COMPARISON OF FLEXIBILITY, BALANCE, STANDING LONG JUMP, HAND GRIP AND BACK STRENGTH VALUES IN SOCCER PLAYERS AND WRESTLERS

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Abstract

The present study aimed to compare flexibility, balance, standing long jump, handgrip and back strength values in football players and wrestlers aged 11-17 years. A total of 236 participants, 139 male football players and 97 male wrestlers, were included in the study. T-test, one-way analysis of variance and LSD tests were used for statistical analysis. No statistically significant difference was found between anthropometric measurements and fat percentages of football players and wrestlers ($p>0.05$). While there was no significant difference in the balance values of football players and wrestlers ($p>0.05$), statistically significant differences were found between flexibility, standing long jump, hand grip and back strength values ($p<0.05$ and $p<0.001$). While no significant difference was found in balance values in terms of age ($p>0.05$), statistically significant differences were found between flexibility, standing long jump, hand grip and back strength values ($p<0.001$). Long jump and strength values increased with increasing age in general. Flexibility value was positively correlated with hand grip strength, back strength and standing long jump ($p<0.001$). Balance value was only positively correlated with fat percentage ($p<0.001$). Hand grip strength was positively correlated with standing long jump and back strength ($p<0.001$). It was concluded that standing long jump values of football players were better than those of wrestlers, while flexibility, hand grip and back strength values of wrestlers were better than those of football players. Balance values were found to be similar. Standing long jump, flexibility, hand grip and back strength were found to increase with increasing age. Coaches and trainers should take these differences into consideration in football players and wrestlers aged between 11 and 17 years.

Keywords: *Football, Wrestling, Flexibility, Balance, Standing long jump, handgrip and back strength.*

INTRODUCTION

Flexibility, balance and strength values as biomotor characteristics are important parameters in the performance of athletes (Aslan et al., 2013). Athletes have complex physiological demands and these demands require athletes to have highly developed capacities in terms of maximal strength, power, muscular endurance, maximal aerobic power and anaerobic abilities (Chaabene et al., 2017). Improving strength and balance performance components is important to reduce the risk of injury and improve sports performance (Löklüoğlu et al.,2024). A relationship has been reported between trunk, upper and lower limb function and sports performance. High trunk muscle strength improves trunk stability, reduces the risk of back injury and improves athletic performance. Increased trunk muscular endurance is associated with improved shoulder mobility and stability, which in turn is associated with improved performance (Nakai et al., 2024). Standing long jump is complicated by the difficulty of motor coordination in both upper and lower segments. This movement is also considered a basic skill in various sports. In particular, it is an important test index for assessing the physical fitness levels of secondary school students (Zhou et al., 2020). Hand grip strength is often used to predict a strong hand grip. It is considered a general indicator of muscle strength and power and is useful in assessing general health status when combined with other biological parameters (Quattrocchi et al.,2024).

In football, lower and upper extremities play an important role in all the dynamics that make up a competition such as sprinting, throwing, tackling, and sudden turns (Çakır-Atabek, 2014). Research on flexibility in football has primarily focused on examining its effect on susceptibility to injury and the acute effects of flexibility on performance (Bogalho et al.,2022). Some researchers suggest that high levels of strength and power should go hand in hand with high levels of flexibility. Flexibility, as an important element of conditioning, supports technical preparation and also prevents injuries (Hrysomallis, 2011; Mirzaei et al., 2011; Chaliburda & Cieśliński, 2022).

Wrestling, which is among the Olympic branches, is a branch in which motoric characteristics such as strength, power, flexibility and balance come to the fore in terms of its characteristics (Özbar et al., 2002). Wrestling is a sport that requires very quick

movements in short periods of time and it is largely dependent on body strength (Cicoğlu et al., 2007). Flexibility is also an important factor for success in wrestling where complex skills are dominant. Flexibility creates a positive effect on the application of techniques by providing wrestlers with the ability to move extensively (Aslan et al., 2013). Especially in wrestling, where the balance feature comes to the fore in the correct and fast application of techniques, balance performance of athletes should be at an excellent level (Özbar et al., 2002). In wrestling, balance is very necessary for the positioning of athletes so that they cannot be easily knocked down by the opponent (Dafer, 2020). Wrestling styles require a unique physical profile, including strength, power, agility and flexibility (Chaliburda & Cieśliński, 2022).

Information about the timing and magnitude of changes in athletes' physical performance will also be of great value to coaches/fitness coaches in terms of knowing when to expect improvements in certain physical characteristics or physical performance and when not to expect them (Smpokos et al., 2022). For this purpose, changes in flexibility, balance, standing long jump, hand grip strength, and back strength were examined based on sport type and age group. The present study aimed to determine flexibility, balance, standing long jump, hand grip strength, and back strength values in football players and wrestlers and to compare these values between the two sports.

Method

Participants: A total of 236 athletes between the ages of 11 and 17, including 139 male amateur football players and 97 male wrestlers in Samsun province participated in this study voluntarily.

Measurement parameters:

Body weight (kg): Body weight was measured without shoes and in sportswear. After stepping on the measuring device, the student stood still and the value was recorded.

Height (cm): Height was measured without shoes and in sportswear. During measurement, the heel, hip, back and head (back section) were aligned vertically. The head was positioned so that the eyes were looking straight ahead. After assuming this

position, the student was asked to take a deep breath and hold it, and the measurement was taken at that moment.

Sit-and-Reach (Flexibility) Test. Sit-and-reach test was used to measure flexibility. Participants sat on the floor with their bare feet flat on the test bench, leaned forward, kept their knees straight, and reached forward as far as possible with their hands in front of their bodies, and tried to slowly push the ruler forward. The test administrator stood next to the participant and prevented them from bending their knees. The participant waited for 1-2 seconds without stretching forward or backward at the furthest point. The test was repeated twice and the highest value was recorded (Canlı, 2020).

Standing Long Jump Test: For standing long jump test, participants were instructed to jump as far as possible horizontally by pushing off with both legs simultaneously, starting with a bilateral take-off and landing. The shortest distance from the landing heel to the starting point was measured in centimetres, and the arms were used to increase the jump distance. The furthest distance achieved was used for analysis. Participants performed two trials, and the best result was used for data analysis (Reina et al., 2018).

Flamingo balance test: The athlete stepped onto the balance material with the selected foot. In order to maintain balance and assume the correct position before the test, the athlete received support from the test administrator and held onto the test administrator. The athlete then bent the free leg behind the knee and held it with the hand on the same side. When the athlete was ready, the assistant let go of his hand and started the stopwatch at the same time. Every time the athlete lost his balance (contact with the ground, letting go of his foot), the stopwatch was stopped and restarted when the athlete was ready. The total number of times the athlete lost his balance within 60 seconds was recorded (Tsigilis et al., 2002).

Strength Tests:

Back strength measurement: After placing their feet on the dynamometer stand, the athletes performed the measurement by pulling the dynamometer bar vertically upwards as much as possible, with their knees and arms tense, their backs straight, and their bodies slightly bent forward. The measurements were repeated twice, and the best results were recorded in kilograms (Arı et al.,2024).

Hand Grip Strength Test: TK 5401 Takei Digital Hand Dynamometer was used in this test, which aimed to determine hand grip strength. Participants stood in a resting position without support and squeezed the dynamometer twice with their hands. The average of the two values read on the dynamometer was recorded as the participants' hand dynamometer value (Canlı, 2020).

Skin Fold Thickness Measurements:

Skin fold thickness measurements of children were taken from the triceps, subscapular, and suprailiac regions by using a skinfold caliper (Holtain LTD, England). Measurements were taken twice from the right side of the athletes, and the average of the two measurements was recorded as the result. For the measurement of skinfold thickness, the thickness of the subcutaneous fat layer between the thumb and index finger was pulled up slightly enough to separate it from the muscle tissue. The caliper was placed approximately 1 cm away from the fingers and the thickness of the subcutaneous fat layer was read from the indicator on the caliper within 2-3 sec and recorded in mm (Harrison et al., 1988).

Triceps Skinfold Thickness: The right elbow was placed at a 90º angle and the distance between the acromion process and the olecranon process on the posterior aspect of the arm was measured with a tape measure and the midpoint was marked. The measurement from this midpoint was then made parallel to the axis of the arm as recommended by Harrison et al (1988) (Saraçoğlu, 2019).

Subscapularis: Skinfold thickness was measured by lifting the skin and subcutaneous fat layer just below the scapula with the thumb, index and middle fingers of the left hand, following the natural orientation of the skinfold (the natural orientation of the skinfold extends at an angle of approximately 45° to the vertical axis of the body), as recommended by Harrison et al (1988).

Suprailiac Skinfold Thickness: With the athlete in an upright posture with feet together and arms hanging freely at the sides, the measurement was made from the top of the iliac crest diagonally over the axilla line as recommended by Harrison et al (1988) (Saraçoğlu,2019).

Calculation of Body Density and Body Fat Percentage:

Using the skinfold thicknesses, the body densities (BM) of the participants were determined individually by using the J-P (Jackson-Pollock) formula (1985). Body fat percentages (BMI) were then calculated using the Siri formula (Siri, 1961). The Jackson-Pollock and Siri formulas used for the research group are given below.

J-P equation = VY = chest + abdomen + thighs = sum of skinfolds (ST) Body Density = 1.10938 - (0.0008267 x ST) + (0.0000016 x ST2) - (0.0002574 x age)

Siri equation = BFP% = (495/BFP) - 450

Statistical procedure:

Statistical calculations were made with SPSS 25.00 program. Normality assumption of the data obtained in the study was evaluated with the Kolmogorov-Smirnov test ($p>0.05$). The data were found to be normally distributed. Student t-test was used for pairwise comparisons, one-way analysis of variance was used for multiple comparisons and LSD tests were used to determine the differences.

RESULTS

Table 1. Anthropometric measurements and fat percentages of football players and wrestlers

Parameters	Sport	n	Mean	St.deviation	t	p
Age (Years)	Football	139	13.80	1.59	-0.75	0.468
	Wrestling	97	13.95	2.06		
Height (cm)	Football	139	160.64	9.96	0.78	0.441
	Wrestling	97	159.40	12.92		
Body weight (kg)	Football	139	49.90	10.29	-0.018	0.943
	Wrestling	97	49.88	12.12		
Fat percentage (%)	Football	139	15.42	3.02	1.77	0.088
	Wrestling	97	14.49	4.66		
Sport experience (Years)	Football	139	6.50	1.62	-0.41	0.675
	Wrestling	97	6.60	2.02		

No statistically significant difference was found between anthropometric measurements and fat percentages of football players and wrestlers ($p>0.05$).

Table 2. Flexibility, balance, standing long jump, hand grip and back strength values of football players and wrestlers

	Sport	N	Mean	St.deviation	t	p
Flexibility (cm)	Football	139	22.07	6.47	-4.62	0.000**
	Wrestling	97	26.09	6.10		
Balance (number)	Football	139	6.10	4.17	-0.48	0.630
	Wrestling	97	5.85	3.21		
Right hand grip strength (kg)	Football	139	27.76	7.33	-2.11	0.036*
	Wrestling	97	30.25	10.08		
Left hand grip strength (kg)	Football	139	27.12	7.33	-2.30	0.23*
	Wrestling	97	29.71	9.40		
Standing long jump (cm)	Football	139	202.86	31.00	2.40	0.017*
	Wrestling	97	193.34	25.27		
Back strength (kg)	Football	139	86.80	28.96	-2.98	0.003*
	Wrestling	97	101.32	43.26		

*p<0.05 and **p<0.001

While no significant difference was found in the balance values of football players and wrestlers (p>0.05), statistically significant differences were found between flexibility, standing long jump, hand grip and back strength values (p<0.05 and p<0.001).

Table 3. Comparison of flexibility, balance, standing long jump, hand grip and back strength values by age

Parameters	Age	n	Mean	St. deviation	F/LSD	p
Flexibility (cm)	11 (1)	24	23.48	4.20	4.31 1<7 2<3.5.7 3.4<7	<0.001**
	12 (2)	40	20.66	6.10		
	13 (3)	50	23.36	7.39		
	14 (4)	40	22.90	6.76		
	15 (5)	30	25.91	6.28		
	16 (6)	25	23.07	5.03		
	17 (7)	27	28.22	6.07		
Balance (number)	11 (1)	24	5.55	3.25	0.66	0.681
	12 (2)	40	6.24	3.32		
	13 (3)	50	6.32	3.99		
	14 (4)	40	5.37	3.65		
	15 (5)	30	6.36	4.31		
	16 (6)	25	6.52	5.05		
	17 (7)	27	5.04	3.13		
Right hand grip strength (kg)	11 (1)	24	18.70	1.85	46.29 1<2.3.4.5.6 .7 2<3.4.5.6.7 3<4.5.6.7 4<5.6.7 5.6<7	<0.001**
	12 (2)	40	22.36	3.04		
	13 (3)	50	25.89	5.81		
	14 (4)	40	29.29	7.35		
	15 (5)	30	33.36	5.95		
	16 (6)	25	35.12	7.26		
	17 (7)	27	40.96	6.32		

Left hand grip strength (kg)	11 (1)	24	17.94	1.78	35.89 1<2.3.4.5.6.7 2<3.4.5.6.7 3<4.5.6.7 4<5.6.7 5.6<7	<0.001**
	12 (2)	40	21.93	3.34		
	13 (3)	50	26.34	6.22		
	14 (4)	40	28.75	7.90		
	15 (5)	30	32.70	6.52		
	16 (6)	25	34.24	6.20		
	17 (7)	27	37.90	6.13		
Standing long jump (cm)	11 (1)	24	169.30	19.29	14.43 1.2<3.4.5.6.7 4.5<6	<0.001**
	12 (2)	40	181.66	20.39		
	13 (3)	50	195.24	27.27		
	14 (4)	40	203.82	27.45		
	15 (5)	30	209.03	19.58		
	16 (6)	25	223.10	25.10		
	17 (7)	27	216.20	30.73		
Back strength (kg)	11 (1)	24	60.75	11.48	37.33 1.2<3.4.5.6.7 3<4.5.6.7 4<6.7 5.6<7	<0.001**
	12 (2)	40	67.05	11.52		
	13 (3)	50	78.29	21.73		
	14 (4)	40	94.74	33.12		
	15 (5)	30	103.40	31.54		
	16 (6)	25	117.25	21.92		
	17 (7)	27	145.68	35.79		

**p<0.001

While no significant difference was found in balance values with respect to age (p>0.05), a statistically significant difference was found between flexibility, standing long jump, hand grip and back strength values (p<0.001). Long jump and strength values were found to increase with age.

Table 4. Correlations of flexibility, balance, standing long jump, hand grip, back strength and fat percentage

	Balance	Right hand grip	Left hand grip	Standing long jump	Back strength	Fat percentage
Flexibility	,014	,384**	,365**	,190**	,359**	-,016
Balance		-,033	-,049	-,173*	,000	,338**
Right hand grip			,892**	,560**	,818**	,049
Left hand grip				,557**	,811**	,004
Standing long jump					,479**	-,122
Back strength						,121

Flexibility value was positively correlated with hand grip strength, back strength and standing long jump (p<0.001). Balance value was only positively correlated with fat

percentage ($p<0.001$). Hand grip strength was positively correlated with standing long jump and back strength ($p<0.001$).

DİSCUSSİON AND CONCLUSİON

The present study aimed to determine flexibility, balance, standing long jump, hand grip strength, and back strength values in football players and wrestlers and to compare these values between the two sports. The results found were discussed in line with similar studies conducted in the literature. In terms of sociodemographic characteristics of the participants, mean age was found to be 13.80 years for football players and 13.95 years for wrestlers, while sports experience was found to be 6.50 years for football players and 6.60 years for wrestlers in the present study. There are different results in terms of fat percentages at these ages in the literature. For example, Canlı (2020) found an average body fat percentage of 12.50 in children with an average age of 11 years in his study. Arı et al. (2024) found mean body fat percentage as 12.74 in football players around the age of 14. İmamoğlu et al. (2018) found mean fat percentage as 10.88 in U15 football players. In the present study, mean fat percentage was found to be 15.42% in football players and 14.49% in wrestlers. The fat percentages in the study can be considered to be consistent with the literature for these ages.

Hepsert et al. (2023) found the value of standing long jump in 10-year-old football players to be 178.46 cm in the pre-test and 151.77 cm in the post-test after 8 weeks of training. Hepsert et al. (2023) found that the value of standing long jump in 11-year-old football players was 216.03 cm in the pre-test and 217.63 cm in the post-test after 8 weeks of training. Chaliburda and Cieśliński (2022) found the value of standing long jump in junior wrestlers as 255 cm in medal winners and 246 cm in non-medal winners. While the standing long jump score of children in the 12 and 14 age group was 161.91 cm in the study of Günay et al. (2011), Arabacı et al. (2008) found 203.95 cm for the group with an average age of 14.65 years. According to the study of Şimşek et al. (2014), the 9 years age group had the lowest standing long jump score, and while it was not different from the age groups of 10, 11 and 12 age groups, there were some differences from the age groups of 13, 14 and 15. İmamoğlu et al. (2018) found mean standing long jump value in U15 football players as 196.2 cm. In the present study, standing long jump

value was found to be 202.86 cm in football players and 193.34 cm in wrestlers. In the present study, standing long jump was found to be 169.30 cm in 11-year-old athletes and 223.10 cm in 16-year-old athletes. A statistically significant difference was found between the values of standing long jump in football players and wrestlers in the present study ($p<0.05$). Statistically significant difference was found between standing long jump values in terms of age ($p<0.001$). An increase in the value of standing long jump was observed with increasing age. The increase in maturation and sports experience with increasing age is effective in this increase. Long jump values increase with increasing age. The fact that the long jump values of football players are higher than wrestlers may be due to some anthropometric and physiological differences. For example, it is a known fact that football is a running-based sport and that football players use their legs more than wrestlers in competitions and training. Hepsert et al. (2023) and Aktuğ and İri (2018) attributed the long jump values of children playing football being better than other branches to the fact that the quedriceps muscle is the main reason determining the performance during shooting and long jump in football. Yıldız et al. (2018) found a significant relationship between standing long jump and short distance running performances in 10-11 age group male tennis athletes when they examined the standing long jump and sprint performance in child tennis players.

In their 2020 study, Canlı found that the mean flexibility value in children with a mean age of 11 years was 19.50 cm. Özdemir and Civan (2018) found that the flexibility value in 17-year-old football players was 23.06 cm in the pre-test and 27.26 cm in the post-test in the experimental group. Demirkan (2015) determined the flexibility value in adolescent wrestlers to be between 30.6 and 33.6 cm. Demirkan et al. (2015) reported flexibility values between 32 and 36 cm for wrestlers in another study. According to the study by Şimşek et al. (2014), the 15-year-old athlete group achieved the highest score in flexibility and was similar to the 9, 10, 13, and 14-year-old athlete groups, while the 11-year-old athlete group achieved the lowest score and was similar to the 10 and 12-year-old groups. In the present study, flexibility value was found to be 22.07 cm in football players and 26.09 cm in wrestlers. A statistically significant difference was found between the flexibility values of football players and wrestlers ($p<0.001$). Again,

a statistically significant difference was found between flexibility values in terms of age ($p<0.001$). The present study showed differences in flexibility values in terms of age. The lowest flexibility value was 20.66 cm in 12-year-old athletes, while the highest flexibility value was 28.22 cm in 17-year-old athletes. The inconsistent results in flexibility in terms of age may also be due to the different numbers of wrestlers and football players in each age category.

Berisha and Çilli (2018) reported the mean values of the flamingo balance test in 11-year-old students in Kosovo as 11.8 for boys. In the present study, the mean balance test scores were found to be 6.10 for football players and 5.85 for wrestlers. Balance test results did not vary in terms of sport type or age ($p>0.05$). Although wrestling requires more balance than football, the lack of difference can be interpreted as indicating that football players have better leg muscle strength and development than wrestlers.

Many studies in the literature have also reported an increase in hand grip strength in children who participate in sports and exercise (Katie et al., 2003). In a study by Canlı (2020), the mean hand grip strength in children with an average age of 11 years was found to be 20.20 kg. Karacabey et al. (2016) found that the mean right hand grip strength of football players aged 10–12 was 15.27 kg and the mean left hand grip strength was 15.29 kg. Arı et al. (2024) found the mean handgrip test values for 14-year-old football players to be 46.30 kg for the right hand and 46.29 kg for the left hand. According to the study by Şimşek et al. (2014), left and right hand grip strength gradually increased between the ages of 9 and 13, remained constant and showed no further development between the ages of 13 and 15. In the present study, handgrip strength was found to be 27.76 kg for the right hand and 27.12 kg for the left hand in football players, and 30.25 kg for the right hand and 29.71 kg for the left hand in wrestlers. Similarly, hand grip strength was found to be lowest in 11-year-old athletes (18.70 kg for the right hand and 17.94 kg for the left hand) and highest in 17-year-old athletes (40.96 kg for the right hand and 37.90 kg for the left hand). A statistically significant difference was found between the hand grip strength values of football players and wrestlers ($p<0.05$). Statistically significant differences were also found

between handgrip strength values in terms of age ($p<0.001$). Handgrip strength values generally decrease with age. It is noteworthy that the difference in handgrip strength in terms of sport type is small, while the difference in terms of age is greater. The fact that wrestlers have better hand grip strength than football players may also be due to the nature of the sport they practise. For example, while the use of hands is prohibited in football (except for goalkeepers), the use of hands and gripping movements is a high priority in wrestling. Again, the fact that the right hand grip strength is higher than the left hand grip strength suggests that most of the subjects are right-handed and that this is related to handedness.

Dafer (2020) found that elite class wrestlers had back muscle strength ranging from 112.50 to 153.00 kg. Arı et al. (2024) found that football players around the age of 14 had a mean back strength of 64.31 kg. In Demirkan's (2015) study, although there was no significant difference in back strength values between age groups, the back strength of 15-year-old wrestlers was relatively lower than that of 16- and 17-year-old wrestlers. In the present study, back strength was found to be 86.80 kg in football players and 101.32 kg in wrestlers. Similarly, back strength increased with age, from 60.75 kg for 11-year-old athletes to 145.60 kg for 17-year-old athletes. Statistically significant differences were found between the back strength values of football players and wrestlers ($p<0.05$). Again, statistically significant differences were found between back strength values in terms of age ($p<0.001$). Back strength values generally increased with age. Smpokos et al. (2022) suggested that U-19 players had higher levels of power, strength, flexibility, and endurance than U-17, U-16, and U-15 players. This may be due to differences in their sporting training history and individual levels of strength/power/endurance ability. Increases in muscle strength in children depend on age, gender, maturity level, previous level of physical activity, and body measurements (Özer & Özer, 2020).

Şahin (2021) found no statistically significant relationship between body fat percentage and right-left hand grip strength, back strength, and leg strength in elite-level freestyle wrestlers. Arı et al. (2024) found no statistically significant relationship between body fat percentage and right-left hand grip strength and back strength in their study. In

Demirkan's study (2015), moderate to high correlations were found between lean body mass and muscle strength and values obtained from hand grip and leg-back strength in wrestlers. In the present study, flexibility was positively correlated with handgrip strength, back strength, and standing long jump ($p<0.001$). Balance was positively correlated only with body fat percentage ($p<0.001$). A positive correlation was found between handgrip strength and standing long jump and back strength ($p<0.001$). The differences between these studies are thought to be due to differences in the participants' sports disciplines, age, height, weight, and sports experience.

CONCLUSİON AND RECOMMENDATİONS

The value of standing long jump increases with age and is higher in football players than in wrestlers. The reasons for this include the fact that football is a running-based sport and that football players use their legs more than wrestlers. Flexibility values, which vary by age, are better in wrestlers than in football players. This may be due to the nature of wrestling and the flexibility exercises performed by wrestlers. Balance test results are similar in terms of sport type or age. Hand grip strength values, which vary by age, are higher in wrestlers than in football players. One of the reasons for this is the nature of the sport. In football, the use of hands (except for goalkeepers) is prohibited, while in wrestling, the use of hands and gripping movements is of primary importance. Back strength increases with age and is higher in wrestlers than in football players. In addition to physical movements or exercises, this may be due to the greater use of back muscles in wrestling. Flexibility value has a positive correlation with handgrip strength, back strength, and standing long jump. Balance value shows a positive correlation only with fat percentage. Handgrip strength has a positive correlation with standing long jump and back strength.

As a conclusion, it has been determined that footballers have better standing long jump values than wrestlers, while wrestlers have better flexibility, hand grip and back strength values than footballers. There are similarities in terms of balance. Standing long jump, flexibility, hand grip strength, and back strength have been found to increase with age. Coaches should take these differences into account when working with football players and wrestlers aged 11-17.

REFERENCES

1. *Arı, Y. (2020). The relationship between anthropometric characteristics and motoric performance of female futsal players. International Journal of Applied Exercise Physiology, 9(9), 11-17.*
2. *Arı, Y., Sevinç, K., Arslan, K., Kantemür, F., & Gürbüz, M.A. (2024). Futbolcuların vücut yağ yüzdesi ile antropometrik ve motorik performans özellikleri arasındaki ilişki. Herkes için Spor ve Rekreasyon Dergisi, 6 (2), 130-135.*
3. *Aslan, C.S., Karakollukçu, M., Gül, M., & Fişne, M. (2013). Comparison of annual changes in selected physical and motoric characteristics in age 13-15 wrestlers. Sports Medicine Journal, 48, 1-7.*
4. *Atakan, M. M., Unver, E., Demirci, N., Bulut, S., & Turnagöl, H. H. (2017). Effect of body composition on fitness performance in young male football players. Turkish Journal of Sport and Exercise, 19(1), 54-59.*
5. *Berisha, M., Çilli, M. (2018). Normative values for physical fitness in children aged 11-17 in Kosovo. Pedagogics, psychology, medical-biological problems of physical training and sports, 22(1):17–27.*
6. *Bogalho, D., Gomes, R., Mendes, R., Dias, G., & Castro, M.A. (2022). Impact of flexibility on vertical jump, balance and speed in amateur football players. Applied Sciences, 12, 5425.*
7. *Canlı, U. (2020). Investigation of relationships between body composition and physical fitness parameters in football players of pre-adolescence period. Spor Eğitim Dergisi, 4 (3), 33-42.*
8. *Chaabene, H., Negra, Y., Bouguezzi, R., Mkaouer, B., Franchini, E., Julio, U., & Hachana, Y. (2017). Physical and physiological profile of wrestler athletes: a short review. Journal of Strength Conditioning Research, 31(5), 1411–1442*
9. *Chaliburda, I., & Cieśliński, I. (2022).Relationships between physical fitness and wrestling – Specific fitness in freestyle wrestlers. Polish Journal of Sport Tourism, 29(4), 15-20.*
10. *Cicioğlu, H.İ., Kürkçü, R., Eroğlu, H., & Yüksek, S. (2007). 15-17 yaş grubu güreşçilerin fiziksel ve fizyolojik özelliklerinin sezonsal değişimi. Spormetre Beden Eğitimi ve Spor Bilimleri Dergisi,5, 151-6.*
11. *Çakır-Atabek, H., (2014). The relationship between hand-grip strength, anaerobic performance and isokinetıc muscle strength in female handball players. Niğde University Journal of Physical Education and Sport Sciences, 8(3), 242-250.*
12. *Çelik, S., Örer, G. E., Diler, K., & Yelken, M. E. (2022). Futbolcuların vücut yağ yüzdesi ile sürat ve dikey sıçrama performansları arasındaki ilişkinin incelenmesi. Gazi Beden Eğitimi ve Spor Bilimleri Dergisi, 27(4), 313-332.*
13. *Dafer, N. (2020). Review of physical condition of wrestling athletes. Advances in Social Science, Education and Humanities Research, 460, 166-168.*
14. *Demirkan, E. (2015). Age-related patterns of physical and physiological characteristics in adolescent wrestlers. Montenegrin Journal of Sports Science and Medicine, 4, 13– 18.*
15. *Esco, M. R., Fedewa, M. V., Cicone, Z. S., Sinelnikov, O. A., Sekulic, D., & Holmes, C. J. (2018). Field-based performance tests are related to body fat percentage and fat-free mass, but not body mass index, in youth soccer players. Sports, 6(4), 105.*
16. *Günay, M., Ciğerci, A.E., & Aksen, P. (2011). The evaluation of some physical and motor features of the female and male students aged 12–14 who participated in sports or not. Bulletin of the Transilvania University of Brasov Series VIII: Art, Sport, 4 (53) 203-210.*

17. *Harman, A. E., Rosenstein, M. T., Frykman, P. N., Rosenstein, R. M., & Kraemer, W. J. (1991). Estimation of human power output from vertical jump. Journal of Strength and Conditioning Research 5(3), 116-120*
18. *Harrison, G.G., Buskirk, E.R., Carter, J.E., et al. (1988). Skinfold Thicknesses and Measurement Technique. in: Lohman TG, Roche AF, Martorell R, editors. Anthropometric standardization reference manual. Champaign (Illinois): Human Kinetics Books, p. 55-70.*
19. *Hepsert, S., Kılıç, Y., & Tan, Ç. (2023). Adölesan fubolcularda uygulanan beceri antrenmanının seçilmiş bazı motorik özellikler ve yetenek testlerine etkisi. ROL Spor Bilimleri Dergisi, 4(2), 714-728.*
20. *Höner, O., Leyhr, D., & Kelava, A. (2017). The influence of speed abilities and technical skills in early adolescence on adult success in soccer: A long-term prospective analysis using ANOVA and SEM approaches. PloS One, 12(8), e0182211.*
21. *Hrysomallis, C. (2011). Balance ability and athletic performance. Sports Medicine, 41(3), 221-232.*
22. *Hyka, A., Bicoku, E., Mysliu, A., & Cuka, A. (2017). The association of sprint performance with anthropometric parameters in youth soccer players. Sport Monthly, 15(1), 31-33.*
23. *İmamoğlu, O.,Çebi, M.,& Yıldız, M. (2018). The research of consecutive sprint, jump and leg strength relationships in U15 football players. The Journal of International Social Research, 11(58), 913- 918.*
24. *Jackson, A. S. & Pollock, M. (1985). Practical Assessment of Body Composition. Physician Sport Medicine, 13, 76-90.*
25. *Karacabey, K., Tetik, G., Kartal, R., Çağlayan, A., & Kaya, K. (2016). Analysis on the effect of core training program on some physical and motoric characteristics for female volleyball players aged 8-11. CBU Journal of Physical Education and Sports Sciences, 11(1).*
26. *Katie, M., Brad, S. M., Joanne, K., Linda, D. V., & Terence, J. W. (2003). Contribution of time tabled physical education to total physical activity in primary school children: Cross sectional study. British Medical Journal, 13(327), 592-593.*
27. *Kokstejn, J., Musalek, M., Wolanski, P., Murawska-Cialowicz, E., & Stastny, P. (2019). Fundamental motor skills mediate the relationship between physical fitness and soccer-specific motor skills in young soccer players. Frontier Physiolology, 10, 596.*
28. *Leyhr, D., Kelava, A., Raabe, J., & Höner, O. (2018). Longitudinal motor performance development in early adolescence and its relationship to adult success: An 8-year prospective study of highly talented soccer players. Plos One, 13(5), e0196324.*
29. *Löklüoğlu, B., Yılmaz, S., Özcan, S., & Tatlıcı, A. (2024). Investigation of balance performance of wrestling and kickboxing athletes. Physical Education of Students, 28(1):37–42.*
30. *Maud, P.J., & Foster, C. (1995). Physiological Assessment of Human Fitness, USA, Human Kinetics, 1995: 205-215.*
31. *Mirzaei, B., Curby, D.G., Barbas, I., Lotfi, N. (2011). Physical fitness measures of cadet wrestlers. International Journal of Wrestling Science 1(1), 63-66.*
32. *Mohammad, A., & Tareq, A. (2016). The relationship between body fat percentage with speed, agility and reaction time of male football players of Bangladesh. International Journal of Sport Culture and Science, 4(4), 453-460.*
33. *Nakai, Y., Usumoto, Y., Takeshita, Y. (2024). The effects of regional muscle strength and mass on standing long jump performance. Muscles, 3(1), 60-70.*
34. *Özbar, N., Şahin, Ş., & Akan, Ş. (2002). Türk milli bayan boks takımının fiziksel parametrelerinin incelenmesi. Spor Araştırmaları Dergisi.8(2); 35-47*
35. *Özdemir, İ., & Civan, A. (2018). Effect of lower extremity strength training done in young male soccer players on some physiological, motoric and technical parameters during preparation period. Journal of Human Sciences, 15(2), 1193- 1205.*

36. *Reina, R., Iturricastillo, A., Sabido, R., Campayo-Piernas, M. & Yanci, J. (2018). V ertical and horizontal jump capacity in international cerebral palsy football players. International Journal of Sports Physiology and Performance. 13, 597–603*
37. *Sever, O., & Arslanoğlu, E. (2016). Futbolcularda yaşa bağlı çeviklik, ivmelenme, sürat ve maksimum sürat ilişkisi. Journal of Human Sciences, 13(3), 5660-5667*
38. *Siri, W. E. (1961). Body composition from fluid space and density. In: Brozek J, Hanschel A, editors. Techniques for Measuring Body Composition. Washington, DC: National Academy of Science; pp. 223-244*
39. *Smpokos, E., Mourikis, C., Tsikakis, A., Katsikostas, N., & Linardakis M. (2022). Reference performance values of pre-seasonal physical fitness in elite youth male football players in Greece. Journal of Public Health: From Theory to Practice, 30:1307–1318.*
40. *Şahin, M. (2021). Elit güreşçilerde aerobik ve anaerobik kapasitenin vücut kompozisyonu ve antropometrik ölçümler açısından incelenmesi. Doktora Tezi Gazi Üniversitesi, Sağlık Bilimleri Enstitüsü*
41. *Şimşek, E., Aktuğ, Z.B., Çelenk, Ç. , Yılmaz, T., Top, E., & Kara, E. (2014). The Evaluation of the physical characteristics of football players at the age of 9-15 in accordance with age variables. International Journal of Science Culture and Sport, Special Issue 1,460-468.*
42. *Taşkın, C., Karakoç, Ö., Acaroglu, E., & Budak, C. (2015). Futbolcu çocuklarda seçilmiş motorik özellikler arasındaki ilişkinin incelenmesi. Spor ve Performans Araştırmaları Dergisi, 6(2), 101-107.*
43. *Tsigilis, N., Douda, H., & Tokmakidis, S. P. (2002). Test-retest reliability of the eurofit test battery administered to university students. Perceptual and Motor Skills, (95), 1295-1300.*
44. *Tutkun, E., Eyüboğlu, E., & Ağaoğlu, S.A. (2006). İlköğretim çağı çocuklarında antropometrik ölçümlerle bazı fiziksel ve fizyolojik parametrelerin ilişkisi. 9. Uluslararası Spor Bilimleri Kongresi, Muğla, 2006.*
45. *Quattrocchi, A., Garufi, G., Gugliandolo, G., De Marchis, C., Collufio, D., Cardali, S.M., & Donato, N.(2024). Handgrip strength in health applications: A review of the measurement methodologies and influencing factors. Sensors, 24, 5100.*
46. *Yavuz, M., Işıkdemir, E., & Metin, S. C. (2023). Futbolda temel eğitim alan çocuklarda sürat, çeviklik, denge ve dikey sıçrama performansı arasındaki ilişkinin iİncelenmesi. Uluslararası Bozok Spor Bilimleri Dergisi, 4(1), 141-149*
47. *Yıldız, S., Gelen, E., Sert, V., Akyüz, M., Taş, M., Bakıcı, D., & Çırak, E. (2018). Çocuk tenisçilerde patlayıcı kuvvet ile sürat arasındaki ilişkinin incelenmesi. Manisa Celal Bayar Üniversitesi Sağlık Bilimleri Enstitüsü Dergisi, 5(3):64-67.*
48. *Zanini, D., Kuipers, A., Somensi, I. V., Pasqualotto, J. F., Quevedo, J. D. G., Teo, J. C., & Antes, D. L. (2020). Relationship between body composition and physical capacities in junior soccer players. Revista Brasileira de Cineantropometria & Desempenho Humano, 22, e60769*
49. *Zhou, H.,Yu, P., Thirupathi, A., & Liang, M. (2020). How to improve the standing long jump performance? A mininarrative review. Applied Bionics and Biomechanics, 93,09 (1); 1-5.*