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FOREWORD

Dear participants of the 1st International Scientific Conference "Exercise and Quality of Life":

We welcome you and wish you a nice stay in Novi Sad, the host town of the first international scientific gathering dedicated to exercise and quality of life.

Scientists of 16 countries will share their experience and knowledge related to effects of physical exercising on the growth and development of children, quality of life of elderly people, as well as the health status of chronically ill people. There will also be opportunities to exchange knowledge of the current trends in sport research, top sport and the role of sports medicine in everyday exercising.

The key topic of the Conference reflects the current focus of physical exercising in which physical activity is recognized and promoted due to its contribution to overall development in the first place, as well as its benefits for health, and wellbeing of people in dynamic complex conditions of contemporary living.

Different forms of physical activity and physical exercising – from an active play to top sport, from recreative activity to therapy exercising – can significantly improve the quality of life, which is probably their ultimate goal and purpose.

It is an obligation of experts from the fields of sport, education, medicine, politics and other relevant disciplines to make it possible to anyone, regardless of age, gender, national and religious background, abilities and health status, to have equal access to qualitative physical exercising.

Doubtlessly, this requires an interdisciplinary approach and a strong support for scientific research of issues related to physical exercising. The Conference "Exercise and Quality of Life" is in function of better positioning of Serbia in the international scientific community, as well as knowledge exchange among scientists from the region and wider surroundings, with the purpose of improving knowledge of physical exercising and quality of life.

Special thanks are due to our honored visiting lecturers who have kindly accepted an invitation of the Organizers, whose presence and lectures have significantly contributed to good quality and scientific goals of the Conference. We also thank all participants of the Conference for their high scientific contribution. After being peer reviewed, their papers have been selected and published in the Conference Proceedings Book.

We are especially grateful to the Ministry of Science and Technological Development of the Republic of Serbia, Secretariat for Science and Technological Development of the Autonomous Province of Vojvodina, as well as to the Secretariat for Sport and Youth of the Autonomous Province of Vojvodina.

Novi Sad, the town on the Danube, a large European river, the town in which people speak and sing in many different languages, the town with a heart as big as the plane of Vojvodina, is awaiting open-handed all participants of the Conference. Enjoy the Conference and farewell till we meet again next year!

Milena Mikalački, Ph.D
Dean of the Faculty of Sport and Physical Education

Contents

PART 1.

Plenary Sessions

TREND OF CHANGES OF GENERAL MOTOR ABILITY STRUCTURE IN PRE-SCHOOL CHILDREN

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Abstract

General motor ability was tested and analyzed in 1291 preschool children (670 boys and 621 girls), aged 4-7 by battery of 7 motor tests. Estimates of the structure of general motor ability (factor) of boys and girls separately in every age category were performed according to the principle component method. Research results pointed to the similarity of general motor abilities in boys and girls, but the structure of these abilities are better explained at the time of enrollment in school than in younger ages.

Key words: general motor factor; preschool children.

Introduction

According to kinesiology theories, it is thought that motor development of preschool children has a general character, and that a child solves motor tasks with his/her entire body, which is motorically very uneconomical. These findings have been reported by Bala (1981), however there remains a question whether this is only the nature of motor development and behavior, or it may be a result of methodological limitations. General motor factor is identified in studies that were done on relatively small variable samples which are basically representations of the primary motor factors in older subjects. It is quite feasible to expect that general factor would also be derived in older participants from such a sample of variables, among which there is a strong differentiation of both basic and specific motor abilities. One of the issues is definitely difficulties associated with applying a larger number of motor assessments on small children, due to their short attention span, impatience, and lack of cooperation during testing.

Another problem lies in proving the existence of general factor as the only dimension, which has been discussed in kinesiology theories on motor space in young children, most often of preschool age. It is methodologically almost impossible to prove the existence of a single dimension within a child's motor space. There are more and more studies suggesting it is indeed possible to talk about differentiated motor abilities in preschool children, too, especially if more variables are included in the testing and subsequent analyses (Strel, & Šturm, 1981; Dukovski, 1984; Rajtmajer, & Proje, 1990; Rajtmajer, 1993; Bala, 1999a; 1999b; Pišot, & Planinšec, 2005). The problem of flexibility in the motor space of young children is especially intriguing because its existence has been questioned (Bala, Nićin, & Popović, 1997; Bala, 1999a; 1999b).

In this particular analysis, it was assumed that the general motor factor in preschool children is a construct which structure consists of yet undifferentiated abilities, manifested during motor tasks in routinely used, but often standardized and adapted motor tests for young children (Bala, Stojanović, & Stojanović, 2007). According to the accepted and widely used practice, i.e. classic model of measurement, this analysis is based on the understanding that true results for a variable are stochastically independent from its own measurement errors, and that the errors themselves are stochastically independent from one another. The other assumption is that true results for a variable are stochastically independent from the measurement errors of the other variables. Therefore, the authors' main premise is that correlations between variables depend only on the true results for all variables.

The purpose of this study is to analyse the trend of structure changes of the general motor ability in preschool children, with respect to their age and gender. The paper has been written as a part of the "Integrated development, aberrant behaviour and physical activity of preschool children", supported by

the Ministry of Science and Technological Development, Republic of Serbia, and conducted by the academic staff and students at the Faculty of Sport and Physical Education in Novi Sad, Serbia.

Method

670 boys and 621 girls from five preschool centres in the Province of Vojvodina (Novi Sad, Bačka Palanka, Sremska Mitrovica, Sombor and Zrenjanin), aged 4-7, were tested.

Table 1. *Age of children (in decimal years)*

Age	BOYS			GIRLS		
	N	M	SD	N	M	SD
4.0	58	4.29	0.12	46	4.30	0.10
4.5	73	4.72	0.13	85	4.74	0.15
5.0	111	5.26	0.15	80	5.27	0.14
5.5	132	5.75	0.14	108	5.75	0.14
6.0	119	6.23	0.14	124	6.25	0.14
6.5	120	6.72	0.13	131	6.75	0.15
7.0	57	7.13	0.12	47	7.13	0.10
Total	670	5.81	0.85	621	5.86	0.86

A battery of seven motor metric instruments was applied, which has previously been proposed by Bala, Stojanović and Stojanović (2007), representing a battery under the reduced model of Kurelić, Momirović, Stojanović, Šturm, Radojević, & Viskić-Štalec (1975), and also Gredelj, Metikoš, Hošek, & Momirović (1975).

The following motor ability tests were utilized:

1) 20m dash – to estimate functional co-ordination of primary motor abilities,
2) Obstacle course backwards – to estimate functional co-ordination of primary motor abilities,
3) Arm plate tapping – to estimate frequency of simple movements,
4) Seated straddle stretch – to estimate flexibility,
5) Standing broad jump – to estimate explosive strength,
6) Bent-arm hang – to estimate static strength of arms,
7) Sit-ups – to estimate repetitive strength of the trunk.

Statistical characteristics of variables were calculated separately by gender and age (mean (M) and standard deviation (SD)), as quantitative indicators of the motor status and development in children. Factor analysis (Hotelling's method of principal components) was used for defining qualitative indicators of the general motor ability by age and gender.

Results and Discussion

Quantitative indicators (M and SD) point to a relatively linear development of motor abilities needed for the executions of motor tasks in the analysed motor tests, both in boys and girls (Tables 2 and 3). The improvement of these abilities is accompanied by proportional homogeneity of results within the age and gender subgroups.

Table 2. *Means and standard deviations of variables in boys*

V A R I A B L E	4		4.5		5		5.5	
	M	SD	M	SD	M	SD	M	SD
20m dash (0.1 s)	62.0	8.3	58.9	7.7	55.3	6.9	52.3	5.4
Obstacle course backw.(0.1 s)	410.7	140.9	384.2	140.1	333.5	109.3	283.9	90.0
Arm plate tapping (freq.)	11.3	3.0	13.4	2.6	14.4	3.4	15.5	3.4
Seated straddle stretch (cm)	32.4	6.7	34.3	7.6	33.9	6.3	35.9	6.2
Standing broad jump (cm)	84.0	19.4	92.5	16.6	101.8	19.3	111.5	17.1
Bent-arm hang (0.1 s)	49.6	53.0	80.6	76.3	81.8	76.9	109.0	115.6
Sit-ups (freq.)	10.6	8.3	12.7	7.8	17.2	9.1	19.7	9.4

Table 2. (continued)

V A R I A B L E	6		6.5		7	
	M	SD	M	SD	M	SD
20m dash (0.1 s)	50.2	5.1	48.4	5.2	47.1	5.6
Obstacle course backw. (0.1 s)	271.6	96.6	252.4	106.0	210.7	74.3
Arm plate tapping (freq.)	16.7	3.4	17.6	3.6	19.0	3.5
Seated straddle stretch (cm)	36.5	7.0	37.5	7.3	38.6	8.1
Standing broad jump (cm)	116.9	18.6	121.3	18.6	131.7	18.8
Bent-arm hang (0.1 s)	122.9	119.5	150.3	147.5	187.7	147.4
Sit-ups (freq.)	22.6	8.3	23.7	8.5	26.8	8.8

Table 3. Means and standard deviations of variables in girls

V A R I A B L E	4		4.5		5		5.5	
	M	SD	M	SD	M	SD	M	SD
20m dash (0.1 s)	64.4	10.2	61.2	8.0	57.7	7.3	55.4	6.5
Obstacle course backw. (0.1 s)	536.5	232.1	418.1	146.7	385.4	123.4	327.4	110.1
Arm plate tapping (freq.)	11.6	3.1	12.6	2.7	14.0	2.8	15.6	3.6
Seated straddle stretch (cm)	36.5	5.7	37.8	6.3	38.3	5.8	41.0	7.6
Standing broad jump (cm)	75.5	16.5	86.4	17.8	92.7	15.3	101.5	18.9
Bent-arm hang (0.1 s)	56.3	60.9	72.4	81.2	85.4	64.7	104.3	96.1
Sit-ups (freq.)	13.0	8.9	15.4	8.4	18.8	8.8	20.4	9.4

Table 3. (continued)

V A R I A B L E	6		6.5		7	
	M	SD	M	SD	M	SD
20m dash (0.1 s)	52.4	4.8	51.5	7.1	50.5	5.1
Obstacle course backw. (0.1 s)	300.4	99.1	290.6	98.5	287.5	121.1
Arm plate tapping (freq.)	15.9	2.8	17.0	3.1	18.0	2.7
Seated straddle stretch (cm)	41.9	7.6	43.0	7.1	43.4	9.3
Standing broad jump (cm)	108.2	16.2	114.1	18.4	117.0	19.1
Bent-arm hang (0.1 s)	137.4	107.9	157.2	120.7	118.1	88.6
Sit-ups (freq.)	23.7	9.8	25.1	8.9	24.8	9.9

Based on the explained common variability of each principal component (H) in boys, one can observe an increase in every whole year, but also decreases in every half-year period (Table 4). This phenomenon is not easy to explain without some information on the biological and mental development, either general or seasonal. In girls, there is a less significant variability at 4.5 and 5, then 6 years of age, while there were small increments of the common variability of the analysed motor variables structure at the other ages (Table 5). Although it may be inferred from this information that the general motor factors

can be better defined at older ages, the results suggest it is only partly true, considering that it is not always the same variables that are equally included in defining these motor structures.

Table 4. General motor factors in boys

V A R I A B L E	H4	H4.5	H5	H5.5	H6	H6.5	H7
20m dash	-.75	-.66	-.79	-.74	-.76	-.74	-.65
Obstacle course backwards	-.33	-.41	-.68	-.71	-.76	-.75	-.78
Arm plate tapping	.71	.50	.64	.39	.57	.54	.40
Seated straddle stretch	.36	.30	.32	.28	.38	.26	.29
Standing broad jump	.78	.70	.79	.78	.83	.86	.88
Bent-arm hang	.46	.40	.55	.53	.42	.42	.77
Sit-ups	.71	.59	.54	.63	.55	.61	.63
% of Variance	38.0	28.2	40.7	36.9	40.3	39.9	43.7

Table 5. General motor factors in girls

V A R I A B L E	H4	H4.5	H5	H5.5	H6	H6.5	H7
20m dash	-.80	.81	-.75	-.65	-.66	-.79	-.73
Obstacle course backwards	-.53	-.66	-.64	-.75	-.64	-.76	-.77
Arm plate tapping	.45	.63	.30	.63	.37	.54	.70
Seated straddle stretch	.27	.01	.55	.31	.28	.24	.53
Standing broad jump	.76	.63	.75	.80	.82	.85	.85
Bent-arm hang	.54	.48	.17	.61	.50	.41	.44
Sit-ups	.70	.57	.58	.55	.52	.59	.51
% of Variance	37.0	35.2	33.1	40.3	32.5	40.6	44.5

Considering correlations of the motor variables with general factor (H) at every boys' and girls' age, general factor can be understood as a general ability representing a combination of basic abilities, that is not fully developed or latent, which capacity ought to further develop at later ages under the genetic potential and environmental factors. Functioning of a such a structure depends mostly on the efficient function of the entire central nervous system at the overall preschool age. This can be inferred from the strength of the correlation of variables evaluating the informational component of the general motor ability (not only for simple, but also more complex, quick and forceful movements), relative to the correlation of variables evaluating the energy component (long-lasting, consecutive repetitions, or sustaining of the set motor task with the isotonic or isometric contraction of the appropriate muscles). Hence, with the combination of basic abilities of preschool children, the greatest roles are played by those abilities which are under the control of the mechanisms regulating movement structuring and excitation intensity.

It is necessary to draw attention to the Seated straddle stretch variable, which is an indicator of flexibility in children. In both gender, it is the least correlated at all ages, which may raise suspicion regarding its place in the motor space. It is true that this ability can substantially contribute to the manifestation of motor abilities and behaviour in children, and even more so in adults. In the adults' motor space, it belongs to the group of abilities that are under the control of the mechanism of sinergistic automatism and tonus regulation. However, particular attention should be directed to the variable for the assessment of flexibility in children.

In conclusion, the results of this study have demonstrated that there are quantitative differences in favour of boys as compared to girls, except for the variable estimating flexibility. The structure of the general motor ability of boys and girls of the same age is quite comparable, and is shown to be better explained at the time of enrollment in school than in younger age categories.

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