13 (2) (2024) 378 - 381
Journal of Physical Education, Sport, Health and Recreations
https://journal.unnes.ac.id/journals/peshr

Determinants of Performance of 12-Year-Old Soccer School Players in Central Java

Cahyo Yuwono[1]✉, Adi S[2], Mohamad Annas[3], Agus Darmawan[4], Bhayu Billiandri[5], Dwi Tiga Putri[6], Ade Bagus Pratama[7]

Faculty of Sports Science, Universitas Negeri Semarang, Indonesia[123456]
Faculty of Sports Science, Chulalongkorn University, Thailand[7]

Article History

Received February 2024
Accepted June 2024
Published Vol.13 No.(2) 2024

Keywords:
Performance, Soccer, Identification

Abstract

This study aims to predict the determinants of performance in the 12-year age group. This study uses a mixed methods approach with a diverse research method (concurrent), namely a balanced quantitative and qualitative hybrid model (concurrent triangulation). The sample of this study amounted to 201 KU 12 soccer school athletes in Central Java. Anthropometry is measured using anthropometric measurements, including head circumference, arm length, leg length, arm circumference, abdominal circumference, thigh circumference, and chest circumference. 2) Body Mass Index (BMI) uses measurements of height and weight. Biomotor ability tests include 1) Speed Running speed using a 20m running test on a straight line with the fastest possible time measured in seconds. It was measured as quickly as possible using units of seconds. 2) Flexibility Flexibility using the sit and reach test is measured in centimeters (cm) 3) Strength Measuring leg muscle strength using the leg strength test using a leg dynamometer. 4) Aerobic endurance VO2 Max ability is measured using a 12-minute running test according to the Wilcoxon Signed Rank Test Protocol 5) Coordination Eye-foot coordination test with Soccer Wall Voley Test. Factors that affect the performance of 12-year-old soccer students are height, Body Mass Index. 20 meter run, strength, coordination and biomotor. While anthropometric and psychological factors as a whole there is no relationship. In the future, further research is needed with playing position-based analysis.

How to Cite

Yuwono, C., Adi S., Annas, M., Darmawan, A., Billiandri, B., Putri, D. T., & Pratama, A. B. (2024). Determinants of Performance of 12-Year-Old Soccer School Players in Central Java. Journal of Physical Education, Sport, Health and Recreation, 13 (2), 378-381.

✉ Correspondence address :
E-mail: : cahyoyuwono@mail.unnes.ac.id

p-ISSN 2460-724X
e-ISSN 2252-6773

INTRODUCTION

Currently, the game of soccer is developing very rapidly. The number of soccer academies to develop the talents, interests, and potential of early childhood so that later they can make the nation proud to excel in the world of domestic and foreign football. For a soccer team, many factors are essential for the success of anthropometric and physiological characteristics in sports performance (Sutton et al., 2009). However, evaluating body composition in soccer players can help improve their performance and assess the results of the training plan that has been implemented (Sutton et al., 2009).

These factors can help formulate sports development plans and policies (Ackland et al., 2012). Factors such as the setting and grading sports examination items, research on standards, training methods, and physical examination learning can affect sports performance (Mahdavi et al., 2017; Wang et al., 2022). In addition, environmental quality, including air, water, and soil pollution, can also affect athletes' health and performance (Musaddiq et al., 2022). By identifying and monitoring these factors, sports professionals can make informed decisions to improve performance and ensure athletes' well-being (Alshanqiti & Namoun, 2020). Therefore, predicting and understanding the factors influencing athlete performance is crucial for effective sports development and overall athlete success.

Measuring soccer performance is essential for many reasons. It allows for the identification and selection of talented individuals and the evaluation of the effects of specific training programs (Ali, 2011; Benchehida et al., 2015). Performance tests provide a controlled simulation of sport and exercise performance, which allows for research and applied science purposes (Rösch et al., 2000). Validity, reliability, and sensitivity are essential factors in performance testing. A valid protocol closely resembles simulated performance, while a reliable protocol has low variation (García-Ceberino et al., 2020). Measuring soccer performance involves assessing the physical condition, technical and tactical performance, cognitive and perceptual skills, motor skills, and decision-making ability (Currell & Jeukendrup, 2008).. A battery of standardized tests has been developed to evaluate physical and skill performance in soccer, providing objective measures for coaches, researchers, and health professionals. Overall, measuring soccer performance is essential for talent identification, training evaluation, and understanding the complex factors contributing to the sport's success.

Soccer talent identification at 12 is crucial because it enables younger athletes to receive early support and resource allocation, improving their chances of realizing their potential (Babu & Nimkar, 2020). Furthermore, identifying talent at this age aids in providing a top-notch coaching and training environment to maximize the future development of likely elite athletes (Babu & Nimkar, 2020). Youth talent identification should be multidisciplinary, considering football-specific content and physiological and physical evaluations (Jauhiainen et al., 2019). Furthermore, research suggests that assessments of general motor skills given in elementary school may have a moderate-to-high predictive validity when forecasting an individual's success in competitive soccer during their teenage years (Hohmann & Siener, 2021). As a result, seeing soccer talent at 12 enables early intervention, focused training, and the chance to discover future elite players—benefits that extend to the player and the sport.

Previous research (Doewes et al., 2021; Zambom-Ferraresi et al., 2018) has limitations, namely the diverse and complex nature of soccer performance analysis and limited consideration of performance indicators. This study aims to predict the determinants of performance in the 12-year age group.

METHODS

This study uses a mixed methods approach with a diverse research method (concurrent), namely a balanced quantitative and qualitative hybrid model (concurrent triangulation). The sample of this study amounted to 201 KU 12 soccer school athletes in Central Java. Anthropometry is measured using anthropometric measurements, including head circumference, arm length, leg length, arm circumference, abdominal circumference, thigh circumference, and chest circumference. 2) Body Mass Index (BMI) uses measurements of height and weight. Biomotor ability tests include 1) Speed Running speed using a 20m running test on a straight line with the fastest possible time measured in seconds. It was measured as quickly as possible using units of seconds. 2) Flexibility Flexibility using the sit and reach test is measured in centimeters (cm) 3) Strength Measuring leg muscle strength using the leg strength test using a leg dynamometer. 4) Aerobic endurance VO2 Max ability is measured using a 12-minute running test according to the Wilcoxon Signed Rank Test Protocol 5) Coordination Eye-foot coordination test with Soccer Wall Voley Test.

RESULTS AND DISCUSSION

Table 1. Results

X	Y	Result	
Height	Performance	0,007	Corelate
BMI		0,037	
20 Meter Run		0,004	
Strength		0,048	
Coordination		0,230	
Biomotor		0,046	

The results of the biomotor component are great but not consistent. Variations in measurement accuracy are caused by different approaches and technology employed for data collection (Mara et al., 2017). Recent works by (Park et al., 2019; Scott & Lovell, 2018) however, reveal that methodological approaches might affect data in a different way than previously proposed. High-intensity running and sprinting, regardless of their overall activity contribution, are essential elements (22-28% of total match distance covered (Vescovi & Favero, 2014) of the sport's physiological demands (because they are involved in crucial match and ball running actions) and will require the use of extra physiological and metabolic resources (e.g., anaerobic energy systems). Athletes that prioritize biomotor components have a lower risk of injury. Soccer-related injuries are often complicated and impacted by the interplay of several risk variables (Bittencourt et al., 2016). Risk factors can be either extrinsic (connected to the environment) or intrinsic (related to the athlete), and they can also be changed or not (Bahr & Holme, 2003).

In soccer, speed is vital since it is connected to many technical and physical aspects of the game. Players need speed to change directions, stop abruptly, shoot after dribbling, and escape opponents (Roecker et al., 2017). In addition, speed influences game results and is related to other tactical and physical aspects of soccer (Abt et al., 2003; Beato et al., 2021). Players at various places on the pitch need to be able to move quickly and access the ball soon (Tomáš et al., 2014). Although it can be challenging to develop speed, it can be enhanced by training regimens emphasizing high-speed running and agility exercises. Soccer players need to possess quickness to perform well in the game.

In soccer, strength and coordination are crucial. College soccer players' physical stress levels have decreased, and their bodily functions have developed more effectively with coordination training. Coordination is essential for players to make decisions together and successfully intercept the ball in soccer (Smith et al., 2023). It has been demonstrated that soccer players perform better using training techniques that emphasize lower limb strength and coordination (Fei, 2023).

CONCLUSION

Factors that affect the performance of 12-year-old soccer students are height, Body Mass Index. 20 meter run, strength, coordination and biomotor. While anthropometric and psychological factors as a whole there is no relationship. In the future, further research is needed with playing position-based analysis.

REFERENCES

Abt, G., Reaburn, P., Holmes, M., & Gear, T. (2003). Changes in peak sprint speed during prolonged high-intensity intermittent exercise that simulates team sport play.

Ackland, T. R., Lohman, T. G., Sundgot-Borgen, J., Maughan, R. J., Meyer, N. L., Stewart, A. D., & Müller, W. (2012). Current status of body composition assessment in sport: review and position statement on behalf of the ad hoc research working group on body composition health and performance, under the auspices of the I.O.C. Medical Commission. Sports Medicine (Auckland, N.Z.), 42(3), 227–249. https://doi.org/10.2165/11597140-000000000-00000

Ali, A. (2011). Measuring soccer skill performance: a review. Scandinavian Journal of Medicine & Science in Sports, 21(2), 170–183. https://doi.org/10.1111/j.1600-0838.2010.01256.x

Alshanqiti, A., & Namoun, A. (2020). Predicting Student Performance and Its Influential Factors Using Hybrid Regression and Multi-Label Classification. IEEE Access, 8, 203827–203844. https://doi.org/10.1109/ACCESS.2020.3036572

Babu, J., & Nimkar, N. (2020). Study on Talent Identification of Soccer For Young Indian Male Players. Annals of Tropical Medicine and Public Health, 23. https://doi.org/10.36295/ASRO.2020.231723

Bahr, R., & Holme, I. (2003). Risk factors for sports injuries—a methodological approach. British Journal of Sports Medicine, 37(5), 384–392.

Beato, M., Drust, B., & Iacono, A. Dello. (2021). Implementing High-speed Running and Sprinting Training in Professional Soccer. International Journal of Sports Medicine, 42(4), 295–299. https://doi.org/10.1055/a-1302-7968

Benchehida, A., Bensikaddour, H., & Mohammed, S. (2015). Study of the Determinants of the Sports Performance in Football. Evropejskij Žurnal

Fizi□ eskoj Kul□ tury i Sporta, 10. https://doi.org/10.13187/ejpe.2015.10.167

Bittencourt, N. F. N., Meeuwisse, W. H., Mendonça, L. D., Nettel-Aguirre, A., Ocarino, J. M., & Fonseca, S. T. (2016). Complex systems approach for sports injuries: moving from risk factor identification to injury pattern recognition—narrative review and new concept. British Journal of Sports Medicine, 50(21), 1309–1314.

Currell, K., & Jeukendrup, A. E. (2008). Validity, reliability and sensitivity of measures of sporting performance. Sports Medicine (Auckland, N.Z.), 38(4), 297–316. https://doi.org/10.2165/00007256-200838040-00003

Doewes, R., Hendarto, S., Adi, P., Prasetyo, H., & Manshuralhudroli, M. (2021). Anthropometry and Physical Condition Profile of Bhayangkara FC Professional Football Athletes. Jp.Jok (Jurnal Pendidikan Jasmani, Olahraga Dan Kesehatan), 5(1 SE-Articles). https://doi.org/10.33503/jp.jok.v5i1.1676

Fei, Z. (2023). Strength Training And Coordination In Soccer Players' Lower Limbs. In Revista Brasileira de Medicina do Esporte (Vol. 29). scielo .

García-Ceberino, J. M., Antúnez, A., Ibáñez, S. J., & Feu, S. (2020). Design and Validation of the Instrument for the Measurement of Learning and Performance in Football. International Journal of Environmental Research and Public Health, 17(13). https://doi.org/10.3390/ijerph17134629

Hohmann, A., & Siener, M. (2021). Talent Identification in Youth Soccer: Prognosis of U17 Soccer Performance on the Basis of General Athleticism and Talent Promotion Interventions in Second-Grade Children. Frontiers in Sports and Active Living, 3, 625645. https://doi.org/10.3389/fspor.2021.625645

Jauhiainen, S., Äyrämö, S., Forsman, H., & Kauppi, J.-P. (2019). Talent identification in soccer using a one-class support vector machine. International Journal of Computer Science in Sport, 18(3), 125–136. https://doi.org/doi:10.2478/ijcss-2019-0021

Mahdavi, G., Maharluie, M. S., & Shokrolahi, A. (2017). The Use of Artificial Neural Networks for Quantifying the Relative Importance of the Firms' Performance Determinants. International Journal of Economics and Financial Issues, 7(3 SE-Articles), 119–127. https://www.econjournals.com/index.php/ijefi/article/view/4354

Mara, J. K., Thompson, K. G., Pumpa, K. L., & Morgan, S. (2017). Quantifying the high-speed running and sprinting profiles of elite female soccer players during competitive matches using an optical player tracking system. The Journal of Strength & Conditioning Research, 31(6), 1500–1508.

Musaddiq, M. H., Sarfraz, M. S., Shafi, N., Maqsood, R., Azam, A., & Ahmad, M. (2022). Predicting the Impact of Academic Key Factors and Spatial Behaviors on Students’ Performance. In Applied Sciences (Vol. 12, Issue 19). https://doi.org/10.3390/app121910112

Park, L. A. F., Scott, D., & Lovell, R. (2019). Velocity zone classification in elite women's football: where do we draw the lines? Science and Medicine in Football, 3(1), 21–28.

Roecker, K., Mahler, H., Heyde, C., Röll, M., & Gollhofer, A. (2017). The relationship between movement speed and duration during soccer matches. PLOS ONE, 12(7), e0181781. https://doi.org/10.1371/journal.pone.0181781

Rösch, D., Hodgson, R., Peterson, T. L., Graf-Baumann, T., Junge, A., Chomiak, J., & Dvorak, J. (2000). Assessment and evaluation of football performance. The American Journal of Sports Medicine, 28(5 Suppl), S29-39. https://doi.org/10.1177/28.suppl_5.s-29

Scott, D., & Lovell, R. (2018). Individualisation of speed thresholds does not enhance the dose-response determination in football training. Journal of Sports Sciences, 36(13), 1523–1532.

Smith, D., Zaal, F. T. J. M., & Memmert, D. (2023). Emergent Coordination of Heading in Soccer: Of Two Players and a Single Ball. Research Quarterly for Exercise and Sport, 94(4), 959–965. https://doi.org/10.1080/02701367.2022.2088674

Sutton, L., Scott, M., Wallace, J., & Reilly, T. (2009). Body composition of English Premier League soccer players: Influence of playing position, international status, and ethnicity. Journal of Sports Sciences, 27, 1019–1026. https://doi.org/10.1080/02640410903030305

Tomáš, M., František, Z., Lucia, M., & Jaroslav, T. (2014). Profile, correlation and structure of speed in youth elite soccer players. Journal of Human Kinetics, 40, 149–159. https://doi.org/10.2478/hukin-2014-0017

Vescovi, J. D., & Favero, T. G. (2014). Motion characteristics of women's college soccer matches: Female Athletes in Motion (FAiM) study. International Journal of Sports Physiology and Performance, 9(3), 405–414.

Wang, P., Liu, J., & Liao, B. (2022). [Retracted] Prediction of Sports Performance and Analysis of Influencing Factors Based on Machine Learning and Big Data Statistics. Journal of Sensors, 2022, 3276576. https://doi.org/10.1155/2022/3276576

Zambom-Ferraresi, F., Rios, V., & Lera-Lopez, F. (2018). Determinants of sport performance in European football: What can we learn from the data? Decision Support Systems, 114. https://doi.org/10.1016/j.dss.2018.08.006.