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# Longitudinal study on the development of speed, leg explosive power, aerobic endurance, and technical skill of young football players in talented and non-talented categories: implications for talent identification?

# Estudio longitudinal sobre el desarrollo de la velocidad, la potencia explosiva de las piernas, la resistencia aeróbica y la habilidad técnica de jóvenes futbolistas en categorías de talentos y no talentosos: ¿implicaciones para la identificación de talentos?

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**Abstract.** This longitudinal study aimed to assess the development and differences in speed, leg explosive power, aerobic endurance, and technical skills among young players categorized as talented and non-talented. A total of 44 players aged 11-14 years, training in an amateur club, were classified into talented (n = 23) and non-talented (n = 21) groups. Furthermore, physical abilities and technical skills were measured over 1 year of training at 3 intervals, namely T0 (January), T1 (July), and T2 (December). The results showed that speed, leg explosive power, aerobic endurance, and technical skills, increased in both talented and non-talented players by 10.23% and 15.18%, 11.27% and 11.07%, 15.88% and 14.85%, as well as 11.71% and 9.51%, respectively. Based on observations, talented players showed emphasis on dynamic movement, changes in direction, and essential technical skills during the training period. Conversely, non-talented players prioritized speed over other components in football.
**Keywords:** longitudinal, speed, explosive power, aerobic endurance, football

Abstracto. Este estudio longitudinal tuvo como objetivo evaluar el desarrollo y las diferencias en la velocidad, la potencia explosiva de las piernas, la resistencia aeróbica y las habilidades técnicas entre jugadores jóvenes categorizados como talentosos y no talentosos. Un total de 44 jugadores de entre 11 y 14 años, que entrenaban en un club amateur, se clasificaron en grupos de talentos (n = 23) y no talentosos (n = 21). Además, las habilidades físicas y técnicas se midieron a lo largo de 1 año de entrenamiento en 3 intervalos, a saber, T0 (enero), T1 (julio) y T2 (diciembre). Los resultados mostraron que la velocidad, la potencia explosiva de las piernas, la resistencia aeróbica y las habilidades técnicas aumentaron tanto en los jugadores talentosos como en los no talentosos en un 10,23% y 15,18%, 11,27% y 11,07%, 15,88% y 14,85%, así como en un 11,71% y 9,51%, respectivamente. Según las observaciones, los jugadores talentosos mostraron énfasis en el movimiento dinámico, los cambios de dirección y las habilidades técnicas esenciales durante el período de entrenamiento. Por el contrario, los jugadores sin talento priorizaron la velocidad sobre otros componentes en el fútbol.
**Palabras clave:** longitudinal, velocidad, potencia explosiva, resistencia aeróbica, fútbol

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## Introduction

Professional football club managers are responsible for overseeing football academies, tasked with preparing young players for optimal performance. The primary goal of the academies, both in Indonesia and worldwide, is to nurture young talents into professional players. A crucial responsibility for managers is the selection of players to nurture over a 6-10-year period, a decision-making process often supported by talent scouting teams. The search for prospective players who show promise is typically conducted among the age groups between 10 to 15 years, using various methods and instruments (Larkin & O'Connor, 2017), while considering the costs and resources required to manage professional football academies. It is important to develop valid and reliable strategies, methods, and instruments for recruiting players (Jokuschies et al., 2017). However, there persists an ongoing debate regarding the efficacy of these instruments in identifying talented players, due to lack of standardization among football academies. The value of physical testing programs for talent identification and development (TID) remains a contentious topic (Méndez et al., 2013).

Professional football academies engage in the long-term development of players from amateur clubs, where training typically occurs 2-4 times per week. Amateur football clubs comprise heterogeneous athletes training voluntarily for the love of the game, with the operations being sustained through membership dues. Young players from these clubs, participate in competitions organized by football federations at the regency, provincial, and national levels. Some players nurtured in professional football academies secure professional contracts, while a majority face failures. Based on a development program conducted over a 10-year in England, only 23% of players managed to play at least 1 professional match and attain professional status, leaving the remainder without professional contracts (Roescher et al., 2010). Evaluating both the talent Search process and training regimen is essential to enhancing the success rate of development within professional football academies.

Some professional football academies use competency tests for assessing technical skills and physical abilities. Meanwhile, others adopt a multifaceted approach, incorporating assessment of physical abilities, technical skills, and playing aptitude to identify and nurture players. Invalid talent identification instruments, the challenge of selecting the right age for players to commence training, and the provision of suboptimal training, are predicted components contributing to the failure of development processes in professional football academies. The effectiveness of talent identification instruments in football remains a subject of ongoing scientific debate. Coaching patterns, curricula designed

by professional football academies, as well as external factors such as sports club management policies, economic support, social support, educational services, and family support influence the performance of players. While the causes of development failures are diverse, a critical determinant in the initial stages of achieving quality input is the efficacy of talent scouting instruments.

The recruitment model for discovering talented football players remains a contentious topic among experts, with debate persisting over the optimal approach. According to Honer, commitment to task execution is more crucial in predicting the future performance of athletes (HÖner et al., 2015). Furthermore, Hendry suggested that prediction of future success predictions could be made based on metrics such as height, weight, and body mass index (Hendry et al., 2018). According to William et al., technical skill is a dominant factor in predicting the success of players nurtured over the long-term. Skills, decision-making, and strategies differ between 11 vs. 11 and 3 vs. 3 play formats, hence, observations become a consideration in identifying footballing talents (Williams, 2000). Additionally, there is no significant difference in functional characteristics between U9 and U15, except for dribbling skills. The results show that based on physical abilities such as speed, strength, and agility, players aged 15-17 typically serve as forwards. It is important to acknowledge that physical characteristics for different positions at the senior level are not fully developed among young players aged 8 to 14 (D. Deprez et al., 2015).

Leyhr et al., conducted a study to understand motor performance development over 3 years from early to mid-adolescence. The results showed no significant interaction between APL and time, showing that future elite players perform better early in the TID program, maintaining this level during progression from U12 to U15 (Leyhr et al., 2018). According to Roescher, endurance capacity increases with age in talented young football players. Furthermore, a 15-year-old footballer reaching professional levels shows faster development, positively influenced by specific football training and additional factors (Roescher et al., 2010). Studies on talent are often conducted in professional club settings by classifying players into talented and non-talented groups. These players are trained with the same treatment and observed for physical as well as technical skills development over 1 year at the ages of 11, 12, 13, and 14.

The primary objective of this study is to understand the development of speed, leg explosive power, aerobic endurance, and technical skills in young players within 1 year. Additionally, it aims to identify differences in speed, leg explosive power, aerobic endurance, and technical skills among talented and non-talented football players aged 11-14 undergoing training in amateur clubs over a year. The results are expected to provide recommendations for talent identification instruments and the appropriate age for professional football academies to recruit talented players. The study predicts no significant differences in physical abilities and technical skills.

The talent identification results are crucial for professional football clubs to make decisions in determining players with the potential to develop into long-term professionals. While some studies have identified formulas for talent identification models in football, ongoing debates among experts on this subject continue.

## Method

The study was conducted within the framework of an amateur football club dedicated to training young players aged 11-14 with varying skill levels. A total of 97 participants attended training sessions held three times a week, with each session lasting for 120 minutes, spanning a period of 2 to 6 years. These young footballers were divided into 2 categories, namely talented and non-talented. Assessments of physical abilities and technical skills were carried out in January (T0), July (T1), and December (T2). Additionally, comprehensive written and oral summaries were provided to both players and parents, outlining the voluntary and confidential nature of the study, along with its objectives, procedures, risks, and benefits. Consent was obtained from 44 players prior to the commencement of measurements and observations over the course of a year.

Young footballers were subjected to measurements and tests to assess anthropometric characteristics such as height and weight, physical abilities, and technical skills. Height (to the nearest 0.1 cm) and weight (to the nearest 0.01 kg) were measured using a stadiometer (Leicester Height Measure, seca Ltd., UK) and a portable digital scale (seca 770, Seca Ltd., Birmingham, UK) respectively. The players participated in a 30m sprint, a counter-movement jump with arm swing (CMJA), and a multistage fitness test (MSFT Ramsbottom et al., 1988). For the 30m sprint test, each player completed 2 warm-up exercises followed by 2 maximum sprints, with a 3-minute recovery period. Sprints were initiated from a 1-meter line behind the starting gate using the player's preferred foot. The best time achieved for 30m was recorded for analysis. Additionally, players performed a counter-movement vertical jump using full arm swing (equipment used: Newest Jump Mat, Oulu, Finland, or Smart Jump, Fusion Sport, Australia) at least twice, with a 3-minute recovery period between attempts. The multistage fitness test comprised running back and forth over a 20m distance within a specified time frame signaled by an audio cue, while heart rate monitoring was conducted by an adult. Players were required to reach the end of each shuttle and touch or cross the 20m line simultaneously with the audio signal. The required running speed began at 8.0 km.h−1 and increased to 9.0 km.h−1 after 63 seconds.

Physical abilities were assessed through measures of speed, leg explosive power, and aerobic endurance, while technical skills such as passing and dribbling, were evaluated using the David Lee test. This test comprised various dribbling movements, ground passes, and high passes. Dribbling

movements required players to navigate obstacles positioned 1m apart, with high passes attempted only after accurately completing ground passes to a target. The final movement included dribbling the ball as quickly as possible without obstacles after completing a maximum of 4 high passes. Players were considered to have higher technical skills when the time taken during the battery test was smaller. Statistical analysis was performed using SPSS version 20.0. Mean and standard deviation scores were calculated for each variable based on physical abilities and technical skills, for both talented and non-talented players groups. Multivariate analysis of covariance (MANOVA) was performed to compare talented and non-talented players in all performance characteristics. In this analysis, the 2 groups of players were the dependent variables, while physical abilities, technical skills, and age were independent variables. An alpha of 0.05 was adopted for all significance test

## Results and Discussion

Table 1 shows differences in test results where 14 years as the oldest age group had greater height, weight, and body mass index compared to younger age groups. This is certainly a natural thing when conducting tests on all players, but variations in results are evident when making comparisons among the same age.

Table 1.
Status of Height, Weight, and Body Mass Index

| Age | Anthropometric Characteristics | | |
|---|---|---|---|
| | Height (m) | Weight (kg) | Body Mass Index |
| 11 | 1.37 | 33.27 | 17.65 |
| 12 | 1.44 | 40.00 | 19.14 |
| 13 | 1.50 | 41.81 | 18.52 |
| 14 | 1.62 | 52.01 | 19.81 |

Table 2.
Mean Scores of Physical and Skill Components in Young Football Players

| Physical and Skill Components | T0 (n=44) | | T1 (n=44) | | T2 (n=44) | |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD |
| Speed (seconds) | 5.89 | 0.38 | 5.38 | 0.43 | 5.14 | 0.42 |
| Leg Explosive Power (cm) | 33.18 | 7.33 | 35.32 | 7.02 | 36.89 | 7.77 |
| Aerobic Endurance (cc/kg.min) | 33.04 | 7.08 | 35.87 | 6.72 | 38.14 | 6.41 |
| Technical Skills (seconds) | 30.05 | 5.57 | 29.03 | 5.28 | 26.85 | 5.39 |

Table 2 presents the results of the 4 components tested on all 44 players aged 11-14 years, 3 times over the span of a year (T0 - January, T1 - July, T2 - December).

Table 3.
Mean Scores of Physical and Skill Components in Young Football Players Based on Chronological Age

| Physical and Skill Components | Category | T0 | | T1 | | T2 | |
|---|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | Mean | SD |
| Speed (Seconds) | 11 Years (n=13) | 5.79 | 0.24 | 5.52 | 0.25 | 5.29 | 0.33 |
| | 12 Years (n=17) | 5.87 | 0.43 | 5.40 | 0.36 | 5.21 | 0.34 |
| | 13 Years (=6) | 5.87 | 0.51 | 5.62 | 0.61 | 5.26 | 0.61 |
| | 14 Years (n=8) | 5.11 | 0.33 | 4.91 | 0.33 | 4.67 | 0.23 |
| Leg Explosive Power (cm) | 11 Years (n=13) | 29.69 | 5.02 | 32.15 | 4.51 | 33.85 | 4.76 |
| | 12 Years (n=17) | 30.53 | 3.95 | 32.71 | 4.25 | 33.29 | 6.20 |
| | 13 Years (=6) | 32.17 | 3.82 | 35.50 | 4.32 | 39.03 | 5.05 |
| | 14 Years (n=8) | 45.25 | 5.78 | 45.88 | 7.10 | 47.88 | 5.99 |
| Aerobic Endurance (cc/kg.min) | 11 Years (n=13) | 30.95 | 5.87 | 32.85 | 7.01 | 35.62 | 6.42 |
| | 12 Years (n=17) | 29.35 | 5.22 | 34.06 | 5.37 | 36.30 | 5.74 |
| | 13 Years (=6) | 35.67 | 7.31 | 36.75 | 4.98 | 38.98 | 5.11 |
| | 14 Years (n=8) | 42.33 | 1.55 | 43.98 | 2.98 | 45.50 | 2.22 |
| Technical Skills (Seconds) | 11 Years (n=13) | 33.35 | 4.91 | 31.03 | 3.68 | 28.30 | 3.05 |
| | 12 Years (n=17) | 31.44 | 3.91 | 31.15 | 3.16 | 27.04 | 3.84 |
| | 13 Years (=6) | 29.86 | 3.65 | 29.42 | 6.49 | 31.52 | 9.10 |
| | 14 Years (n=8) | 21.86 | 1.88 | 20.97 | 1.47 | 20.59 | 1.40 |

Table 4.
Mean Scores of Physical and Skill Components in Young Football Players Based on Talented and Non-Talented Categories

| Physical and Skill Components | Category | T0 | | T1 | | T2 | |
|---|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | Mean | SD |
| Speed (Seconds) | Non-talented (n=21) | 6.13 | 0.36 | 5.55 | 0.47 | 5.20 | 0.49 |
| | Talented (n=23) | 5.67 | 0.24 | 5.22 | 0.32 | 5.09 | 0.35 |
| Leg Explosive Power (cm) | Non-talented (n=21) | 31.43 | 7.15 | 33.10 | 6.11 | 34.90 | 7.62 |
| | Talented (n=23) | 34.78 | 7.27 | 37.35 | 7.30 | 38.70 | 7.62 |
| Aerobic Endurance (cc/kg.min) | Non-talented (n=21) | 31.93 | 7.66 | 34.46 | 7.89 | 36.67 | 7.03 |
| | Talented (n=23) | 34.06 | 6.50 | 37.16 | 5.29 | 39.47 | 5.60 |
| Technical Skills (Seconds) | Non-talented (n=21) | 30.80 | 5.96 | 28.89 | 4.98 | 27.86 | 5.80 |
| | Talented (n=23) | 29.37 | 5.23 | 29.15 | 5.64 | 25.93 | 4.93 |

Table 5.
Changes in Physical and Skill Components in Young Football Players Based on Talented and Non-Talented Categories at Measurements 1, 2, and 3 (T0, T1, T2)

| Physical and Skill Components | Category | T0-T1 (%) | T1-T2 (%) | T0-T2 (%) |
|---|---|---|---|---|
| Speed | Non-talented (n=21) | 9.46 | 6.31 | 15.18 |
| | Talented (n=23) | 7.93 | 2.49 | 10.23 |
| Leg Explosive Power | Non-talented (n=21) | 5.31 | 5.47 | 11.07 |
| | Talented (n=23) | 7.39 | 3.64 | 11.27 |
| Aerobic Endurance | Non-talented (n=21) | 7.92 | 6.41 | 14.85 |
| | Talented (n=23) | 9.10 | 6.22 | 15.88 |
| Technical Skills | Non-talented (n=21) | 6.20 | 3.57 | 9.51 |
| | Talented (n=23) | 0.72 | 11.05 | 11.71 |

Table 6.
Analysis Results of Differences in Physical and Skill Components in Young Football Players Based on Talented and Non-Talented Categories at Measurements 1, 2, and 3 (T0, T1, T2)

| Physical and Skill Components | T0 | T1 | T2 |
|---|---|---|---|
| | Asymp. Sig. (2-tailed) | Asymp. Sig. (2-tailed) | Asymp. Sig. (2-tailed) |
| Speed | 0.000 | 0.014 | 0.245 |
| Leg Explosive Power | 0.064 | 0.033 | 0.12 |
| Aerobic Endurance | 0.323 | 0.196 | 0.157 |
| Technical Skills | 0.385 | 0.778 | 0.155 |

## Discussion

This study aims to explore the development of speed, explosive power, aerobic endurance, and technical skills in amateur players aged 11-14 years. Additionally, it seeks to identify differences in these attributes between talented and non-talented players, with measurements conducted in January, July, and December. The data analysis results showed progressive improvement in the physical abilities and technical skills of amateur players aged 11-14 years. Over 6 months, speed in a 30m sprint, explosive power, aerobic

endurance, and technical skills increased by 6.47%, 5.47%, 7.43%, and 5.45%, respectively.

According to (Abarghoueinejad et al., 2021), factors such as maturity status, lean body mass, playing position, previous performance, and training stimuli contribute to improvements in the physical fitness components of young football players. The report further stated that training stimuli and playing position are associated with differences in the aerobic capacity of football players, except for goalkeepers. Explosive lower limb strength (counter-movement jump) shows a non-linear increase with age, while the increase is linear in the standing broad jump test. Differences in biological maturity affect physical and physiological development, specifically height and muscle strength in elite adolescents or children aged 12–13 years who mature early. This group shows larger thigh and calf circumferences than those with late maturity due to increased muscle thickness and bone width at an earlier stage (Itoh & Hirose, 2020). Children will continue to develop physical performance characteristics, which are closely related to biological maturity over time (Karahan, 2016). The results were in line with (Perroni et al., 2014) stated that when children undergo changes, specifically in size and functional capacity, the individual traits and performance cannot be separated from maturity according to age. According to (Slimani & Nikolaidis, 2019), anthropometric, physical, and physiological characteristics essentially serve as a reference in determining whether football players are talented or not. This is because the data obtained provides clear insights into various significant differences among players distinguished by respective positions. However, these differences will continue to change in line with physiological development. A study conducted by (le Gall et al., 2010) on 14-year-old football players indicated that anthropometric abilities can serve as an initial factor in determining the talent status of children, thereby helping ascertain further opportunities to achieve higher achievements. In evaluating whether players are talented or not, various tests are required to obtain results that align with the available data, avoiding arbitrary decisions or biases that could hinder the maximum development of children. (D. N. Deprez et al., 2015) conducted measurements on anthropometry, motor coordination, and physical characteristics such as endurance, strength, specific football skills in players aged 8-16 years, resulting in valid data usable used to assess players. On the other hand, the measurement process does not overlook the level of biological and physiological maturity, which is also a determining factor in decision-making.

Based on Table 1, the 13-year-old age group experiences the highest increase in speed and explosive power. The result is in line with the (Itoh & Hirose, 2020) reported that during growth and development, an increase in stride length in adolescence can contribute to enhanced running speed. This is supported by the observed increase in sprint times among 13-year-old children, which is more related to stride length than stride speed. Performance in speed is associated with explosive power in the countermovement jump (CMJ) and squat jump (SJ) in hockey players (Ferreira et al., 2019). Considering the relationship between vertical jumps and speed, acceleration in sprints appeared to have a significant influence on CMJ performance (Coledam et al., 2013); (Dragula et al., 2017). Previous studies indicated that training impacts all ages, with 13-year-olds showing particularly significant improvements (Rodríguez-Rosell et al., 2017). This phenomenon is often observed during the inter-pubertal period, where the biological maturity of players becomes a determinant for accepting regular and continuous training stimuli. Furthermore, the improvement in speed and explosive power is also influenced by the bone age of football players, particularly evident in activities such as dribbling and shuttle dribbling (Gouvêa et al., 2017). These results indirectly indicate that maturity status and longer training time are determining variables for development. According to (Buchheit & Mendez-Villanueva, 2014), maturity in players has a significant impact on speed due to the more mature bone compared to earlier ages, allowing players to have higher speed.

The highest increase in aerobic endurance and football-playing technical skills occurs at the age of 12 and 11, respectively. Technical skills impact the improvement of aerobic endurance (Borges et al., 2018); (Farley et al., 2020). In line with this study, the skills are achieved earlier at the age of 11, thereby contributing to improved aerobic endurance for the age of 12. Aerobic endurance performance is significantly better in children aged 11–12 years compared to the most mature players (Figueiredo et al., 2010). (Itoh & Hirose, 2020) stated that the variable may depend more on technique, nervous system, and training experience than muscle strength and height. Adolescent players aged 12 years show a tendency for a significant increase compared to the expected football technique, strengthened by functional development (Malina et al., 2007).

The 11-year-old age group shows the highest improvement in technical skills compared to others, reflecting a flux phase in the career of young football players' career. (Hosseinikhezri & Zaxarova, 2018) stated that the phase covers ages 8–12, and during this period, young players are more focused and motivated to learn all fundamental football skills, continually strive to build overall sports skills, gradually transition from being selfish to self-critical, and develop a need for team play.

For boys, the age of 11 is considered a learning-to-train phase in the process of sports skill development. This phase is a time for growth and development (maturity), thereby creating more connections between nerve cells, while at the same time, body muscles become stronger. Children are deemed ready to learn specific skills at a certain maturity point, particularly when all muscles and nerves have developed sufficiently. (Domingues, 2013) stated that regular football training has a positive effect on improving the skills, speed, and agility of boys, thereby providing acceleration in physical growth.

This study showed that all components, including speed, explosive power, aerobic endurance, and technical

skills, for talented and non-talented groups improved gradually every 6 months of evaluation. The talented group experiences an average increase in speed, explosive power, aerobic endurance, and technical skills of 5.11%, 5.64%, 7.94%, and 5.86% respectively every 6 months. Meanwhile, the non-talented group showed a progressive average increase in speed, explosive power, aerobic endurance, and technical skills of 7.59%, 5.54%, 7.42%, and 4.76%, respectively. Childhood is considered the best period for improving strength, speed, and energy through activities that promote the adaptation of the neuromuscular system. The post-pubertal adolescent period, on the other hand, makes these improvements stronger, faster, and more energetic through muscle fiber hypertrophy and increased muscle cross-sectional area (Lloyd & Oliver, 2012). Football training for young players entails repetitive movements, thereby training the components of the motor system to enhance technical skills, physical performance, and movement coordination. (Ford et al., 2011) stated that before puberty, optimal power and muscle strength are improved by enhanced neural coordination. During and after puberty, gains in power and strength result from a combination of neural and structural adaptations, influenced by factors such as hormonal changes, training stimuli, and nutrition. Assessing the maturity of children is integral to understanding the physical development. Coaches can estimate maturity levels by observing anthropometric variables that undergo rapid growth, particularly around the age of 14 in males. Anthropometric measurements, such as height, weight, sitting height, and leg length, tracked over time, enable coaches to assess individual maturity levels within a group (Kozieł & Malina, 2018). These results were in line with (Peña Gónzalez et al., 2022) who advocated for evaluating the talent of players based on maturity level. However, performance was assessed by conducting various tests at different times to obtain standardized results. Adjustments can also be made based on competitiveness or age as well as the components requiring the acquisition of skills according to the characteristics of the game.

According to this study, the talented player group had superior improvements in explosive power, aerobic endurance, and technical skills. In line with the results, (Irurtia et al., 2022) stated that talented young Chinese football players had better motor performance compared to the non-talented counterparts. (Malina et al., 2007) stated that the maturity status of football players ranges from pre-puberty to adulthood, which positively influences combined football skill scores. Speed, muscle strength, and aerobic endurance are correlated with maturity status during male adolescence and tend to peak around the time of maximum height growth in football players, independent of age. According to (Meylan et al., 2010), advanced biological maturity can be associated with slightly better technical performance.

Early-maturing boys also tend to experience more intense adolescent growth acceleration (larger peak height velocity/PHV), resulting in increased height, weight, and lean mass during puberty (Malinam & Cumming, 2004). This provides potential athletic advantages for adult male athletes in terms of size, power, speed, and greater strength, specifically between the ages of 11 and 14 (Malina et al., 2015). From a psychological perspective, early-maturing boys show a more adaptive motivation profile with higher perceptions of physical attributes, namely strength, attractiveness, physical fitness, and sports competence, along with greater self-esteem (Cumming et al., 2012).

Individual differences in biological maturation directly and indirectly impact the talent identification process (Cumming et al., 2012). Direct effects originate from variations in physical and functional attributes that influence athletic success, while indirect effects reflect psychosocial interpretation and management of growth and maturation (Mitchell et al., 2016). Most importantly, adolescents with physical and functional attributes considered most suitable for success in a particular sport like football have higher chances of being promoted and rewarded for participation. They often receive more playing time, opportunities to assume leadership roles such as team captaincy, and access to specialized coaching and training resources (Farley et al., 2020). Physically skilled children typically experience spirited and healthy gameplay, while those less skilled are often marginalized. This creates a cycle where proficient players continue to enhance fitness and skills through regular game participation. Conversely, less skilled individuals may receive fewer playing opportunities and lower chances to refine skills.

According to (Irurtia et al., 2022), the non-talented group has superior improvement in speed. This is in line with (Buchheit et al., 2012) where young football players with higher acceleration achieve maximal sprinting speed (MSS) at a slower rate during a 40m sprint compared to those with lower acceleration. Therefore, this suggests that better acceleration in older players does not allow asses to MSS after a shorter sprint distance than the younger counterparts with less favorable acceleration. This could be due to the specific focus of non-talented players on speed, neglecting other components. In contrast, talented players pay attention to almost all components, resulting in consistent but relatively small improvements. This is in line with the study by (Bidaurrazaga-Letona et al., 2019) where players are categorized into 2 similar groups based on anthropometric results, showing that talented players are more relevant to overall performance rather than focusing solely on anthropometric parameters. Conversely, non-talented players focus on speed, without considering general performance. Both groups perform the same training sessions, but the difference lies in the efficiency level during the training.

This study identified differences between the components with the highest and lowest improvements. The highest improvement in the non-talented group occurs in speed (7.59%), while in the talented group, it occurs in explosive power (7.94%). The lowest improvement in the non-talented and talented group is in technical skills (4.76%) and

speed (5.11%), respectively. Young footballers can be divided into 2 biological age categories, namely early and late-maturing players. Late-maturing players can surpass earlier-developing peers with superior technical and psychological skills (Zuber et al., 2016) ; (Cumming et al., 2018). This is also in line with (Abarghoueinejad et al., 2021) that individual development is significantly influenced by biological development and maturity, specifically when accompanied by a series of training sessions.

## Conclusion

In conclusion, development in the training process became a crucial aspect that was considered by coaches based on the supporting components of the sport, such as football. The fundamental aspects of football were speed, leg explosive power, aerobic endurance, and technical skills. These factors served as a reference point for mapping whether players could be considered talented or not in the sport based on age.

The results showed that players categorized as talented during 1 year of training tended to emphasize dynamic movement, changes in direction, and essential technical skills in the game. This contrasted with players categorized as non-talented, who prioritize speed over other components in football.

These observations were based on measurements over 1 year, showing that speed, leg explosive power, aerobic endurance, and technical skills in talented and non-talented players increased by 10.23% and 15.18%, 11.27% and 11.07%, 15.88% and 14.85%, as well as 11.71% and 9.51%, respectively. The results could serve as a reference or consideration for coaches to achieve the desired goals.

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