaga et al., 2025).

This research reveals which exercises can improve children's agility (Hirono et al., 2025).

In addition to training agility skills, this study also improved children's motor skills, such as running, walking, jumping, sprinting, and changing directions quickly (Silva-Atencio & López-Valerio, 2025).

Overall, the results of the pretest and posttest studies showed that training focused

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on fundamental movement agility was able to improve the agility of children aged 9–11 years in futsal (Rahmoune et al., 2026).

This improvement demonstrates the importance of a structured, specific, and developmentally appropriate training program (Zhou et al., 2025).

With good fundamental movements, children are not only able to play futsal better but also have the potential to develop better sports skills in the future (Başarır et al., 2025).

Based on the research findings, it can be concluded that implementing futsal training based on fundamental movements—with a specific focus on agility—is an effective approach that aligns with the motor development characteristics of children aged 9–11.

Training that integrates fundamental movements such as running, stopping, turning, changing direction, accelerating, and coordinating not only enhances agility but also establishes a foundation for developing the more complex movement skills required in futsal.

These findings contribute to the field of Physical Education, Sports, and Health (PJOK)—specifically regarding youth futsal coaching—by emphasizing the importance of integrating fundamental movement and physical ability development into children's training programs, rather than focusing solely on game techniques.

From a practical standpoint, coaches and physical education teachers are encouraged to implement training sessions that are varied, progressive, enjoyable, and appropriate for the children's developmental stage; meanwhile, future researchers could expand upon this study by utilizing larger sample sizes, longer training durations, and control groups, as well as by examining additional variables related to physical abilities and futsal skills.

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FAQs

What is GPTZero?

GPTZero is the leading AI detector for checking whether a document was written by a large language model such as ChatGPT. GPTZero detects AI on sentence, paragraph, and document level. Our model was trained on a large, diverse corpus of human-written and AI-generated text with support for English, Spanish, French, German, and other languages. To date, GPTZero has served over 17 million users around the world, and works with over 100 organizations in education, hiring, publishing, legal, and more.

When should I use GPTZero?

Our users have seen the use of AI-generated text proliferate into education, certification, hiring and recruitment, social writing platforms, disinformation, and beyond. We've created GPTZero as a tool to highlight the possible use of AI in writing text. In particular, we focus on classifying AI use in prose. Overall, our classifier is intended to be used to flag situations in which a conversation can be started (for example, between educators and students) to drive further inquiry and spread awareness of the risks of using AI in written work.

Does GPTZero only detect ChatGPT outputs?

No, GPTZero works robustly across a range of AI language models, including but not limited to ChatGPT, GPT-5, GPT-4, GPT-3, Gemini, Claude, and AI services based on those models.

What are the limitations of the classifier?

The nature of AI-generated content is changing constantly. As such, these results should not be used to punish students. We recommend educators to use our behind-the-scenes [Writing Reports](#) as part of a holistic assessment of student work. There always exist edge cases with both instances where AI is classified as human, and human is classified as AI. Instead, we recommend educators take approaches that give students the opportunity to demonstrate their understanding in a controlled environment and craft assignments that cannot be solved with AI. Our classifier is not trained to identify AI-generated text after it has been heavily modified after generation (although we estimate this is a minority of the uses for AI-generation at the moment). Currently, our classifier can sometimes flag other machine-generated or highly procedural text as AI-generated, and as such, should be used on more descriptive portions of text.

I'm an educator who has found AI-generated text by my students. What do I do?

Firstly, at GPTZero, we don't believe that any AI detector is perfect. There always exist edge cases with both instances where AI is classified as human, and human is classified as AI. Nonetheless, we recommend that educators can do the following when they get a positive detection: Ask students to demonstrate their understanding in a controlled environment, whether that is through an in-person assessment, or through an editor that can track their edit history (for instance, using our [Writing Reports](#) through Google Docs). Check out our list of [several recommendations](#) on types of assignments that are difficult to solve with AI.

Ask the student if they can produce artifacts of their writing process, whether it is drafts, revision histories, or brainstorming notes. For example, if the editor they used to write the text has an edit history (such as Google Docs), and it was typed out with several edits over a reasonable period of time, it is likely the student work is authentic. You can use GPTZero's Writing Reports to replay the student's writing process, and view signals that indicate the authenticity of the work.

See if there is a history of AI-generated text in the student's work. We recommend looking for a long-term pattern of AI use, as opposed to a single instance, in order to determine whether the student is using AI.