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The Effect of FIFA 11+ Training on the Improvement of Speed among Soccer Players at SSB Spartan FC

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Abstract. The aim of this study was to determine the effect of FIFA 11+ training on the speed improvement of SSB Spartan FC football players. The population of this study consisted of 20 players, all of whom were included as the sample through a saturation sampling technique. This study employed a quasi-experimental method with a one-group pretest–posttest design, in which measurements were taken before and after the intervention to assess the effect of FIFA 11+ training on players' speed. The training program was implemented for 45 minutes per session over a period of four weeks. Speed performance was measured using a 20-meter sprint test. The results showed that the average speed before training (pretest) was 3.80 seconds, while after training (post-test) it improved to 3.60 seconds. The paired t-test results yielded a p-value of 0.000, indicating that $p < 0.05$ and, therefore, the null hypothesis (H_0) was rejected. It can be concluded that FIFA 11+ training had a significant effect on improving the speed of SSB Spartan FC football players.
Keywords: football, speed; FIFA 11+; training effect

Abstract in Indonesia. Tujuan penelitian ini adalah untuk mengetahui pengaruh latihan FIFA 11+ terhadap peningkatan kecepatan pemain sepak bola SSB Spartan FC. Populasi dalam penelitian ini berjumlah 20 pemain, yang seluruhnya dijadikan sampel dengan teknik sampling jenuh. Penelitian ini menggunakan metode eksperimen semu (quasi-experimental) dengan rancangan one group pretest–posttest design, yaitu pengukuran dilakukan sebelum dan sesudah perlakuan untuk mengetahui pengaruh latihan FIFA 11+ terhadap peningkatan kecepatan pemain. Program latihan dilaksanakan selama 4 minggu dengan durasi 45 menit setiap sesi. Pengukuran kecepatan dilakukan menggunakan tes lari sprint 20 meter. Hasil penelitian menunjukkan bahwa rata-rata kecepatan sebelum latihan (pretest) adalah 3,80 detik, sedangkan setelah latihan (posttest) meningkat menjadi 3,60 detik. Hasil uji-t berpasangan (paired t-test) menunjukkan nilai $p = 0{,}000$, yang berarti $p < 0{,}05$ sehingga H_0 ditolak. Dengan demikian, dapat disimpulkan bahwa latihan FIFA 11+ berpengaruh signifikan terhadap peningkatan kecepatan pemain sepak bola SSB Spartan FC.
Kata Kunci: sepak bola; kecepatan; FIFA 11+; pengaruh latihan

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INTRODUCTION

Football is a high-intensity, intermittent sport dominated by aerobic activities involving sprinting, acceleration, jumping, and agility (Agustiyawan & Pratama, 2019; Cerrillo-Sanchis et al., 2024; Foqha et al., 2023; Judge et al., 2020; Larsen et al., 2021; Nishad et al., 2023). Each professional football player performs approximately 1.000–1.400 short sprints lasting 2–4 seconds, repeated every 90 seconds, with an average recovery time of 18 seconds in 90% of cases (Chiu et al., 2022; Davidovica et al., 2025; Escudero-Ferrer et al., 2025; Mahdiye et al., 2024; Milosz et al., 2017; Panchal et al., 2025). The performance of a football player on the field is largely determined by physical fitness, one of which is speed. In Spanish league competitions, football players perform sprinting activities averaging 193–260 meters per match, compared to 208–278 meters in the English league and 167–345 meters in the Europa League (Milosz et al., 2017). These sprint distances demonstrate that speed is an essential component in modern football performance, alongside technical and tactical skills.

The importance of speed ability in football players has a linear relationship with aerobic capacity, which is a critical component in optimizing performance and reducing injury risk. In modern football, speed has become a key factor in determining match outcomes, complementing technical and tactical aspects (Lago et al., 2010; Andrzejewski et al., 2012). Therefore, speed plays a decisive role in achieving optimal performance within a football team.

Efforts to enhance speed ability which correlates with aerobic capacity require appropriate training program selection to ensure optimal results during both training and competition. Properly designed programs can enhance physiological adaptations, increase muscle temperature, improve blood flow, and optimize metabolic responses (Bizzini et al., 2013). One recommended program by FIFA is FIFA 11+, a comprehensive warm-up protocol designed to improve kinesthetic awareness, speed, neuromuscular control, and muscle strength during both static and dynamic movements (Oluwatoyosi et al., 2014).

During football matches, players are typically engaged in high-intensity activities every 60 seconds and perform sprints every 4 minutes, averaging 30–40 sprints per game. The number of sprints varies depending on a player's position on the field. In professional football, sprints are generally short, with distances exceeding 20 meters rarely lasting more than 4 seconds (Andrzejewski et al., 2015). Speed performance is commonly assessed using the 20-meter sprint test, a standardized method to evaluate sprinting ability in football players (Barengo et al., 2014).

Speed is defined as a motor skill and physical ability that allows an individual to move from one point to another as quickly as possible, largely determined by genetic factors (Milenković, 2011). According to Jones et al. (2013), speed can be categorized into three types: (1) Speed endurance, the ability of muscles to perform rapid movements over a relatively extended duration; (2) Sprinting speed, the ability to move forward with maximal power and velocity; (3) Reaction speed, the ability to respond quickly to external stimuli. Furthermore, factors influencing speed include (1) age, (2) myofibril composition, (3) muscle elasticity and relaxation ability, (4) muscle strength, (5) cognitive function, (6) muscle biochemistry, (7) neural innervation, and (8) coordination (Jones et al., 2013).

METHODS

The study involved twenty male football players from SSB Spartan FC who participated as the research subjects. The sampling method applied was total sampling, which included all available players in the team. Participants were informed in detail about potential risks and research procedures, and each provided written informed consent prior to data collection. The research employed a quasi-experimental approach utilizing a one-group pretest–posttest design without a control group. The FIFA 11+ training program was implemented forty-five minutes per session over a period of four weeks to evaluate its influence on speed performance. Speed ability was measured using a standardized 20-meter sprint test, which served as an objective indicator of short-distance acceleration. Each participant performed two sprint attempts, and the fastest recorded time was selected for analysis. Timing was conducted manually with a stopwatch, ensuring consistency across all trials. The test equipment consisted of a stopwatch, whistle, field area, two cones positioned three meters beyond the 20-meter line to prevent early deceleration, and basic administrative materials. Data analysis employed a bivariate statistical approach using the paired t-test to examine significant differences between pre-training and post-training results, as the dataset demonstrated normal distribution. The experimental procedure provided empirical evidence supporting the effectiveness of FIFA 11+ as a structured warm-up program for enhancing sprint performance among football players.

RESULTS AND DISCUSSION

Respondent Characteristics

Table 1 presents the descriptive characteristics of the twenty football players who participated in the study. The group represented adolescent athletes according to the World Health Organization age classification. The average age of the respondents was 16 years, with a minimum of 16 years and a maximum of 17 years, demonstrating a homogeneous age composition within the adolescent category. The relatively narrow age range indicates that the players had comparable physiological maturity, which contributes to a more stable interpretation of physical performance responses to the FIFA 11+ training intervention. Homogeneity in age is advantageous for experimental control because variations in skeletal and muscular development among adolescents could influence speed outcomes.

The mean height of the participants was 167 cm, with a recorded minimum of 157 cm and a maximum of 175 cm. The height range indicates that the athletes were generally within the normal growth standards for adolescent males in Indonesia. Height provides a general indicator of anthropometric development that influences stride length and biomechanical efficiency during sprinting. Players with taller stature typically display longer stride patterns, although coordination and muscular

strength remain critical determinants of sprint performance.

The mean body weight of the respondents was 60 kg, ranging from 50 kg to 74 kg. The recorded distribution shows that the athletes had relatively balanced body compositions appropriate for competitive youth football. Body mass contributes to sprint acceleration when supported by adequate muscular strength and low fat mass. Excessive body weight can hinder rapid movement, while insufficient mass may reduce power output during propulsion.

The average Body Mass Index (BMI) of the sample was 21.50 kg/m², with individual values ranging from 19.0 kg/m² to 25.0 kg/m². The mean BMI value classifies the players within the normal range according to World Health Organization standards, reflecting a proportionate relationship between body mass and height. Maintaining a healthy BMI is crucial for football players, as optimal body composition enhances speed, endurance, and overall performance while reducing the likelihood of musculoskeletal injury. The anthropometric characteristics described in Table 1 indicate that the group was physically suited for participating in a structured conditioning program such as FIFA 11+.

Table 1. Characteristics of Participants (n = 20)

Variable	Group (n = 20)	Min	Max	Mean
Age (years)		16	17	16
Height (cm)		157	175	167
Weight (kg)		50	74	60
BMI (kg/m²)		19.0	25.0	21.50

BMI = Body Mass Index

The homogeneity reflected in the anthropometric data supports the reliability of subsequent comparisons between pre- and post-training results. The age distribution concentrated in the mid-adolescent stage suggests similar hormonal and musculoskeletal adaptation potentials. Height and weight consistency further enhance the comparability of participants' responses to physical training stimuli. The baseline condition of the respondents indicates readiness for an intervention targeting neuromuscular control and sprint speed improvement. Overall, the descriptive characteristics reveal a population of adolescent football players with proportional physiques and stable physiological conditions suitable for evaluating the effects of structured warm-up and conditioning exercises.

Univariate Analysis

The univariate analysis was performed to examine the normality and homogeneity of the measured variables before and after the training program. Table 2 summarizes the results obtained through the Shapiro–Wilk test for normality and Levene's test for homogeneity. Both pretest and post-test data sets demonstrated normal distribution and homogeneity, fulfilling the assumptions required for parametric statistical analysis.

The mean pretest value for sprint speed was 3.80 seconds, whereas the post-test mean was 3.60 seconds. The Shapiro–Wilk test yielded a significance value of 0.215 for the pretest and 0.076 for the post-test. Both values exceeded the 0.05 threshold, indicating that the speed data were normally distributed. Homogeneity testing produced significance values of 0.591 and 0.741 for the pretest and post-test, respectively, which were also greater than 0.05, confirming that the variance between measurements was homogeneous. The assumption of data normality and variance equality ensures that the paired-sample t-test could be appropriately applied to evaluate differences in mean speed performance.

Table 2. Normality and Homogeneity Tests (n = 20)

Variable	Group (n = 20)	Mean	p (Normality)	p (Homogeneity)
Pretest		3.80	0.215	0.591
Post-test		3.60	0.076	0.741

Note: All p-values > 0.05 indicate normal and homogeneous data distributions

The descriptive evaluation of the normality results demonstrates a consistent pattern between pre- and post-test measurements, showing that the players responded uniformly to the testing protocol. The minimal variation observed between the two assessments reflects stable environmental and physiological conditions during the data collection sessions. The maintenance of similar testing conditions strengthens the validity of the comparison between the two measurement points.

The pretest average of 3.80 seconds represents the baseline sprint speed before the intervention, while the post-test average of 3.60 seconds reflects the outcome following the four-week FIFA 11+ program. The improvement of 0.20 seconds indicates a measurable enhancement in short-distance acceleration, consistent with physiological expectations that neuromuscular-based training improves muscle activation efficiency. Although environmental factors such as field condition or temperature could influence performance, the homogeneous test environment minimized external variability.

The confirmation of normality and homogeneity supports the reliability of the subsequent paired-sample comparison. The adherence to statistical assumptions ensures that the observed mean differences are attributable to the training intervention rather than measurement error or random variation. The normality verification also implies that the distribution of sprint times clustered closely around the mean, representing consistent performance across participants.

The descriptive univariate findings therefore establish a sound foundation for the inferential analysis, allowing confident interpretation of the relationship between the FIFA 11+ training regimen and improvements in speed performance among adolescent football players. The pre-training and post-training values illustrate not only measurable differences but also confirm that the group maintained consistent physiological and technical conditions throughout the research period.

Bivariate Analysis

The bivariate analysis was conducted to determine the effect of the FIFA 11+ training program on sprint speed improvement. The paired-sample comparison summarized in Table 3 reveals a statistically significant reduction in sprint time following the four-week intervention. The mean pretest value was 3.80 seconds, whereas the mean post-test value decreased to 3.60 seconds, producing a p-value of 0.000, which is below the 0.05 significance threshold. The findings demonstrate a meaningful improvement in sprint performance among the football players after participation in the FIFA 11+ training program.

Table 3. Effect of FIFA 11+ Training on Speed Improvement (n = 20)

Speed (sec)	Pretest Mean	Post-test Mean	p	Description
Experimental Group	3.80	3.60	0.000	Significant

Note*:* $p < 0.05$ indicates a significant difference between pretest and post-test values

The reduction in sprint time reflects enhanced neuromuscular coordination, increased muscle elasticity, and improved efficiency of energy transfer during high-intensity movement. The FIFA 11+ training protocol emphasizes dynamic balance, core stabilization, and functional strength, all of which contribute to more effective sprint mechanics. By strengthening the lower-limb muscle groups and improving proprioceptive control, the program enables athletes to achieve more rapid acceleration over short distances. The descriptive interpretation of Table 3 highlights a consistent trend of performance enhancement across all participants. The uniform direction of change suggests that the training stimulus was sufficient to elicit adaptation within a relatively short intervention period. The four-week duration provided enough cumulative load to trigger neuromuscular adaptation while avoiding excessive fatigue or overtraining.

The improvement from 3.80 seconds to 3.60 seconds, although numerically small, represents a substantial percentage change when expressed relative to the initial performance level. Sprint events in football often involve very short distances where fractional second differences can determine successful ball interception or defensive recovery. Therefore, a 0.20-second improvement may hold significant tactical implications during competitive play. The consistency of the observed performance gains aligns with prior findings in sports-science literature demonstrating that structured warm-up and injury-prevention programs contribute not only to reduced injury risk but also to enhanced athletic performance. The FIFA 11+ program, originally designed for injury prevention, has shown collateral benefits for motor control, strength, and agility, which translate into improved speed execution.

The descriptive data reveal that all participants maintained normal BMI levels, providing favorable biomechanical conditions for acceleration. The relationship between anthropometric stability and speed improvement underscores the role of optimal body composition in training responsiveness. Participants within the normal BMI range were able to translate the mechanical advantages of the training program into faster sprinting movements due to balanced muscle-mass distribution.

The paired-sample comparison indicates that the training intervention induced measurable enhancement in motor output without introducing variability that could obscure the results. The consistency across pre- and post-test data points reinforces the reliability of the observed trend. The normal distribution and homogeneous variance confirmed earlier further validate that the mean difference accurately represents a genuine performance improvement rather than random fluctuation. The descriptive findings also imply that the structure of the FIFA 11+ exercises, which include running, cutting, and core-stability movements, directly complements the physiological demands of sprinting. Dynamic stretching and strength-based components likely facilitated faster muscle fiber recruitment during explosive actions. The short-duration, high-intensity nature of the drills may have contributed to enhanced phosphagen energy system efficiency, leading to improved sprint speed over 20 meters (Alimoradi et al., 2024; Nuhu et al., 2021; Patti et al., 2022; Puerta-Mateus et al., 2021; Rohmansyah & Hiruntrakul, 2021; Sarışık & Şahin, 2024; Sharifatpour et al., 2024).

From a deductive perspective, the observed improvements can be attributed to the specific neuromuscular adaptations elicited by the FIFA 11+ sequence. Exercises emphasizing balance and single-leg stability enhance proprioceptive feedback, which in turn refines stride control and foot placement. The resulting biomechanical precision minimizes ground-contact time, producing faster sprint times. The program's integration of plyometric movements, such as vertical jumps and bounding, strengthens the stretch-shortening cycle of the lower-limb muscles, facilitating rapid force production during sprint initiation. In addition to neuromuscular benefits, the structured progression of the FIFA 11+ may improve cognitive aspects of movement control. Repetitive practice of coordinated patterns encourages motor learning, allowing athletes to internalize efficient movement sequences. Such improvements in motor control manifest as smoother acceleration phases and more consistent sprint technique, contributing to measurable reductions in sprint time (Asgari et al., 2022; Edis et al., 2023; Febrianta et al., 2023; Ferreira-Júnior et al., 2023; Martín et al., 2025; Perez de Arrilucea Le Floc' h et al., 2025; Seyedi et al., 2023).

The findings support the interpretation that regular implementation of FIFA 11+ training contributes to both performance enhancement and injury prevention. The improved speed performance observed after the intervention demonstrates that conditioning programs focusing on integrated functional movements can generate significant outcomes even over relatively brief timeframes. The data suggest that adolescent football players respond positively to neuromuscular-oriented warm-up routines that emphasize controlled dynamic movement rather than static stretching alone. The bivariate results therefore confirm the research objective, which sought to determine the influence of FIFA 11+ training on speed improvement among adolescent football players of SSB Spartan FC. The statistically significant difference between pre-training and post-training results verifies that consistent participation in the program enhances sprint performance. The mean reduction of 0.20 seconds in 20-meter sprint time represents a tangible manifestation of improved athletic capacity resulting from the systematic application of evidence-based warm-up and conditioning principles (Arsenis et al., 2020; Bukry et al., 2024; Chen et al., 2021; Franchina et al., 2023; Sayyad et al., 2021; Suryo Putro et al., 2025; Z. Zhou et al., 2024).

From a broader analytical standpoint, the observed enhancement in speed performance aligns with the theoretical framework suggesting that functional training improves the integration of muscular strength, coordination, and flexibility. The FIFA 11+ regimen, by engaging multiple joints and muscle groups simultaneously, fosters movement patterns that directly correspond to the demands of football sprinting. Consequently, the players displayed more efficient stride mechanics and energy utilization during post-training assessments. The results provide empirical support for implementing FIFA 11+ as a routine preparatory activity in youth football programs. Coaches and trainers may adopt the program not only for injury prevention but also as a scientifically grounded method for enhancing performance metrics such as sprint speed. The data generated through this research reinforce the dual functionality of FIFA 11+ in promoting athlete safety and performance development (Al Attar, Al Shamrani, et al., 2021).

The findings emphasize the importance of structured warm-up protocols in athletic training. Spontaneous or unstructured warm-up routines may fail to adequately activate key muscle groups, leading to suboptimal performance. The FIFA 11+ offers a standardized format that ensures comprehensive activation of major muscle chains, thereby preparing athletes for high-intensity exertion. The observed post-training improvements illustrate how systematic activation enhances movement efficiency and power generation during sprint tasks. Collectively, the descriptive results from the three analytical stages respondent characteristics, univariate analysis, and bivariate comparison demonstrate a coherent pattern of physical readiness, normal data distribution, and measurable speed enhancement following the FIFA 11+ intervention. The integration of anthropometric stability with structured neuromuscular conditioning yields a synergistic effect that enhances overall athletic performance (Nuhu et al., 2021; Patti et al., 2022; Puerta-Mateus et al., 2021; Sarışık & Şahin, 2024).

The findings of the study demonstrate that the FIFA 11+ training program significantly enhances sprint speed among adolescent football players, providing empirical evidence that fills a critical gap in the existing literature regarding the performance benefits of this globally promoted injury-prevention program. While prior studies have emphasized the role of FIFA 11+ in reducing injury incidence, relatively few investigations have focused on its capacity to improve specific performance parameters, particularly short-distance acceleration and sprint speed among adolescent athletes. The results presented in the previous section confirm that the structured warm-up regimen, when implemented consistently over a four-week period, produces measurable improvements in motor performance. This outcome bridges the gap between preventive and performance-oriented applications of the FIFA 11+ program, affirming that an intervention originally designed for safety enhancement also contributes to athletic development (Al Attar, Al Shamrani, et al., 2021; Bakare et al., 2021; Chen et al., 2021; Franchina et al., 2023; Gok et al., 2024; Maleki et al., 2025; Suryo Putro et al., 2025).

The improvement in 20-meter sprint time from 3.80 seconds to 3.60 seconds reflects the successful translation of neuromuscular adaptations into functional performance gains. From a physiological perspective, the observed improvement is grounded in the principle of neuromuscular facilitation, which occurs when repetitive, controlled movement patterns enhance motor unit recruitment and synchronization. FIFA 11+ incorporates dynamic balance, plyometric, and core-stability exercises that collectively stimulate the stretch-shortening cycle of the lower-limb muscles. This process increases the efficiency of muscle contraction during rapid acceleration, thereby improving sprint speed. The enhancement in performance also aligns with the findings of Bizzini et al. (2013), who reported that dynamic neuromuscular training elevates both muscle activation and coordination, leading to more efficient power generation during high-intensity efforts. The present study extends those findings by providing data specifically from adolescent football players in a Southeast Asian context, a population that remains underrepresented in the global literature (Foqha et al., 2023; Judge et al., 2020; Larsen et al., 2021).

The novelty of this research lies in its integration of the FIFA 11+ framework into a focused analysis of sprint performance rather than merely injury prevention outcomes. Previous investigations, such as those by Soligard et al. (2008) and Barengo et al. (2014), concentrated on epidemiological outcomes related to injury reduction, whereas the present study isolates and quantifies the program's effect on a key indicator of physical performance speed. This approach establishes a new line of evidence demonstrating that the same neuromuscular mechanisms responsible for injury prevention can also produce measurable athletic benefits. By situating the research within the context of youth football development in Indonesia, the study introduces regional novelty as well, since few controlled investigations have explored the adaptation of FIFA 11+ among young Southeast Asian athletes with distinct anthropometric and environmental characteristics (Martín et al., 2025; Nuhu et al., 2021; Patti et al., 2022; Sarışık & Şahin, 2024).

The critical interpretation of the data suggests that the effectiveness of FIFA 11+ in improving sprint speed can be attributed to the multidimensional structure of the exercises. The program's emphasis on core stabilization enhances proximal control, which allows more efficient distal movement of the lower extremities during acceleration. Improved balance and coordination facilitate more effective energy transfer through the kinetic chain, reducing energy loss during each stride. The dynamic strength component of the regimen strengthens major muscle groups quadriceps, hamstrings, gluteals, and gastrocnemius which are essential for explosive movement. Furthermore, the proprioceptive and agility

drills refine the athlete's ability to adjust body position rapidly, leading to shorter ground-contact times during sprinting. The combination of these elements creates a synergistic effect that enhances both movement economy and velocity (Cerrillo-Sanchis et al., 2024; Larsen et al., 2021; Mahdiye et al., 2024; Nishad et al., 2023; Panchal et al., 2025).

From a theoretical standpoint, the findings align with motor-learning principles, particularly the notion that consistent exposure to complex, coordinated movement patterns reinforces neural pathways associated with efficient performance. The repetitive structure of FIFA 11+ enables continuous refinement of motor control, which translates into improved biomechanical precision. The program's progression from basic to advanced drills mirrors the process of skill acquisition, where repeated, context-specific movements lead to automated, efficient execution. This relationship between neural adaptation and physical performance is supported by contemporary research emphasizing the importance of neuromuscular re-education in athletic conditioning (Grooms et al., 2015). The study thus provides a physiological explanation for the performance enhancement observed following systematic participation in the FIFA 11+ program.

The contribution of the present research extends beyond performance optimization to practical implications for training methodology in youth sports. Coaches and athletic trainers often face the challenge of balancing injury prevention with performance enhancement within limited training time. The demonstrated capacity of FIFA 11+ to address both objectives simultaneously offers a practical solution for sports practitioners. By adopting a scientifically validated warm-up system that improves neuromuscular efficiency, coaches can optimize training sessions without increasing overall training volume or risk of overtraining. The study therefore contributes to evidence-based coaching practices that prioritize both athlete safety and competitive readiness (Edis et al., 2023; Ferreira-Júnior et al., 2023; Martín et al., 2025; Perez de Arrilucea Le Floc' h et al., 2025).

From a broader societal perspective, the findings hold implications for the promotion of physical activity and the development of structured youth sports programs. Implementing standardized warm-up routines such as FIFA 11+ in community-based football academies can foster safer and more effective athletic participation among adolescents. The accessibility and simplicity of the program allow for large-scale application across various developmental levels, including school-based sports programs. By enhancing motor performance while reducing injury risk, FIFA 11+ supports the long-term sustainability of sports engagement, aligning with public health objectives related to adolescent physical fitness and well-being (Nuhu et al., 2021; Patti et al., 2022; Puerta-Mateus et al., 2021; Sarışık & Şahin, 2024).

The observed results also highlight the adaptability of FIFA 11+ to diverse athletic populations. While the program was initially validated in European and North American cohorts, the present study confirms its effectiveness among Indonesian adolescent athletes with different anthropometric characteristics and training environments. Such findings reinforce the universality of neuromuscular conditioning principles and encourage the localization of global training models for regional application. The cross-cultural adaptability of FIFA 11+ enhances its relevance as a global standard for injury prevention and performance enhancement (Arsenis et al., 2020; Bukry et al., 2024; Franchina et al., 2023; Suryo Putro et al., 2025; Z. Zhou et al., 2024).

The critical synthesis of the findings underscores that speed improvement following FIFA 11+ participation stems from cumulative adaptations across multiple physiological systems. Muscular adaptations involve increased force production capacity due to enhanced fiber recruitment and synchronization. Cardiovascular contributions include improved oxygen delivery efficiency during repeated high-intensity efforts, facilitating quicker recovery between sprints. Biomechanical adaptations emerge through refined movement patterns, particularly improved stride length and reduced braking forces. Together, these multidimensional improvements explain the statistically significant reduction in sprint time (Al Attar, Al Shamrani, et al., 2021; Bakare et al., 2021; Chen et al., 2021; Maleki et al., 2025).

An in-depth interpretation of the results also reveals that consistency and adherence are crucial for realizing the benefits of the FIFA 11+ program. The four-week intervention period in the study demonstrated meaningful changes despite its short duration, suggesting that early adaptations occur rapidly in response to structured neuromuscular training. Continued implementation beyond four weeks could potentially lead to further gains, as chronic adaptations in muscle strength and tendon stiffness become more pronounced. Future research could therefore extend the intervention period and

incorporate comparative analyses across age categories to explore long-term developmental effects (Al Attar, Yamani, et al., 2022; Caudet et al., 2025; Gok et al., 2024; Horan et al., 2023; Perkins & Canavan, 2023).

The contribution of this research to the scientific community lies in its evidence-based demonstration that preventive training frameworks possess untapped potential for enhancing athletic performance. By quantifying measurable improvements in sprint speed, the study encourages a paradigm shift in how coaches and sports scientists conceptualize injury-prevention protocols not as separate from performance training but as integral components of athletic development. The data provide empirical support for integrating FIFA 11+ into daily training regimens not only as a safety measure but also as a performance enhancement tool (Anam et al., 2024; Hanief et al., 2025; Mannaa et al., 2023; Stępiński et al., 2020; Trajković et al., 2020; Zarei et al., 2021; X. Zhou et al., 2022).

In terms of theoretical implications, the findings reinforce the interconnectedness of biomechanical efficiency, neuromuscular control, and performance output. The observed relationship between structured functional training and improved sprinting ability illustrates the application of systems theory in sports science, where adaptation results from the interaction of multiple physiological subsystems. The research thereby contributes to a holistic understanding of performance development, demonstrating that improvements in speed are the outcome of coordinated enhancements across mechanical, neural, and metabolic domains (Arfiansyah et al., 2025; Azizan et al., 2023; Cierson et al., 2025; Şar et al., 2025; Soussi et al., 2025; Taghizadeh Kerman et al., 2023; Yalfani et al., 2020).

Practically, the study offers a replicable model for sports institutions seeking to improve athlete performance through evidence-based training design. Football academies, school teams, and community clubs can adopt FIFA 11+ as a cost-effective, low-equipment intervention with dual benefits for performance and injury prevention. The results advocate for policy support from sports governing bodies to include structured neuromuscular warm-up programs within youth training curricula. Such institutional adoption could standardize best practices across developmental pathways, ensuring that young athletes receive scientifically validated conditioning from early stages of participation (Al Attar, Alarifi, et al., 2021; Al Attar, Alharbi, et al., 2022; Aouadi et al., 2025; Khosravi Rad et al., 2025; Mercurio et al., 2025; Sánchez-Díaz et al., 2022; Sumartiningsih et al., 2022).

The study fills a significant research gap by demonstrating that FIFA 11+, beyond its established role in reducing injury risk, also produces quantifiable improvements in speed performance among adolescent football players. The novelty of the research lies in its context-specific application to a Southeast Asian cohort and its focus on performance outcomes. The results provide both scientific and practical contributions by affirming the physiological mechanisms underlying speed improvement and by offering a validated, adaptable intervention for youth football programs. The integration of preventive and performance-based conditioning through FIFA 11+ enhances the understanding of how neuromuscular training contributes to athletic development. The findings not only enrich the body of sports science literature but also provide actionable insights for coaches, institutions, and policymakers seeking to advance safe and effective athletic training practices for adolescent populations.

CONCLUSION

The study concludes that the FIFA 11+ training program effectively enhances sprint speed among football players of SSB Spartan FC, as evidenced by the improvement in mean sprint time from 3.80 seconds before training to 3.60 seconds after four weeks of consistent implementation, with a statistically significant value of $p < 0.05$. The findings confirm that structured neuromuscular warm-up routines not only serve preventive functions but also contribute directly to performance enhancement by improving coordination, balance, and muscular efficiency. Scientifically, the research contributes to the growing body of evidence supporting the dual role of FIFA 11+ as both an injury-prevention and performance-development tool within sports science. The results emphasize the importance of incorporating evidence-based warm-up programs into regular football training, particularly for adolescent athletes, to optimize physical readiness and long-term athletic development. Going forward, the integration of FIFA 11+ into youth football systems holds promise for cultivating athletes who are not only safer but also faster, more efficient, and better prepared for the physical demands of modern football.

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