

The Level of Chosen Coordination Abilities in 10 Year old Boys as Selection Criteria for Sport Classes

by

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The main objective of this work was to evaluate the level of chosen coordination abilities in 10 year old boys selected to sport classes in the city of Stettin. In all 136 pupils were examined, including 39 that consisted the control group. The applied methods were based on previously accepted test batteries with high reliability and validity.

The obtained results indicate significant inter group differences in kinesthesia of strength, movement frequency and space orientation. No differences were found in tests the sense of balance, which most often occur in coordination test batteries. The sense of balance was frequently omitted by experts creating selection criteria for particular sport disciplines.

Keywords: *coordination motor abilities, youth sport, sports selection*

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Introduction

The effectiveness of the training process in competitive sport is highly dependent upon proper selection of candidates for a particular discipline (Wazny 1989). Unfortunately a valid and early determination of predispositions for a particular sport discipline is not an easy task. This is confirmed by a relatively small number of talented children (1 in 1000) among those subjected to selection (Karwacki 2000). Searching for appropriate candidates for competitive sports requires sound scientific background (Naglak 1989). The importance of this problem is confirmed by continuous research in this area, different in particular nations.

Proper selection should exclude subjects at a certain age from a certain population of children and youth that possess the greatest talent which will allow for a dynamic development of abilities that determine success in competitive sports. The selection criteria should include significant traits and abilities for a particular sport discipline (according to the champion model) that are strongly determined genetically – low trainability (Szopa 1986; Szopa *et al.* 1996; Sozanski 1993).

The selection process in Poland is usually carried out on a limited number of subjects with easily accessible methods and apparatus. Most research indicates coaches conducting the selection process relate only to morphological characteristics and motor fitness (Szopa 1984; 1996). Very often, research conducted on prepubescent children omits the evaluation of the rate of biological development. Such a state automatically discriminates a reliable evaluation of a given candidate for participation in a particular sport discipline. This is often confirmed by partial consideration or total exclusion of coordination abilities from selection criteria which play an important role in the process of steering and control of movements (Szopa *et al.* 1996). Taking into consideration that coordination abilities are responsible for accuracy and precision of movements under frequently changing conditions, such an approach seems unjustified.

The aim of this research was to evaluate the level of chosen coordination abilities in 10 year old boys selected for particular sport disciplines in comparison to a general population of similar age.

Material and methods

The research material included 97 10 year old boys selected for training of particular sport disciplines. The choice of schools and classes on which the

research was conducted was based on information from local Departments of Education related to extended programs of physical education. The control group consisted of 39 ten year old boys that were subjected only to a basic physical education program. The subjects were chosen randomly. Basic characteristics of research material are presented in tab 1.

Table 1

Basic characteristics of research material

Discipline	N	Selection criteria
Basketball	23	Body height prediction, motor fitness tests – (elements of Denisiuk’s test and others)
Volleyball	22	Body height prediction, motor fitness tests – (elements of Eurofit test and others)
Handball	24	Motor fitness tests – (elements of Eurofit test and others)
Soccer	28	Motor fitness tests – (elements of Eurofit test and others)
Control group	39	-
Total	136	

The research methods presented in this paper were based on previous assumptions, confirming the lack of possibilities of synthetic evaluation of the entire coordination potential. It was necessary to base the analysis on tests evaluating particular abilities with different levels of complexity. The main objective was to choose a test that evaluates a dominant ability determining the performance of particular movement tasks (Szopa *et al.* 1996; Juras and Waskiewicz 1998).

The evaluations included:

- Kinesthetic differentiation – standing broad jump at 50% max (Mynarski 2000)
- Speed of reaction – catching the Ditrich stick (Mekota and Blahus 1983),

converted to time according to the formula $t = \sqrt{\frac{2h}{g}}$

- Movement frequency – flat tapping (Eurofit 1988)
- Space orientation – target march (Raczek *et al.* 2002)

- Sense of balance – „flamingo balance” (Eurofit 1988)

These tests were backed up by basic somatic variables such as: body mass and body height, skin fold measurements in order to determine the morphological age of the subject and the rate of biological development (Szopa *et al.* 1996).

The collected data was analyzed statistically, calculating x, SD and the inter group difference with the t-students test. In all possible cases normalized values were also determined (Stanisz 2000).

Results

On the basis of anthropometric measurements an evaluation of morphological age of tested subjects was conducted (tab. 2).

Table 2

Morphological age of tested subjects

Discipline	Morphological age
Basketball	10,7±0,8
Volleyball	10,0 ± 1,2
Handball	10,5±2,8
Soccer	10,2 ± 0,9
Control group	9,9 ± 0,9

Further statistical analysis of the obtained results indicated significant differences in morphological age in particular cases (tab.3).

Table 3

Differences in morphological age of boys representing particular disciplines

	Basketball	Volleyball	Handball	Soccer	Control group
Basketball	X	0,7 *	0,2	0,5 *	0,8 **
Volleyball	0,7 *	X	0,5	0,2	0,1
Handball	0,2	0,5	X	0,3	0,6 *
Soccer	0,5 *	0,2	0,3	X	0,3 *
Control group	0,8 **	0,1	0,6 *	0,3 *	X

* Statistically significant (p<0,05); ** statistically significant (p<0,001)

The first analyzed factor included the sense of balance. The result of the test was equaled to the amount of attempts necessary to maintain balance over a period of 1 min. The conducted research showed no significant differences in the level of this ability, yet the control group had the worst results (11,07±5,67). The best results in the test evaluating the sense of balance were reached by boys practicing volleyball (8,30±4,65) and handball (8,32±4,38). The basic statistics of results obtained in tests evaluating the level of coordination abilities are presented in table 4.

Table 4

Basic statistics of coordination tests in particular groups of boys.

Ability	Basketball		volleyball		Handball		Soccer		control	
	\bar{x}	SD	\bar{x}	SD	\bar{x}	SD	\bar{x}	SD	\bar{x}	SD
Sense of balance [falls per/60 s]	10,26	3,67	8,30	4,65	8,32	4,38	9,48	4,29	11,07	5,67
Strength differentiation [%]	68,94	11,98	78,36	25,04	86,25	24,20	94,63	22,13	89,41	24,48
Speed of reaction [s]	0,22	0,14	0,25	0,11	0,24	0,12	0,25	0,12	0,23	0,15
Movement speed [repetition per /15 s]	49,26	5,78	45,61	4,81	52,70	5,87	51,19	6,63	49,78	6,85
Space orientation [cm]	42,18	19,23	51,98	30,28	64,76	22,14	56,10	26,45	85,05	59,09

The next test evaluated the level of kinesthetic strength differentiation. The motor task consisted of a standing long jump performed at 50% of maximum strength. The obtained results were significantly different not only between the athletes and control group but also within particular groups, practicing different sport disciplines. Statistically significant differences were observed between basketball and handball players as well as between boys practicing volleyball and soccer (table 5).

The analysis of results of the test evaluating speed of reaction (catching the Ditrich stick) showed no significant differences between representatives of sport groups and the control group. Statistically significant differences occurred between boys practicing basketball and soccer as well as volleyball players. The best results were obtained by basketball players (0.22 ± 0.14) while the worst by volleyball players (0.25 ± 0.11). Movement speed, evaluated by hand taping showed statistically significant differences between volleyball players and boys from the control group. The volleyball players reached the worst results (45, 61 ± 4 , 81), while the best ones were obtained by handball players (52.70 ± 5.87).

Table 5*Significance of differences*

		DISCIPLINES	basketball	volleyball	handball	Soccer	Control
Sense of balance	Basketball	X	1,96	1,94	0,78	0,81	
	Volleyball	1,96	X	0,02	1,18	2,77	
	Handball	1,94	0,02	X	1,16	2,75	
	Soccer	0,78	1,18	1,16	X	1,59	
	Control	0,81	2,77	2,75	1,59	X	
Strength differentiation	basketball	X	9,42	17,31*	25,69**	20,47**	
	volleyball	9,42	X	7,89	16,27*	11,05	
	Handball	17,31*	7,89	X	8,38	3,16	
	Soccer	25,69**	16,27*	8,38	X	5,22	
	Control	20,47**	11,05	3,16	5,22	X	
Speed of reaction	basketball	X	0,03*	0,02	0,03*	0,01	
	volleyball	0,03*	X	0,01	0	0,02	
	Handball	0,02	0,01	X	0,01	0,01	
	Soccer	0,03*	0	0,01	X	0,02	
	Control	0,01	0,02	0,01	0,02	X	
Movement speed	basketball	X	3,65*	3,44*	1,93	0,52	
	volleyball	3,65*	X	7,09**	5,58*	4,17*	
	Handball	3,44*	7,09**	X	1,51	1,41	
	Soccer	1,93	5,58*	1,51	X	1,41	
	Control	0,52	4,17*	1,41	1,41	X	
Space orientation	Basketball	X	9,8	22,58*	13,92*	42,87*	
	Volleyball	9,8	X	12,78	4,12	33,07	
	Handball	22,58*	12,78	X	8,66	20,29	
	Soccer	13,92*	4,12	8,66	X	28,95*	
	Control	42,87*	33,07*	20,29	28,95*	X	

Statistically significant ($p < 0,05$); ** statistically significant ($p < 0,001$)

The last of applied tests related to space orientation. This ability was evaluated by the “target march” in which the objective was to reach a certain point, without visual control. By far the worst results were reached by the control group (85, 05±59, 09). These results were not statistically different only from those obtained by handball players. Once again the best results were reached by boys practicing basketball (42, 18±19, 23). Other statistically significant differences in the level of this ability occurred between soccer and basketball players as well as between boys training basketball and handball.

The results obtained by boys participating in particular sport disciplines were normalized to the control group.

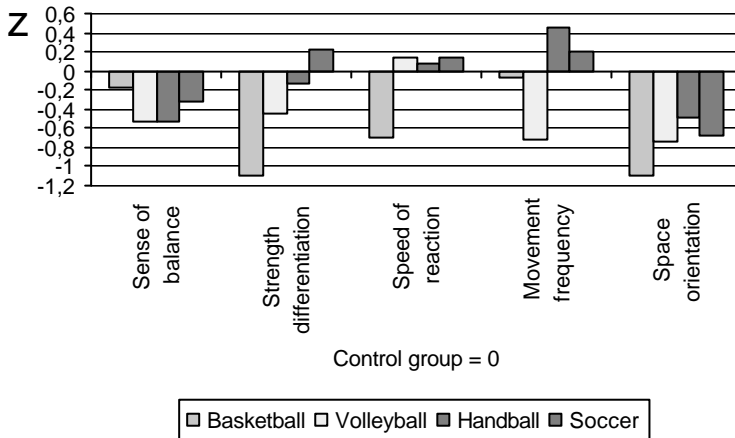


Fig. 1

Normalized differences between particular sport groups and control group.

Discussion

The main objective of this paper was to determine the differences in motor fitness of children attending sport classes in Stettin in comparison to a control group. On this basis the methods and criteria of selection for competitive sports were evaluated.

The compared groups of children differ significantly in relation to morphological age (tab.3) Such a state may indicate the selection of individuals with accelerated maturation, what can be considered a serious mistake. The idea of selecting children with accelerated development for sport is not new (Szopa 1996; Chromiuk *et al.* 1998), yet those responsible for this process should

be aware of the consequences. These consequences were confirmed by Szopa and Srutowski (1990) when evaluating the effects of selection for sport schools in Cracow. The review of literature indicates that several authors included this factor in their selection process (Stepinski selecting children for soccer), yet this is by no means a normal procedure.

The diagnosis of coordination of motor abilities and their influence on sport results has been an issue of many research projects. The role of coordination motor abilities differs significantly in particular sport discipline. In team sports they are responsible for quick and effective learning of technical skills and proper conductance of technical and tactical tasks under different conditions and in constantly changing situations of a game. These abilities seem to have a decisive effect on championship level, what has been confirmed by Zimmermann (1982). This fully justifies the notion of selecting children for team sports with a significantly higher level of coordination abilities than the average population.

According to Zimmermann (1982) the ability to adjust and speed of reaction are of greatest importance for team sports. Several authors in Poland have confirmed the importance of these abilities in team sports (Ljach and Raczek 2003). Szopa et al reached similar results when evaluating handball players (1984). The selection process should include abilities significant for a particular sport and at the same time strongly determined genetically – low trainability. The conducted research did not show significant differences in the level of chosen coordination abilities of children selected for team sports and a control group. The exception included basketball players which produced significantly better results in most tests in comparison to the control group.

The research conducted by Golaszewski and Wieczorek (2001) showed significant differences in the level of balance between young soccer players and their peers not engaged in sports. The results of this investigation did not confirm such differences between children selected for team sports and the control group. One must underline that most experts do not list this ability as important for success in team sports.

Space orientation was the next considered ability. In case of team sports space orientation seems of great importance, what has been confirmed by Ljach and Raczek (2003). Significant differences in the level of this ability in soccer players and general population of children were observed by Stepinski (2003). Similar results in case of other team sports were obtained by Szopa (1984). The presented research confirms such a tendency, since children selected to sport classes reached higher results in tests evaluating space orientation in

comparison to the control group. Such selection criteria may be accepted in team sports.

The last considered ability, speed of movement showed little differences between selected children for sports training and control group. Differences registered between volleyball players and control subjects were significant do to extremely low results reached by the first ones. These results are not in accordance to those registered by Stepinski (2003).The influence of training on the level of coordination motor abilities was conducted by Szczepanik and Szopa (1993). The results of this research project indicate that young volleyball players have a significantly higher level of speed of reaction, space orientation, static balance and movement frequency in comparison to children the same age not engaged in competitive sports training.

Conclusions

1. The analysis of obtained results indicates significant differences in morphological age of tested children.
2. The greatest difference in the level of coordination abilities between particular groups of athletes were registered in case of strength differentiation and space orientation.
3. No significant differences were observed between particular groups in case of balance the ability most often included in test batteries.
4. The problems in interpretation of obtained results related to coordination abilities are a consequence of previous mistakes in constructing selection criteria for competitive sports.

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