



## El programa del Centro de Investigación Médica de la FIFA ejercita para prevenir lesiones en los atletas de fútbol entre Unimuda Sorong

### *FIFA'S Medical Research Centre Program Exercise Prevent Football Athlete Injury Among Unimuda Sorong*

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#### Abstract

**Introduction.** Football is the most popular sport in Southwest Papua Indonesia. In a football match, the game lasts 2 x 45 minutes. However, football players are often injured due to collisions and errors in landing after jumping. Some factors that increase the occurrence of injuries are poor balance, and poor running speed. FIFA created FIFA 11+ as a training program to guard against sports-related injuries to football players. However, although there has been quite a lot of research related to the FIFA 11+ training program in Southwest Papua Indonesia, there still needs to be more research on the provision of the FIFA 11+ training program.

**Objective.** This study aims to determine the effect of the FIFA 11+ training program on speed and body balance.

**Methodology.** This experimental study has a one-group pre-test and post-test design. The research was conducted at the PS UNIMUDA Sorong Southwest Papua, Indonesia. The population sample consists of 42 boys between the ages of 18 and 23. FIFA 11+ practice is provided over 4 weeks (2 sessions in 1 week). The data obtained was then tested for Pearson product-moment correlation and multiple regression correlation tests using the Statistical Product and Service Solutions (SPSS) application version 26.

**Results.** The results showed that after the FIFA 11+ training program, there was a significant increase in speed and body balance. This was proven in the effect test, with SPSS showing results of  $p < 0.05$ .

**Conclusions.** Based on the results and discussion above, the FIFA 11+ program significantly increases running speed and body balance.

#### Keywords

FIFA 11+; speed; body balance; injury

#### Resumen

**Introducción.** El fútbol es el deporte más popular en el suroeste de Papúa Indonesia. En un partido de fútbol, el partido dura 2 x 45 minutos. Sin embargo, los jugadores de fútbol suelen lesionarse debido a colisiones y errores al aterrizar después de saltar. Algunos factores que aumentan la aparición de lesiones son el equilibrio deficiente y la mala velocidad de carrera. La FIFA creó FIFA 11+ como un programa de entrenamiento para proteger a los jugadores de fútbol de lesiones relacionadas con el deporte. Sin embargo, aunque se han realizado muchas investigaciones relacionadas con el programa de entrenamiento FIFA 11+ en el suroeste de Papúa Indonesia, todavía es necesario realizar más investigaciones sobre la provisión del programa de entrenamiento FIFA 11+.

**Objetivo.** Este estudio tiene como objetivo determinar el efecto del programa de entrenamiento FIFA 11+ sobre la velocidad y el equilibrio corporal.

**Metodología.** Este estudio experimental tiene un diseño de prueba previa y posterior a un grupo. La investigación se llevó a cabo en la PS UNIMUDA Sorong Southwest Papua, Indonesia. La muestra de población está formada por 42 chicos de entre 18 y 23 años. La práctica de FIFA 11+ se realiza durante 4 semanas (2 sesiones en 1 semana). Luego, los datos obtenidos se probaron para la correlación de Pearson producto-momento y las pruebas de correlación de regresión múltiple utilizando la versión 26 de la aplicación Statistical Product and Service Solutions (SPSS).

**Resultados.** Los resultados mostraron que después del programa de entrenamiento FIFA 11+, hubo un aumento significativo en la velocidad y equilibrio corporal. Esto se demostró en la prueba de efecto, donde SPSS mostró resultados de  $p < 0,05$ .

**Conclusiones.** Según los resultados y la discusión anterior, el programa FIFA 11+ aumenta significativamente la velocidad de carrera y el equilibrio corporal.

#### Palabras clave

FIFA 11+; velocidad; equilibrio corporal; lesión.

## Introduction

Football is one of the most popular sports worldwide, engaging individuals across diverse societal and cultural contexts (Wijaya et al., 2021). This team-based sport involves 11 primary players and several substitutes per team, competing over two 45-minute halves, separated by a 15-minute halftime interval. Additional injury time is often added to compensate for stoppages caused by fouls, injuries, or other disruptions during play (Ferianto & Subagio, 2021). In cases where the match remains tied after extra time, a penalty shootout determines the winner (Kolbinger & Stöckl, 2019). However, football's dynamic and high-contact nature predisposes players to a heightened risk of injuries, making it a pressing concern for player welfare and team performance.

Football-related injuries impose significant economic and public health burdens (Owoeye et al., 2020). The financial costs include medical expenses, rehabilitation, and lost productivity, which impact not only the players but also the healthcare system and sports stakeholders (Turnbull et al., 2024). Epidemiological studies consistently show that lower extremity injuries, such as sprains, strains, and ligament damage, are the most prevalent, with hamstrings, quadriceps, knees, and ankles being particularly vulnerable (Agel et al., 2007; Mai et al., 2017). These injuries occur more frequently during matches than in practice, posing a severe challenge to maintaining player fitness and availability throughout the competitive season (López-Valenciano, et al., 2020). Addressing these injuries as a public health issue highlights the need for effective prevention strategies that target both individual players and broader team dynamics (Grygorowicz et al., 2020).

Injury prevention is a critical component of football training, particularly during high-intensity periods like competitive seasons when the risk of injuries peaks (Bisciotti et al., 2020). Effective prevention strategies include comprehensive warm-ups to improve muscle blood flow and flexibility (Woods et al., 2007), structured conditioning programs to enhance strength, stamina, and agility (Stølen et al., 2005), and proper training in football-specific techniques to reduce injury risks (Schussler et al., 2018). Additionally, injury prevention programs focusing on flexibility and muscle strengthening have been proven to reduce the likelihood of injuries (Padua et al., 2018). Among these strategies, the FIFA 11+ Program stands out as a widely recognized and evidence-based intervention.

The FIFA 11+ Program, developed by the FIFA Medical Assessment and Research Center (F-MARC), is a 20-minute warm-up protocol specifically designed to reduce injuries in football. It consists of exercises targeting dynamic stability, strength, and proper technique, making it both practical and effective for implementation in diverse team settings (Bizzini & Dvorak, 2015). Studies have demonstrated its ability to not only reduce injury incidence but also improve players' physical attributes, such as strength, balance, and proprioception (Zein & Saryono, 2020). Despite its proven benefits, the extent to which the FIFA 11+ enhances athlete performance and minimizes injuries warrants further investigation, particularly in both male and female players.

This study aims to evaluate the effectiveness of the FIFA 11+ Program in reducing football-related injuries while exploring its impact on player performance metrics, including muscle strength, sprint speed, jump height, balance, and proprioception. By addressing preventable injury factors, this research seeks to provide evidence for integrating the FIFA 11+ into routine training practices. Given the high prevalence of preventable injuries in football and the accessibility of the FIFA 11+ Program, this intervention represents a critical step toward improving player health, enhancing performance, and addressing the broader public health implications of sports injuries.

## Method

### *Study Design*

The quasi-experimental study with one group pretest and post-test design was designed to analyze the effect of the four-week FIFA 11+ program on speed, static and dynamic balance and leg muscle power in football club university player. Before football training, the participants perform the FIFA 11+ program for 20 min each session for 16 sessions a month. This study aimed to determine the effects of FIFA 11+ program on speed, body balance, leg muscle power to prevent injury in football players who



were members of the PS UNIMUDA Sorong Southwest Papua, Indonesia. This investigation occurred on the football pitch at Stadion Khalid Bin Walid Universitas Pendidikan Muhamamdiyah Sorong in March 2023.

### **Participants**

For this study, the population consisted of individuals who participated in football. The participants in this study all played football for the PS UNIMUDA Sorong Southwest Papua, Indonesia, so the sample size for this research was 42 people. There are the criteria for the sample: 1) currently participating in football at the PS UNIMUDA Sorong Southwest Papua, Indonesia; 2) being in good physical and mental health; 3) being willing to take the test; 4) already to follow the FIFA 11+ program and 5) having completed a body mass index check, speed test, static balance test, dynamic balance test, and vertical jump test.

The PS UNIMUDA Sorong Southwest Papua, Indonesia was selected as the subject of the investigation by the researchers because, of all the clubs in Sorong, this University Football Club was the one with the most notoriety. As a direct consequence of this, it was selected to go up against other universities and represent the region in 2019 at the National Football Championship for Universities in Yogyakarta.

### **Outcome Measurement**

Before the actual research was carried out, the participants were asked to fill out a questionnaire that included questions about their identities as well as their ages, heights, weights, and body mass index measurements. The formula for determining a person's body mass index is  $\text{kg/m}^2$ , which can be found in the body mass index Calculator. This formula can be used to determine a person's BMI (Nuttall, 2015; Syamsuryadin et al., 2022). Because of this, the data regarding BMI are utilized as supporting data for this study.

### **Outcome Measurement**

Table 1. Body Mass Index Category (Nuttall, 2015)

Category	Body Mass Index Score ( $\text{kg/m}^2$ )
Underweight	< 18.5
Normal	18.5-25
Overweight	25-30
Obesity	>30

Speed measurement is evaluated by running a 50-meter sprint. This measurement has been very often found in previous studies. Some equipment needed to make this measurement is a stopwatch, a 50-meter straight running track, and a whistle. The implementation is the test carried out by running 50 meters with a standing start. Four respondents stood behind the start line after the "yes" command, and the respondents ran as fast as they could to the finish line. The test was carried out two times. The score is determined from the time obtained (Dharmadi, 2022).

The stork balance test was utilized for the purpose of determining participants' static balance in this study. The Standing Stork Test, also known as the one leg stand or simply standing on one leg, is a measurement tool that is used to test an athlete's ability to maintain static balance while standing on one leg with their eyes closed. When comparing the Standing Stork Test to other balance tests for the functional balance test, the Standing Stork Test is typically considered to be the "gold standard." When a person is 15 to 30 years old, they have the highest average of 26 to 39 seconds that they can stand on one leg (McCurdy & Langford, 2006).

Table 2. Standing Stork Balance Test Rate (Ogwumike & Tijani, 2011)

Category	Score (second)
Not enough	<10
Enough	10-24
Average	25-39
Good	40-50
Very good	>50



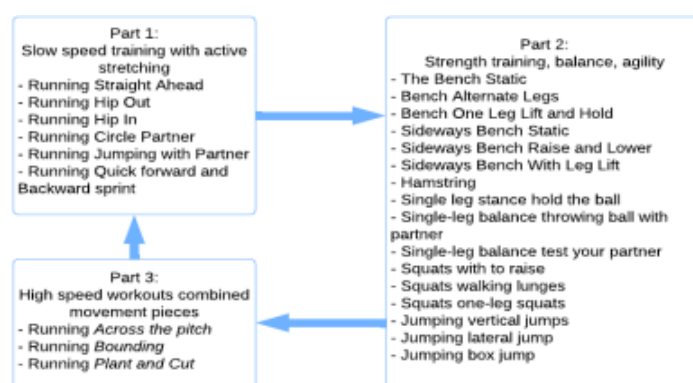
The Y-Balance Test was a dynamic balance test that requires strength, flexibility, core control, and proprioception. It is performed in a single-leg stance. It has been utilized in the evaluation of a person's physical performance, the demonstration of functional symmetry, and the identification of athletes who are at a greater risk of sustaining lower extremity injuries. This procedure is for the Lower Quarter version of the Y Balance test, which is described further below. The Upper Quarter Y Balance Test was another test that evaluates the stability and balance of the upper body (Plisky et al., 2009; Wijaya et al., 2024).

## Intervention

In the warm-up program for FIFA 11+, the spatial orientation, anticipation, and perception parts of the game are emphasized. Especially when performing dual roles and attempting to avoid making accidental contact with other players or objects. Additionally, playing FIFA 11+ helps players improve their body stability and coordination of movement, in addition to teaching them the proper technique for falling when tackled. The ability to minimize the adverse effects and risks associated with unavoidable falls, such as injury, was one of the benefits of learning proper fall techniques (Sumartiningsih et al., 2022).

Training your body for FIFA 11+ for an hour and 45 minutes every week. The recommended amount of FIFA 11+ physical training is. Training Sessions 1 and 2, the frequency of exercise being twice a week with an intensity of 70% of HRMax, the type of aerobic exercise being performed for 45 minutes, 15 repetitions of movements being performed twice, and two sets. Exercise sessions 3, 4, and 5 are performed on a biweekly basis. The intensity of the workout is increased to 75% of the participant's maximum heart rate (HRMax), aerobic exercise is performed for 45 minutes, and there are 15 repetitions performed in each set. Exercise sessions 6, 7, and 8 will have a frequency of twice per week, an intensity of 80% of one's maximum heart rate (HRMax), an aerobic exercise type, 45 minutes of exercise time, 15 repetitions of each movement, and two exercise sets (Agustiyawan et al., 2022).

Figure 1. The FIFA 11+ program procedure (Sumartiningsih et al., 2022)



## Data analysis

Statistical Program for the Social Sciences was used for the statistical analysis. The researchers started by performing a Levene test to determine whether or not the data were distributed consistently. The researchers then used the Chi-Square test to evaluate the degree to which the data were distributed normally. Finally, a paired sample t-test was used by the researchers so that they could determine how playing FIFA 11+ affected a participant's speed, body balance, and the power of their leg muscles.

## Results

There were 42 samples in total, and all of them were male. Between the ages of 18 and 22, inclusive. The sample of students aged 18 was comprised of 8 football players, the sample of students aged 19 comprised of 10 football players, the sample of students aged 20 comprised of 13 football players, the sample of students aged 21 comprised of 6 football players, and the sample of students aged 22 comprised of 5 football players. In the following table, which can be found below, you will see the vulnerable ages of the sample used in this study.



Table 4. Age of Sample Population

Age	Frequency	Percentage (%)
18	8	19%
19	10	23.8%
20	13	31%
21	6	14.2%
22	5	12%
Total	42	100%

Table 5. Body Mass Index Respondent

Category	Frequency	%
Underweight	0	0%
Normal	40	95.2%
Overweight	2	4.8%
Obesity	0	0%
Total	42	100%

There was a total of 42 people who followed the BMI check. There were a total of 40 respondents football players who had a normal body mass index, and there were 2 respondents football players who had an overweight body mass index. There was not a single respondent who fell into either of the extreme categories of obesity or underweight.

Table 6. Result Standing Stork Balance Test

Category	Pre		Post		p-value
	Freq	%	Freq	%	
Very less	0	0	0	0	0.021
Not enough	2	4.7%	0	0	
Pretty good	22	52.4%	10	23.8%	
Good	11	26.2%	19	45.2%	
Very good	7	16.7	13	31%	
Total	42	100%	42	100%	

The standing stork balance test was used to obtain the testing results, which were then analyzed during the pretest. 2 football players were ranked as having not enough balance, 22 were ranked as having pretty good balance, 11 were ranked as having good balance, and 7 were ranked as having very good balance. There was an increase in the results of the posttest standing stork balance test scores after being given the FIFA 11+ physical training program. 0 football players had a balanced level of not enough, 10 players in the category of pretty good, 19 in the category of good, and 13 in the category of very good. With a significance level of  $p=0.021$  ( $p<0.05$ ), the paired sample t-test reveals that the FIFA 11+ training program increases the statistical balance. The hypothesis supports this finding.

Table 7. Result Y Balance Test Score

Side	Move	Pretest (cm)	Posttest (cm)	Difference (cm)	p-value
Right	Anterior	78.23	91.66	13.43	0.012
	Posteromedial	96.16	103.81	7.65	0.032
	Posterolateral	101.43	114.51	13.08	0.011
	Composite	93.33	103.45	10.12	0.017
Left	Anterior	75.31	90.52	15.21	0.010
	Posteromedial	94.87	103.15	8.28	0.028
	Posterolateral	102.34	115.13	12.81	0.011
	Composite	92.24	104.43	12.19	0.014

According to the results of the pre-test and the post-test for the dynamic balance check that was performed using the Y Balance Test. When comparing the results of the pre-test and post-test on anterior movement on the right side, there is a difference of 13.43 cm. The results of the pre- and post-tests show a difference of 7.65 centimeters with regard to the right side posteromedial movement. A difference of 13.08 centimeters can be seen between the pre- and post-test results when it comes to the right side posterolateral movement. The results of the pre-test and post-test both show a difference of 10.12 centimeters in the composite movement on the right side. Due to the fact that the results of the influence test obtained  $p<0.05$ , it can be concluded that the provision of FIFA 11+ program significantly improved the dynamic balance of football players.



When comparing the results of the pre-test and post-test for anterior movement on the left side, there is a difference of 15.21 cm. The difference between the results of the pre-test and the post-test for the posteromedial movement on the left side is 8.28 cm. The difference in the results between the pre-test and the post-test for the posterolateral movement on the left side is 12.81 cm. When comparing the results of the pre-test and post-test on the left side of the composite movement, there is a difference of 12.19 cm. The provision of the FIFA 11+ training program was shown to have a significant effect on improving the dynamic balance of football players, as demonstrated by the results of the effect test, which obtained  $p < 0.05$ .

Table 8. Result Average Speed Test Rate

Pre (Second)	Post (Second)	p-value
6.35	5.87	0.001

After doing some balance and leg muscle power tests, the football players do a speed test. The speed test uses the 50-meter sprint method. This test was carried out two times, namely before the football players joined the FIFA 11+ training program and after participating in the FIFA 11+ training program. The research results showed that the pretest found that the average speed of football players at university clubs was 6.35 seconds. However, after being given the FIFA 11+ training program, the time taken was faster, namely 5.87 seconds to run 50 meters. These results were then tested for influence, which was  $p = 0.01$ . Therefore, it can be concluded from these results that the provision of the FIFA 11+ training program significantly increases the running speed of football players in university clubs.

## Discussion

The findings of this research project indicate that participating in program training FIFA 11+ for a duration of four weeks can significantly improve various aspects of physical fitness that were measured in the study. Aspects such as body balance and speed are included in this category. Football, which is widely regarded as the most dominant lower-extremity action sport, is thought to benefit from this boost in terms of supporting player performance (Steffen et al., 2008).

A significant increase in leg muscle power was observed among the participants in this study, as demonstrated by the finding that  $p < 0.05$  was significant. This enhancement provides support for fundamental football movements, such as kicking, dribbling, and running at high speed. The power of one's leg muscles is absolutely necessary for the sport of football, particularly in terms of one's ability to kick. Studies have shown a positive correlation between the speed of the ball when attempting kick approaches as well as instep kicks (Parmadi et al., 2022). This correlation holds true in spite of the fact that there are many different types of kicks. In addition, there are anywhere from 1400 to 1600 different sprints and directional changes that take place during the course of a football game (Silva, 2022).

A p-value of less than 0.05 indicated that the participants in this study experienced a significant improvement in their overall balance after receiving FIFA 11+ program training. After receiving the FIFA 11+ program, the static and dynamic balance will improve. Increased leg strength, particularly in the lower legs, can help improve body balance (Grill et al., 2007). When it comes to the avoidance of injuries, a football player's ability to maintain a balance between the strengths of their various muscles is of the utmost importance (Buckthorpe et al., 2021). The ratio of hamstring strength to quadriceps strength is an important factor in determining the likelihood of injury to the lower extremities (Ernlund & Vieira, 2017). Previous research has demonstrated that the comprehensive FIFA 11+ program is effective in increasing knee flexor strength and, as a consequence, the hamstring-to-quadriceps strength ratio (Zhou et al., 2022). There is a possibility that the force tension that is maintained between the presses is also important for releasing the lower leg. Interstitial limitations in eccentric knee flexor strength have been shown to increase the risk of a hamstring injury, according to the findings of a prospective research study (Bourne et al., 2015).

This research also demonstrates the results of a significant effect of training with the FIFA 11+ program on increasing a participant's speed with a p-value less than 0.05. The findings of this study are consistent



with the findings of the research conducted by Bizzini & Dvorak (2015). The training for the FIFA 11+ program is an exercise that can increase the excitability of the nervous system, which in turn can increase the reactive ability of the neuromuscular system (Barengo et al., 2014). Myotatic stretch reflex can be stimulated to produce a more robust muscle response during running by performing exercises that concentrate on core stability, eccentric muscle, proprioception, and dynamic stabilization (Matos et al., 2020). Every movement pattern that is practiced in the FIFA 11+ program includes a series of repeated stretch-shortening cycles. These cycles generate kinetic energy, which forces the neuromuscular system to react quickly in order to produce concentric contractions, which improve muscle performance while running. Muscles, tendons, and ligaments are all functionally strengthened during this exercise. This is accomplished in addition to repeated stretching and shortening cycles, which are used to train specific movements biomechanically (Davies et al., 2015; Kusuma et al., 2024).

Very good of this, it is essential to emphasize that football is one of the sports that has the greatest level of participation all over the world (Bharlaman et al., 2024). However, there is a significant risk of injury, particularly to the lower limbs, when engaging in this activity (Buckthorpe et al., 2021). These injuries are almost always caused by modifiable factors, which highlights the significant part that the coaching staff plays in providing a training program for the team (Ekstrand et al., 2011).

## Conclusions

Based on the results study, the FIFA 11+ program significantly increases running speed and body balance. As a result, these programs need to be implement and include participation from all football players, which is consistent with the program that is being proposed for FIFA 11+. As a result of this, new research on this topic is required, and it should follow the recommendations of the FIFA 11+ program in order to determine its efficacy based on specific periods of utilization (frequency and duration) and the quality of training performance.

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