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Motor and swim skills of canditates for sport-focused class
Sprawność motoryczna i pływacka kandydatów do klasy sportowej

Summary
The selection is one the major elements in high-performance sport. On the basis of this issue the research has been conducted: the evaluation of motor and somatic levels of the candidates joining swimming profile classes. There were 197 children that participated in the research (101 girls, 96 boys), at the age of 10, from primary schools in Zabrze and Ruda Śląska. The evaluation concerned the motor and of swimming efficiency as well as the somatic features of the candidates for sport class. The analysis of the results was made using U Mann- Witney test, the analysis ANOVA of Kruskal-Wallis ranks, the test of the median and the Spearman's rank correlation. The analysis of the results showed that the boys achieved higher level of motor efficiency whereas the girls were more efficient in swimming. The sex of the subjects differentiated their motor efficiency profiles. The somatic features and the motor efficiency did not determine the level of the subjects' swimming abilities. The motor efficiency was conditioned by the weight of body. The work presented is an attempt of finding the ways of optimization of the usage of selective tests for children who want to do swimming sport.

Key words: selection, motor abilities, somatic features, swimming

Streszczenie
Jednym z czynników w wysokokwalifikowanym sporcie jest selekcja, która jest przedmiotem tego artykułu. Celem badań była ocena somatycznych i motorycznych zdolności kandydatów do klas sportowych o profilu pływackim. W badaniach uczestniczyło 197 uczniów (101 dziewcząt, 96 chłopców) w wieku 10 lat z szkół podstawowych z Zabrza i Rudy Śląskiej. Ocena dotyczyła sprawności pływackiej jak również cech somatycznych kandydatów do klasy sportowej. Analiza wyników była wykona z zastosowaniem testu U Manna-Witneya, analizy ANOVA rang Kruskala-Wallisa i testu mediany, korelacji rang Spearmana. Analiza wyników wykazała, że chłopcy osiągnęli wyższy poziom sprawności motorycznej, zaś dziewczęta były efektywniejsze w pływaniu. Płeć istotnie różnicowała profile sprawności motorycznej. Cechy somatyczne oraz sprawność motoryczna nie determinowały poziomu sprawności pływackiej badanej grupy., natomiast sprawność motoryczna kandydatów do klas sportowych była uwarunkowana masą ciała. Zaprezentowana praca jest próbą szukania dróg optymalizacji stosowania testów selekcyjnych dla dzieci chcących uprawiać sport pływacki.

Słowa kluczowe: selekcja, zdolności motoryczne, cechy somatyczne, pływanie

Modern professional sport is a complex phenomenon with systematically increasing degree of difficulty. Competitors are faced with higher and higher requirements in consequence of which the level of results and records increases as well as simultaneously difficulty and complexity of sport competition grows. Effective participation in a sport competition requires proper preparation. A training process aimed at that purpose takes many years and is complex, multifactorial and multidimensional. It starts from the selection of young gifted candidates who during many years of training should obtain specialist qualifications enabling to achieve record results. Sport mastery requires a wide range of perfection within: somatic structure, energy and regulation functions of the system, psyche qualities, profile and level of motor skill, technical and tactical skill as well as theoretical knowledge (Sozański, 2005; Płatonow, 2000, 2004; Sachnowski et al. 2005).

The selection and orientation of competitors for a particular sport discipline should be performed within the framework of a systematic and multi-stage process of long-term training due to the low level of reliability of young age-related resultant forecasts. A complex approach while evaluating potential abilities of candidates for competitors is one of more important principles at qualifications (Płatonow, 2004; Sachnowski et al. 2005). During the initial selection for the disciple of swimming the following factors are of significance: evaluation of health condition, calendar and biological age, respiratory system, motor potential preferred in swimming. The following factors are of equal importance: proper evaluation of personality-psychic features of candidates, family traditions in sports, somatic features as well as specific predispositions for swimming related to "feeling for water".

As far as swimming is concerned the following fitness abilities are of basic relevance: stamina, strength and speed. Training practice proves also the importance of flexibility. A high level of fitness abilities and flexibility enables more effective learning and mastering of sport motor activities, ability to overcome water resistance in a longer period of time as well as the ability to use propulsion in the shortest possible time and in the most efficient manner.

In swimming, just like in most sport disciplines, coordinative abilities are of huge significance. They are of particular importance at first phases of sport development of a competitor as they contribute to faster and better mastering of sports skills and are conducive to effectiveness of the technical preparation process (Czabański, 2000; Płatonow, 2000, 2004; Raczek et al. 2003; Sachnowski et al. 2005; Frank, 2005).

The effectiveness of propulsive motions of a swimmer consists in correct representation of the technique and its continuous improvement till an individual "master technique" is achieved. It is worth emphasizing that fitness abilities constitute a specific motor potential, whereas coordinative abilities enable these potentials to be revealed in a particular sport activity (Czabański, 2000). Also the evaluation of somatic features plays an important role in qualifying for professional swimming. The qualification should take one's body type into consideration, i.e. slenderness or stoutness as the training practice shows the meaning of body type and its proportions that increases during consecutive phases of sports training.

Summing up individuals with suitable somatic body structure and optimum level of motor skills as well as swimming ability should be selected for sport swimming. Therefore, taking actions aimed at researching what candidates declare willingness to go in for swimming seems to be justified and interesting.

The objective of the paper was an attempt to evaluate motor and somatic level of candidates for sport-focused classes with extended curriculum in swimming.
The following research questions were asked:

1. What is the level of motor, swimming and somatic skills of candidates for the class with extended curriculum in swimming like?
2. Are there any differences in somatic-motor profiles depending on sex?
3. Are there any diversified relations between motor skill and somatic development of future swimmers ?
4. Does the motor skill collate with the level of their swimming skill?

Material and methods

One hundred ninety seven 10-year-old children (101 girls, 96 boys) being pupils of primary schools in Zabrze and Ruda Śląska took part in the research. Their level of motor skill was assessed by means of fitness tests evaluating: arm strength – a medicine ball throw (2kg), strength of legs – standing long jump, stamina – 600 meters, speed – 60 meters, suppleness – bend forward and agility – slalom run, static balance – two-leg-standing on the balance beam, dynamic balance – bench pivots, reaction rate – 3 meters run after a bend forward, motion frequency – two-legged jumps over the bench, kinaesthetic diversification of motions – catching a ball in a cup.

The level of swim skills of candidates was determined by means of a test prepared on the basis of swim skills by Dybińska (2002, 2004), whereas swimming technique was assessed by means of the point system. At evaluating basic swim activities and water jumps (depending on the level of performance) the subject could achieve from 0 – 3 points; at evaluating limb motions at a distance the subject achieved from 0 – 5 points (2 extra points could be given for swimming the distance of 15 meters). The highest number of points (maximum 10 points) was given for swimming the distance of 25 meters in correct technique of front and back crawl. The following elements were judged: body position in water, alternating limb work, bending legs in knee joints, feet position, moving arms over water, palm downsweep and upsweep as well as breathing and coordination of movement. The subject could achieve for each correctly performed technical element 1 points, whereas 2 extra points for swimming the distance of 25 meters.

Summing up the results of particular tests allowed to determine the level of swimming ability and to create fitness groups of pupils according to the following criteria:

0 – 10 points – poor level, fitness group – “1”,
11 – 20 points – medium level, fitness group – “2”,
21 – 30 points – good level, fitness group – “3”,
31 – 39 points – very good, fitness group – “4”.

For the purpose of fuller evaluation of subjects also measurements of basic somatic features were carried out, namely of body mass and height.

On the grounds of data received the body slenderness index (BSI) was calculated according to the following formula:

$$BSI = \frac{\text{height [cm]}}{\sqrt[3]{body\ \ mass\ [kg]}}$$

as well as the body mass index (BMI) according to the following formula:

$$BMI = \frac{\text{body mass [kg]}}{height^2[m]}$$

Measurement data gathered in the computer database were subjected to adequate statistic procedures. The statistic analysis included: the descriptive analysis, Mann-Whitney U test, ANOVA analysis, Kruskal-Wallis analysis of variance by rank and median test, Spearman rank correlation. The set of values of standardized parameters defining motor skill was assumed as the profile of motor skill. The standardization conducted was related to average values and standard deviations organized according to sex. Signs of standardized variables, namely 6o and 600 meter – run and slalom run were reversed.

Research results

The level of swimming skills of candidates for sports-focused class with extended curriculum extended is presented in figure 1. Results obtained (tab. 1) show that the level of swimming ability among the subjects varied. Among girls the highest level of very good – “4” was represented by 52.8% of the subjects, the swimming ability on the level of good (“3”) – 31.5%; whereas 12.5% obtained results on the medium level (“2”). In the group of female candidates there were also girls with the swimming skill on the level of “1” – 3.4%. the level of swim skills of boys was similar to that of their female peers. The highest level of swim skills (“4”) was achieved by 45.2% of the subjects, the level of good (“3”) – 31.5%; whereas 16.4% obtained results on the medium level (“2”); 6.9% of pays swam poorly (level “1”). Thus, it may be concluded that most candidates (girls and boys) had swim skills on the level of very good (49.4%) and good (31.5). The direction of results obtained shows that girls with slightly higher level of swim skills than boys participated in the recruitment to a sport-focused class.

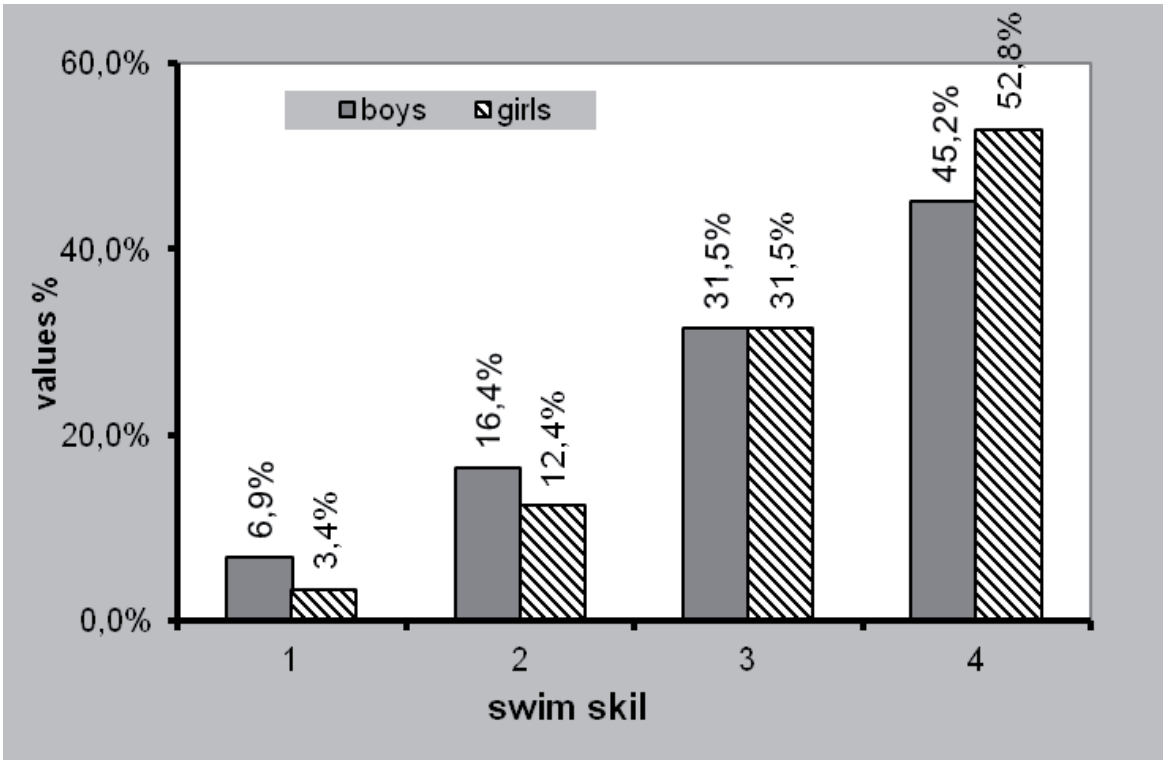


Fig. 1. Level of swimming skills

Swim skills did not diversified the subjects in terms of sex, neither were statistically significant differences among particular fitness groups reported in the group of girls and of boys.

The correlation analysis (Spearman's rank correlation) of swim skills with somatic features did not show any statistically significant difference in the group of girls and of boys. The results of the correlation of swim skills and motor skills show a small relation of these two variables. Significant relations cab be seen in the group of girls as regards the kinaesthetic diversification of motions and stamina, whereas in case of boys only when compared to arm strength.

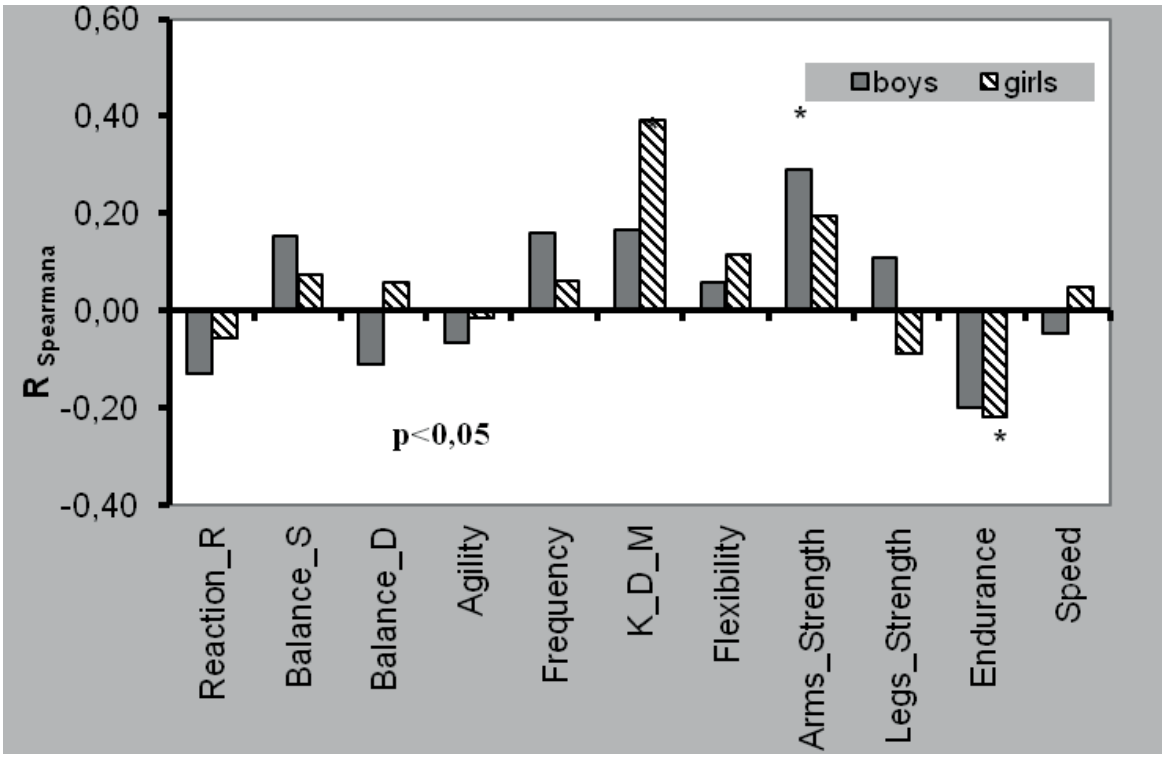


Fig. 2. Correlations between swim skills and motor skills

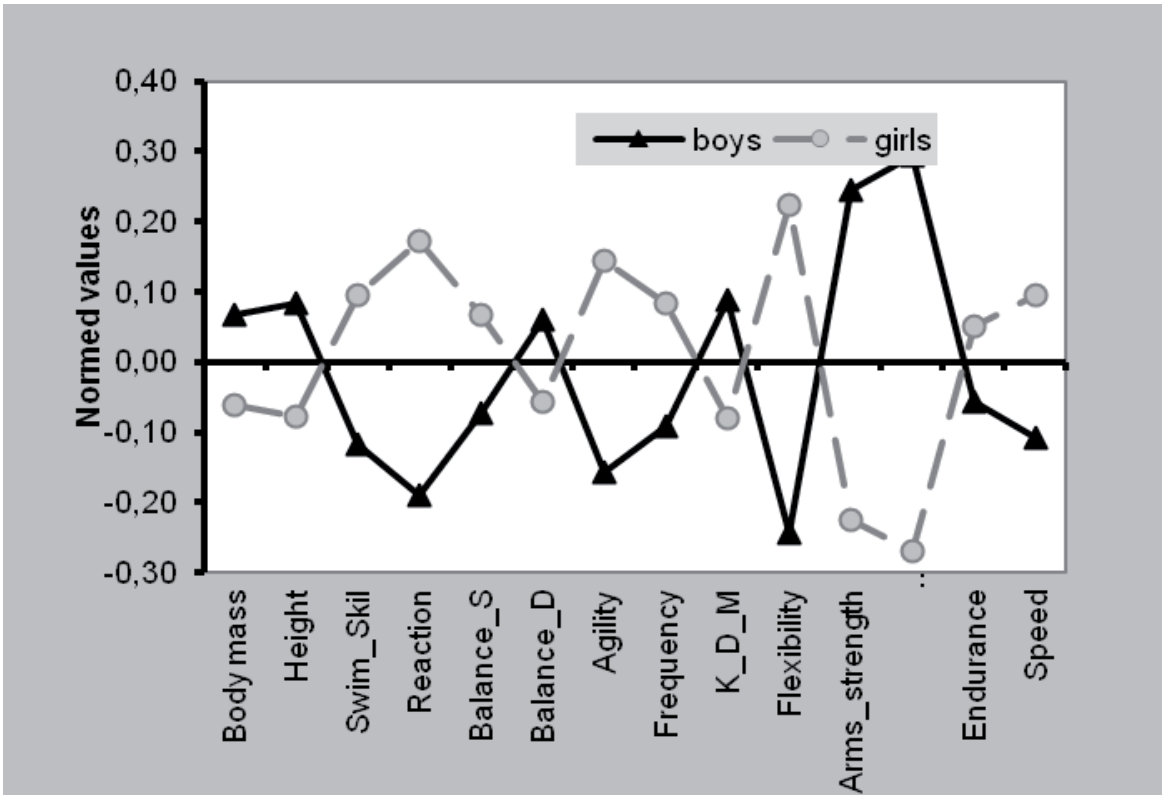


Fig. 3. Somatic and motor profiles of candidates for sport-focused class with extended curriculum in swimming

The results of the comparative analysis of motor and swim skills as well as somatic features (somatic-motor profiles, Fig. 2) show that boys dominated in terms of somatic features, arm and leg strength, dynamic balance and the kinaesthetic diversification of motions.

Whereas the analysis based on Mann-Whitney U Test (tab. 1) showed that sex diversified the subjects significantly within the scope of: reaction rate, static balance, agility, arm and leg strength as well as flexibility. No statistically significant difference in somatic features compared was reported among the subjects.

Tab. 1. Values of Mann-Whitney U Test

Variable	Sum.rang	Sum.rang	U	Z	Level p	Z	Level p
	m	f				correction	
SPR_PŁ Swim skill	5616	7587.00	2915.00	-1.12	0.26	-1.22	0.22
S_R Reaction rate	9323	12205.00	4373.00	-2.26	0.02*	-2.26	0.02*
RÓW_ST Static balance	9435	12093.50	4484.50	-2.00	0.05*	-2.00	0.05*
RÓW_DYN Dynamic balance	10562	10966.00	5080.00	0.62	0.54	0.63	0.53
Agility	9308	12220.50	4357.50	-2.30	0.02*	-2.30	0.02*
Frequency	9732	11796.50	4781.50	-1.31	0.19	-1.31	0.19
Kinaesthetic diversification of motions	10797	10731.50	4845.50	1.16	0.25	1.17	0.24
Body Mass	10820	10708.00	4822.00	1.22	0.22	1.22	0.22
Height	10834	10694.50	4808.50	1.25	0.21	1.25	0.21
Flexibility	8821	12707	3871	-3.42511	0.00**	-3.48	0.00**
Arms strength	11593	9935	4049	3.01163	0.00**	3.01	0.00**
Legs strength	12164	9364	3478	4.33801	0.00**	4.34	0.00**
Endurance	9558	11970	4608	-1.71313	0.09	-1.71	0.09
Speed	8468	10447	4190	-1.28425	0.20	-1.28	0.20
*p<0,05							
**p<0,005							

The analysis of body proportions shows that 60% of the subjects represented medium built, whereas only 15-18% (boys, girls) – wide built. The average of slenderness index for boys amounted to 42.94; for girls – 43.06. Whereas, BMI for girls was 17.9, for boys – 18.1 .

The paper was also an attempt to find out whether the level of motor skill depended on somatic features. Correlations of somatic features with motor skill showed stronger relation with body mass. The results obtained in the course of the analysis inform that body height determined motor skill of boys to a smaller extend than of girls. In the group of boys significant correlations were only reported in respect of dynamic balance, whereas in case of their female peers – in respect of reaction rate, static balance, agility and arm strength. Body mass proved to be significantly correlated with motor skill (Fig. 4) – it refers to most motor skills evaluated. These correlations in case of girls were related to reaction rate, static and dynamic balance, agility, frequency of motions, arm and leg strength as well as speed. The strongest correlations were reported in respect of static balance, agility and speed. In the group of boys there were the strongest correlations between body mass and reaction rate, static and dynamic balance, agility, leg strength, stamina and speed.

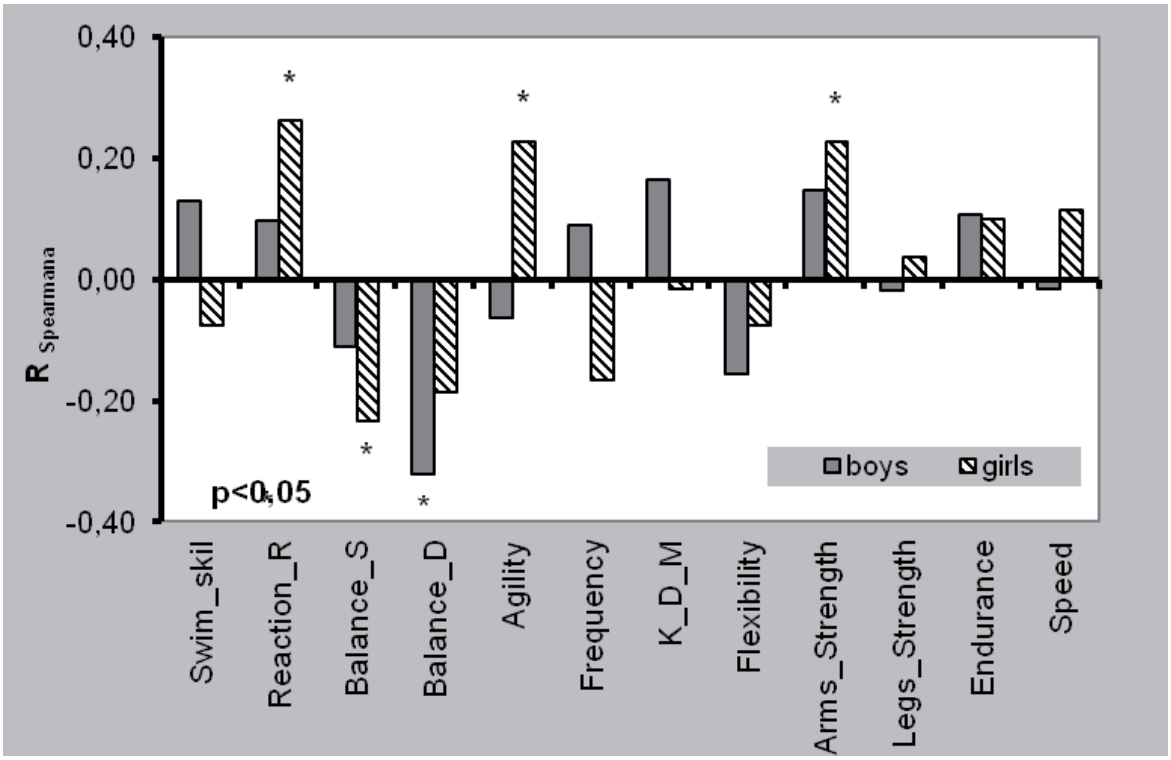


Fig. 4. Correlations between body height and motor skills

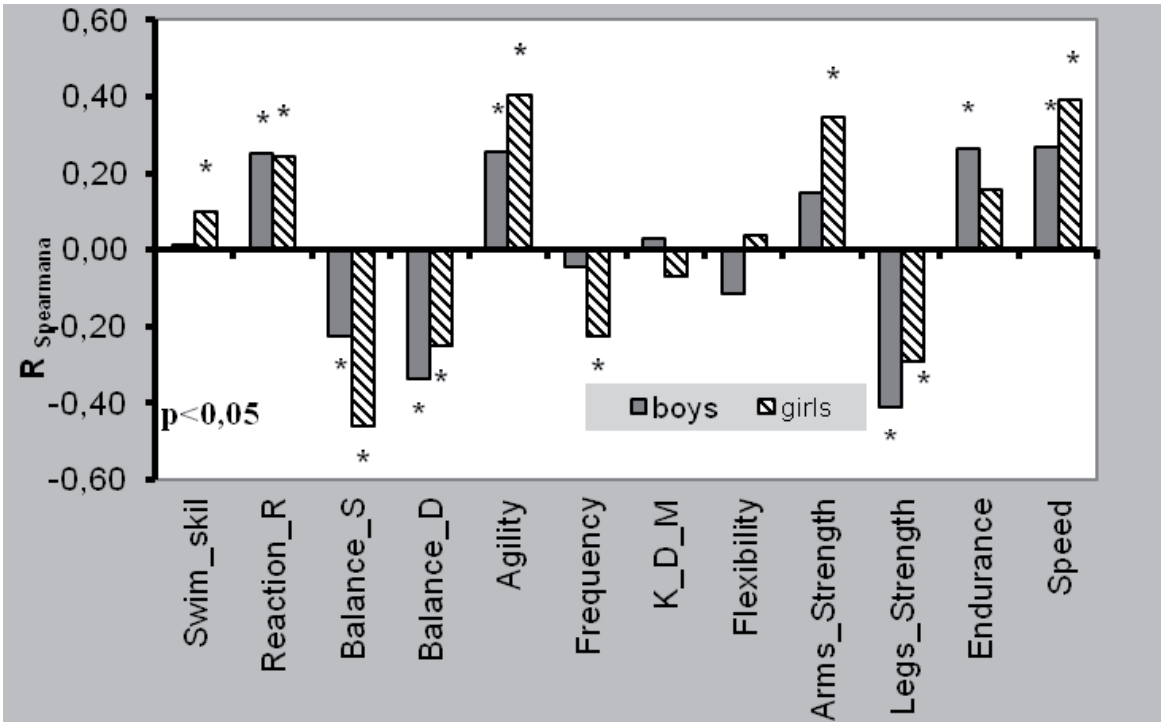


Fig. 5. Correlations between body mass and motor skills

Tab. 2. Descriptive statistics for boys

Variable	Average	Median	Min.	Max	Stand. deviation	Coefficient of variation	Skewness
SPR_PŁ Swim skill	3.15	3	1	4	0.94	29.77	-0.83
S_R Reaction rate	1.75	1.76	1.29	2.24	0.20	11.26	0.12
RÓW_ST Static balance	5.99	3.78	1.00	30	6.15	102.68	2.42
RÓW_DYN Dynamic balance	4.11	4	1	8	1.52	36.92	0.20
ZWINNOŚĆ Agility	9.01	8.92	7.30	11.92	0.87	9.65	0.39
CZĘSTOT Frequency	33.62	34	14	49	7.43	22.10	-0.25
K_R_R Kinaesthetic diversification of motions	3.95	4	0	13	2.93	74.16	0.78

MASA Mass	36.46	36	22.9	64.5	7.66	21.01	0.74
WYSOKOŚĆ Height	141.41	141	125.5	160	7.02	4.96	0.18
GIBKOŚĆ Flexibility	2.31	2	0	6	1.66	71.66	0.40
SIŁA_RR Arm strength	3.93	3,8	1.5	7.2	1.19	30.19	0.45
SIŁA_NN Leg strength	1.37	1.38	0.5	1.95	0.26	19.07	-0.39
WYTRZYM Stamina	180.12	192.2	0	302.31	68.84	38.22	-1.58
SZYBKOŚĆ Speed	11.92	11.8	9.66	15.8	1.14	9.55	0.86

Tab. 3. Descriptive statistics for girls

Variable	Average	Median	Min.	Max	Stand. deviation	Coefficient of variation	Skewness
Swim skill	3.34	4	1	4	0.82	24.72	-1.08
Reaction rate	1.83	1.805	1.4	2.78	0.22	12.24	0.94
Static balance	6.81	4.96	0.93	30	5.74	84.22	1.89
Dynamic balance	3.95	4	1	7	1,19	30.22	0.16
Agility	9.28	9.245	5.98	11.83	0.90	9.66	-0.15
Frequency	34.86	36	16	50	6.88	19.72	-0.49
Kinaesthetic diversification of motions	3.47	3	0	11	2.78	80.16	0.61
Mass	35.44	34	22.6	63.4	7.97	22.48	1.00
Height	140.30	140	126	160	6.69	4.77	0.44
Flexibility	3.08	3	0	6	1.55	50.39	-0.20
Arm strength	3.43	3.4	1.5	5.8	0.85	24.78	0.12
Leg strength	1.23	1.225	0.5	2.05	0.22	17.46	0.24
Stamina	187.62	199.225	0	265.31	69.39	36.98	-1.90
Speed	12.17	11.93	10.16	16.97	1.24	10.15	1.11

Conclusions

The analysis of the material gathered in the course of research allows to conclude that:

1. Boys showed a higher level of motor skill, whereas girls a higher level of swim skill.
2. Sex of the subjects diversified their profiles of motor skill. Statistically significant differences were reported in respect of reaction rate, static balance, agility, flexibility, arm and leg strength.
3. Somatic features and motor skill did not determine the level of swim skill of the sample group.
4. Motor skill was conditioned by body mass.

Discussion

The recruitment of children and youth to swimming should be based not only on an initial selection, but most of all it should be a long-term and multi-phase process incorporated into the entire system of swimming education (Wieczorek, 2001; Sachnowski et al. 2005; Płatonow, 2000, 2004). As the training practice shows selecting a future champion already at a younger age is not easy. Many issues need to be dealt with, numerous questions need to be answered, doubts concerning a proper selection procedure of individuals for swimming should be resolved and simultaneously these actions require caution and consideration.

Many authors emphasize that both fitness and coordinative abilities as well as somatic features play a significant role in swimming (Kunicki, 2004; Raczek, 2003; Sachnowski et al. 2005; Dybińska, 2004; Wieczorek, 2001). The presented research does not show any relation between motor skill and swim skills. However, it is supposed that the reason of this lack of relation is the swim skills of the subjects as persons with various levels of swimming ability took part in the recruitment.

Obviously, age at which children commence their swimming training is a significant factor in swimming qualification. It is assumed that the recruitment for sport-focused class with extended curriculum in swimming should take place when children are 8-9 years old. The sample group of children was 10 years old, the delay in the recruitment to a sport-focused class resulted from assumptions and the organizational plan of the self-government body as well as the access to the sport-recreational centre. The aforementioned situation does not allow to refer fully all results obtained to the results of other authors dealing with similar issues.

The conducted research showed that somatic features significantly determined the level of motor skill of candidates for swimmers. It is worth noticing that somatic features are conditioned to a larger extend genetically and are least susceptible to effects of swimming training. The genetic conditioning of this diversification is also accompanied by impacts of social and economic factors. One of these factors is the place of residence, i.e. the so-called urbanization factor which is the resultant of social and economic modificators. Thus the results obtained were also evaluated against research data of children coming from various regions of the world. The comparisons show that the sample group of candidates for the class with extended curriculum in swimming was

characterized with the level of somatic development similar to the level of groups from different regions of Poland (Wieczorek, 2001; Dutkiewicz et al. 2004; Umiastowska, 2001; Saczuk, 2005; Chrzanowska, Gołąb, 2003; Gołąb, Chrzanowska, 2002; Stachura, 2004).

The research results were also referred to the population of children from Upper Silesia as they were evaluated by means of similar sets of tests. The comparisons showed that candidates for sport-focused class with extended curriculum in swimming looked better. Both somatic features and motor skill of children applying for classes with extended curriculum in swimming were on higher level than in the comparative group (Stachura, 2004; Szepelawy, 2000, 2002).

As the training practice in swimming shows early identification of a "talent" is not a guarantee of a sport success in childhood, not to mention adolescence or adulthood. Many variables determine a success, they are related to normal growth, maturing and development as well as sport education system. In swimming sector it is a frequent phenomenon that children who initially are very successful in their age group and after going to the next one fall down to the end of classification lists.

A proper selection for the discipline of swimming is a "starting point" to the further effective development of a swimmer and talent identification. Thus, in the situation when motor potential and skills of children are on a similar level it is worth seeking attributes that may increase their advantage over their rivals, namely relative body length and length of body parts (feet, palms, arms). They give a swimmer a "natural" advantage over other rivals providing such person with mechanical advantage in the development of propulsive power (Carter, Auckland, 1994).

The recruitment and selection of children for professional sports require a complex approach that needs to be remembered about. Tests and examinations should be selected in such a way so as to evaluate the level of motor skill globally and give a correct picture of abilities of each candidate. They should be helpful to determine to what extent a given candidate meets expectations and on what level the abilities of significance for a given discipline are. However, the specialization should not be the only decisive factor when evaluating suitableness of candidates in respect of selected motor skills – desirable in a given sport dissilience. Motor aptitudes are equally important and so is the willingness of children to do sports. Only afterwards the selection of candidates should be based on the narrow approach to the issue. This way it is possible to avoid omitting potentially talented competitors and discoursing them from doing sports (Czabański, 2000; Płatonow, 2000, 2004; Sachnowski et al. 2005; Raczek et al. 2003).

Tab. 4. Specification of results of selected indexes and body mass and height

Populations of children	Mass	Height	SI	BMI	Mass	Height	WS	BMI
	girls				boys			
children from Szczecin voivodeship (Umiastowska 2001)	34.6	142.5			38.6	145		
children from Kielce voivodeship (Dutkiewicz 2004)	33.13	140.03			33.7	1.39		
children from Krakow voivodeship (Chrzanowska 2003)	34.5	139.9	43.3	16.5	35.4	140.9	43.3	17.7
children from Łódź voivodeship (Wieczorek 2001)	34.59	141.35	43.54		34.56	141.18	42.51	
children from Lublin voivodeship (Saczuk 2005)	34.63	143.44	44.26	16.68	34.55	142.54	43.55	16.89
children from Silesia voivodeship (Stachura 2004)	33.03	137.77			32.5	139.09		
Own research	35.44	140.30	43.13	17.89	36.46	141.41	42.72	18.13

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