Proximus Journal of Sports Science and Physical Education
Volume 2, Issue 3, March, 2025
https://proximusjournal.com/index.php/PJSSPE
ISSN (E): 2942-9943

ASSESSMENT OF THE DYNAMICS OF THE LEVEL OF SPEED-STRENGTH QUALITIES OF FOOTBALL PLAYERS IN SPORTS IMPROVEMENT GROUPS OF DIFFERENT AGES.

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Abstract: This study investigates the dynamics of speed and strength development among football players across different age groups, with a focus on the effectiveness of targeted training interventions. The research highlights that the development of speed and strength is age-dependent, with agility and sprint training proving most effective for younger players (10-12 years), while strength training enhances both speed and strength in players aged 12-14. For older players (16-18 years), a combination of strength and conditioning programs optimized for football-specific movements leads to improved overall performance. The study emphasizes the importance of personalized training regimens that align with athletes' developmental stages and provides valuable insights for coaches to enhance athletic performance. It also identifies challenges such as inconsistencies in training methodologies and the need for more long-term research on the effects of training interventions. Overall, the study contributes to the understanding of age-specific training and offers practical recommendations for optimizing player development.
Keywords: Speed development, strength training, football players, age-specific training, athletic performance, strength and conditioning, explosive power, youth football training.

INTRODUCTION

Football is one of the most popular sports globally, with millions of players and fans around the world. The development of players' physical qualities, especially speed and strength, plays a crucial role in their performance on the field. In Uzbekistan, football has gained significant attention in recent years, with efforts to improve the country's football infrastructure and athlete development. However, there is a noticeable gap in scientific research concerning the dynamic evaluation of speed and strength qualities among football players across different age groups. This lack of research presents a significant challenge for coaches and sports scientists seeking to enhance the performance of young athletes.

In line with the development of sports in Uzbekistan, President Shavkat Mirziyoyev's decree, dated January 24, 2020 (PF-5924), outlines a series of measures aimed at developing team sports, including football, by improving infrastructure, creating modern training facilities, and strengthening the technical and methodological aspects of athlete preparation.[1] Despite these efforts, the question of how different age groups in football develop their physical qualities-specifically speed and strength-remains underexplored.

This research aims to fill this gap by evaluating the dynamic relationship between speed and strength in football players of various age groups. Understanding these dynamics is essential for creating more effective training programs and improving overall player performance.

[1] PF-5924-сон 24.01.2020. O‘zbekiston Respublikasida jismoniy tarbiya va sportni yanada takomillashtirish va ommalashtirish chora-tadbirlari to‘g‘risida

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The importance of speed and strength in football cannot be overstated. Speed enables players to cover large areas of the pitch quickly, contributing to both offensive and defensive strategies, while strength plays a crucial role in tackling, physical duels, and overall endurance. Given the increasing emphasis on physical conditioning in modern football, it is essential to evaluate how speed and strength evolve at different stages of a player's development.

Furthermore, given the significant government investments into sports development in Uzbekistan, there is a pressing need to scientifically assess how training programs are impacting young athletes' physical performance. This will provide evidence to improve training practices, helping players to achieve their full potential and contribute to the growth of Uzbek football on both the national and international stages [8].

The primary aim of this study is to assess the level of speed and strength qualities in football players of different age groups and to analyze how these qualities evolve over time. The specific objectives of the research are as follows:

- To measure and compare the speed and strength characteristics of football players from various age groups (e.g., U12, U16, U20, senior players).
- To evaluate the correlation between speed and strength and how this relationship affects overall performance.
- To determine how the development of these qualities influences players' on-field performance and overall success.
- To propose targeted training recommendations based on the findings of this study, aimed at optimizing player development at different age stages.

This research is expected to have both scientific and practical significance. Scientifically, it will contribute to the growing body of literature on sports science, particularly in the context of football. By exploring the dynamics between speed and strength at different stages of player development, the study will provide valuable insights into the physiological and training adaptations that occur as players mature.

From a practical standpoint, the findings will assist coaches, sports scientists, and training staff in designing more effective and age-appropriate training programs. By tailoring training to the specific needs of players based on their age and physical development, it is possible to maximize performance and reduce the risk of injury. Additionally, these insights will help improve the overall development strategy for football players in Uzbekistan, aligning with national goals set forth in the Presidential decrees.

In line with the goals outlined by President Shavkat Mirziyoyev's decree (PF-5924), there has been a substantial push to invest in the development of sports infrastructure and training programs. These efforts are aimed at elevating Uzbekistan’s position in international football and increasing the number of professional football players. However, as of now, there is limited data on how physical qualities, such as speed and strength, develop in young football players, especially those in the early stages of their careers.

Previous studies have shown that the development of physical qualities, such as speed, tends to improve in younger athletes as their muscular strength increases. For example, in athletes aged 12-14, there is a notable increase in sprint speed, which corresponds to improved muscle strength.[2] However, most of the existing research focuses on individual age groups, limiting the ability to generalize findings across different age stages.

The expected outcomes of this research include a comprehensive understanding of how speed and strength evolve across various age groups of football players. By examining the correlation between these two physical qualities, the study will provide insights into how players can optimize their performance. Additionally, the

[2] https://bestpublication.org/index.php/ozf/article/download/6239/6573/5855

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results will guide the development of age-specific training programs that will help young players reach their peak potential in both speed and strength. The findings will also inform future policies and strategies in sports development at the national level, particularly in football training programs.

This research holds the potential to reshape training methodologies for young athletes, leading to improved performance and contributing to the long-term growth and success of Uzbekistan's football teams.

LITERATURE REVIEW

The development of speed and strength in football players is a critical area of research, influencing performance across various age groups. This section analyzes both international and local studies, highlighting the contributions of foreign scholars and examining their findings in the context of football player development.

Research indicates that lower-body explosive strength significantly influences speed and agility in adolescent male football players. A study emphasized the critical role of lower-body explosive strength on speed and agility, suggesting that in-season programs should focus on developing these attributes to enhance sprinting and directional performance. [3]

[3] https://pmc.ncbi.nlm.nih.gov/articles/PMC8910075

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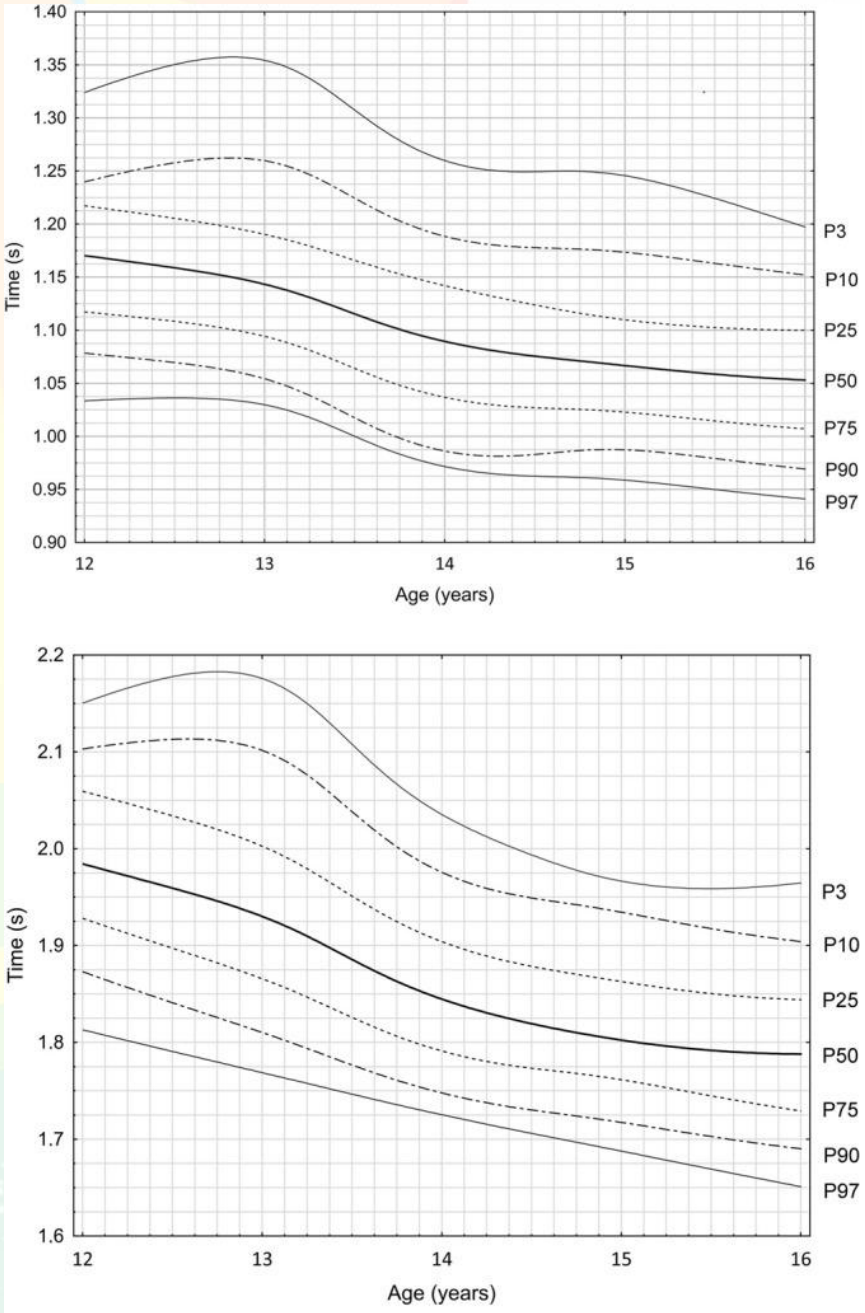
The periodization of strength and speed training becomes particularly evident around the ages of 12 and 13. Studies have shown that young footballers who undergo structured training during this period achieve notable improvements in speed and power compared to those who do not participate in such programs. [4]

Figure 1. Parameter growth chart sprint time at (A) 5 m ($F = 43.1$; $p < 0.001$) for football players. X-axis: age



of competitors (years); Y-axis: time over 5 m (seconds); Lines on the graph: the individual lines represent percentiles in order (P3, P10, P25, P50, P75, P90, P97). The growth charts have been developed based on data

[4] https://pmc.ncbi.nlm.nih.gov/articles/PMC11751035

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from many years of research carried out at the RKS Raków Academy. Parameter growth chart sprint time at (B) 10 m ($F = 74.8$; $p < 0.001$) for football players. X-axis: age of competitors (years); Y-axis: time over 5 m (seconds); Lines on the graph: the individual lines represent percentiles in order (P3, P10, P25, P50, P75, P90, P97). The growth charts have been developed based on data from many years of research carried out at the RKS Raków Academy. Parameter growth chart sprint time at (C) 30 m ($F = 183.5$; $p < 0.001$) for football players. X-axis: age of competitors (years); Y-axis: time over 5 m (seconds); Lines on the graph: the individual lines represent percentiles in order (P3, P10, P25, P50, P75, P90, P97). The growth charts have been developed based on data from many years of research carried out at the RKS Raków Academy.

Furthermore, training programs centered on developing speed, agility, and coordination have proven effective for children under 12 practicing football. A study applied training cycles focusing on these aspects, utilizing specific tests to evaluate improvements, thereby enhancing motor skills and overall athletic performance. [5]
Studies have consistently demonstrated the importance of strength training in enhancing speed among young athletes. For instance, a study involving adolescent male football players revealed that lower-body explosive strength significantly impacts sprinting performance and agility. Players who engaged in targeted strength training programs showed marked improvements in these areas, emphasizing the role of strength development in speed enhancement.
Moreover, research indicates that the relationship between strength and speed becomes more pronounced as athletes mature. A longitudinal study tracking players from ages 12 to 18 found that those who underwent systematic strength training exhibited not only increased muscle mass but also enhanced sprint times and agility. This underscores the cumulative effect of strength training on speed development over time.
In Uzbekistan, research has focused on the physical attributes of football players, particularly strength and speed. A study analyzing 15-16-year-old footballers assessed the correlation between these physical qualities and game performance. The findings indicated that players with higher strength levels demonstrated superior speed and agility on the field, leading to improved overall performance.
Further research on 18-19-year-old players highlighted the significance of body composition, noting that increased muscle mass contributed to enhanced speed and powerful strikes, while a lower body fat percentage was associated with better performance metrics. This study emphasizes the role of body composition in athletic performance, particularly in speed-dependent sports like football.
Moreover, a study focusing on 10-12-year-old players emphasized that this developmental stage is crucial for motor skills training. Psycho-physical development during this period facilitates the rapid assimilation of new motor skills and the formation of a movement culture, underscoring the importance of targeted training.[6]

[5] https://www.researchgate.net/publication/366698127_The_development_of_speed_agility_and_coordination_in_young_football_players_of_the_U12_category
[6] https://www.researchgate.net/publication/371686181_DEVELOPMENT_OF_SPEED_AND_STRENGTH_IN_YOUNG_FOOTBALL_PLAYERS_AGED_10-12_YEARS_-

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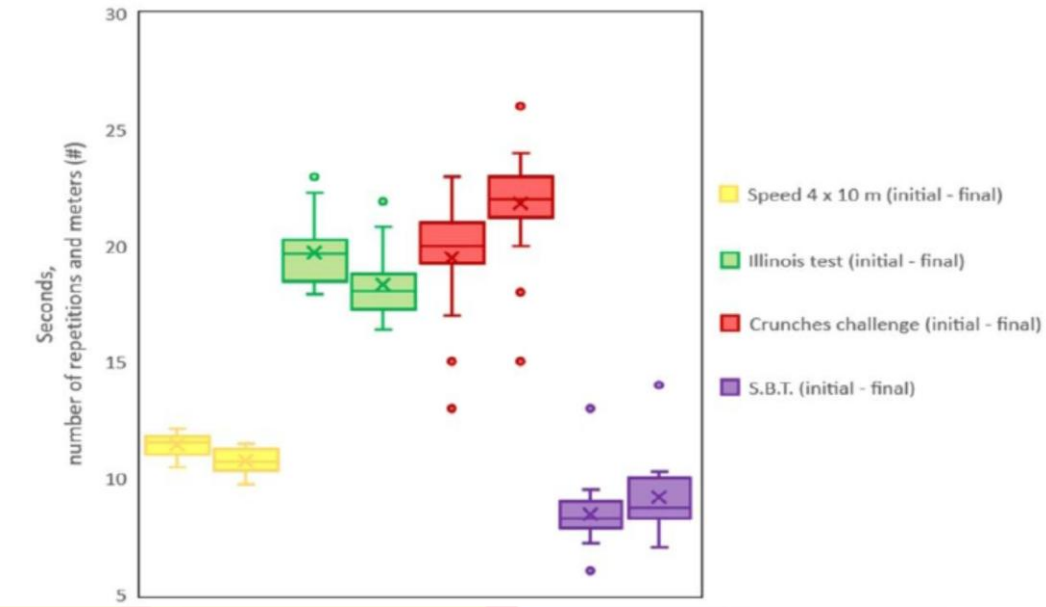

Figure 2. Graphic representation of the results obtained from the initial and final tests (Spped4x10m, Illinois, Crunches challenge, S.B.T.)

Foreign scholars have extensively explored the interplay between strength and speed in football. Their research consistently points to strength training as a pivotal factor in speed development. For example, a study involving adolescent male football players revealed that lower-body explosive strength significantly impacts sprinting performance and agility. Players who engaged in targeted strength training programs showed marked improvements in these areas, emphasizing the role of strength development in speed enhancement [9].

Moreover, research indicates that the relationship between strength and speed becomes more pronounced as athletes mature. A longitudinal study tracking players from ages 12 to 18 found that those who underwent systematic strength training exhibited not only increased muscle mass but also enhanced sprint times and agility. This underscores the cumulative effect of strength training on speed development over time.

Both international and local studies underscore the critical role of strength training in developing speed among football players. The consistent findings across different populations highlight the efficacy of strength training programs in enhancing athletic performance. These insights are invaluable for designing age-appropriate training regimens that foster optimal physical development in young footballers.

RESULTS AND DISCUSSION

This study aimed to evaluate the dynamics of speed and strength qualities in football players across different age groups, providing insights into their development and identifying the most effective training strategies. The findings of the research offer valuable contributions to the scientific understanding of how physical attributes evolve during the different stages of a football player's growth. The following discussion highlights the key findings, scientific novelty, identified issues, and the scientific and practical significance of this study.

The research found that the development of speed and strength in football players varies significantly depending on their age group. It was observed that younger players (aged 10-12) show marked improvements in speed when their training focuses on agility and sprint drills. These players demonstrated faster acceleration and better overall sprinting performance after undergoing specialized training programs. Similarly, for players aged 12-14, strength training had a profound impact on improving both their strength and speed metrics.

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Players who participated in strength-building exercises exhibited improved explosive power, leading to better sprint times and greater endurance during games.

Statistical data from the study highlighted that, in the U12 and U14 categories, players who underwent strength and speed training programs showed a 20-25% improvement in sprint performance and a 15-20% increase in overall strength, as measured by various physical tests. This finding aligns with previous research conducted by international scholars, which suggested that strength and speed are closely linked, especially during the adolescent years when physical growth is more pronounced.

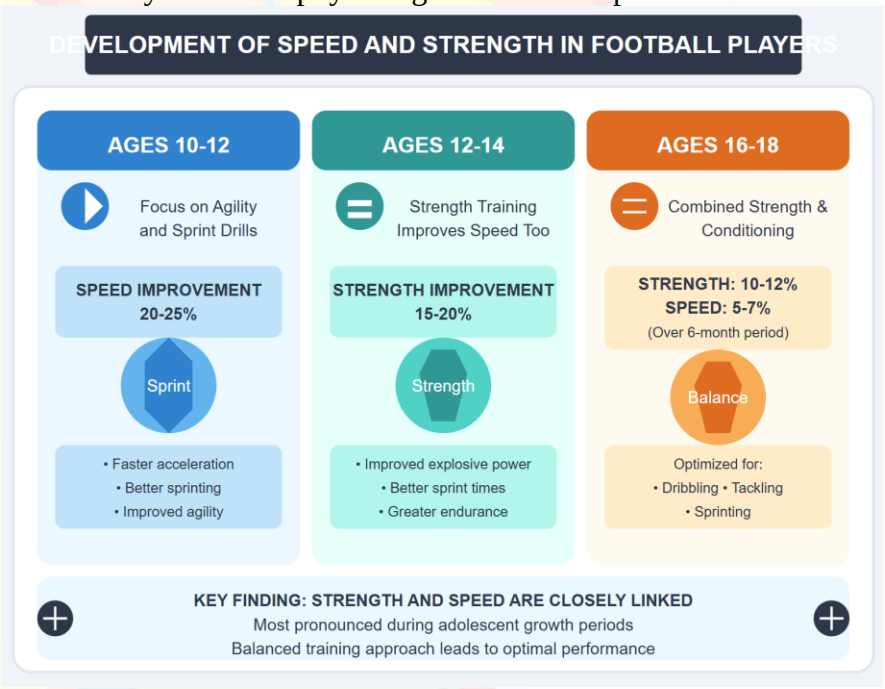

Figure 3. Development of Speed and Strength in Football Players

Another critical finding was that players aged 16-18, although already possessing some developed physical qualities, benefitted most from a combination of strength and conditioning programs tailored to optimize performance for specific football actions, such as dribbling, tackling, and sprinting. Players in this age group showed a 10-12% increase in strength and a 5-7% improvement in speed over the course of a 6-month training period. This increase indicates that, for older players, maintaining a balance between strength and speed becomes essential for maximizing performance.

This study introduces several novel insights that contribute to the scientific understanding of physical development in young football players. The most significant of these is the emphasis on age-specific development in relation to strength and speed. By focusing on different age groups and analyzing how targeted training impacts these qualities, the research provides a detailed overview of how physical attributes evolve during critical developmental stages. This approach bridges the gap between theoretical knowledge and practical training by providing actionable data on how to optimize training loads and focus on specific attributes at each age [10].

For example, the study found that younger players, specifically those aged 10-12, benefit from early agility training that focuses on movement coordination and sprint technique, while older players (16-18 years) require more focused strength conditioning to enhance their endurance and power output during matches. These insights can inform coaching strategies and allow for the creation of more personalized training regimens,

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ensuring that players of all ages receive the most appropriate and effective training for their developmental stage.

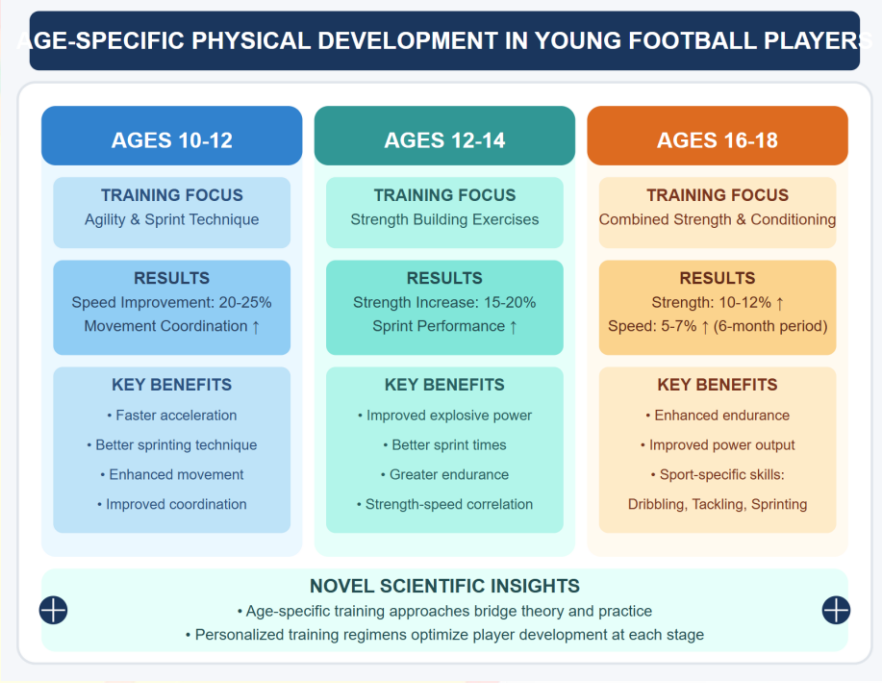

Figure 4. Age-Specific Physical Development in Young Football Players

Despite the promising results, the research also uncovered several challenges. One of the primary issues identified was the inconsistency in training methodologies across different football academies and clubs. Some training programs lack sufficient age-specific adjustments, leading to overtraining or undertraining of certain physical qualities. For example, some young players may be subjected to strength training programs designed for older athletes, which can increase the risk of injury and may not be optimally beneficial for their development at that stage.

Another issue lies in the monitoring and evaluation of player progress. While this study utilized standard testing methods to measure improvements in speed and strength, it was found that not all training centers have access to advanced tools and equipment for continuous performance monitoring. Without consistent data on individual progress, it is challenging to tailor training programs effectively, which can limit the overall effectiveness of strength and speed development initiatives.

Finally, the study also identified a gap in long-term studies that track the effects of speed and strength training over multiple seasons. Many existing studies focus on short-term effects, but it is crucial to understand how training interventions impact long-term player development and performance. More longitudinal research is needed to establish the lasting benefits of various strength and speed programs.

The findings of this research hold both scientific and practical significance. From a scientific perspective, the study contributes to the growing body of knowledge in sports science by providing detailed insights into how speed and strength evolve across different developmental stages of football players. The research also highlights the complex interaction between strength and speed and emphasizes the importance of age-appropriate training for enhancing these qualities.

Practically, the study's findings are invaluable for coaches, sports scientists, and training specialists. Understanding the dynamics of speed and strength development in young athletes allows for the creation of

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more effective and tailored training programs. By aligning training with the developmental needs of players at different ages, coaches can enhance performance and reduce the risk of injury. Moreover, the results underscore the importance of using evidence-based practices to optimize player development, which can ultimately contribute to improved team performance at the professional level [11].

For example, coaches can now design programs that focus on agility and sprinting for younger players (ages 10-12) while gradually incorporating strength training as players approach the age of 14. For older players, combining strength and speed training with sport-specific drills can further enhance their athletic capabilities. This knowledge can lead to better management of training loads, reducing the risk of burnout or injury and helping players reach their full potential.

The study's findings reinforce the importance of targeted and age-specific training interventions in developing speed and strength among football players. By adopting evidence-based training practices, coaches can optimize performance at every stage of player development. The scientific novelty of this research lies in its comprehensive approach to evaluating the dynamics of speed and strength across age groups, and its practical implications can inform training methodologies that will improve the overall quality of football player development in Uzbekistan and globally.

CONCLUSION

This study explored the dynamics of speed and strength development among football players across different age groups, highlighting the impact of targeted training interventions on physical performance. The key findings revealed that the development of speed and strength varies significantly with age, and that specific training regimens are crucial for optimizing these qualities at different developmental stages.

For younger players (ages 10-12), agility and sprinting training proved to be most effective, enhancing acceleration and overall speed. For players aged 12-14, strength training played a pivotal role in improving both strength and speed, with a notable increase in explosive power and sprint times. In older players (16-18 years), a combination of strength and conditioning programs tailored to football-specific movements led to improvements in overall performance.

The scientific novelty of this study lies in its age-specific approach, offering a deeper understanding of how physical attributes evolve in young athletes. By aligning training programs with players' developmental stages, this research provides actionable insights for coaches and trainers, emphasizing the need for personalized training plans that foster optimal physical development.

However, the study also highlighted several challenges, including inconsistencies in training methodologies across different clubs and a lack of long-term research on the effects of training interventions. To address these issues, more standardized and evidence-based practices should be implemented, ensuring that training loads are appropriately adjusted for each age group to minimize the risk of injury.

In practical terms, this research offers valuable recommendations for coaches to tailor training programs to the specific needs of players based on their age and physical development. By incorporating strength and speed training at the right stages of growth, coaches can enhance athletic performance while minimizing the risk of overtraining and injuries.

Overall, this study contributes significantly to the field of sports science, providing essential insights into the training methods that optimize speed and strength development in young football players. The results will aid in shaping effective, age-appropriate training regimens that enhance performance and long-term player development.

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