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Comparison of Speed, Agility and Reactive Agility Performance in Soccer Players

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ORIJINAL ARTICLE

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Abstract

The soccer's demands have changed considerably and rose in recently. Today, athletes need to have more power and to cover greater distances during the game. The aim of this research was to search the differences in reactive agility, speed, and agility in soccer players. A total of 59 male athletes (aged 14–19 years) voluntarily participated in the study. The participants were grouped based on their age to under 15 (U15; n = 20), under 17 (U17; n = 20), and under 19 (U19; n = 19) players. 10-30m sprint, T-test and Reactive agility tests were applied to the participants. Kolmogorov-Smirnov test was used to determine whether all data were normally distributed. Kruskal Wallis test was used to evaluate the three groups among themselves. Tamhane's T2 test, one of the post hoc tests, was used to find which groups caused the difference between the groups. In group comparisons, there were significant differences in 10m sprint ($p < 0,05$), 30 m sprint ($p < 0,05$), t-test ($p < 0,05$), and reactive agility performances ($p < 0,05$) of the participants. It has been determined that some improvements were observed in participants' performance parameters depending on age.

Keywords: Agility; Speed, Reactive Agility, Performance, Soccer

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Futbolcularda Sprint, Çeviklik ve Reaktif Çeviklik Performanslarının Karşılaştırılması

Öz

Futbolun talepleri son zamanlarda önemli ölçüde değişmiş ve artmıştır. Günümüzde bir futbol müsabakası sırasında, oyuncuların daha fazla güce sahip olmaları, yüksek şiddet gerektiren hareketleri daha sık ve sayıda yapmaları ve daha uzun mesafeleri kat etmeleri gerekmektedir. Bu çalışmanın amacı futbolcuların sprint, çeviklik ve reaktif çeviklik performansları arasındaki farklılıkları araştırmaktır. Çalışmaya toplam 59 erkek futbolcu (14-19 yaşlar arası) gönüllü olarak katılmıştır. Oyuncular yaşlarına göre 15 yaş altı (U-15; n = 20), 17 yaş altı (U-17; n = 20) ve 19 yaş altı (U-19; n = 19) oyuncular olarak 3 grupta değerlendirilmiştir. Katılımcılara 10-30m sprint, çeviklik t testi ve reaktif çeviklik testleri uygulanmıştır. Tüm verilerin normallik testi varsayımını karşılayıp karşılamadığını doğrulamak için Kolmogorov-Smirnov testi kullanılmıştır. Çalışma sonuçlarının karşılaştırmaları ise Kruskal Wallis testi ile yapılmıştır. Gruplar arasındaki farkın hangi gruplarda oluştuğunu bulmak için post hoc testlerden biri olan Tamhane's T2 testi kullanıldı. Grup karşılaştırmalarında, katılımcıların 10 m sprint ($p <0,05$), 30 m sprint ($p <0,05$), çeviklik t testi ($p <0,05$) ve reaktif çeviklik performanslarında ($p <0,05$) anlamlı farklılıklar bulunmuştur. Sonuç olarak, katılımcıların performans parametrelerinde yaşa bağlı olarak bazı iyileşmeler olduğu tespit edilmiştir.

Anahtar kelimeler: Hız, Çeviklik, Reaktif Çeviklik, Performans, Futbol

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Introduction

The soccer's demands have changed considerably and rose in recently. Today, players need more power and cover more distance for optimal performance during the game (Carling et al. 2008). Various high-intensity activities such as sprints, quickness and agility happen during offensive and defensive actions in the competition (Faude et al. 2012 ; Paul et al., 2016; Pojskic et al., 2018). As a result of the analysis of the soccer game, it was specified that the players did 1000-1400 short-term and high-intensity activities varying between 4-6 seconds in a game (Mohr et al. 2003; Stolen et al., 2005).

The change of direction speed involving acceleration and maximum speed occur very often during the match. Therefore, speed, agility and reactive agility abilities in soccer players are accepted as important physical parameters for soccer success (Young and Rogers, 2013; Fiorilli et al., 2016; Negra et al. 2017). There is no clear consensus in the sports science community on the definition of agility. Nowadays, some researchers state that agility and reactive agility are the same skill (Fiorilli et al., 2017; Trajkoviç et al., 2020). However, recent studies reveal that these two concepts are different from each other. In these studies, agility and change of direction can be defined as codes in a pre-planned manner. Despite this, reactive agility (RA) is defined as the change in directional speed according to the stimulus (Sheppard and Young, 2006). For this reason, reactive agility depends on higher levels of motor control compared to pre-planned codes (Spasic et al. 2015).

One of the important performance components of soccer is sprint (Balsom,1994; Reilly and Doran, 2003). In football, the most important feature that distinguishes elite and non-elite athletes is the total number of sprints and distance during the competition. In other words, it has been determined that higher-level soccer players did more sprints and longer distances (Mohr et al, 2003; Mann et al., 2007; Rumpf et al., 2016; Trecroci et al., 2019). There are some differences between young (under 19 years) and senior professional adult players according to physical and physiological requests of the game in soccer. Junior soccer athletes travel a total distance during the match of 5.0 km (Under-13), 6.7 km (Under-15), and 9.0 km (Under-17). But this distance is within 10–14 km for adult professional players (Bradley et al., 2009; Vieira et al., 2019). During the game, junior athletes carry out more than 20–30 sprints which have an average time of 1.4 ± 0.4 s (Gregson et al., 2010; Haugen and Buchheit, 2015; Nikolaidis et al., 2016; Vieira et al., 2019).

In addition, the analyses show that adult soccer players cover more distance than young players (9-14 km) during the game. Of this, 8-12 % is high-intensity running or sprinting. It has been reported that peak sprint velocity values are 31-32 km/h in soccer players. In addition, the amount of sprints in the range 17-81 per game for each player was stated during the match. The average duration of these sprints is between 2 and 4 s, and most of the sprinted distance is less than 20 m (Di Salvo et al.,

2010; Matlak et al., 2016; Rumpf et al., 2016; Nikolaidis et al., 2016; Negra et al., 2017; Horicka et al., 2018). Soccer also requires motor skills such as acceleration, deceleration, and change of direction speed during the match. The athletes have to accelerate and change direction very quickly according to the situation of the field and the opponent players. It is known that the speed that occurs during the game is not always in a straight line, it also includes changes of direction (Little and Williams, 2005; Brughelli et al., 2008; Salaj and Markoviç, 2011; Krosta et al., 2020). For this reason, it is necessary to evaluate the components of change of direction speed (CODs), linear speed and agility in soccer players separately in terms of optimal performance. It would be a more precise technique to arrange them separately in the following trainings. In this context, the purpose of this research was to search the differences between the sprint, agility and reactive agility performances of soccer players.

Materials and Methods

Participants

Fifty nine male adolescent players who play football in the U-15, U-17 and U-19 categories of a professional football team participated in the research. Of the 59 athletes, 20 were under-15 (U-15), 20 were under-17 (U-17), and 19 were under-19 (U-19). Age, stature, body weight and body mass index values of the participants were recorded, respectively. A standard warm-up protocol including 5 minutes of low-intensity running and stretching exercises was applied to the participants before each test. The participants were given a detailed explanation of the purpose and procedure of this study. They also have a parental leave certificate. An explanation was given to the participants about the purpose of this study and the details of the study to be conducted. In addition, written informed consent was obtained from all participants and their parents. Participation was voluntary and participants could leave the study at any time. During the current research, it has been acted within the framework of "Higher Education Institutions Scientific Research and Publication Ethics Directive" Before the study, 28 August 2022 (Decision number: E-60116787-020-261830) The ethics committee approval was obtained from the Pamukkale University Non-Invasive Clinical Trials Ethics Committee.

Data Collection Process

In this study, 10-30m sprint, agility and reactive agility tests were applied to soccer players for physical performance. 20 min standardized warm up program was applied before the measurements. Participants were familiar with the protocols in all tests. The best score from the two tests was recorded.

Anthropometric Measures

The test subject' stature was taken with a scale having a sensitivity of 0.01 m, and their body weights were taken with electronic scales (SECA, Germany) with a sensitivity level of 0.1 kg.

10-30m sprint test

The time during 10-30m sprint in a straight line was measured utilizing single beam photocell gates placed 10 m above the ground level (Time It; Eleiko Sport, Halmstad, Sweden) (Figure 1). The photocells placed the starting and finishing lines of 10 m and 30 m. All participants started from 1 m behind the starting line. Each subject performed 2 trials with 3 minutes of passive rest between trials (Kacoglu and Kırkaya, 2020).

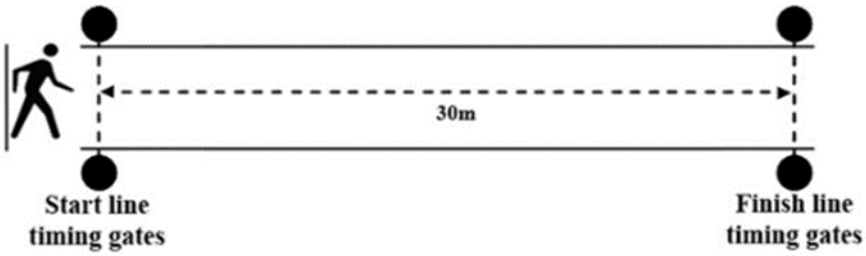

Figure 1: 30m sprint test

Agility t test

The T-test procedure was utilised to assess the agility performance of the participants, as illustrated in Figure 2. All participants started 1 m behind the starting line. They were asked to contact the funnel with hand when they accessed them. First of all, the participant goes 10 m forward as fast as possible, then go to the right by side steps, 5 m long. Later, he goes by side steps to the left, 10 m long. Once more, he runs to the center cone by side steps, 5 m long. After he goes by back steps, 5 m along. In the end, he comes back as soon as possible and sprints to the final gates (Raya et al. 2013).

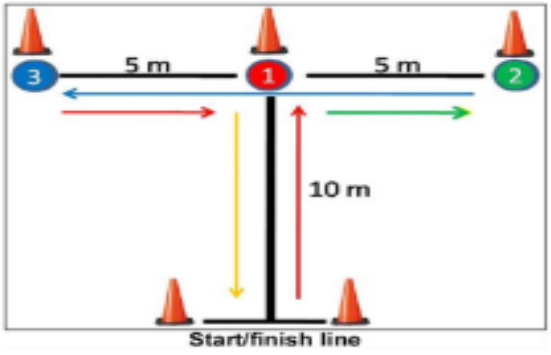

Figure 2: Agility t test

Reactive agility test

We employed the reactive agility test protocol adapted for soccer, as demonstrated in Figure 3 (Alptekin et al., 2017). The total distance of the test course is 15 m. Firstly, the participant runs by side step to the left with 4 m and to the right with 2 m (starting line/gate 1). Then he runs 1 m forward as quickly as possible (to gate 2) and cuts either to the left or the right at 45º (to gate 3 or gate 4) when presented with the stimulus on the screen.

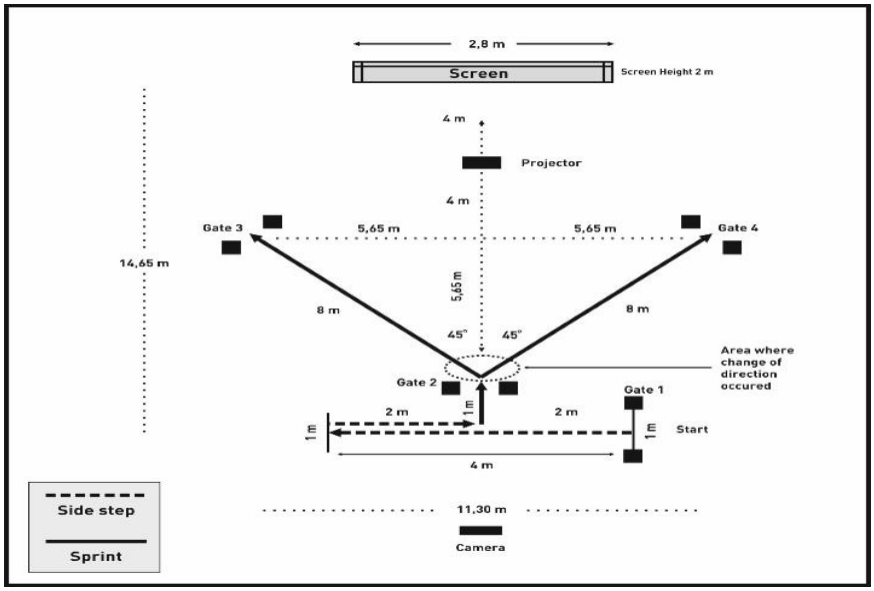

Figure 3: Reactive agility test

Statistical Analysis

Data are given as mean ± standard deviation. The data that were suitable for normal distribution were tested with the Kolmogorov-Smirnov test. It was determined that the data did not show normal distribution. Kruskal Wallis test was used to evaluate the three groups among themselves. Tamhane's T2 test, one of the post hoc tests, was used to find which groups caused the difference between the groups. The level of significance was taken as $p<0,05$.

Results

The descriptive information of the subjects attending in the research is shown in Table 1.

Table 1

Physical Characteristics of Subjects

Variables	**U-15 (n=20)**	**U-17 (n=20)**	**U-19 (n=19)**
	X±Sd	**X±Sd**	**X±Sd**
Age (year)	14,8±0,41	16,6±0,50	18,3±0,65

Stature (cm)	167,2 ± 0,02	172,6 ± 0,02	174,4 ± 0,01
Body mass (kg)	60,4 ± 1,37	64,4 ± 2,45	67,6 ± 2,05
Body mass index (kg/m^2)	22,4± 0,54	21,7± 0,70	22,2± 0,58

Table 1 shows the physical characteristics of the players according to age group. Stature (cm) and body mass (kg) were similar across the groups (p > 0,05); therefore, adjustments were not performed Table 2 shows mean, standart deviation, min and max values of variables.

Table 2

Mean, Standard Deviation of Data and Kruskal Wallis Test Analysis Results

Variables	**N**	**X±Sd**	**Mean Rank**	**df**	**X^2**	**p**
U15-10mS	20	1,75 ± 0,04	37,88			
U17-10mS	20	1,72 ± 0,03	29,93	2	8,639	**0,013***
U19-10mS	19	1,7 ± 0,03	21,79			
U15-30mS	20	4,39 ± 0,1	40,05			
U17-30mS	20	4,32 ± 0,07	27,9	2	11,709	**0,003***
U19-30mS	19	4,28 ± 0,08	21,63			
U15-TT	20	12,1 ± 0,79	46,28			
U17-TT	20	10,83 ± 0,81	26,35	2	30,241	**0,000***
U19-TT	19	10,28 ± 0,5	16,71			
U15-RAT	20	5,19 ± 0,08	48,13			
U17-RAT	20	4,97 ± 0,09	24,85	2	36,125	**0,000***
U19-RAT	19	4,91 ± 0,09	16,34			

Note: 10mS: 10 meters sprint; 30mS: 30 meters sprint; TT: T Test; RAT: Reactive Agility Test

On average, the U15 needed significantly more time than U17 and U19 to perform all tests. A significantly slower average performance of sprint 10-30 m, TT and RAT was also observed in U15 as compared to U17 and U19. looking at the table 1, significant differences were found between the groups in all tests applied (p<0,05).

Table 3

Tamhane's T2 Test Analysis Results

Variables	Group	Group	Mean Difference	Std. Error	P
10 m sprint	U15	U17	0,045	0,01	**0,006***
		U19	0,021	0,01	0,177
	U17	U19	0,021	0,01	0,177
30 m sprint	U15	U17	0,070	0,02	**0,045***
		U19	0,11	0,02	**0,002***
	U17	U19	0,039	0,02	0,334
TT	U15	U17	1,23	0,24	**0,000***
		U19	1,81	0,2	**0,000***
	U17	U19	0,581	0,21	**0,031***
RAT	U15	U17	0,21	0,02	**0,000***
		U19	0,27	0,02	**0,000***
	U17	U19	0,06	0,03	0,111

Looking at Table 3, significant differences were found between U15 and U17 in the 10 m sprint test, between U17 and U19 with U15 in the 30 m sprint test, among all groups in T test, between U17 and U19 with U15 in RAT test ($p<0,05$).

Discussion

The aim of the this study is to search the differences between the sprint, agility and reactive agility performances of soccer players. Looking at the current findings, on average, the U15 needed significantly more time than U17 and U19 to perform all tests. A significantly slower average performance of sprint 10-30 m, TT and RAT was also observed in U15 as compared to U17 and U19. looking at the table 1, significant differences were found between the groups in all tests applied ($p<0,05$).

The sprint drills containing shorter than 5 m and longer than 20 m differ from each other. Because each of them includes separate and specific biomechanical and neuromuscular qualities (Harris et al., 2008).

According to the present study's results, significantly difference was observed in 30m sprint performance in athletes, which is in line with the above mentioned fact. But a significantly difference was no observed in 10 m sprint performances between U17 and U19. In addition, current study findings have shown that U15 athletes have worse scores than U17 and U19 athletes in all tests. The findings of current research are similar to the findings of related studies in the literature. Generally, many studies that examined age difference concluded that adult players had better scores than junior

players. The reason for these differences can be explained by the maturity stage of the athletes (Waldron and Murphy, 2013). In addition, post adolescence the athletes develop physically and gains strength. As young players develop physically, they can perform better physically (Lloyd and Oliver, 2012; Trecroci et al., 2019).

Looking at the agility findings of the participants, there were similar results in U-19 and U-17 players in agility test, but they had statistically better scores than U-15 players. According to these findings, it appears to be non-existent differences between U-19 and U-17 athletes. The main reason for this may be that individual differences in biological maturation are greater in athletes aged 11-16 years (Deprez et al., 2015). But the results of the study conducted by Poljskic et al. (2018) are not similar to the findings of our study. In this study, U19 athletes had significantly better scores than U17 athletes. A possible reason U-19 athletes have better scores in the agility test can be explained as a result of the direct consequence of their long involvement in regular soccer training.

Our study' findings demonstrate that U-19 athletes made better scores in the reactive agility test than U-17 and U-15 athletes. Looking at these results, there was a significant difference in favor of U-19 athletes in the reactive agility test. The reason of this may be these athletes have more experience and a better cognitive skill. In addition, they have better ability to know relevant cues in the football-specific image on the screen during the test (Paul et al., 2016). In the literature, our study' results are similar to the findings of the studies by Fiorilli et al. (2017) and Pojskic et al. (2018) in the reactive agility test. Conversely, there is a study that found no significant difference between young and older athletes in reactive agility tests (Sekulic et al., 2020).

The reason for the incoherence in the studies' findings can ce explained as reactive agility performance is being improved in the players up to the late adolescent age, while it can attain its peak.

According to our research findings, training program shows similarity for all age groups in adolescent athletes. At the present time, the coaches started using the sport-specific stimuli in their training program for physical skills. During the soccer game, the athletes have to make fast and correct decisions according to the developing instant situations. For this, they must have anticipatory expertise and recognize and respond quickly to a stimulus.

Junior players who have no more experience may need more time to react to a stimulus as soon as possible to avoid being carried out by the opponent players during the match.

The present study has two limitations. The first, the talent and training levels of the players are not considered in this study. The second is the circadian rhythm's effect on performance parameters because of the time the testing was carried out (10:00 to 12:00 h).

Conclusion

Reactive agility and COD speed are indispensable abilities for optimal performance in football. In addition, reactive agility test make the difference between elite and sub elite athletes. Because elite athletes have more experience and better cognitive skill. Furthermore, our research' results substantiate that field-based tests containing speed, agility, and reactive agility are key abilities to distinguish the skill levels between elite and sub elite athletes in football. It is recommended that trainers should consider more drills to develop these abilities in their training programs. More studies are needed to support these findings.

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Conflicts of Interest

It has been declared by the author that there is no conflict of interest.

Statement of Researchers' Contribution Rates

All stages of the research were carried out by a single author.

References

Alptekin, A., Agbuga, B., & Egesoy, H. (2017). *The validity and reliability of the open skill agility test system (Reactive agility test system).* Oral presentation, 15th International Sports Sciences Congress. 15-18 November. Antalya, Türkiye.

Balsom, P. (1994). Sprint performance in soccer. *Science and Football*, 8,16-19.

Bradley, P. S., Sheldon, W., Wooster, B., Olsen, P., Boanas, P., & Krustrup, P. (2009). High-intensity running in English FA Premier League soccer matches. *J. Sports Sci.*, *27*, 159–168. [CrossRef] [PubMed]

Brughelli, M., Cronin, J., Levin, G., & Chaouachi, A. (2008). Understanding change of direction ability in sport. *Sports Med.*, *38*, 1045–1063. [CrossRef] [PubMed]

Carling, C., Bloomfield, J., Nelsen, L., & Reilly, T. (2008). The role of motion analysis in elite soccer. *Sports Med.*, *38*, 839–862. [CrossRef]

Deprez, D., Buchheit, M., Fransen, J., Pion, J., Lenoir, M., Philippaerts, R.M., & Vaeyens, R. A. (2015). Longitudinal study ınvestigating the stability of anthropometry and soccer-specific endurance in pubertal high-level youth soccer players. *J. Sports Sci. Med.*, *14*, 418–426.

Di Salvo, V., Baron, R., González-Haro, C., Gormasz, C., Pigozzi, F., & Bachl, N. (2010). Sprinting analysis of elite soccer players during European Champions League and UEFA Cup matches. *J Sports Sci*, *28*(14), 1489–1494.

Faude, O., Koch, T., & Meyer, T. (2012). Straight sprinting is the most frequent action in goal situations in professional football. *J. Sports Sci.*, *30*, 625–631. [CrossRef]

Fiorilli, G., Iuliano, E., Mitrotasios, M., Pistone, E. M., Aquino, G., Calcagno, G., & Di Cagno, A. (2017). Are change of direction speed and reactive agility useful for determining the optimal field position for young soccer players? *J. Sports Sci. Med.*, *16*, 247–253.

Gregson, W., Drust, B., Atkinson, G., & Salvo, V. D. (2010). Match-to-match variability of high-speed activities in premier league soccer. *Int j Sports Med., 31*(4), 237–242.

Harris, N. K., Cronin, J. B., Hopkins, W. G., & Hansen, K. T. (2008). Relationship between sprint times and the strength/power outputs of a machine squat jump. *J. Strength Cond. Res., 22*, 691–698. [CrossRef] [PubMed]

Haugen, T., & Buchheit, M. (2015). Sprint running performance monitoring: methodological and practical considerations. *Sports Med., 46*, 641–656. [CrossRef] [PubMed]

Horicka, P., Simonek, J., & Brodani, J. (2018). Diagnostics of reactive and running agility in young football players. Phys *Act Rev, 6*, 29-36.

Little, T., & Williams, A. G. (2005). Specificity of acceleration, maximum speed, and agility in professional soccer players. *J Strength Cond Res, 19*(1), 76–8. https://doi.org/10.1519/14253.1

Lloyd, R. S. & Oliver, J. L. (2012). The youth physical development model: A new approach to long-term athletic development. *Strength Cond. J., 34*, 61–72. [CrossRef]

Kacoglu, C., & Kırkaya, I. (2020). The acute effects of pre-conditioning activities with a weighted vest on subsequent linear sprint and change of direction performance in physical education students. *Asian J Edu Train, 6*(3), 341-346.

Krosta, R., Drozd, M., Goralczyk, R., Kostrzewa, M., Fischerova, P., & Ingatieva, A. (2020). Models of speed development in soccer. *Balt J Health Phys Act. 12*(2), 27-34. doi: 10.29359/BJHPA.12.2.04

Mann, D. T., Williams, A. M., Ward, P., & Janelle, C. M. (2007). Perceptual-cognitive expertise in sport: A meta-analysis. *J. Sport Exerc. Psychol., 29*, 457–478. [CrossRef]

Matlak, J., Tihanyi, J., & Rácz, L. (2016). Relationship between reactive agility and change of direction speed in amateur soccer players. *J Strength Cond Res., 30*(6), 1547-1552.

Mohr, M., Krustrup, P., & Bangsbo, J. (2003). Match performance of high standard soccer players with special reference to development of fatique. *J Sport Sci, 21*(7), 519-528.

Negra, Y., Chaabene, H., Hammami, M., Amara, S., Sammoud, S., Mkaouer, B., & Hachana, Y. (2017). Agility in young athletes: is it a different ability from speed and power? *J Strength Cond Res, 31*(3), 727-735.

Nikolaidis, P. T., Knechtle, B., Clemente, F., & Torres-Luque, G. (2016). Reference values for the sprint performance in male football players aged from 9–35 years. *Biomed. Hum. Kinet., 8*, 103–112.

Paul, D. J., Gabbett, T. J., & Nassis, G. P. (2016). Agility in team sports: Testing, training and factors affecting performance. *Sports Med., 46*, 421–442. [CrossRef]

Pojskic, H., Åslin, E., Krolo, A., Jukic, I., Uljevic, O., Spasic, M., Sekulic, D. (2018). Importance of reactive agility and change of direction speed in differentiating performance levels in junior soccer players: Reliability and validity of newly developed soccer-specific tests. *Front. Physiol., 15*, 9, 506. doi: 10.3389/fphys.2018.00506. [CrossRef]

Raya, M. A., Gailey, R. S., Gaunaurd, I. A., Jayne, D. M., Campbell, S. M., Gagne, E., & Tucker, C. (2013). Comparison of three agility tests with male service members: Edgren side step test, t-test, and illinois agility test. *J Rehabil Res Dev., 50*(7), 951-960.

Reilly, T., & Doran, D. (2003). *'Fitness assessment' in Reilly, T; and Williams Science and Soccer*. Routeledge, New York. 21-47.

Rumpf, M. C., Lockie, R. G., Cronin, J. B., & Jalilvand, F. (2016). Effect of different sprint training methods on sprint performance over various distances: A brief review. *J. Strength Cond. Res., 30*, 1767–1785. [CrossRef]

Salaj, S., & Markovic, G. (2011). Specificity of jumping, sprinting, and quick change-of-direction motor abilities. J. *Strength Cond. Res., 25*, 1249–1255. [CrossRef]

Sekulic, D., Gilic, B., Foretic, N., Spasic, M., Uljevi´c, O., & Versi´c, S. (2020). Fitness profiles of professional futsal players: Identifying age-related differences. Biomed. *Hum. Kinet., 12*, 212–220. [CrossRef]

Sheppard, J. M., & Young, W. B. (2006). Agility literature review: Classifications, training and testing. *J Sports Sci., 24* (9), 919-32.

Spasic, M., Krolo, A., Zenic, N., Delextrat, A., & Sekulic, D. (2015). Reactive agility performance in handball; development and evaluation of a sport-specific measurement protocol. *J. Sports Sci. Med., 14*, 501–506.

Stolen, T., Chamari, K., Castagna, C., & Wisløff, U. (2005). Physiology of soccer: an update. *Sports Med.*, *35*(6), 501-36. doi: 10.2165/00007256-200535060-00004.

Trajkoviç, N., Sporis, G., Kristicevic, T., Madic, D. M., & Bogataj, S. (2020). The importance of reactive agility tests in differentiating adolescent soccer players, Int. J. Environ. Res. *Public Health*, *17*(11), 3839. doi: 10.3390/ijerph17113839

Trecroci, A., Longo, S., Perri, E., Iaia, F. M., & Alberti, G. (2019). Field-based physical performance of elite and subelite middle-adolescent soccer players. *Res. Sport. Med.*, *27*, 60–71.

Waldron, M., & Murphy, A. A. (2013). Comparison of physical abilities and match performance characteristics among elite and subelite under-14 soccer players. *Pediatr. Exerc., Sci. 25*, 423–434. [CrossRef] [PubMed]

Vieira, L. H. P., Carling, C., Barbieri, F.A., Aquino, R., & Santiago, P.R.P. (2019). Match running performance in young soccer players: A systematic review. *Sports Med.*, *49*(2), 289-318. doi: 10.1007/s40279-018-01048-8.

Young, W., & Rogers, N. (2014). Effects of small-sided game and change-of-direction training on reactive agility and change-of-direction speed. *Journal of Sports Sciences*, *32*(4), 307-314, doi: 10.1080/02640414.2013.823230