

# Comparison of Agility, Vertical Jump and Speed Parameters in Children Between 6-12 Years

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## Abstract

The aim of the study is to compare the agility, vertical jump and velocity parameters in children between 6-12 years of age. One hundred thirty-six children (61 girls, 74 boys) participated as volunteers. The t-test was applied to the participants as a measure of agility test. Vertical jump and 20 meters speed test were applied. Statistics were performed using by SPSS package program. The data were evaluated by the Shapiro-Wilk test for normal distribution. Mann Whitney U test was used for intergroup comparisons. Accordingly, there is a significant difference in favor of males in the vertical jump in the 10-year age group ( $p<0.05$ ). There is a significant difference between males and females in the 9 and 10 age groups in favor of males in vertical jump and speed ( $p<0.05$ ). There was no statistically significant difference in the agility test, but the data showed that men performed better.

**Key Words:** Agility, vertical jump, speed

## INTRODUCTION

Sportive abilities are characterized by different psychomotor characteristics. These; force, speed, endurance, skill and range of motion. Sportive abilities are characterized by different psychomotor characteristics. These are; force, speed, endurance, skill, and range of motion. These characteristics are the factors that determine how successful a person will be more successful and in which sport. Durability feature may be a prominent athlete marathon runner, who has a very good speed can be a sprinter, someone who uses his feet well can be a footballer, who use a good hand can be more successful in using volleyball (1). The width of movement in sports is an expression of flexibility. There are four main features of muscle tissue, namely: extensibility, flexibility, excitability, and contraction. The extensibility and flexibility of these forms the width of motion (2, 3). Elongation is the ability of the muscle to stretch. Flexibility; the ability

to return to the normal length of the muscle after stretching or after contraction (4). Children between the ages of 6 and 12, rather than gaining new skills, demonstrate the basic skills they have previously gained more fluently and accurately. This phase of motor development is the stage of development of basic movements. Here, the term sports has been widely used; that is, it is adopted not only as a competition but also as a means of activities such as recreation, play, dance (5, 6). It is the transition phase of the age of seven to eight. During this period, performance is highlighted and efforts are made to increase. Performance is expected to increase with strength, durability, reaction time, movement time and balance (7). After this period, special movement skills are introduced and this phase includes children aged 11-13. At this stage, Starts to choosing a branch. Children are willing to learn and practice their mobility skills. The branch of movement which is specific to the sports branch is also called the branching period (8). In the age of 6-12 years, the child's perceptual

abilities are sharpened. Sensory-motor organs work more and more harmoniously. Thus, at the end of this semester, the child can achieve numerous complex skills. For example, hitting the flung baseball; age, application, visual acuity, running ability, reaction and movement time and sensory-motor integration depending on. It is imperative for the children to experiment for the maximum maturation of his movement skills. In other words, children can develop motor skills by developing their perceptual processes during normal maturation process (9).

Motor development; it is a process that continues throughout the acquisition of a child's movement patterns and skills. Continuous changes and developments are involving the interaction of many functions. These functions include neuromuscular maturation, an important genetic component. This maturation is realized through the environment and social life of a social being (10). Speed can be defined as the speed at which the whole body or body parts occur when applying a movement. Briefly, it can be defined as the ability to move the body or a part at high speed (11).

Based on this information, it was aimed to compare the agility, vertical jump and velocity

parameters in children aged 6-12 years. Thus, we will have an idea about age groups by revealing the difference between the parameters we examined and comparing them in terms of gender.

## MATERIALS & METHODS

One hundred thirty-six children (61 girls, 74 boys) aged 6-12 years in basketball, volleyball and football branches participated in the study voluntarily. Participants who were invited by face-to-face interview with their families were informed about the purpose and content of the study. The volunteer consent form was signed before the study. Body composition, body weight, body mass index (BMI), fat ratio (kg) and fat ratio (%) were performed by body composition analysis (Tanita BC 418, USA) based on bioelectric impedance method. The 4 funnel tracks are arranged in the T-shape for T-test section. Then run to the left (C funnel) side step and touch the C funnel with the left hand. Then the right hand (D funnel) runs sideways and touches it with the right hand. Then come to B with side running and then the funnel and touch it with the left hand. It then returns to A funnel by running back. The chronometer is stopped as soon as you reach the A funnel (Figure 1). The best duration of the participant will be recorded (12).

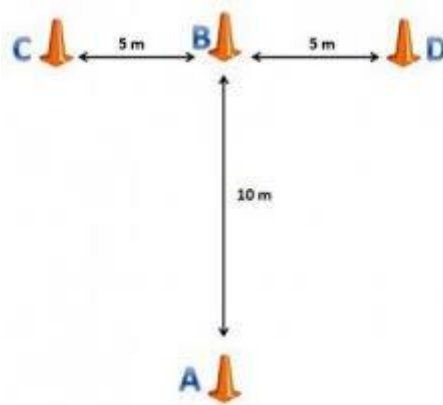


Figure 1. T-test

The vertical jump test was performed using the Jump Meter. Athletes, time and distance scale on the sensitive ground without taking the step and the top of the strength has jumped upwards. The distance he jumped was determined in inches on the device. Athletes jumped two times. The best degree is recorded as the vertical jump values.

## Statistical Analysis

Statistical analysis was performed by in SPSS 23.00 package program. The data were evaluated by the Shapiro-Wilk test for normal distribution. All data were expressed as mean and standard deviation. The Mann Whitney U test was used to compare genders. Significance was accepted at  $p < 0.05$ .

## RESULTS

Descriptive parameters of age groups are shown in Tables 1, 2, 3, 4 and 5.

**Table 1.** Descriptive parameters of age group 6

Age	Parameters	Girls (n=19)		Boys (n=23)	
		Min-max	Mean±SD	Min-max	Mean±SD
6 years	Height (cm)	94-128	116.05±8.83	103-139	119.78±8.4
	Body weight (kg)	13.2-32	19.94±4.23	33.7-22.73	22.73±5.17
	Body fat (%)	13.1-31.6	18.67±5.28	3-33.4	18.17±5.79
	Body fat (kg)	2.10-10.10	3.82±1.85	1-10.7	4.32±2.18
	BMI (kg/cm <sup>2</sup> )	12.1-20.8	14.69±1.88	13.2-20.5	15.66±1.96
	Vertical jump (cm)	10-28	16.1±4.79	9-27	18.6±4.66
	20 m. speed (sec)	4.45-6.44	5.27±0.59	4.18-6.32	5.04±0.49
	T test (sec)	9.25-14.12	11.46±2.64	8.74-13.54	10.1±4.65

**Table 2.** Descriptive parameters of age group 7

Age	Parameters	Girls (n=10)		Boys (n=13)	
		Min-max	Mean±SD	Min-max	Mean±SD
7 years	Height (cm)	119-142	125.1±7.74	122-131	126.23±3.0
	Body weight (kg)	17.9-45.6	25.96±7.73	20.7-42.7	26.58±5.49
	Body fat (%)	3-34.1	18.77±8.87	12.9-38.9	20.11±6.7
	Body fat (kg)	1.7-15.5	5.35±4.17	2.7-16.6	5.66±3.53
	BMI (kg/cm <sup>2</sup> )	12.6-22.6	16.3±2.91	13.9-26.1	16.66±3.16
	Vertical jump (cm)	11-25	17.14±3.25	10-24	19.84±4.12
	20 m. speed (sec)	4.23-5.80	5.01±0.52	4.15-5.98	4.82±0.55
	T test (sec)	9.88-13.48	10.67±15.2	8.56-13.56	9.67±15.1

**Table 3.** Descriptive parameters of 8 age group

Age	Parameters	Girls (n=10)		Boys (n=16)	
		Min-max	Mean±SD	Min-max	Mean±SD
8years	Height (cm)	123-138	131.4±4.88	108-145	129.5±9.12
	Body weight (kg)	19.1-33.7	25.98±4.89	13.9-46.6	27.83±9.32
	Body fat (%)	9-28	16.43±6.23	9-30.9	17.16±6.64
	Body fat (kg)	1.7-9	4.5±2.44	1.3-13.7	5.31±3.91
	BMI (kg/cm <sup>2</sup> )	11.5-18.9	14.98±2.35	11.9-22.3	16.15±3.32
	Vertical jump (cm)	11-23	19.1±2.4	13-25	20.15±6.1
	20 m. speed (sec)	4.18-6.39	4.95±0.76	4.31-5.21	4.74±0.26
	T test (sec)	9.75-13.45	10.56±4.12	8.42-13.32	9.56±3.48

**Table 4.** Descriptive parameters of 9 age group

Age	Parameters	Girls (n=11)		Boys (n=12)	
		Min-max	Mean±SD	Min-max	Mean±SD
9 years	Height (cm)	132-153	139.18±5.94	119-150	139.75±8.4
	Body weight (kg)	21.2-40.5	29.03±5.54	25.9-50.7	36.55±8.18
	Body fat (%)	3-28.7	14.88±8.02	12.4-30.6	21.06±5.53
	Body fat (kg)	1-11.6	4.59±3.27	3.6-14.7	8.02±3.74
	BMI (kg/cm <sup>2</sup> )	12.2-34	25.76±35.97	14.9-22.5	18.51±2.46
	Vertical jump (cm)	15-28	20.21±6.12	20-27	24.1±3.25
	20 m. speed (sec)	3.98-5.57	4.69±0.46	2.39-5.23	3.87±1.22
	T test (sec)	9.65-13.2	10.21±15.4	8.32-13.1	9.12±15.46

Age	Parameters	Girls (n=11)		Boys (n=10)	
		Min-max	Mean±SD	Min-max	Mean±SD
10years	Height (cm)	133-157	145±12	138-159	146.7±7.36
	Body weight (kg)	27.7-61.3	40.7±18.04	23.1-63.4	43.09±11.85
	Body fat (%)	15.5-35.6	23.4±10.71	6.3-35.9	20.42±8.41
	Body fat (kg)	4.3-21.8	10.8±9.57	1.5-20.1	9.49±5.49
	BMI (kg/cm <sup>2</sup> )	15.7-24.9	18.76±5.31	12.1-26.3	19.79±4.27
	Vertical jump (cm)	20-29	25.65±5.17	22-34	28.1±2.54
	20 m. speed (sec)	4.40-4.72	4.6±0.17	3.67-4.56	3.88±0.42
	T test (sec)	9.56-12.84	9.76±45.1	8.12-12.58	9.10±1.65

The gender comparison of the parameters is shown in Table 6. According to this, there is a significant difference between boys and girls in 9

and 10 age groups in favor of males in vertical jump and speed.

	6 years	7 years	8 years	9 years	10 years
	P	P	P	P	P
Vertical jump (cm)	.110	.165	.265	.354	.046*
20m Speed (sec)	.215	.687	.493	.039*	.042*
T test (sec)	.154	.215	.226	.154	.354

\*p<0.05

## DISCUSSION & CONCLUSION

One hundred thirty-six children (61 girls, 74 boys) participated as volunteers between the ages of 6-12. The age group consisted of 42 participants (19 female, 23 male). Twenty-three participants from 7 age group (10 girls, 13 boys). Twenty-six participants (10 girls, 16 boys) aged 8 years. Twenty-three participants (11 girls, 12 boys) aged 9 years. The age group ten consisted of 22 participants (11 females, 10 males). All participants' vertical jump, 20m speed, and agility tests were compared. According to this, there is a significant difference between boys and girls in nine and ten age groups in favor of males in vertical jump and speed.

Kara (2018), the aim of this study was to investigate the relationship between body mass index and speed in male and female athletes aged 10 years. as a result, it is possible to mention an improvement in speed characteristics in parallel with the positive increase in BMI, albeit at a low level. (13). It is stated in the sources that the bone length reached the endpoint in the first 2-4 years following puberty in girls (14). With age progression, the increase in height and body weight together with passive physical activity are thought to negatively affect girls' long distance performances. It is seen that the boys perform better when the children who are engaged in sports are

considered to be better at the same time when their long-distance values are better.

Savucu et al. (2004) found that the average age of the basketball players, 14 from the junior category, 36 from the star category, 32 from the junior category and 30 from the basketball players, the average of the vertical jump values of small males was found to be 36.75 ± 3.82 cm. The male average of the stars was found to be 45.55 ± 4.03 cm. Young people have found an average of 50.83 ± 5.26 cm (15). Erikoglu et al (2009) evaluated the performance parameters of the Eurofit test battery according to gender and age groups in children aged 7-12 years. In conclusion, it was reported that boys and girls showed similar development up to the age of 10, however, boys from this age showed a higher rate of development in some parameters than girls (16). Anil (2001), in the study conducted by female basketball players in the 14-16 age group, found that the vertical jump values were 33.58 cm in the experimental group, 42.17 cm in the post-training group, and 33.25 cm in the control group before the training and 33.08 cm in the post-training period (17). Williams et al (2011), 10 m sprint times in their study for 40 football players under age 12 1.98 ± 0.09. Mean age of 13 for 47 football players was reported to be 1.97 ± 0.34 (18). Girard and Millet (2009) reported that 12 tennis players with ages of 13.6 ± 1.4 years had 5m sprint and 10m sprint

performance as  $1.19 \pm 0.07$  and  $2.02 \pm 0.14$ , respectively (19).

In our study, no difference was observed between the age groups in terms of gender in the agility test. However, it is possible to say that the boys have completed the test at a higher degree than

the girls. A significant difference was found in favor of males in terms of sex in the 10 years age group in vertical jump and speed. It can be said that there is a proportional change in aerobic and anaerobic performance along with age-related anthropometric properties.

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