

Development of the Jogstride Training Model to Improve Endurance and Agility of Futsal Athletes

Figo Fahlevi Amaris^{1*}, A. Apri Satriawan Chan², Yuliwati³

^{1,2}Sport Education Study Program, STKIP Kusuma Negara, Jakarta, Indonesia

³Childhood Teacher Education Study Program, STKIP Kusuma Negara, Jakarta, Indonesia

* figofahlevi@stkipkusumanegara.ac.id

Abstract

This study aims to develop a jogstride training model integrated with endurance and agility components as an effort to improve the physical quality of futsal athletes. The background of this research stems from the need for a more varied training program, considering that conventional futsal training patterns tend to focus primarily on basic technical skills, while aspects of physical endurance and agility receive less attention. This condition results in athletes' low performance in maintaining game intensity throughout a match. To address this issue, the study employed a Research and Development (R&D) approach using the 4-D model, which includes the stages of Define, Design, Develop, and Disseminate. The research subjects consisted of 20 futsal athletes participating in extracurricular activities at SMPN 258 Jakarta. Data were collected through observation, interviews, questionnaires, documentation, and physical tests measuring endurance and agility. The research findings indicate that the developed jogstride training model featuring modifications such as the addition of lateral shuffle and zig-zag run variations was considered feasible, practical, and effective. Validation by futsal experts and physical conditioning specialists rated the model as "good" to "very good," while small- and large-group trials showed a significant improvement in athletes' physical abilities, particularly in endurance and agility. These findings confirm that the modified jogstride training model can serve as an alternative evidence-based physical training program that is easy to implement, relevant to the needs of school-level futsal development, and has the potential to support athletes' performance achievement more optimally.

Keywords: agility, endurance, futsal, jogstride, model development.

1 INTRODUCTION

Futsal is a team sport characterized by high-intensity gameplay. This game requires a balanced combination of technical skills, tactical understanding, and strong physical capacity. According to Naser, Ali, and Macadam (2017), futsal not only tests technical abilities such as dribbling, passing, and shooting, but also demands that athletes possess strong physical endurance to maintain consistent performance throughout the match. The relatively short duration of the game, combined with its fast tempo and limited playing area, requires futsal athletes to have quick reaction speed, agility, and excellent physical fitness.

Initial observations conducted at SMPN 258 Jakarta revealed that the training patterns implemented in the futsal extracurricular program still tend to focus on mastering basic technical skills such as passing, shooting, and dribbling. Although these technical skills are essential, the lack of attention to endurance and agility aspects has caused athletes to experience fatigue more quickly during matches. This condition leads to a decline in game quality, particularly in the final minutes of play when stamina and physical consistency are crucial. These findings indicate the need to design an alternative and more structured

training model that emphasizes the improvement of physical capacity while remaining relevant to the demands of futsal gameplay.

Previous studies have provided an important foundation for the development of this training model. Mardiansyah, Taufan, and Chan (2021) found that agility and speed have a significant influence on dribbling skills. In futsal, dribbling is not merely a technical skill but is also strongly affected by the body's ability to move agilely, change direction quickly, and respond to opponents' pressure. This highlights the importance of a training model that not only develops aerobic and anaerobic endurance but also enhances agility as a fundamental physical skill.

On the other hand, the COVID-19 pandemic has provided valuable lessons regarding the adaptation of physical education and sports learning. Studies by Asmadi, Bayu, and Chan (2024), as well as Chan, Ningsih, and Pardede (2024), emphasized the effectiveness of online physical education learning through platforms such as Google Classroom. Although instruction was conducted remotely, variations in physical training methods proved essential for maintaining students' motivation, skills, and fitness levels. These findings imply that methodological variation both in online learning contexts and in-field training is a key factor in sustaining student engagement and achieving learning objectives. In other words, innovation in designing physical training models is crucial to ensure that students not only acquire technical skills but also maintain their motivation and interest in training.

Furthermore, the study by Yuliwati (2019) revealed a significant relationship between creative thinking ability and academic competence, particularly in the process of developing research proposals. This finding provides a perspective that creativity is also relevant in the development of sports training models. Coaches and educators are required to think creatively in designing training patterns that align with real needs in the field. Meanwhile, Yuliwati, Mawarni, and Nurhasanah (2019) emphasized the importance of evaluating educational policies using the CIPP model (Context, Input, Process, Product). This evaluation framework can also be applied to assess the effectiveness of a sports training model namely, whether it aligns with the learners' contextual needs, possesses adequate input or resources, operates effectively in implementation, and produces outcomes in the form of significant improvements in physical performance.

In addition to methodological and evaluative aspects, the study by Maimunah, Yuliwati, and Sunarmo (2019) illustrates that the use of innovative media plays a crucial role in enhancing students' practical skills. In the context of futsal, similar innovation can be realized through the development of training models that incorporate engaging, systematic, and easily followed movement variations. Innovation is not limited to digital technology but also involves creativity in modifying training forms to make them more challenging while remaining relevant to the demands of the game.

Referring to the aforementioned research findings, it is evident that the development of a physical training model for futsal must take into account several key aspects: endurance, agility, methodological variation, and relevance to the school-based training context. The jogstride training model, which essentially combines jogging and sprint intervals, holds great potential for further development. This type of exercise can enhance athletes' aerobic and anaerobic capacities. However, in its conventional form, jogstride is often perceived as monotonous and lacking in movement variation. Therefore, this study focuses on developing a modified jogstride training model by incorporating agility elements such as lateral shuffle and zig-zag run movements.

By modifying the jogstride training model, this study aims to achieve two main objectives: first, to improve physical endurance so that athletes can maintain game intensity throughout the match; and second, to develop agility, which is essential for responding to the fast-paced, compact, and direction-changing nature of futsal. Moreover, this training model is expected to contribute to the enhancement of fundamental futsal skills particularly dribbling—which is strongly influenced by the combination of endurance, speed, and agility.

Thus, the direction of this study is clearly defined: to design, develop, and test a modified jogstride training model that not only focuses on stamina but also enhances agility and the practical skills of school-level futsal athletes. This innovation is expected to serve as an alternative, evidence-based physical training program that is applicable, easy for school coaches to implement, and relevant to the demands of modern futsal development.

2 RESEARCH METHODS

This study employed a Research and Development (R&D) method using the 4-D development model, which consists of four main stages: Define, Design, Develop, and Disseminate (Borg & Gall, 1984). The selection of this method was based on the research objective, which not only aimed to describe a phenomenon but also to produce a product in the form of a modified jogstride training model that can be utilized in school-level futsal development programs.

The first stage, Define, was carried out to identify the actual needs in the field. The researcher conducted observations of the futsal extracurricular activities at SMPN 258 Jakarta and interviews with the coach. From this stage, it was found that the physical training implemented tended to be monotonous, emphasizing basic techniques, which resulted in suboptimal development of athletes' endurance and agility. The second stage, Design, produced a prototype of the modified jogstride training model by incorporating additional movement variations such as the lateral shuffle and zig-zag run. The design was structured systematically to be easily implemented in school settings with limited facilities and adapted to the characteristics of junior high school students. The third stage, Develop, resulted in an initial product in the form of a training manual containing movement descriptions, training principles, and visual illustrations. The product was validated by physical conditioning experts and futsal specialists to assess content feasibility and alignment with training objectives. Subsequently, a small-scale trial was conducted with 10 futsal athletes to examine practicality, followed by a large-scale trial involving 20 athletes from SMPN 258 Jakarta to test product effectiveness. The final stage, Disseminate, involved refining the product based on validation and trial results, and distributing the training model so that it could be utilized by coaches and physical education teachers (PJOK) in other schools.

Data collection techniques included observation, interviews, questionnaires, documentation, and physical tests in the form of pre-test and post-test. Data analysis was performed using a descriptive-comparative approach by comparing scores before and after the model implementation, complemented by expert evaluations and user feedback to assess the product's validity, practicality, and effectiveness.

3 RESULT AND DISCUSSION

3.1 Result

The results of this study can be described in five main stages that correspond to the process of developing the modified jogstride training model.

3.1.1 Needs Analysis

Based on observations of futsal extracurricular activities at SMPN 258 Jakarta, it was found that the physical training program implemented lacked sufficient variation. The training primarily focused on basic technical aspects such as passing, shooting, and dribbling, while endurance and agility components received limited attention. This condition resulted in athletes experiencing fatigue more quickly during matches and a decline in performance consistency, particularly in the latter half of the game. These findings serve as an important foundation for developing a more comprehensive and needs-oriented physical training model.

3.1.2 Product Design

Based on the results of the needs analysis, the researcher designed a modified jogstride training model by incorporating movement variations such as lateral shuffle and zig-zag run. The addition of these variations aimed to enhance endurance while simultaneously improving athletes' movement agility, making the training more varied, engaging, and relevant to the characteristics of futsal, which demands quick directional changes and dynamic movements.



Example of Lateral Shuffle Movement



Example of Zig-Zag Movement

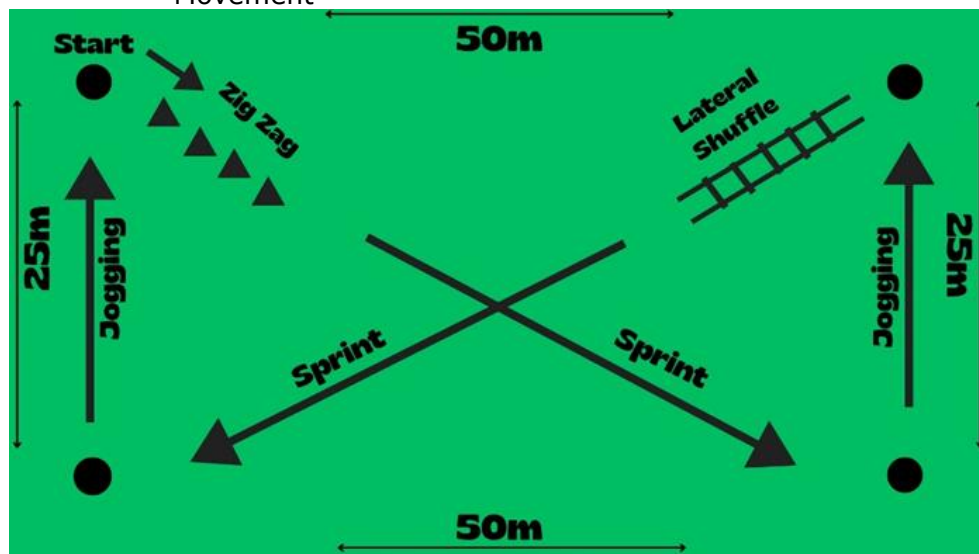


Figure 1. Design of the Training Model

3.1.3 Expert Validation

The initial product design was validated by two experts—one in physical conditioning and the other in futsal. The validation results indicated that the training model was deemed feasible for use, with several minor revisions recommended. These revisions pertained to the clarification of technical movement instructions and the reorganization of the training sequence to ensure a more systematic structure. Overall, the experts evaluated the product as being in the "good" to "very good" category, allowing it to proceed to the trial phase.

3.1.4 Small-Scale Trial

The small-scale trial was conducted with 10 futsal athletes to assess the practicality and comprehensibility of the training model. The results showed that the athletes were able to understand the instructions clearly, and the coach considered the exercises easy to implement without requiring complex additional facilities. The athletes' responses also

indicated that the variations in the training made the sessions more engaging and challenging.

3.1.5 Field Trial

The large-scale field trial was conducted with 20 futsal athletes from SMPN 258 Jakarta. The measurement results showed a significant improvement in endurance, as assessed through the 12-minute run test, as well as an increase in agility, measured using an agility test. These improvements demonstrate the effectiveness of the modified jogstride training model in developing athletes' physical condition more optimally compared to the previous training patterns.



Figure 2. Design of the Jogstride Training Model Development

Overall, the results of this study confirm that the modified jogstride training model, incorporating lateral shuffle and zig-zag run variations, is feasible, practical, and effective for use in school-level futsal training programs.

3.2 Discussion

The findings of this study provide an important contribution to the development of physical training models in futsal, particularly at the school level. In general, the research results reinforce the idea that interval training incorporating movement variations is an effective approach to improving endurance (Popova, 2019) while simultaneously supporting agility, as suggested by Sukadiyanto and Muluk (2011). Thus, this study is not only practically relevant but also theoretically grounded in the field of sports coaching science.

3.2.1 Interval Training with Movement Variations and Endurance Improvement

Interval training is a well-established method in the field of sports for enhancing both aerobic and anaerobic capacities. The main characteristic of this method lies in the combination of periods of high-intensity activity with intervals of rest or low-intensity exercise. Popova (2019) emphasized that interval training is effective in improving

endurance because it repeatedly challenges the cardiovascular and respiratory systems, thereby forcing the body to adapt to high-intensity conditions.

In this study, the modification of the jogstride training model was implemented by adding variations such as lateral shuffle and zig-zag run. These variations not only increased the intensity of the training but also enhanced the complexity of movement. Athletes were required not only to run straight in a combination of jogging and sprinting but also to move laterally and perform rapid directional changes. This demanded greater engagement of stabilizer muscles, neuromuscular coordination, and the anaerobic energy system that supports explosive movements. Consequently, the training provided a dual stimulus: improving aerobic capacity for long-term endurance and anaerobic capacity to support quick, short-duration movements.

The results of the 12-minute run test showed a significant improvement in the athletes' endurance after following this training model. This improvement aligns with the principles of training specificity and overload. Specific training that replicates game situations provides direct transfer to performance, while the overload principle ensures that the body undergoes adaptation due to the increased training demands (Bompa & Buzzichelli, 2019). Thus, the findings of this study are consistent with fundamental principles of exercise physiology.

3.2.2 Agility, Speed, and Dribbling Skills

Agility is one of the most essential components of physical conditioning in futsal. The game is characterized by limited playing space, high intensity, and the constant need for rapid directional changes when facing opponents. Mardiansyah, Taufan, and Chan (2021) found a significant relationship between agility, speed, and dribbling skills in futsal. This finding indicates that technical skills such as dribbling cannot be separated from the fundamental physical qualities that support them.

The modification of the jogstride training model through the zig-zag run directly trains athletes' ability to change direction quickly. Meanwhile, the lateral shuffle exercise develops lateral movement skills, which are frequently used in both defensive and offensive situations in futsal. These two variations not only enhance agility but also train coordination among the legs, hips, and upper body.

Therefore, this study provides empirical evidence that structured physical training can have a positive impact on technical performance. This supports the concept of integrated training, which emphasizes the interconnection between physical and technical development. In this context, physical training does not stand alone but is designed to specifically support game-related skills.

3.2.3 School Context and Early-Age Athlete Development

Sports development at the school level plays a highly strategic role in building the foundation of young athletes' physical abilities and technical skills. Schools, through extracurricular activities and physical education (PJOK) programs, serve as the initial environment for students to cultivate interest, talent, and fundamental competencies in sports. However, development at this level often faces several challenges, including limited facilities, a lack of training method variation, and insufficient coaching competence. Therefore, innovative training models are needed that are suitable for the physical and psychological developmental characteristics of junior high school students.

In this context, the development of the modified jogstride training model holds high relevance. The model is designed to be simple, requiring no specialized facilities, yet remains effective in improving endurance and agility. Mardiansyah, Taufan, and Chan (2021) emphasized that agility and speed are determining factors for dribbling skills in futsal, which represent one of the most frequently used fundamental techniques in matches. Hence, the implementation of this training model in schools can have a direct impact on improving students' game performance.

Furthermore, Asmadi, Bayu, and Chan (2024) highlighted the importance of institutional readiness in designing physical education programs that are relevant to

students' needs. This reinforces the notion that innovation in physical training models must align with real conditions in schools, including limitations in facilities and infrastructure. Through such an approach, school-based sports development can serve not only as a form of recreation but also as a foundation for nurturing young athletes with strong physical and technical capabilities.

3.2.4 Creativity, Innovation, and Relevance of the Training Model

The development of sports training models is inseparable from aspects of creativity and innovation. Yuliwati (2019) emphasized that creative thinking ability correlates with academic achievement. This finding can be adapted to the sports context coaches and educators who think creatively are more capable of designing effective training sessions that meet the learners' needs.

Maimunah, Yuliwati, and Sunarmo (2019) asserted that the use of innovative media can enhance students' practical skills. The same principle applies to the development of physical training models: variation and innovation in training design can increase athletes' motivation, prevent boredom, and accelerate goal achievement. The modified jogstride training model developed in this study represents a simple yet relevant form of innovation, as it combines the fundamental elements of interval training with movement variations suited to the characteristics of futsal.

Furthermore, Yuliwati, Mawarni, and Nurhasanah (2019) emphasized the importance of program evaluation using the CIPP model (Context, Input, Process, Product). This approach can be applied to assess the success of training model implementation. In the context of this study, context refers to the needs of futsal athletes at SMPN 258 Jakarta; input includes the design of the training model and the resources used; process refers to the implementation of the training during small- and large-scale trials; and product represents the improvement in athletes' endurance and agility. Therefore, this study not only produced a tangible product in the form of a training model but also provided a systematic basis for evaluating its effectiveness.

3.2.5 Implications

Theoretically, this study reinforces the foundation that interval training with movement variations can serve as an effective strategy for developing physical conditioning in team sports. The inclusion of agility elements within interval training provides a more comprehensive contribution, as it not only develops the body's energy systems but also enhances sport-specific motor skills. This aligns with the paradigm of integrated training, which emphasizes the interconnection between physical, technical, tactical, and mental aspects in sports development. Practically, the developed training model offers several advantages (1) It is easy to implement in schools with limited facilities. (2) It does not require special equipment only a field and cones are needed. (3) It increases athletes' motivation, as the movement variations make the training sessions more engaging. (4) It is effective in improving endurance and agility, two key components in futsal performance. With these advantages, the modified jogstride training model can be adopted by futsal coaches in other schools as part of a regular physical conditioning program.

4 CONCLUSION

The findings of this study indicate that the modified jogstride training model, incorporating agility-based movement variations such as lateral shuffle and zig-zag run, has proven to be feasible, practical, and effective in improving the endurance and agility of futsal athletes at SMPN 258 Jakarta. This success is largely attributed to the model's simplicity, systematic structure, and alignment with the real needs of junior high school students. The exercises are easy to implement on school fields with limited facilities and resources, yet they still produce significant improvements in key physical aspects that form the foundation of futsal

performance. These findings further emphasize the importance of agility and speed as key factors influencing fundamental futsal skills such as dribbling, passing, and off-the-ball movement. Consequently, this study enriches the body of knowledge on evidence-based physical training model development in schools while contributing practically to the cultivation of young athletes.

The proposed training model aligns with previous studies highlighting the importance of varied training methods in enhancing students' motivation, fitness, and skill acquisition. The innovation introduced through the modification of the jogstride model is particularly relevant, as it addresses the challenges of school-based sports training that often face constraints in facilities and time. Moreover, this model can be integrated into both physical education (PJOK) lessons and futsal extracurricular programs, offering flexibility in implementation. This demonstrates that small innovations in movement design can yield substantial impacts on achieving physical training objectives.

Based on the research findings, several recommendations can be made: (1) Integration into school programs: Physical education teachers and futsal coaches are encouraged to incorporate the modified jogstride training model into regular training programs both extracurricular and formal learning sessions to optimize students' endurance and agility development. (2) Institutional support: Schools should provide adequate support in the form of training time, space, and supervision to ensure that this model can be implemented sustainably. (3) Further research: Future studies should involve larger and more diverse samples to test the model's effectiveness across different age groups and skill levels. (4) Integration with technical skills: The integration of physical training models with futsal technical skills should be further developed so that physical conditioning not only enhances endurance and agility but also strengthens game-specific performance in a comprehensive manner. Through continuous development, implementation, and evaluation, the modified jogstride training model is expected to serve as a sustainable, relevant, and evidence-based alternative physical training program that contributes positively to the development of school-level futsal in Indonesia.

5. ACKNOWLEDGEMENT

Hereby declare that the article included in my undergraduate skripsi is entirely my own original work. This article was written independently without any form of plagiarism, fabrication, or unauthorized assistance, and all sources of information used have been properly cited in accordance with academic standards. I fully acknowledge that if, at any time, this statement is proven to be false, I am willing to accept any academic sanctions imposed by the university in accordance with the applicable regulations.

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