RESEARCH ANALYSIS OF SELECTION CRITERIA AT THE INITIAL STAGE OF SWIMMING TRAINING OF PRIMARY SCHOOL JUNIOR STUDENTS

Paweł Eider

Faculty of Physical Culture and Health Promotion, University of Szczecin, Szczecin, Poland

Address for correspondence:
Paweł Eider
Faculty of Physical Culture and Health Promotion, University of Szczecin
Al. Piastów 40b, building 6,71-065 Szczecin, Poland
E-mail: pawel.eider@univ.szczecin.pl

Abstract. This article serves as a review of literature dedicated to the issue of selection criteria at the initial stage of swimming training of children in junior grades of primary school. Research methods used by the reviewed authors were varied. Only in some cases the overall anthropometric examination was used. This paper presents research results of multiple authors concerned with the swimming initiation age, basic somatic features (height and body mass), physical (motor) fitness, and physical function as major criteria for selection. The literature presented in this article lacks, however, information about potential correlations between the sports skills and measurements of motor skills and somatic features of children who are at an initial stage of competitive swimming. Therefore, this issue has not been discussed in the article.

Key words: selection in competitive swimming, junior primary school

Review of literature

Every sportsperson strives to reach a champion's level in their respective discipline. For most, it is a guarantee of participation in the greatest sports competition, namely in the Olympic Games. Only the very best can accomplish their sports goals for which they prepared for many years (Eider and Eider 2012).

Knowledge of particular features (such as age, body mass, age at which trainings commenced, years of experience etc.) of medalists and other Olympic finalists in respective disciplines, is extremely valuable to coaches. It is them who should be on the lookout for future sports champions with these specific, promising features, or 'champion models'. Therefore the general effectiveness of the whole sports training process depends greatly on: correct selection of children and adolescents for particular disciplines (Łaski 2006; Siewierski 2006; Haleczko et al. 2010a; 2010b; Rakowski 2010), and effectiveness of the training system (Jagiełło 2000; Leonard 2002; Cięszczyk 2005; Cięszczyk and Stępiński 2007; Bergier 2011), which needs to consider changes of the 'model' features of champions (Karpiński and Rejdych 2008; Karpiński and Opyrchał 2008).

In the literature, there are studies describing various aspects of beginner swimmers aged 7–12 (Dybińska and Ostrowski 2003; Paradowski et al. 2003; Cardon et al. 2004; Dybińska 2004; Geladas et al. 2005; Nowacka-Chiari 2005; Ostrowski 2005; Kucia and Dybińska 2007; Roczniok et al. 2007; Kucia-Czyszczoń and Dybińska 2008; Stachowicz et al. 2011; Zarzeczny et al. 2011; Ziara 2011). As it has been noticesd by Łubkowska et al., physical activity in the water environment is crucial for human health (Łubkowska et al. 2014).

The literature about 7-year-olds is, however, limited (Głąb and Pietrusik 1980; Pietrusik 1980, 1981c, 1995; Waade et al. 2000; Light 2012; Leko and Grčieacute-Zubčevié 2013). Research by Głąb and Pietrusik (1980) was focused on the assessment of physical and motor agility of children that participated in competitive swimming trainings. The main aim of that research was to determine whether differences in terms of physical development and agility in 7-year-old boys influenced their training results, i.e. technical skills in freestyle, backstroke and breaststroke swimming. The authors examined 50 boys from Poznań, Poland, who attended primary school's 1st grade (specialized in swimming). Their physical development was assessed with basic somatic features (height and body mass), while their overall physical fitness was determined with an International Physical Fitness Test. The assessment was conducted at the beginning of the school year.

The analysis of the gathered data revealed that the average height and body mass of swimmers only slightly exceeded norms determined by Wolański (1975) for this age category. 7-year-old boys with higher body mass and height than their swimming peers, who had lower parameters, found it easier to master the technique of freestyle, breaststroke and backstroke swimming. Young swimmers with better physical and motor development than their swimming peers were able to master the front crawl better and with more precision. The presented data undoubtedly proves a need for detailed research focused on physical development of schoolchildren, which may be used for pre-selection or organizational decisions at the stage of teaching swimming techniques to children (Głąb and Pietrusik 1980).

Pietrusik authored a number of papers related to competitive swimming of children in primary school's junior grades (Pietrusik 1980, 1981c, 1995, 1997a). In one if his works (Pietrusik 1981c), he presented results of a 2-year experiment conducted amongst 93 children from Poznań, Poland in which he examined their physical development, motor fitness and physical functions. These children were divided into 2 groups: swimmers (n = 47) and control group (n = 48). In the swimmers' group, there were 25 girls and 20 boys who could not swim when they started the 1st grade. They were divided into two subgroups: one had a basic swimming program (3 hours per week), and the other had an intensive sports curriculum (6 hours per week). The control group consisted of their peers (27 girls and 21 boys) who did not pursue any sports activities. They only participated in the obligatory Physical Education classes. The assessment was conducted 4 times, in autumn and spring while children attended the 1st and 2nd grade. The measurements included height and body mass, dynamics of body function development (speed, strength, endurance, motor coordination), agility and physical functions (cardiovascular system, Ruffier's test, functional and anatomical characteristics of the respiratory system).

The statistical analysis of the obtained results revealed no significant differences between the height and body mass development in the group of swimmers and the control group. An increase of somatic values was in accordance with the development of their young organisms. At the beginning of the experiment (Assessment I), both groups displayed a similar level of motor fitness. In the swimming group, the last assessment (IV) revealed an overall increase (statistically highly significant) in all motor skills of all subjects. In the control group, however, this significance was not observable in four aspects (strength of upper limbs, shoulder muscles, motor coordination and

agility). Participation in regular swimming classes had a positive impact on the progression of functional indicators of the circulatory and respiratory system, held breath time, and oxygen efficiency of the swimming boys and girls (Pietrusik 1981c).

Another research focused on 10-year-olds who attended 3rd grade of primary school. Wieczorek and Witkowski (1990) conducted a study on somatic structure and motor fitness amongst 102 girls who – at the beginning of the experiment – were 3rd-grade students in primary schools in Łódź, Poland. In the experimental group, there were 45 girls who attended sports classes specialized in swimming. All of them had 2 years' experience in swimming (selection at the age of 7). For the control group, 57 of their peers were selected, who attended schools where there were only 2 hours of Physical Education weekly. Physical fitness of subjects was assessed by Denisiuk's test (1975); upper and lower limb speed was assessed by Bondarowicz's test (1976), and flexibility of shoulder girdle and spine was measured by Groszenków and Wolański's method (Wolański and Pariźkowa 1976). Body structure was described with 19 somatic characteristics. They included length, girth and width measurements. The measurements were conducted 3 times, with 6 months' intervals.

The statistical analysis of the results showed that girls in the experimental group obtained (on average) better results than the control group in terms of strength, agility, leg speed and flexibility of the shoulder girdle. There was no statistically significant difference in terms of speed, power, endurance and upper limb speed and agility. Young swimmers achieved better results in majority of somatic characteristics, compared to their peers who did not train any sport. Most of all, there were highly noticeable, statistically significant differences in terms of length parameters (body height, foot length) torso girth, its flexibility, as well as lung capacity.

Wieczorek and Witkowski (1992) conducted the same research amongst 95 boys from Łódź. At the beginning of the experiment, subjects attended 3rd grade at primary schools. There were 46 boys in the swimming group (with 2 years' experience in competitive swimming), while the control group included 49 of their peers. The authors used similar research methods as in case of the girls (Wieczorek and Witkowski 1990). The statistical analysis of results included 6 measurements of fitness and anthropometric values, which were taken with 6-month intervals (October and April). Detailed statistical calculations revealed that the swimming group displayed better strength, power and agility results than the control group. In terms of speed and endurance, arithmetical average values in both groups were similar. In majority of anthropometric measurements, swimmers achieved better results, especially in terms of length (body height, arm, hand and foot length). According to the authors, 'better length parameters of the experimental group may indicate a correct selection at sports schools in Łódź' (Wieczorek and Witkowski 1992).

In her research on physical development and motor skills, Antosiak (1998) examined girls (n = 18) who were about to start competitive swimming compared to their peers (n = 22) who did not pursue any sport. All subjects were 2nd-grade students (aged 8–9) of primary school in Konin, Poland. Girls from the experimental group trained 3 times per week for one hour, as well as participated in 2 hours of obligatory PE classes at school. To measure the physical development, the author examined height, body mass and skinfold measurement. The level of selected motor skills was assessed with strength tests (strength: explosive, static, functional, and of torso muscles) from the European Physical Fitness Test. The assessments was conducted twice: in October and in May of the same school year, when all girls attended 2nd grade at primary school. Based on the statistical (comparative) calculations, Antosiak (1998) concluded that swimming trainings did not have any significant impact on the anthropometric parameters she had measured. There were no significant differences between body height between the groups,

and there was a slightly significant difference in terms of body mass and average skinfold measurements. Regular swimming classes had a positive impact on the assessed motor skills and strength.

Another paper was authored by Dziedziczak and Witkowski (1998). It focused on the physical development and agility of children who participated in the swimming experiment in Łódź (Wieczorek and Witkowski 1990, 1992). The analysis of earlier studies (Wieczorek and Witkowski 1990, 1992) was based on the results of assessments I–III, which were published separately for girls (Wieczorek and Witkowski 1990) and boys (Wieczorek and Witkowski 1992). Dziedziczak and Witkowski (1998) added the results of assessments IV–VI of the swimming girls and their non-training peers, which were not included in the statistical analysis in the earlier paper (Wieczorek and Witkowski 1990). Therefore, research conducted by Dziedziczak and Witkowski (1998) includes complete results of the experiment (6 measurements from the 3-year period). The statistical analysis of the results revealed that longer training period influenced better progress of the anthropometric parameters and skills amongst swimming boys and girls.

Białecki and Czekalska (2000) studied completely different issues related to swimming, compared to the previously discussed works. They assessed the level of swimming skills amongst children and adolescents from Warsaw, Poland, in terms of the following parameters: age, fear of water, time to swim 50 m in 3 styles (freestyle, backstroke, breaststroke), swimming technique evaluation (freestyle, backstroke), using two subjective tests. The research included one-time assessment of 195 subjects, who were divided into three groups based on age: 10–11, 12–13, and 14–19-year-olds. To answer the question: 'Does the skill level, expressed as an assessment of swimming technique, determine the speed of swimming at a particular distance?' (Białecki and Czekalska 2000), the authors used Spearman's correlation coefficient. Statistical calculations revealed that the correlation coefficient was not significant in some cases.

Another study, focused on motor coordination, was conducted amongst 7–8-year old swimmers. Waade et al. (2000) examined 74 children (38 girls and 36 boys) from Gdańsk, Poland, who attended 1st grade specialized in swimming. The assessments was conducted twice: in September and June of the school year 1996/1997. To assess motor coordination, the authors used the German Körper- Koordinationstest für Kinder (KTK), which included four tests (balancing backwards, jumps on one leg, jumps sideways). The sum of points from the tests determined the final 'indicator of motor coordination'. Based on the result of the statistical analysis, Waade et al. (2000) showed that development of motor coordination in children in both studies was moderate (scale: high, good, moderate, impaired, highly impaired). There was, however, a moderately significant progression of the motor coordination indicator after 1-year of swimming trainings. It was also revealed that not all children were able to reach a high sports level in a particular sports discipline in the future.

Focus on swimming can also be found in studies by authors from Kraków, Poland (e.g. Dybińska 2004; Ostrowski 2005; Kucia and Dybińska 2007; Ziara 2011). Dybińska's research (2004) was significantly different in terms of methodology from studies of other authors before her (Pietrusik 1981c; Wieczorek and Witkowski 1990; Wieczorek and Witkowski 1992; Antosiak 1998; Dziedziczak and Witkowski 1998; Białecki and Czekalska 2000; Waade et al. 2000). In her experiment, Dybińska (2004) wanted to obtain information about potential correlations between theoretical and visual information (motor representation) which the students received before swimming classes, and the effectiveness of learning and teaching freestyle swimming. The final statistical analysis took into consideration full results of 532 subjects (out of 597 who began the experiment) from three primary school grades in Kraków, Poland. Subjects were divided randomly into two groups: experimental (n = 279 at the end of

the experiment) and control group (n = 253). The difference between groups was that the experimental group would have short meetings with their coach before every class, during which they were given visual information about a particular swimming style (e.g. observing program card). The experiment was conducted between February and June and included 1 lesson (40 minutes) per week. There were 2 assessments (7th and 14th lesson), which measured swimming skills and motor imagination. A detailed analysis of the results proved a strong correlation between the level of motor imagination of children and their ability to learn and be taught swimming motions. Children with a higher level of motor imagination tended to master freestyle swimming quicker and better. In the teaching process of junior primary school children '...teachers should consider using such teaching methods (not only visual, but also verbal, and more importantly, practical activities) that aim at a precise and long-lasting image of the motor activity that is being taught' (Dybińska 2004). 'It must be remembered that if we teach a child incorrect technique of a certain motion, it will be very difficult and time-consuming to eliminate it and correct it' (Paczyńska--Jędrycka and Łubkowska 2014).

Research similar to Dybińska's (2004) was conducted by Zysiak (2004). The main aim of the author in that experiment was to determine whether verbal and visual information (charts, photos) about freestyle swimming style would impact how quickly subjects learned that style. Her research included 58 children (28 girls and 30 boys), primary school 2nd-graders from Wrocław, Poland. Before the research, boys and girls had no theoretical knowledge nor swimming skills in terms of freestyle swimming. They were divided into two groups: experimental and control group. In the experimental group, the teacher presented information about swimming technique before each lesson, either verbally or visually (photos of motion phases), which was not presented in the control group. The experiment took two months (45 minutes twice per week). After 16 lessons, researchers assessed skills and knowledge of subjects with tests (knowledge, skills and swimming skills tests). Zysiak's research (2004) showed that children from the experimental group learnt the freestyle swimming technique better and quicker, compared to their peers from the control group. The theoretical knowledge they received as well as memorized technical details significantly facilitated the process of learning the new style.

Nowacka-Chiari's (2005) research was also related to analysis of body structure of young female swimmers. The author studied 129 girls aged 11–12 from Wrocław, Poland. The swimming group consisted of 25 girls with 2–6 years' of experience in sports training, who practiced swimming 12–19 hours per week, depending on their experience. The control group consisted of 104 peers who did not pursue any sport nor activities, expect for the obligatory PE classes at school. The assessment was conducted once. Swimmers were assessed in terms of 16 anthropometric characteristics, while the subjects from control group were assessed in terms of only eight parameters. The analysis of statistical data revealed that swimmers in both age categories (11 and 12 years old) were taller, compared to their non-training peers, their chests were larger in girth, and they had a higher body mass.

Ostrowski's (2005) research was aimed at assessing swimming skills of 10-year-olds who participated in swimming classes in Kraków, Poland. These classes took place during the obligatory PE lessons (30 hours) throughout the whole school year, when the subjects were 3rd-graders. Swimming skills test was conducted at the beginning and at the end of the experiment, i.e. when subjects started and finished the 3rd grade. Ostrowski (2005) determined criteria and points to create four groups of children with a varied level of swimming skills (non-swimmers; those adapted to water environment; those with basic swimming skills; those able to swim at least one style). In the initial test, 981 subjects took part; among them, the non-swimmers were the biggest group (57.19%), while only 8.56% of subjects already had some swimming skills.

However, only 541 children participated in regular classes throughout 1 year (30 hours). The final test revealed that as many as 66.15% children knew how to swim one style. 'The biggest increase of skills was noticed in children that were adapted to water environment, and the lowest increase was noted in children who knew how to swim and those who started from scratch' (Ostrowski 2005).

Ziara's (2011) research was also based on children from Kraków, Poland. who participated in a scientific experiment. The main aim of the study was to determine the impact of somatic parameters (height and body mass), functional parameters (lung capacity), and motor parameters (eight basic tests of coordination & motor skills (Raczek et al. 2002) on the speed of learning swimming skills amongst boys and girls who were 3rd graders at primary schools in Kraków, Kraków. Children (n = 100) participated in swimming classes once per week (obligatory PE classes) throughout one year. They were divided into two groups: one group had classes in a shallow pool, the other swam in deep water. Children themselves decided which group they wanted to be a part of, which may be related to the so-called 'behavioral fear'. The study encompassed 37 girls and 30 boys. The analysis of statistical data revealed that there were no statistically significant differences between height, body mass and lung capacity of children who swam in shallow and deep water. There was also no correlation between the speed of learning and the level of somatic measurements and lung capacity. Therefore, speed of learning amongst primary school junior students seemed to be determined not by somatic parameters, but by motor and mental skills, as well as teaching environment (Ziara 2011).

Conclusions

1. There are many available studies focused on competitive swimming.
2. Studies focus on boys and girls who have just taken up swimming or had 3-years' experience in trainings.
3. Only single studies focused on detailed anthropometric measurements.
4. Majority of authors focused on the swimming initiation age, basic somatic features (height and body mass), physical (motor) fitness, and physical function as the key criteria for selection in swimming.
5. The available literature does not present results which could illustrate potential correlations between sports skills, motor skill measurements and somatic characteristics of children who begin their swimming training.

References

Antosiak K. Dynamika rozwoju fizycznego oraz wybranych cech zdolności motorycznych u dziewcząt uprawiających pływanie sportowe na tle ich rówieśniczek nie uprawiających sportu. In: Sport pływacki i lekkoatletyczny w szkole (Wrocław–Srebrna Góra 1996, 1997), eds. P. Kowalski, J. Migasiewicz. AWF. Wrocław 1998: 233–238.

Bergier J. Od naboru do mistrzostwa sportowego w piłce nożnej. In: Sport wyczynowy – stan i perspektywy, eds. J. Bergier, A. Piechniczek. Kancelaria Senatu. Warszawa 2011: 40–43.

Białecki R., Czekalska J. Analiza porównawcza poziomu sprawności pływackiej dzieci i młodzieży, uczestników Szkoły Pływania AWF w Warszawie. In: Sport pływacki i lekkoatletyczny w szkole (Wrocław–Srebrna Góra 1998), eds. P. Kowalski, J. Migasiewicz, K. Zatoń. AWF. Wrocław 1999: 227–230.

Cardon G.,Verstraete S., Clercq D., Bourdeaudhuij I. Physical activity levels in elementary-school physical education: a comparison of swimming and non swimming classes. Journal of Teaching in Physical Education. 2004; (23) 3: 252–263.

Cięszczyk P., Stępiński M. W jaki sposób proces doboru wstępnego do piłki nożnej różnicuje kandydatów na tle innych dyscyplin sportowych i osób nietrenujących. Antropomotoryka. 2007; 37: 83–94.

Dybińka E., Ostrowski A. Wybrane czynniki koordynacyjno-sprawnościowe a postępy w uczeniu się czynności pływackich dzieci 10-letnich. Kultura Fizyczna. 2003; 9–10: 3–8.

Dybińska E. Wpływ wyobrażeń motorycznych na sprawność uczenia się i nauczania czynności pływackich 10 letnich dzieci. Antropomotoryka. 2004; 27: 25–36.

Dziedziczak K., Witkowski M. Rozwój fizyczny i sprawność fizyczna dzieci uprawiających pływanie. Wychowanie Fizyczne i Sport. 1998; 4: 13–20.

Eider J, Eider P. Olimpijczycy i paraolimpijczycy województwa zachodniopomorskiego Londyn 2012. PPH Zapol, Szczecin 2012.

Eider P. Selection in swimming traning – theoretical study. No. 1 in Szczecin. Centr Eur J Sport Sci. 2014; 5 (1): 65–75.

Geladas N.D., Nassis G.P., Pavlicevic S. (2005). Somatic and Physical Traits Affecting Sprint Swimming Performance in Young Swimmers. International Journal of Sports Medicine. 2005; (26) 2: 139–144.

Głąb S., Pietrusik K. Ocena rozwoju fizycznego i sprawności motorycznej ogólnej dzieci w młodszym wieku szkolnym poddanych procesowi nauczania pływania sportowego. In: IV Konferencja nt. „Teoretyczne podstawy wychowania fizycznego i sportu. Aktualny stan badań". Monografie. AWF. Poznań 1980; 143: 239–250.

Haleczko A., Jezierski R. Korzewa R., Misiołek E., Włodarczyk U. Formy selekcji i indentyfikacji talentów przy doborze dzieci do szkolenia sportowego. Antropomotoryka. 2010a; 50: 27–38.

Haleczko A., Jezierski R. Korzewa R., Misiołek E., Włodarczyk U. Ocena motoryczności zdolności kondycyjnych i koordynacyjnych dziesięcioletnich dzieci w ramach doboru do szkolenia sportowego. Antropomotoryka. 2010b; 45: 57–70.

Jagiełło W. Przygotowanie fizyczne młodego sportowca. COS. Biblioteka Trenera. Warszawa 2000.

Kucia-Czyszczoń K., Dybińska E. Skuteczność informacji wizualno- werbalnej jako jednego z komponentów doskonalenia sportowej techniki pływania. In: Aktywność ruchowa ludzi w różnym wieku, ed. D. Umiastowska. Albatros. Szczecin 2008; 12: 251–257.

Karpiński R., Opyrchał Cz. Pływanie na Igrzyskach Olimpijskich w Pekinie – analiza poziomu sportowego, wieku i budowy somatycznej pływaków. Sport Wyczynowy. 2008; 10–12: 7–23.

Karpiński R., Rejdych W. Poziom osiągnięć czołowych pływaków polskich na tle wyników światowych w 2007 roku. Sport Wyczynowy. 2008; 1–3: 31–39.

Leonard J. Sixteen Values that Swimmers Learn from the Sport. ASCA Newsletter. 2002; 4.

Nowacka-Chiari E. Budowa ciała młodych pływaczek. Słupskie prace biologiczne. Uniwersytet Zielonogórski. 2005; 1: 127–133.

Ostrowski A. Umiejętności pływackie dzieci 10 letnich i ich wpływ na efekty zorganizowanej nauki pływania. In: Aktywność ruchowa ludzi w różnym wieku, ed. D. Umiastowska. Wydawnictwo Promocyjne Albatros. Szczecin 2005; 9: 216–223.

Łaski C. Nabór i selekcja w piłce nożnej. Roczniki Naukowe Wyższej Szkoły Wychowania Fizycznego i Turystyki w Olsztynie. 2006: 49–53.

Łubkowska W., Paczyńska-Jędrycka M., Eider J. The significance of swimming and corrective exercises in water in the treatment of postural deficits and scoliosis. Centr Eur J Sport Sci Med. 2014; 6 (2): 93–101.

Łubkowska W., Troszczyński J. Obciążenia treningowe a poziom sportowy w pływaniu. In: Człowiek i środowisko przyrodnicze Pomorza Zachodniego, t. II. Aktywność fizyczna osób w różnym wieku – teoria i praktyka, ed. J. Eider. Uniwersytet Szczeciński WNP, Szczecin 2006: 114–119.

Łubkowska W., Troszczyński J. The assessment of aerobic physical capacity in young swimmers. Centr Eur J Sport Sci Med. 2013; 2 (2): 21–29.

Ostrowski A. Umiejętności pływackie dzieci 10 letnich i ich wpływ na efekty zorganizowanej nauki pływania. In: Aktywność ruchowa ludzi w różnym wieku, ed. D. Umiastowska. Wydawnictwo Promocyjne Albatros. Szczecin 2005; 9: 216–223.

Nowacka-Chiari E. Budowa ciała młodych pływaczek. Słupskie prace biologiczne. Uniwersytet Zielonogórski. 2005; 1: 127–133.

Paczyńska-Jędrycka M., Łubkowska W. Edukacja zdrowotna przez gry i zabawy ruchowe z uwzględnieniem zabaw animacyjnych w opinii studentek pedagogiki elementarnej (na przykładzie województwa wielkopolskiego). Pielęgniarstwo Polskie. Uniwersytet Medyczny, Poznań 2013; 3 (53).

Pietrusik K. Kształtowanie się sprawności motorycznej oraz wydolności fizycznej u dzieci uprawiających pływanie sportowe. Roczniki Naukowe AWF, Poznań. 1981; 30: 107–125.

Pietrusik K. Wpływ zwiększonej aktywności ruchowej na tempo rozwoju motorycznego u dzieci uprawiających pływanie sportowe. In: Aktywność ruchowa ludzi w różnym wieku, ed. D. Umiastowska. Wydawnictwo Promocyjne Albatros. Szczecin 1995; 1: 98–106.

Pietrusik K. Szybkość uczenia się pływania dzieci w młodszym wieku szkolnym. Trening. 1997; 1 (2): 121–129.

Rakowski M. Sportowy trening pływacki- nowoczesne metody treningu pływackiego z uwzględnieniem szkolenia pływaków masters i triatlionistów, Londyn 2010.

Siewierski M. Dobór i selekcja w pływaniu na przykładzie warszawskich klubów pływackich. In: A. Kuder, K. Perkowski, D. Śledziewski, Proces doskonalenia treningu i walki sportowej. AWF. Warszawa 2006; 3: 44–47.

Stachowicz M., Milde K., Janik M. Wytrzymałość beztlenowa młodych pływaków w wieku 12 lat. Wychowanie Fizyczne i Sport. 2011; 55 (4): 237–240.

Waade B., Chrościelewski J., Przybylski S. Poziom i rozwój koordynacji ruchowej młodych pływaków. Wychowanie Fizyczne i Sport. 2000; 2: 41–45.

Wieczorek W,. Witkowski M. Rozwój sprawności fizycznej i zmiany w budowie ciała młodych pływaczek. Wychowanie Fizyczne i Sport. 1990; 1: 21–34.

Wieczorek W., Witkowski M. Rozwój sprawności fizycznej i zmiany w budowie ciała młodych pływaków. Wychowanie Fizyczne i Sport. 1992; 3: 17–26.

Wolański N. Rozwój biologiczny człowieka. PWN. Warszawa. 2006.

Wolański N., Pariźkowa J. Sprawność fizyczna a rozwój człowieka. SiT. Warszawa 1976.

Zarzeczny R., Kubierska M., Deska A., Zarzeczna D., Rydz K., Lewandowska A., Bałchanowski T., Bosicki J. Wpływ 8 tygodniowego treningu pływackiego na zdolność wysiłkową 12 letnich chłopców. Wychowanie Fizyczne i Sport. 2011; 55 (2): 83–86.

Ziara W. Jeszcze raz o morfologiczno-funkcjonalnych determinacjach nauki pływania młodszych dzieci. Antropomotoryka. 2011; 53: 55–67.

Zysiak B. Wiedza o technice pływania kraulem a szybkość uczenia się. Wychowanie Fizyczne i Zdrowotne. 2004; 5: 33–37.

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