THE IMPACT OF PHYSICAL FITNESS COMPONENTS ON FOOTBALL PLAYERS' PERFORMANCE – A SYSTEMATIC REVIEW

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Abstract: *Football requires a high level of physical conditioning, and key fitness components directly influence player performance. Aerobic endurance enables players to maintain a high game intensity and recover more quickly, while anaerobic strength is crucial for executing explosive movements, sprints, and direction changes. The aim of this research was to examine the influence of different physical components of fitness—strength, endurance, speed, and flexibility—on the performance of football players. The systematic review was conducted using relevant scientific databases, including PubMed, Scopus, Web of Science, Google Scholar, and SportDiscus, to encompass the most recent and relevant studies in the field of sports science and football players' physical conditioning. Speed, agility, strength, and explosiveness enhance stability, duels, and shooting accuracy, while flexibility reduces the risk of injuries. Effective training methods include high-intensity interval training (HIIT), sprint training with plyometrics, strength training, small-sided games, and fartlek training. These methods improve aerobic and anaerobic capacity, explosive power, and technical and tactical skills. Core stabilization and flexibility training contribute to injury prevention and optimal movement biomechanics. Further research should focus on individualized training approaches tailored to the specific demands of positional play.*
Key words: *football, physical fitness, aerobic endurance, anaerobic endurance, strength, agility, flexibility.*

INTRODUCTION

Football, as a dynamic and demanding sport, requires players to have a high level of physical fitness that encompasses various components of fitness, including strength, endurance, speed, coordination, and flexibility (Hoff & Helgerud, 2004).

Football, as a complete sport that abounds in the most diverse possible movements, is classified as a polystructural, complex sport. In order for a football player to be able to perform football tasks, he must, among other things, possess the necessary level of motor skills that can only be achieved through systematic physical training (Amiri-Khorasani, Osman, & Yusof, 2011). Lower limb muscle strength and anaerobic power are neuromuscular variables that affect performance in many sports activities, including football (Hoff & Helgerud, 2004).

Today's game requires a higher level of physical fitness from players, unlike in the past when the most important thing was the technical fitness of the players (Bloomfield, Polman, O'donoghue, & McNaughton, 2007). Physical fitness is a key element for success in football. Football is a sport characterized by numerous and diverse complex dynamic kinesiological activities characterized by a large number of cyclic and acyclic movements (Gardasevic et al., 2016). A high level of physical fitness is the foundation for performing all technical-tactical elements and is a key factor distinguishing high-level from lower-level football players (Gissis, 2006). During a football match, players perform approximately 1.200–1.400 different movements, of which 700–800 involve changes of direction (such as sprints, jumps, stops, and accelerations). Only about 11% of the total distance covered is performed at high intensity, yet this portion is crucial for determining match outcomes (Williams, 2006).

Football is a rather dynamic and highly explosive sport that requires a wide range of motor skills, due to the large number of changes in direction of movement, explosive accelerations and reactions. In football, explosive strength, speed and agility, including aerobic and anaerobic endurance, stand out as the most important fitness skills relevant for success (Kaplan, Erkmen, & Taskin, 2009). Physical fitness is an essential part of health and is directly related to quality of life, the development of lifestyle diseases, and mortality. The main aspects of physical fitness are cardiorespiratory fitness, strength, flexibility, and body composition (Schlegel, Křehký & Hiblbauer, 2022).

Therefore, the aim of this research was to examine the influence of different physical components of fitness—strength, endurance, speed, and flexibility—on the performance of football players. It is

hypothesized that higher levels of strength, endurance, speed, and flexibility will significantly improve the performance of football players.

MATERIALS AND METHODS

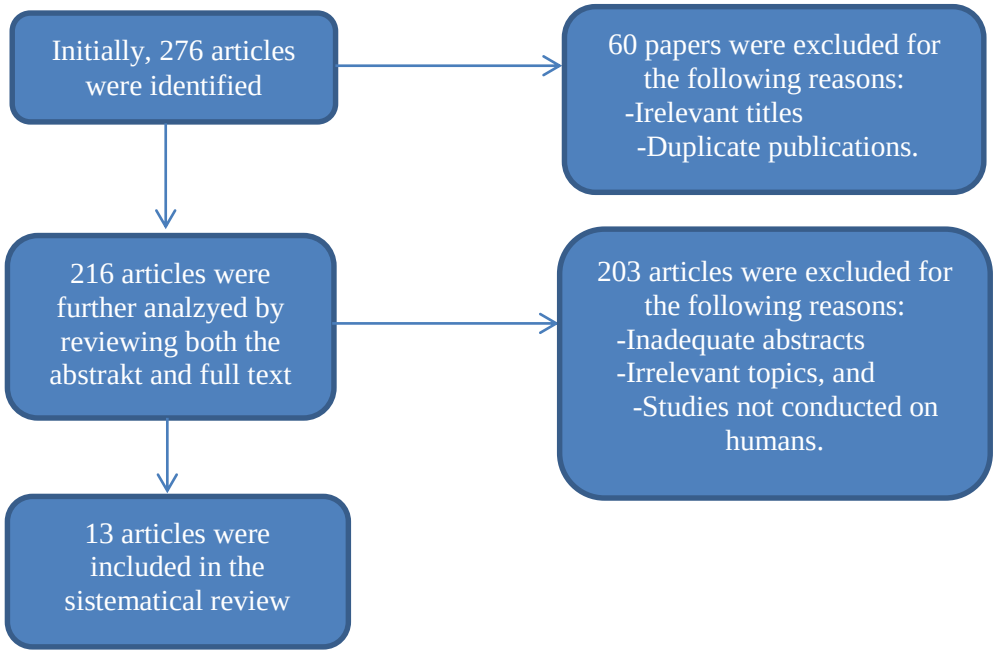
Literature search

Research data for the purposes of this review were collected through the electronic search engines PubMed, Google Scholar, journals in the field of sports sciences, as well as relevant literature that could answer the set problem.

Selection of papers

The selection of papers was determined based on the title and keywords, two selection criteria were set. The first criterion refers to success in football itself. The second criterion was the implementation of the analysis of papers in the period from 2005 to 2025. The papers were close to the research subject and met all the criteria for further consideration.

The flow of the data download procedure



RESULTS

In the time period from 2005 to 2025, twelve papers (n = 12) were taken, which were analyzed in detail and shown in Table 1. The influence of physical components on the success of football players but also the influence of motor abilities on the success of football players.

Table 1 Systematic review of the included studies

References	Population	Group	Treatment	Measurements	Results
Lolić et al. (2006)	Football players of junior cadet age	n=28, 12–13 years	BMS (General and Explosive Power) and SMS (Ball-to-Leaf Range and Ball-to-Head Range)	An initial and final measurement was made	Full recovery (up to 8 minutes) between sets
Smajić et al. (2008)	Football playeres of pioneer age	n=256, 10–12 years	Speed endurance and SP	Measurement	Soccer players with better BMS also have better SP

Molnar et al. (2008)	Football school students	n=105, 10 years	SMS (strikes on the ball, handling, running speed) and morphological characteristics	One measurement was taken	Subjects with worse SMS also have unfavorable morphological characteristics
Ejup et al. (2010)	Football school students	n=105, 10 years	SMS (ball strikes, dribbling, running speed) and morphological characteristics	One measurement was taken	Subjects with worse SMS also have unfavorable morphological characteristics
Janjić et al. (2010)	Senior football players	n=20	Training work aimed at characteristics of BMS and SMS: strength, flexibility, endurance	An initial and final measurement was made	Statistically significant changes in BMS and SMS
Lolić et al. (2011)	Cadet football players	n=83, 13–14 years	SMS (explosive and repetitive speed with endurance and aerobic CMJ)	One measurement was taken	Significant effect: speed, sprint speed, aerobic & anaerobic endurance improved
Jelaška et al. (2013)	Senior female footballers	n=70	Morphological characteristics of BMS and SMS	One measurement was taken	BMS and SMS have greatest influence on player quality
Gardašević et al. (2014)	Cadet football players	n=120, 15 years	Programmed training work and SMT	An initial and final measurement was made	Training program has positive effect on ball-handling speed
Bush et al. (2015)	Senior football players	n=147	Multiple camera and computerized system	Watching the seven seasons	New tactics affect physical and technical demands
García-Pinillos et al. (2015)	Junior football players	n=34, 14–18 years	Flexibility and SMT	One measurement was taken	Flexibility of rear lodge key for SMT performance
Athos et al. (2016)	Prepubescent football players	EG=20 (10.5 y), CG=19 (10.7 y)	Fast feet, sprints, rope ladders, visual stimulation, chase runs, mirror exercises	Initial and final measurement	SPS* SP20 reactive agility CODS
Le et al. (2024)	College football players	EG=9, CG=10 (18.89± 0.8)	Speed wall drills, COD, agility ladders, reaction balls, mirror games	Initial and final measurement	Significant differences in SP20 with ball (EG vs CG)

Legend: BMS - basic motor skills; SMS - Specific motor skills; SP - Specific precision; SMT - Situional motor-test; CMJ - Counter movement jump; FSFV - Faculty of sport and physical education.

DISCUSSION

The primary purpose of this research was to examine the influence of different physical components of fitness—strength, endurance, speed, and flexibility—on the performance of football players. Our results clearly indicate that strength and endurance are key elements that contribute to players' effectiveness during matches, as well as their technical performances. Therefore, the results fully support the hypothesis outlined in the introduction, confirming that physical fitness components play a decisive role in football performance.

A recurrent theme across the studies is the critical role of motor skills in the performance of soccer players. Lolić et al. (2006) observed significant improvements in explosive power among young players, aligning with Smajić et al. (2008) who noted that larger skeletal dimensions and explosive strength correlated with improved performance in specific accuracy tests. This emphasizes that foundational

motor skills, particularly strength and speed, play a pivotal role at early ages in developing players' abilities on the field. The relationship between anthropometric variables and motor skill performance is clear. Molnar et al. (2008) showed that players who demonstrate better motor abilities also have favorable morphological measurements, such as body height and body composition, suggesting that physical attributes can significantly influence performance. This relationship is crucial when considering training focuses, as improving a player's physical profile can lead to improved motor efficiency and effectiveness in the game. On the other hand Janjić et al. (2010) indicates that targeted training during preparation periods can lead to significant progress in motor abilities. The study found significant changes in various motor abilities after a structured training regimen, reinforcing the importance of systematic approaches to training. Programs should be designed to address the specific motor ability deficits of players, taking into account their individual progress and physiological responses. The focus on specific motor ability tests, as shown in the study by Ejup et al. (2010), suggests that individualized assessments are valuable for designing tailored training programs. The analysis pointed out that motor capabilities significantly predict success in situational tests, particularly for energy regulation systems. This indicates that practical, situational assessments can offer valuable insights into training effectiveness and help guide future directions for skill development. More recent studies, particularly the last two reviewed, add an important dimension by considering cognitive and reactive agility components. The meta-analysis emphasizes the lack of research specifically addressing reactive agility in football and highlights the cognitive demands associated with this ability. More attention to cognitive training, alongside physical training, is necessary to equip players not only with speed but also with the decision-making skills required in high-pressure match situations.

Football players who scored higher in strength tests had an improved ability to keep the ball, which is in line with research findings (García et al., 2019) that confirmed the importance of strength in contact with opponents. In addition, the results of our research indicate that speed is directly related to the number of goals and assists scored during the season. This is especially important given that quick reactions and movement are key attributes for success on the field. Miller (2020) similarly reported that players exhibiting superior speed and agility achieve better outcomes in tactical scenarios, a factor of particular importance given the dynamic nature of football matches. Flexibility, although less emphasized, can also play an important role in reducing injuries. Players who demonstrated a higher degree of flexibility had a lower incidence of muscle injuries, which has been confirmed (Rowe, 2018). This finding may help coaches develop a comprehensive training program that emphasizes not only performance, but also injury prevention.

The results should be interpreted with certain limitations in mind. First, the limited number of relevant studies included in the review may restrict the generalizability of the conclusions. Second, the included studies varied in methodology, population, and measurement instruments, making direct comparisons and synthesis of results difficult. Finally, some studies had methodological weaknesses (e.g., small sample sizes), which may affect the reliability of the conclusions. Collectively, these papers open several avenues for future research. There is a need for longitudinal studies to track the development of motor and anthropometric factors over time and their direct impact on performance. Additionally, there's a notable gap in understanding the interplay between cognitive skills and motor performance, particularly in agility and decision-making in football environments. Addressing these gaps can lead to more holistic training strategies that include cognitive skill development alongside physical conditioning.

CONCLUSION

Based on a review of previous research and detailed discussions of each paper, conclusions were drawn that indicate some fundamental importance of success in football. For the success of every young football player, it is necessary to work on the development of motor abilities from the earliest age category. In modern football, physical preparation is one of the most important components of a football player's sports preparation. Indirectly, the improvement of physical preparation will be influenced by improved nutrition, good health, adequate personal hygiene, permitted pharmacological agents, the ability to quickly adapt and acclimatize, player equipment and other similar factors.

The analysis of the influence of motor indicators in situational-motor tests of the football game suggests two main conclusions: the results in motor tests significantly affect the level of achievement in all analyzed situational football tests. Achievements in situational tests are significantly more influenced by those indicators of motor abilities that are under the influence of the energy regulation system than by abilities that are under the influence of the movement regulation system. There are also differences in vertical jump in relation to position in time. Specific motor abilities and basic motor abilities as a factor of general efficiency have the greatest influence on the quality of players, and these factors have been identified as the most important predictors of player quality.

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УТИЦАЈ КОМПОНЕНТИ ФИЗИЧОГ ФИТНЕСА НА ПЕРФОРМАНСЕ ФУДБАЛЕРА – СИСТЕМАТСКИ ПРЕГЛЕД

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Сажетак: *Фудбал захтева висок ниво физичког фитнеса, а кључне компоненте кондиције директно утичу на перформансе играча. Аеробна издржљивост омогућава играчима да одрже висок интензитет игре и брже се опораве, док је анаеробна снага кључна за извођење експлозивних покрета, спринтева и брзих промена правца. Циљ овог истраживања био је испитати утицај различитих фитнес компоненти — снаге, издржљивости, брзине и флексибилности — на перформансе фудбалера. Систематски преглед је спроведен коришћењем релевантних научних база података, укључујући PubMed, Scopus, Web of Science, Google Scholar и SportDiscus, како би се обухватиле најновије и најрелевантније студије у области спортске науке и физичке кондиције фудбалера. Брзина, агилност, снага и експлозивност побољшавају стабилност, дуеле и прецизност шута, док флексибилност смањује ризик од повреда. Ефикасне методе тренинга укључују високо интензивни интервални тренинг (HIIT), спринт тренинг са плиометријом, тренинг снаге, игре на малом простору и фартлек тренинг. Ове методе побољшавају аеробни и анаеробни капацитет, експлозивну снагу и техничке и тактичке вештине. Тренинг стабилизације језгра и флексибилности доприносе превенцији повреда и оптималној биомеханици покрета. Даља истраживања треба да се фокусирају на индивидуализоване приступе тренингу прилагођене специфичним захтевима позиционе игре. Кључне речи: фудбал, физичка кондиција, аеробна издржљивост, анаеробна издржљивост, снага, експлозивност, агилност, флексибилност.*

Кључне речи: *фудбал, физички фитнес, аеробна издржљивост, анаеробна издржљивост, снага, агилност, флексибилност.*