

RESEARCHES OF CHILDREN MOTOR AND FUNCTIONAL ABILITIES

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Review article

Abstract

The object of research is population of school children. The research problem is the division of work according to the structure of motor and functional space, the division works under the age of respondents and the division of work in relation to gender. The objective review of research to arrive at a summarize information on motor and functional abilities of children of different ages and sexes. The task was derived from the problem, and that is to take a paper sorted according to the structure of motor and functional space, according to the age of respondents in relation to gender. The sample of respondents was divided into pre, junior, middle and older school children. The sample of variables is divided into variables for motor and functional abilities. For the study of theory and content analysis we used the method of theoretical analysis. The results indicate that the structure of motor space investigated in 15 selected works, structure functional and motor space is discussed in 5 papers, and the structure of the functional area was investigated in 7 papers. The most common age of the respondents used in the reviewed research is the middle school years 10 papers, junior school age and older school age 7 papers and preschoolers 3 papers. The division of work by sex of respondents shows that most of the papers included mixed groups of subjects and that the result obtained significant research after all and because it is the right measure, to recognize the differences in sex.

Key words: children, school, motor, functional, ability.

Introduction

Characteristics of the children morphological and functional abilities can best be observed at school age. School age can be defined as a period which includes the development of the child from starting school to when the complete primary school. This period is divided into junior school age (from 7 to 11 years), the middle school years (from 11 to 13 years) and older children of school age (from 13 to 15 years). Characteristics of early school age is relatively slower growth in height compared to previous periods of growth and development. This increase in height is accompanied with an adequate increment in body mass. The development of the respiratory system leads to differentiation of type of breathing between men and women. Respiratory rate of 20 respiratory movements per minute. In the beginning of this period, vital lung capacity is 1200 cm³ do1300 cm³, and at the end of 2000 cm³ to 2100 cm³. The blood pressure ranges for systolic blood pressure of 90 to 105 mm Hg and the diastolic from 55 to 65 mm Hg. At the end of this period, muscle tissue is 30% body weight. Middle school age is characterized by intensive growth and development and can be divided into prepubertal and pubertal period. Differences in developmental characteristics of boys and girls in this period were even more pronounced than in previous periods of development. Increase in height that had previously been a little slower now intense. In girls the increase in height is around 8 cm, and weight gain in boys ranging in height from 13 to 15.5 cm. As for weight gain concerns it increases in proportion to body height. Developing and strengthening muscles in this period is intense and is 32% body weight. Development respiratory system continues particularly intense in the

functional sense, which is manifested by an increase of vital lung capacity, which on average for girls is 2800 cm³, and the boys 3500 cm³. At the end of this period the heart rate is 80 beats per minute. The maximum pulse rate during physical stress is about 205-210 beats per minute. Maximum oxygen consumption was identical for men and boys. Its value is about 2.5 liters per minute. It is difficult to determine with certainty a clear age limit between prepubertal and pubertal period. Puberty in girls starts from 11 years and men over 14 years. In this stage, to intensify the development of the skeleton, and the ossification process is nearing its final stage. Cardiovascular system gets its final look, but the heart is no different in size from the heart of adults. Heart rate during this period reaches from 70 to 75 beats per minute. Functional values of the respiratory system is increased, so that there is an increase vital capacity, which is closer in size to adults. At the end of this developmental period, vital capacity ranging from 4500 to 5000 ml in men and in women from 4000 to 4500 milliliters. Maximum ventilation and maximal oxygen consumption is increasing moderately in girls and in boys. These changes are more intense.

Subject, problem and objective

We analyzed the population of school children who carry out research motor and functional abilities. The research problem is the division of work according to the structure of motor and functional space, the division works under the age of respondents and the division of work in relation to gender. The objective review of research is to summarize information on motor and functional abilities of children of different ages and sexes.

The task was derived from the problem, and that is to take a papers sorted according to the structure of motor and functional space, according to the age of respondents in relation to gender.

Methods

The sample of respondents was divided into preschool, junior school children, middle schoolers and older school children. The sample of variables is divided into variables for motor and functional abilities. For the study of theory and content analysis we used the method of theoretical analysis. Descriptive statistics used for data processing. This method is the most reliable source of materials used textbooks, manuals, proceedings, scientific and technical papers.

Results

Medved et al (1985) investigated in order to determine the size of the heart, anthropometric and some physiological size of the sample aged 11 to 25 who were tested on three occasions. These were young people treated for sports training. Heart volume was done using x-ray. There was a mean heart volume of 588 milliliters, and maximal oxygen consumption was 2.65 liters. Metikoš et al (1986) in a survey set a goal to test the hypothesis of the existence of functional capacity defined as the range of regulation and the stability of the transport system and anaerobic capacity. The results of the battery 18 situational-motor tests on a sample of 96 subjects were determined component factor analysis. Obtained four latent dimensions defined as cardiovascular endurance, sprint, absolute speed-endurance and endurance in strength. Matković (1988) investigated a sample of 28 elementary schools in Zagreb, followed by eight to twelve years in order to determine longitudinal changes in maximal oxygen consumption measured by the continuous load on a moving carpet. Differences between ages were tested by analysis of variance. It was found that maximal oxygen consumption shows a significant increase in value from year to year, provided that the difference decreases from measurement to measurement, that increase is not linear. Malacko, Tončev, Zahorjević and Pejčić (1990) examined the structure of morphological characteristics and motor abilities of selected athletic boys school. The aim of this research consisted in the fact that the selected group of boys in athletic sports schools determine the structure of morphological characteristics and motor abilities, and then make the selection and design of the battery of measuring instruments on the basis that will be able to be checked the effectiveness of programmed training, assessment and monitoring of latent dimensions. In a sample of 103 boys, aged 11 year, was applied a system of 36 variables, 18 of which measure of morphological characteristics and 18 variables of motor skills. The data were processed by factor analysis, and in determining the number of latent dimensions was applied Guttman-Kaiser criterion.

The morphologic characteristics were isolated three latent dimensions in the area of motor abilities of eight latent dimensions (dynamic strength, frequency of movement, speed of alternative movements, speed of hand movements, flexibility, coordination of hands and feet, body coordination and explosive power). Based on the largest projection of variables on the latent dimensions was carried out selection and design of the battery of 14 measurements (six morphological measures and eight motor variables). Blažević and Katić (1997) in a sample of 230 respondents in primary schools, male aged between 12 and 15 years apply a set of 12 motor tests. To determine the differences between the groups differentiated by age was used canonical analysis. Result are significant differences in repetitive strength, movement frequency and sprint. Branković (1998) conducted a study on a sample of 771 subjects from urban and rural primary schools, aged 11 years. They have developed a Harvard step test. The study was performed to determine the differences in pulse frequency after the load. T-test examination showed that in patients of rural schools was significantly faster recovery of the cardiovascular system after working in relation to the patients in urban schools. Radovanović, Raić and Milošević (1998) are the subject of his research took anthropometric and motor variables in a sample of 253 students and 248 fifth graders from the territory of Serbia. In their research they conclude that the anthropometric characteristics and motor abilities dependent on internal and external factors and the systematic physical exercises, movements and activities in the game. Ferić (1999) in a sample of 390 boys and 260 girls, aged 6-11 years assessed explosive power, precision and coordination. Data were collected over seven years. Using analysis of variance showed that the respondents differ significantly by gender in all variables. Kukolj et al. (2001) seeks to longitudinal studies have interconnection of motor abilities during the sensitive period. This research included 235 students and 214 students from first to third grade. Development of motor abilities of students tends to constant improvement. The results of this study can serve as an objective basis in selecting the specific content of training. Bala (2002) investigated the structural differences of motor abilities of boys and girls in preschool children. On samples of 220 boys and 220 girls, aged 4-7 years, was used battery of seven motor tests. By analyzing the differences and similarities intercorrelation matrix, and comparing their structures, the obtained results point out a general motor factor which is qualitatively the same for boys and girls of preschool age, but not for all the applied criteria. Kondrić et al. (2002) in a survey on a sample of 400 subjects, elementary school pupils, aged 7 to 19 years, set a goal to determine the structural characteristics of the relations 15 morphological measures and 24 motor tests. Canonical correlation analysis revealed a more severe development of motor skills, especially in coordination, balance, flexibility, speed, strength and endurance.

Raković (2003) investigated a population of primary school students, aged 11 years \pm 6 months, took a sample of 200 subjects in order to determine differences in functional ability in the final compared to initial measurements made under the influence of training process. In both measurements applied to the eight functional tests (the maximum and the relative oxygen consumption, state of the pulse in the first, second and third minute after recovery, the level of systolic and diastolic blood pressure). Using canonical discriminant analysis showed statistically significant differences in all applied tests of functional ability in the final since the initial measure. Jonić (2004) in a sample of 200 subjects (athletes and non athletes) set a goal to determine differences in functional abilities between athletes and non athletes. Results of T-test showed that the athletes significantly differ in the level of resting heart rate, forced vital capacity, expiratory volume, maximum and relative oxygen consumption. The differences were not found only in diastolic and systolic blood pressure. Joksimović et al. (2004) investigated in order to determine differences in functional and motor abilities and morphological characteristics between primary school students, athletes and non athletes players, ages 11 and 12 years. For measurement of functional abilities, pulse rate at rest, vital lung capacity in peace and pulse rate after the load. Using analysis of variance MANOVA and ANOVA revealed that players have a higher level of functional ability in all applied tests. Rašović and Raičković (2004) are research in a sample of 43 players and 53 sedentary, aged 10-12 years applied the 11 motor tests. The aim was to determine differences in motor abilities. Results showed statistically significant differences between tennis players than non athletes. Kocić (2005) research a sample of 101 respondents 6th grade elementary school, were divided into experimental and control groups applied the six tests of explosive force in order to determine the differences between the experimental groups (basketball section) and the control group (taught physical education). Using canonical analysis showed that the experimental group significant differences in explosive force than the control group. Kumahugotis et al. (2005) investigated the influence of morphological characteristics and basic motor skills. In sample of 63 players, elementary school pupils, aged 12 years in the cities of Rhodes and Nafrakos in Greece, have been tested basic motor skills and special motor skills. Applied a total of 21 variables, 9 of which anthropometric measures, 8 basic motoric and 2 special motor tests. The aim was to establish the relationship of anthropometric measures applied basic motor tests in explaining the achieved results in the special motoric abilities of football players for a quick run with a change of direction at right angles to 25 meters high and fast running start at 10 meters. Results of the special motoric abilities significantly explained by the applied anthropometric measures and the basic motor tests, which can be recommended as a reliable measuring instruments to guide the selection of children for football.

Zrnzević, (2006) conducted a survey on a sample of 82 students and 78 pupils from Trstenik, in order to determine the differences in some of the motor skills between boys and girls first grade. The results showed a statistically significant difference between boys and girls in the area of motor skills. Petrović (2006) in his study aimed to determine potential differences in muscle among boys and girls senior elementary school. Respondents represented 120 students and pupils of the fifth and sixth grades and 60 pupils of the seventh and eighth grades. After statistical analysis using t-test, multivariate and univariate analysis of variance, the results showed that there is a difference. A small number of these differences were not statistically significant. Dejanović (2006) doctoral dissertation had anthropometric characteristics and isometric muscle potential of the lumbar and abdominal region, the isometric endurance of the lumbar and abdominal muscles. The sample of respondents consisted of 428 girls and 441 boys aged 7-14. Period when the most intense and morphological development in harmony with the strength and endurance of muscles. The result of research showed that boys and girls are equal in mean anthropometric characteristics. During this period, the muscle imbalance occurs and isometric endurance has a balanced development. This period represents a phase of major changes in anthropometric characteristics. Zrnzević (2007) investigated the effects of the curriculum and physical education program on motor abilities of first grade. The survey was conducted on a sample of 38 elementary school students from Leposavić. Motor abilities were assessed using 10 variables (hand tapping, background polygon, depth reach on the bench, coordination with the bat, standing long jump seats, running at 30 meters from a standing start, throwing medicine ball, height in the knuckle, raising the legs from lying on his back, to raise troops from lying on his back). He has developed a T-test. The results showed that between the initial and final measurements of first grade students in the area of motor skills, there are differences in some variables and are statistically significant. Statistically significant difference was recorded in variables: coordination with the bat, raising the legs from lying on his back, raising troops from lying on his back. Rančić (2007) explored the differences between the experimental groups (football players) and control (students) group, in an explosive and repetitive strength under the influence of experimental treatments during the summer holidays. We tested 50 of the sixth grade of elementary school from Bela Palanka, 25 of which in addition to compulsory education, usually played soccer in his spare time and once a week during the football section and 25 who have only practiced regular physical education. The subjects were tested with 8 tests, four of which are for the assessment of explosive strength and four to assess dynamic strength. The experimental program consisted of three sessions a week. The research results show that there is improvement in repetitive strength, while the explosive force is no greater progress.

Stanišić (2007) investigated the association between motor coordination and the successful performance of dance structures in preschool children. Sample consisted of 100 boys and 80 girls aged six years (+ / - six months). The causes of motor coordination variables were: the creep with the ball, coordination with the bat, slalom with two balls, skipping rope horizontal, moving backwards through the hoop. Causes of variables for successful performance of dance structures are the steps of waltz, polka and national dance "Moravac". Dance activities were carried out 2 times a week in the 15 targeted activities. A grading dance steps: for each step of the subjects were evaluated with grades ranging from one to five. Correlation analysis revealed the existence of relationships between variables in motor coordination and efficiency in performing dance structures for boys and girls. Batričević (2008) investigated the motor and functional abilities of sports active and inactive students. In a sample of 64 patients of primary schools in Belgrade, aged 14 and 15 years (\pm 6 months), divided into two subsamples and 32 athletes and 32 sedentary, applied the 9 tests of motor and functional abilities. The aim was to determine differences between athletes and non athletes. The research was to examine whether there are significant differences between patients in motor abilities (coordination explosiveness, sprint speed) and functional abilities (vital lung capacity, resting heart rate, systolic and diastolic blood pressure). For the analysis of global quantitative size of individual variables and system variables, their relationships and hierarchies used the T-test for independent samples was small and canonical analysis. The results of this study indicate that athletes different significantly higher levels of sedentary in explosive power, sprint speed, vital lung capacity, systolic and diastolic blood pressure. Jakovljević and Batricević (2008) investigated the effects of explosive energy models for the development motor and functional abilities of students. The aim was to identify quantitative differences in motor and functional abilities under the influence of experimental models of training for power development. The sample of respondents was defined as the population of elementary school boys, ages 14 and 15 years. The experiment involved 38 students from Belgrade included training activities in school sport teams. System for the assessment of functional capacity consisted of four variables: resting heart rate, lung vital capacity, systolic and diastolic blood pressure. The duration of study was eight weeks with 32 hours practice. For the analysis of any differences between the initial and final measurement motor and functional abilities used the T-test for small dependent samples and canonical analysis. At the end of the experiment a statistically significant difference between the processes of transformation an experimental model of explosive strength in repetitive and explosive strength, vital capacity and systolic and diastolic blood pressure. Krsmanović and Radoslav (2008) investigated the differences of anthropometric characteristics and motor abilities of students aged 9-11 years.

We tested 146 students and 129 female students. System variables included the eight variables and anthropometric characteristics of eight tests for motor abilities. Applied battery consisted of the following motor tests: running at 20 meters, polygon backwards, hand taping, bend leg outside, long jump from place to knuckle endurance, lifting the hull, slalom. To determine the differences in motor variables was used univariate analysis of variance (ANOVA), multivariate analysis of variance (MANOVA) and discriminative analysis. Were confirmed statistically significant differences of anthropometric characteristics and motor abilities of students classified by gender. Result: the motor tests in all tests except the bend leg outside, students showed better results than the pupils. Smajić and Molnar (2008) explored the relationship of morphological characteristics and basic motor skills with a system of specific precision players aged 10-12. The study sample was 256 players. Relations system of morphological characteristics and basic motor skills with a system of specific precision were found canonical correlation analysis. Relation factor proves that players aged 10-12 that are greater dimensionality of the skeleton, the more explosive power and better speed endurance, achieve better results in tests of specific precision in football.

Discussion

Analyzed domestic and foreign works are classified according to the research problem, age of respondents and by gender. The results presented in Table 1 indicate that the structure of motor space investigated in 15 selected works, structure and functional motor space is discussed in 5 papers, and the structure of the functional area was investigated in 7 papers.

Table 1. The research problem

Motor abilities	Functional abilities	Motor and functional
15	5	7

Table 2. The division works in relation to age

Age of respondents	pre-school	junior	middle	old
	3	7	10	7

Table 3. The division works in relation to gender.

Sex	boys and girls	boys	girls
	23	4	-

Table 2. shows the most common age of the respondents used in the reviewed research is the middle school years (10 papers), junior school age and older school age (seven papers) and preschoolers (three papers). The division of work by sex of respondents shows that most of the papers included mixed groups of subjects (boys and girls) and that the result obtained significant research after all and because it is the right measure, to recognize the differences in sex. Papers that have been isolated only from the male population are exclusively based on research within the sport that is dominated by the male population and whose system of competition, at least not until now, has not fully adapted to the girls.

Conclusion

Research of functional and motor abilities based on processing the collected data can have a dual significance, as follows: practical importance can be seen in the application of knowledge obtained by the processed data in the immediate practice of working with children of different ages and age theoretical importance of the theoretical application of knowledge for new descriptive research, with always the possibility of permanent stands and permanent overbuilding or comparisons of previous research in relation to present and hopefully future research. Research on motor skills in this work completely spontaneously gathered by a central attention. Most research in the field of motor abilities studies clearly demonstrates that in children the role of various forms of physical activity contributes to the constant process of motor development. Based research in the field of functional abilities were justified in a few compared studies based on the area of motor skills. The answer is found shows the field of functional capabilities included in parallel with both the sports with one hand and health on the other hand, what this box is the reputation of scientific observation and study of two scientific fields, medical and sports. Papers based on motor and functional abilities have a large joint significance.

Monitoring of functional abilities and changes to actively explore motor skills leads to some important conclusions that are highly correlated. Mutual dependence is confirmed in the works, which contained a study of functional status and mobility of patients. Division of ages included in the research (preschool, junior, middle and senior school age) confirmed a statistically significant difference in motor skills of children depending on age. We came to the data to a statistically significant difference of functional abilities of children depending on age. Research based on the participation of boys and girls confirmed that there are differences in the level of motor and functional abilities of boys and girls the same age. Depending in what age groups are the subjects performed research showed that boys and girls differ in the values of motor and functional abilities. Importance of rapid activation of children in the process of raising exercise directly causes both motor and functional ability which results have max effect in the evolution of the human entity. The synergy of genetic and professional process followed by physical exercise. We came to the overall objective in the educational and health process. We came to cognitive functions in the body of data in the phase of intense growth and development. The richness of these findings should guide us in creating a healthy population.

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ISTRAŽIVANJA DJEČJIH MOTORIČKIH I FUNKCIONALNIH SPOSOBNOSTI

Sažetak

Predmet istraživanja je populacija školske djece nad kojima su vršena istraživanja motoričkih i funkcionalnih sposobnosti. Problem istraživanja je podjela radova prema strukturi motoričkog i funkcionalnog prostora, podjela radova prema uzrastu ispitanika i podjela radova u odnosu na spol ispitanika. Cilj preglednog istraživanja je da se dođe do sumiranog saznanja o motoričkim i funkcionalnim sposobnostima djece različitih godina starosti i spola. Zadaci istraživanja proizlaze iz problema, a to je da se prikupljeni radovi sortiraju prema strukturi motoričkog i funkcionalnog prostora, prema uzrastu ispitanika i u odnosu na spol ispitanika. Uzorak ispitanika podijeljen je na predškolski, mlađi, srednji i stariji školski uzrast. Uzorak varijabli je podijeljen na varijable za procjenu motoričkih i funkcionalnih sposobnosti. Za proučavanje teorije i analize sadržaja radova koristi se metoda teorijske analize. Rezultat indicira istraženu strukturu motoričkog prostora u 15 radova, strukturu motoričkog i funkcionalnog prostora u 5 radova i strukturu funkcionalnog prostora u 7 radova. Najrasprostranjenije uzrasno doba u istraživanjima je srednji školski uzrast - 10 radova, mlađi i stariji školski uzrast po 7 radova, a predškolski 3 rada. Podjela radova prema spolu ispitanika pokazuje da je najveći broj radova sadržavao mješovite grupe ispitanika i da je rezultat dobivenih istraživanja značajan pored svega i zato što se u pravoj mjeri mogu sagledati razlike po spolu.

Ključne riječi: dijete, škola, motorička, funkcionalna, sposobnost

Received: September 15, 2010

Accepted: December 20, 2010

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