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PECULIARITIES OF CHANGES OF YOUNG SWIMMERS' ANTHROPOMETRIC PROFILE IN THE TIME OF INTENSIVE TRAINING AND ITS CORRELATION WITH SPORTS RESULTS

Ilona Judita Zuozienė, Asta Drevinskaitė
Lithuanian Sports University, Kaunas, Lithuania

ABSTRACT

Background. Knowledge of the peculiarities of anthropometric indicators, body weight components, and somatotype of athletes is important for coaches, sports scientists, and sports physicians at all stages of perennial training, starting with children's sport. Often this is seen as an important indicator for identifying talented children in sport. The *aim* of this study was to determine how the anthropometric and body weight profile of young swimmers (11–12 years) significantly changes during the training period, and the correlation of these indicators with the competition results in the chosen event.

Methods. The study included 24 young (aged 11.7 ± 0.5 years) national level swimmers – girls (n = 14) and boys (n = 10) with 3 to 4 years of sports experience in the national competitions and demonstrating high results in their age group.

We investigated longitudinal anthropometric measurements, body mass components, established the somatotype and handgrip strength. The change of indicators was analysed during the training period of five months as well as its correlation with the result in the chosen sport. Sports results were rated by FINA ranking points.

Results. The anthropometric longitudinal and transverse dimensions of girls and boys increased during the study period, however, there was no difference between the sex groups except for the length of the foot (it was higher in the group of boys, $p < .05$). The analysis of body weight components showed that girls had higher body fat mass and a percentage of body fat than boys ($p < .05$). The results of boys' swimming had statistically significant links with their height ($r = .857$), foot length ($r = .805$), body weight (r = .857), lean mass and muscle mass ($r = .927$) and right handgrip strength (.786). There was no significant correlation between these indicators in the group of girls.

Conclusion. The results of the study suggest that the characteristics of the anthropometric profile as a prognostic indicator for the viability in the chosen sport for boys were more significant than for girls.

Keywords: anthropometry, body composition, swimming.

INTRODUCTION

Swimming is not a common motor ability of the human. A swimmer needs to move in a horizontal position in an unusual water environment and to perform biomechanically unusual movements. Elite swimmers are high. For example, in the 17th FINA World Championship (Budapest, Hungary, 2017), in 100 meters distance finals of free style, back, butterfly and breaststroke, the average height of men in was 189.1 ± 4.8 cm, and that of women was 176.4 ± 6.0 cm. Swimmers have a long torso, broad shoulders, narrow hips, long arms, large hands and feet, good shoulder, elbow, knee and ankle joint mobility. These morphological parameters allow efficient water slide, perform long strokes, and to develop a great pull force when swimming (Kjendlie & Stalman, 2011).

Research has confirmed that higher achievements are demonstrated by those who have a morphological profile and physical preconditions specific to one sport (Duncan, Woodfield, & al-Nakeeb, 2006;

Jürimäe et al., 2007; Leone, Lariviere, & Comtois, 2002; Pion et al., 2014; Reilly, Bangsbo, & Franks, 2000). Studies on athletes' anthropometric indicators and somatotypes have been successfully linked to athletic achievements in competitive sports (Gutnik et al., 2015; Kjendlie & Stalman, 2011; Lewandowska, Busko, Pastuszak, & Boguszewska, 2011; Ryan-Stewart, Faulkner, & Jobson, 2018). Fields, Merrigan, White, and Jones' (2018) research results show that athletes in different sports differ in somatotype and body weight components, and this can be related to the specific physiological needs of that particular sport. For example, it was found that swimmers had a higher percentage of body fat (BF%) compared to athletes and soccer players, and sprint swimmers - less than those who swim long distances. This phenomenon is explained by the researchers that the higher subcutaneous fat layer acts as a protection against fast cooling of the body in cold water and provides better body buoyancy (Fields et al., 2018; Pyne, Anderson & Hopkins, 2006; Roelofs, Smith-Ryan, Trexler, & Hirsh, 2017; Rüst, Knechtle, & Rosemann, 2012).

Knowledge of peculiarities of anthropometric indicators, body weight components, somatotype characteristics of athletes, and the importance of these indicators to the results of swimming, also changes in these indicators while athletes grow, is important to coaches, sports scientists and sports physicians in all phases of multi-annual workouts as well as a means of identifying talents among children.

Children, encouraged by parents, come to swimming pools with the aim of learning to swim. But in the long run, some of them get involved in swimming training and start participating in the competitions. Systematic training in sport has a positive impact on children's physical development, mobility, motor coordination and movement culture (Fisher et al., 2005; Okely, Booth, & Patterson, 2001). The links between the anthropometric indicators of swimmers, body composition and specific swimming fitness characteristics are evident at a young age. Brauer Jr., Popov and Bulgakova's (2007) research shows that indicators of height, upper and lower extremities in talented young swimmers are higher than those of their peers.

Gelad, Nassis and Pavlicevic (2005) analysed the correlation between 12-year-old swimmers' (boys and girls) anthropometric indicators and 100 m freestyle results. It was found that the results of sprint distances in the group of boys were statistically significantly related to their height and body mass, length of arms and feet, and width of hands, shoulders and pelvis. Girls' results were related to their height, length of their upper limbs and hands, and shoulder joint mobility. Similar results were obtained in previous studies as well (Costill et al., 1985; Grimston & Hay, 1986; Pelayo, Sidney, Kherif, Chollet, & Tourny, 1996).

However, there are not many studies analysing changes in the anthropometric indicators, body weight components and somatotype of young swimmers during intensive training in the annual cycle, and the relationship between these indicators and swimming results. Therefore, in our research we tried to answer a few **research questions**: how important the anthropometric and body weight profiles of young swimmers (11–12 years) are during training and what the correlation between these indicators and the results is in the chosen event.

METHODS

Subjects. Research participants were 24 volunteers of Kaunas Swimming School Youth Team (boys n = 10 and girls n = 14). At the beginning of the study, the age of the boys was 12.0 ± 0.6 years, of girls – 11.4 ± 0.2 years. The subjects' sports experience was 3–4 years. Their coaches notified that all participants had experience in national competitions and showed high results in their age group. The subjects and their parents were informed about the study process, and the consent of the subjects and their parents to participate in the study was obtained.

Research process. The studies were conducted twice during the annual training cycle: in the autumn, at the beginning of October and in spring, at the beginning of April. The gap between the studies was five months. Anthropometric measurements and determination of body mass components were performed at the Department of Coaching Science at the Lithuanian Sports University. Demographic data were collected by a survey. Measurements were made on the following scale: body weight – by Analyser "IOI 353", anthropometric measurements – measuring longitudinal dimensions, transverse dimensions, volumes, skin folds, and left and right handgrip strength. During this period, the subjects had swimming training sessions and three main competitions in December, January and March. The highest result shown in the competition was fixed at the beginning and the end of the study. Personal achievements were assessed by FINA rating points.

Results were taken from the official swimming statistics website www.Swimrankings.net.

Body Mass and Body Mass Components were determined by IOI 353 Portable Body Composition Analyser with segmental muscle and body fat analysis, measuring body resistivity with eight touchable electrodes (in feet and palms) and using three different measurement signal frequencies: 5, 50, and 250 kHz (Jawon Medical Co, South Korea). Body weight (kg), lean body weight (kg), muscle (kg) and fat (kg) mass, body fat percentage (%), and body mass index (BMI) were analysed.

Anthropometry. Anthropometric measurements were taken according to a standardized methodology (Eston & Reilly, 2009). Longitudinal body dimensions were measured using a metal Harpenden (Holtain Ltd., Crymych, Dyfed, Wales, UK) anthropometer (measuring accuracy ± 1 mm). The device measured the height of the anthropometric points from the ground – points on the top of the head, shoulder, radius, elbow, fingers, hip, upper tibia and lower tibia. Measuring the points we determined the length (height) of the body and calculated the length of the individual parts of the body (length of the arm, length of the hand, length of the leg, in centimetres). The length of the foot (in centimetres) was also measured.

Body breadth measurements were taken with breadth measurement calliper (accuracy ± 1 mm). The biepicondylar humerus (elbow) and biepicondylar femur (knee) breadths (in centimetres) were measured.

Arm girth measurements were taken with a flexible metal tape measure (accuracy ± 0.5 cm). Arm girth measurement was taken on the right side of the body. We measured arm relaxed girth and flexed girth. Arm relaxed girth measurement: the arm was relaxed hanging by the side, and the circumference was taken at the level of the mid-point between the acromion (bony point of shoulder) and the olecranon (bony point of elbow) processes. Arm flexed girth measurement: the arm was raised to a horizontal position in the sagittal (forward) plane, with the elbow at about 45 degrees. The subject maximally contracted the biceps muscle, and the largest circumference was measured.

The calliper (Beta Technology Inc. (USA) was used to measure the thickness of the **skin fat folds**. The following skin fat folds were measured (accuracy ± 0.5 mm): Triceps, Subscapular, Supraspinale, Calf (mm).

Somatotype determination. Somatotype was calculated using standard methodology according to the individual indicators of the subject – height, body weight, four skin fat folds (Triceps, Subscapular, Supraspinale, and Calf), the diameter of the distal end of the upper arm and femur, and the diameter of the upper arm and calf (Eston & Reilly, 2009). Endomorphism, mesomorphism, and ectomorphism were evaluated on a seven-point scale, and the somatotype was described as three values (e.g. END – MEZ – ECT, 2.39 – 3.00 – 4.25).

Handgrip dynamometry. Hand dynamometer (Jamar Hand Dynamometer-Hydraulic-200 lb Capacity 1 EA) was used to measure the right and left handgrip strength. The subject was allowed to decide independently on which hand the measurements should start. Three trials were performed and the best score (in kilograms) was recorded in the protocol.

During the study period, the swimmers participated in the competition at the beginning and end of the study, the same week when the measurements were made. Participants swam distances of 200 m at maximum speed, using the front-crawl style, in a heated (26 ± 1°C) indoor 25-m pool. Swimming results were evaluated in FINA Rating Points. Changes in results during the study period were analysed and correlation analysis of the anthropometric indicators and swimming results of study II was performed.

Statistical data analysis was performed using SPSS V.20 program. Descriptive statistics was applied for quantitative variables – means, standard deviation, and arithmetic mean error for different sex groups were calculated. The difference between the indicators in the sex groups was evaluated by the *Mann-Whitney U test*. The difference between the effects of training and the change in the indicators between studies I and II were determined using the *Wilcoxon test* for non-parametric parameters. The difference between the means was considered statistically significant at $p < .05$. The relationship between the indicators was assessed by calculating the Spearman's correlation coefficient (r).

RESULTS

Swimming results, assessed in FINA points, improved statistically significantly ($p < .05$) during the study period in both sex groups – for girls from 341.3 ± 60.8 to 392.3 ± 67.6, in the group of boys – from 259.2 ±. 48.7 to 334.9 ± 39.2.

During the study period, a statistically significant ($p < .05$) increase in all longitudinal and transverse anthropometric parameters was observed in the group of girls, but in the group of boys only the length of hands and feet and the width of shoulders and pelvis increased (Table 1). There were no statistically significant differences ($p > 0.05$) in the comparison parameters of girls and boys with the exception of foot length, which was higher for boys than girls ($p < .05$) (Table 2).

Analysing changes in body composition parameters (Table 3), it was found that the body weight, lean and muscular body mass ($p < .05$), and boys' body weight ($p < .05$) increased significantly during the study period. It was established that girls' fat mass (kg) and percentage fat (%) were higher than those of boys ($p < .05$). Analysis of somatotype parameters showed that endomorphism indicator

Table 1. **Longitudinal and transverse anthropometric parameters of young swimmers (mean ± *SD*)**

Parameters	Girls			Boys		
	Study I	Study II	*p**	Study I	Study II	*p**
Age (years)	11.4 ± 0.2	11.8 ± 0.4	< .05	12.0 ± 0.6	12.5 ± 0.6	< .05
Height (cm)	157.0 ± 6.4	160.0 ± 6.5	< .05	161.3 ± 10.2	165.2 ± 10.3	
Upper limb length (cm)	70.7 ± 3.6	72.0 ± 3.5	< .05	71.9 ± 5.2	73.1 ± 4.4	
Hand length (cm)	18.1 ± 1.2	18.7 ± 1.0	< .05	18.7 ± 0.9	19.7 ± 1.1	< .05
Lower limb length (cm)	84.8 ± 4.7	86.1 ± 4.9	< .05	85.3 ± 5.9	87.3 ± 5.9	< .05
Foot length (cm)	25.1 ± 0.9	25.5 ± 0.9	< .05	26.5 ± 1.9	26.7 ± 1.7	
Shoulder width (cm)	34.2 ± 3.6	35.4 ± 1.8	< .05	34.9 ± 1.0	36.6 ± 2.2	< .05
Hip width (cm)	24.9 ± 1.5	25.7 ± 1.2	< .05	24.6 ± 1.4	25.8 ± 1.4	< .05

Note. * – significant difference ($p < .05$) between studies I and II.

Table 2. **The difference between the longitudinal and transverse anthropometric parameters of young swimmers between the sex groups: girls-boys**

Study		Age (years)	Height (cm)	Upper limb length (cm)	Hand length (cm)	Lower limb length (cm)	Foot length (cm)	Shoulder width (cm)	Hip width (cm)
I	*Z*	2.46	0.54	0.27	1.39	0.00	2.17	1.35	0.42
	p *	< .05					< .05		
II	*Z*	2.47	1.00	0.54	2.01	0.15	1.94	1.24	0.12
	p *	< .05			< .05				

Note. * – significant difference ($p < .05$) between girls and boys.

Table 3. **Body composition, somatotype and handgrip force indicators for young swimmers (mean ± SD)**

Parameters	Girls			Boys		
	Study I	Study II	*p* *	Study I	Study II	*p* *
Body mass (kg)	46.1 ± 7.5	47.9 ± 8.3	< .05	46.2 ± 8.9	48.8 ± 8.6	< .05
BMI (kg/m^2)	18.5 ± 2.6	18.7 ± 2.6		17.6 ± 1.4	17.6 ± 1.4	
Lean body mass (kg)	37.3 ± 4.1	39.2 ± 4.6	< .05	42.8 ± 7.5	42.80 ± 7.5	
Soft lean mass (kg)	34.7 ± 3.7	36.4 ± 4.2	< .05	40.1 ± 7.0	40.1 ± 7.0	
Fat mass (kg)	8.3 ± 4.3	8.7 ± 4.3		3.4 ± 2.1	3.4 ± 2.1	
Body fat (%)	17.3 ± 6.5	17.5 ± 6.1		7.0 ± 3.4	7.0 ± 3.4	
Endomorphy	4.0 ± 1.2	4.5 ± 1.0	< .05	2.9 ± 1.0	3.1 ± 0.7	
Mesomorphy	4.7 ± 0.7	4.5 ± 0.9		5.0 ± 1.3	4.5 ± 1.0	
Ectomorphy	3.6 ± 1.3	3.9 ± 1.4		4.5 ± 0.8	4.6 ± 0.9	
RH strength (kg)	23.8 ± 3.9	24.6 ± 5.4		25.3 ± 4.2	28.5 ± 6.8	< .05
LH strength (kg)	23.2 ± 4.1	23.5 ± 5.4		26.1 ± 8.4	28.3 ± 7.4	

Notes: BMI = Body mass index, RH strength – right handgrip strength, LH strength – left handgrip strength. * – significant difference ($p < .05$) between studies I and II.

increased from 4.0 to 4.5 ($p < .05$) in the group of girls when comparing data of study I and II; there were no significant changes in somatotype in the group of boys. However, significant differences were observed between sex groups ($p < .05$) in endomorphism indicators: in boys they were lower than in girls (Table 4). During the research period, the boys' handgrip strength increased in the right handgrip from 25.3 to 28.5 kg ($p < .05$); in the left handgrip from 26.1 to 28.3 kg ($p > .05$).

Table 5 shows the correlation between swimming results and researched parameters in boys and girls in study II. Correlation analysis shows a strong and significant relationship between the score expressed in FINA rating points and height, foot length, body weight, lean body mass, and right handgrip strength. There was no statistically significant relationship between the indicators in the girls' group.

The data of descriptive statistics (mean ± *SD*) of the anthropometric profile indicators (height, body weight, fat mass percentage and lean body mass) of the swimmers that we investigated were close to those of other authors who studied swimmers of similar age (Table 6).

Table 4. **Difference between body composition, somatotype and handgrip strength in sex groups: girls–boys**

Study		Body mass (kg)	BMI (kg/m²)	Lean body mass (kg)	Soft lean mass (kg)	Fat mass (kg)	Body fat (%)	Endomorphy	Mesomorphy	Ectomorphy	RH strength (kg)	LH strength (kg)
I	*Z*	0.23	0.93	2.08	2.08	2.86	3.16	2.24	1.00	1.62	0.81	0.89
	*p**			< .05	< .05	< .05	< .05	< .05				
II	*Z*	0.23	0.73	0.85	1.16	3.09	3.09	2.82	0.31	1.69	1.28	1.62
	*p**					< .05	< .05	< .05				

Notes: BMI= Body mass index, RH strength – right handgrip strength, LH strength – left handgrip strength. * – significant difference ($p < .05$) between girls and boys.

Table 5. **Correlation between swimming results and anthropometric parameters, body composition and handgrip strength indicators in the groups of girls (*n* = 14) and boys (*n* = 10)**

Parameters	Result, FINA points	
	Boys	Girls
Height (cm)	.857**	.343
Upper limb length (cm)	.690	.287
Hand length (cm)	.695	.259
Lower limb length (cm)	.690	.249
Foot length (cm)	.805*	.305
Shoulder width (cm)	.359	–.063
Hip width (cm)	.595	–.361
Body mass (kg)	.857**	–.154
BMI (kg/m²)	.331	–.294
Lean body mass (kg)	.929**	–.056
Soft lean mass (kg)	.929**	–.021
Fat mass (kg)	.381	–.406
Body fat (%)	–.024	–.380
Endomorphy	–.048	–.378
Mesomorphy	.452	–.259
Ectomorphy	.333	.329
RH strength (kg)	.786*	–.032
LH strength (kg)	.683	.106

Notes: BMI = Body mass index, RH strength – right handgrip strength, LH strength – left handgrip strength. Level of statistical significance of correlation: *– .05; ** – .01.

Table 6. **Descriptive characteristics and body composition of selected samples of girl and boy swimmers (mean ± *SD*) in this and other authors' studies**

Source and sample size (n)	Age (years)	Height (cm)	Body weight (kg)	Percent body fat (%)	Fat-free weight (kg)
Girls swimmers					
Present study, *n* = 14	11.8 ± 0.4	160.0 ± 6.5	47.9 ± 8.3	17.5 ± 6.1	39.2 ± 4.6
Sammoud et al. (2018), *n* = 20	12.0 ± 1.0	155.9 ± 8.0	46.0 ± 8.6	19.0 ± 4.3	37.1 ± 6.4
Akşıt et al. (2017), *n* = 25	12.0 ± 0.9	152.2 ± 8.3	42.1 ± 7.8	13.5 ± 3.2	–
Zuniga et al. (2011), *n* = 31	10.5 ± 2.3	146.5 ± 13.9	31.2 ± 13.8	12.7 ± 6.3	35.3 ± 10.0
Geladas et al. (2005), *n* = 85	12.7 ± 0.1	161.2 ± 0,6	48.3 ± 0.6	20.8 ± 0.5	38.3 *
Boys swimmers					
Present study, *n* = 10	12.5 ± 0.6	165.2 ± 10.3	48.8 ± 8.6	7.0 ± 3.4	42.8 ± 7.5
Sammoud et al. (2018), *n* = 39	11.5 ± 1.3	149.9 ± 10.4	41.5 ± 9.5	16.8 ± 5.5	34.3 ± 6.8
Akşıt et al. (2017), *n* = 25	12.4 ± 1.2	154.7 ± 11.3	49.1 ± 12.0	9.0 ± 3.9	–
Cochrane et al. (2015), *n* = 30	12.4 ± 2.7	152. ± 16.4	44.3 ± 13.8	9.5 ± 3.4	40.0 ± 12.5
Mezzaroba&Machado (2014), *n* = 11	13.0 ± 0.5	163.3 ± 13.8	53.6 ± 12.7	12.9 ± 5.9	–
Zuniga et al. (2011), *n* = 38	11.0 ± 2.3	146.6 ± 14.4	38.6 ± 11.6	9.4 ± 5.4	34.8 ± 9.8
Geladas et al. (2005), *n* = 178	12.8 ± 0.1	165.5 ± 0.7	54.1 ± 0.7	16.5 ± 0.3	45.2 *

Notes. * – Fat-free weight was estimated using the mean percent body fat values from the reported values. First, fat weight was estimated (fat weight = body weight [percent body fat /100]) and consequently, the fat weight was subtracted from the body weight (fat-free weight = body weight – fat weight).

DISCUSSION

The benefits of physical activity and sports for the physical and mental health of children and adolescents have been confirmed by many studies (Barnett, van Beurden, Morgan, Brooks, & Beard, 2009; Opstoel et al., 2015). Physical exercise has a positive effect on normal body weight, body composition, and physical fitness (Fisher et al., 2005; Okely, Booth, & Patterson, 2001). Athletes start to participate in swimming competitions at a young age and this is typical of both sexes – boys and girls. Many children and adolescents who start participating in swimming competitions continue training swimming or swim for leisure when they are adults (Cochrane et al., 2015). The data found in the scientific literature show that elite swimmers have typical characteristics of physical development and functional fitness characteristic of the sport, and their early identification provides preconditions for coaches to notice gifted athletes and to anticipate their specialization at a young age (Richardson et al., 2000; Zuniga et al., 2011). Geladas, Nassis, and Pavlicevic (2005) found that the performance of young swimmers at sprint distances had significant links with indicators of swimmers' height, body weight, and upper limb length. Children in swimming are taller than non-athletes, gymnasts, and tennis or football players of the same age (Baxter-Jones, Helms, Maffulli, Baines-Preece, & Preece, 1995; Brauer Jr et al., 2007).

The data in our study showed that the five-month training period led to a statistically significant growth of young swimmers (girls' height increased by 3.0 cm, body weight by 1.8 kg, and in boys – 3.8

cm and 2.7 kg, respectively). Swimmers' height and body weight indicators in study II were close to the 50th percentile of the representative sample of 12-year-old Lithuanian children (Gruodytė-Račienė, Rutkauskaitė, & Mieželienė, 2017). The girls swimmers were a little higher (2.96 cm) and heavier (1.39 kg) than the average girls of the same age in the country. The mean height of the boys was bigger by 10.2 cm, and the average body weight was 2.2 kg higher than the national averages of those indicators at this age. During the five-month training period, other longitudinal and transverse dimensions studied also increased. Significant changes in the group of girls were observed by measuring the length of the arm, hand, leg and foot, and the width of the shoulders and pelvis. The boys' group, there was a significant increase in the length of hands and legs and the width of shoulders and pelvis. Interestingly, at the age of 11–12 years, the anthropometric indicators of girls and boys in study I and II did not differ significantly, except for the length of the foot ($p < .05$). However, the analysis of body weight components showed that girls had a higher body fat mass and a percentage of fat than boys ($p < .05$). The differences between these indicators among the sex groups have been observed by other researchers as well (Zuniga et al., 2011).

At any rate, longitudinal body dimensions are more genetically determined and more dependent on natural growth and maturation patterns, but the characteristics of body composition are more influenced by environmental factors – nutrition and physical activity. It is claimed that heredity determines the body length (height, limb and foot length) by as much as 70 percent, while fat and muscle mass – by 20–40 percent (Bouchard, Malina, & Perusse, 1997; Issurin, 2017). Earlier studies have shown that longitudinal anthropometric dimensions are important for predicting swimmers' athletic performance and can be considered as selection criteria at a young age (Issurin, 2017; Kjendlie & Stallman, 2011; Morais at al., 2013; Sammoud et al., 2018).

Comparing the body composition indicators, we found that lean body mass and muscle mass ($p < .05$) increased during the five month training period, but the fat body mass (kg) and percentage fat (%) did not change ($p > .05$). It was also found that girls' fat body mass (kg) and percentage fat (%) were higher than those of male swimmers. This conforms the data of other authors (Geladas et al., 2005; Richardson, Beerman, Heiss, & Shultz, 2000; Zuniga et al., 2011). Zuniga and co-authors (2011) suggest that girls' swimming performance can be improved by modelling exercise programs to reduce body fat. Correlation analysis of swimming results in the selected event and anthropometric indicators, body composition and handgrip strength indicators showed that at a young age the results of the swimmers boys' group (age 12.5 ± 0.6) had statistically significant correlations with height (r = .857), foot length (r = .805), body mass (r = .857), lean body mass and muscle mass (r = .927), and right handgrip strength (.786). In the group of girls, the links between the competition result in the selected event and the examined indicators were weaker or reverse (Table 5). Interestingly, no statistically significant correlation was found between the investigated parameters.

Thus, our research partly confirmed the opinion of other authors that we can consider anthropometric indicators as prognostic indicators in young age to assess their viability. On the other hand, we can assume that predicting boys' achievements according to anthropometric indicators is easier than those of girls. Perhaps the sport-swimming – selected by the girls did not match their anthropometric profile characteristic of this sport (Opstoel et al., 2015). On the other hand, according to Issurin's (2017) insights in predicting talent identification in sport, the factors that are determined by heredity are not the only ones and essential in sport. Not only the characteristics of the anthropometric profile, but also the characteristics of the personality are the determinants of future sports performance and have a great influence on the success of the young athletes in the chosen sport – i.e. their high internal motivation, determination, dedication, perseverance and creativity.

CONCLUSIONS

1. At the age of 11–12 years, the anthropometric and body composition characteristics of boys and girls did not differ significantly, except for the less foot length and higher fat body mass and the percentage of fat in the group of girls ($p < .05$).
2. During the five-month training period, an increase in longitudinal and transverse anthropometric parameters and body composition indicators was observed in the group of young swimmers, but this was probably due to their natural growth rather than training.
3. Characteristics of the anthropometric profile as a prognostic indicator for the viability of the chosen sport for boys were more significant than for girls.

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