BIOLOGY OF EXERCISE
VOLUME 5.2, 2009

Evaluation of children 8 - 9 years old based on their physical abilities

D.O.I: http:doi.org/10.4127/jbe.2009.0026

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ABSTRACT

This research deals with four basic abilities of two different samples. One group of 267 selected subjects, among a larger sample of 8 to 9 year old children and one of 211 non-selected. The target of the research was to evaluate the basic abilities, speed at 30 meters, endurance at speed with change of direction, jumping ability and throwing ability; furthermore, to found out the differences of performance among the two sexes at this age, separately for each sample; finally, to correlate the abilities of lower extremities that arise from the application of tests, with those of strength velocity at upper extremities, separately for boys and girls at selected and non selected subjects.

Differences were examined with the one-way ANOVA, while the correlation was carried out by Pearson coefficient. Performances of boys of this age (8 - 9 years old) are statistically better than those of girls at all abilities measured in non-selected children ($p < .001$). However, in selected ones, the differences were smaller, mainly at speed the 70 meters from the standing position ($p < .0001$) and throwing strength velocity at upper extremities, as well as strength of vertical jump, at $p < .05$, while no difference was observed at speed with change of direction at both sexes. Strength velocity at upper extremities is correlated to the basic abilities of lower extremities more in non-selected children.

KEY WORDS: *abilities, selected, non-selected, differences.*

INTRODUCTION

Control and evaluation of the factors of physical fitness consist of a basic principle of training (Ferrauti et al, 2006). Training effects must be checked and the results used for the partial correction or even review of design and execution of training, based on the targets that are being pursued.

Control is considered to be the procedure of collecting information for the given situation or the ways of appearance of one or more factors that affect sport performance and their comparison with the desired result or set up (Steinhoefer, 2003). One of the most important types of control is the sport kinetic test (Letzelter, 1978).

Sport kinetic test is the procedure of diagnosing the level of performance and forecast of expected performances (Wollny, 1997). Most sport kinetic tests are control methods of appearance of technical skills or natural abilities. When tests are applied in the beginning of the training period, they contribute in ascertaining the level of athletes and the further preparation of a long-standing program, thus avoiding the undesirable results of an improper program.

On the one hand, the test results may yield important information for specific abilities (Bos & Wohlmann, 1987) and on the other hand they may help to the evolution of knowledge degree in connection to the different development of kinetic abilities based on age and sex, their stability and forecast degree for complex abilities (Lienert, 1989 - Grosser & Starischka, 1981).

In order a test to be used as information mean, it must meet specific scientific criteria, which are distinguished in main and secondary. The main qualitative criteria are validity, reliability and objectivity, while the secondary qualitative criteria are economy, standardization or content, comparableness or discreteness and usefulness (Pieper, 2006).

Physical abilities at the Greek population were not satisfactorily examined and there are few references in sports science. There are references for other countries, such as the USA or Japan, where we found out that physical abilities are not developed within pupil population (http://www.uta.edu/faculty/drleslie/childrenaging%20text.pdf, 2009, Shimamoto et al, 2008). However, the development of natural abilities in childhood, e.g. higher levels of cardiorespiratory health at childhood and adolescence is related with higher levels of cardiorespiratory health later in adulthood (Ruiz et al, 2006). A thorough study and development of models of physical fitness at these ages is thus required.

MATERIALS AND METHODS

The target of the research is the evaluation of basic abilities, speed at 30 meters, stamina in speed with change of direction –shuttle run–, jumping abilities and throwing ability (strength velocity at upper extremities). Furthermore, to ascertain the performance difference between the two sexes at this age, separately for each sample. Finally, to correlate the abilities of lower extremities that arise from the application of tests, with those of strength velocity of upper extremities, separately for boys and girls in selected and non-selected children.

METHOD

Four tests were used for this research:

Sprint: each pupil begins separately from the standing position and runs the distance of 30 meters straightway, as quickly as possible. Before the beginning of the test, the starting and finishing line was shown, while there was visual demonstration of the standing starting technique and running straight with speed. The measurement of the test is carried out with a timer and begins simultaneously with the ring of start. The time of each performance is recorded in seconds and hundredths.

Vertical jump: The pupil stands looking at a wall. He/she extends as higher as possible, on the toes, and the examiner marks the trace of the toes. Then, without changing direction, after bending the feet –approximately 90 degrees– and with the support of the hands, the child executes a vertical jump, as high as possible. The examiner measures the vertical difference in centimetres (cm) between the original trace (extension, standing on the toes), before jumping, and the trace after the jump. The best, among three jumps, is recorded.

Medicine ball throw: The pupil stands behind the throwing line at a distance of approximately 30cm or slightly more from the opening of the shoulders, holding the ball with the two hand stretched above his/her head. After the extension of the body backwards, he/she throws the ball as far as possible. Feet do not leave the ground before the fall of the ball. The orbit of the ball must be as vertical as possible to the throwing line. For the right placement of the feet, we trace two parallelograms at the throwing line, which are 30cm far from each other. Before carrying out the test, the technique is demonstrated, with a particular emphasis on the throwing angle (30-40 degrees) and the synchronization of body and hands, while warming up and 1-2 trial efforts precede. The distance between the throwing line and the nearest to the line trace of the ball is recorded. The best performance, among the 3 efforts, is recorded in m (e.g. 10,5m).

Shuttle run: Children run for a distance of 20 meters and return. Running is carried out with ongoing tension, specified by sound signals, with the help of a tape recorder. At the beginning of the test, the pupils, who stand at a distance one meter from each other, move between the two parallel lines of the lane. They must cover the above distance within an interval of two sound pulses. The sounds strike at a quicker frequency every minute that passes, requiring from the pupils to make more efforts. The total score that was achieved until the end of the effort is recorded as the number of runs.

Measurement is carried out in stages-phases and the duration of the test depends on the physical ability of the child and more particularly his / her cardiorespiratory ability. The final measurement is the number of the stage that was announced, approximately at the 1/2 of the stage. This number corresponds to a specific value VO_2max (ml/min/kg) and is the index of cardiorespiratory ability.

For the statistical processing of the data, differences were examined by one-way ANOVA, while correlation was made with Pearson coefficient from SPSS program (10). EXCEL was used for graphics.

RESULTS

In non-selected children, between the two sexes of this age (8-9 years old), statistically important differences were noted at all physical abilities, $p < .001$ (Figure 1). Alternatively, at selected children, the performance of boys is statistically better than that of the girls, mainly only at the speed of 30m from standing position ($p < .001$) and less at throwing strength velocity of upper extremities, as well as at the strength of vertical jump, $p < .065$ (Figure 2). No difference was noted at shuttle run between sexes. Strength velocity at upper extremities is correlated with the basic abilities of the lower extremities more in non-selected children (Table 1). In selected ones, the upper extremities strength velocity of boys has a much more important statistical relation with the other tests. Contrastively, the performance of girls at "vertical jump" is statistically correlated with this ability (Table 2).

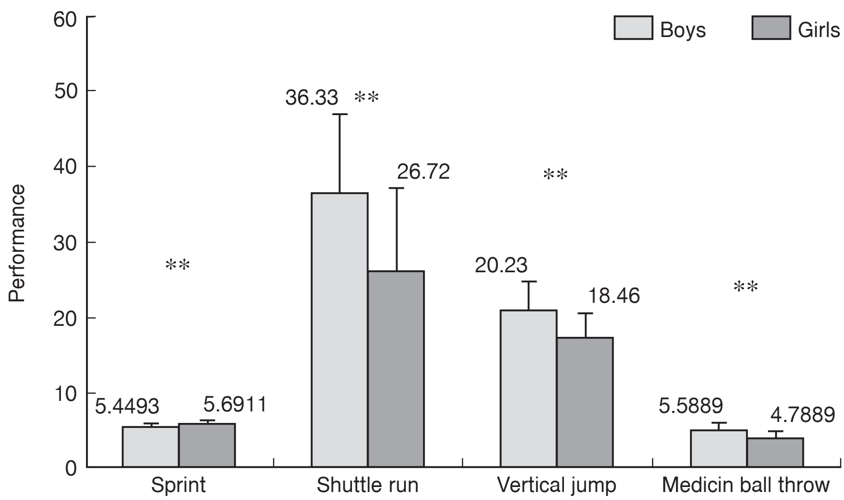

Figure 1: *Performances at the four tests in non-selected boys and girls, with the score and typical variation.*

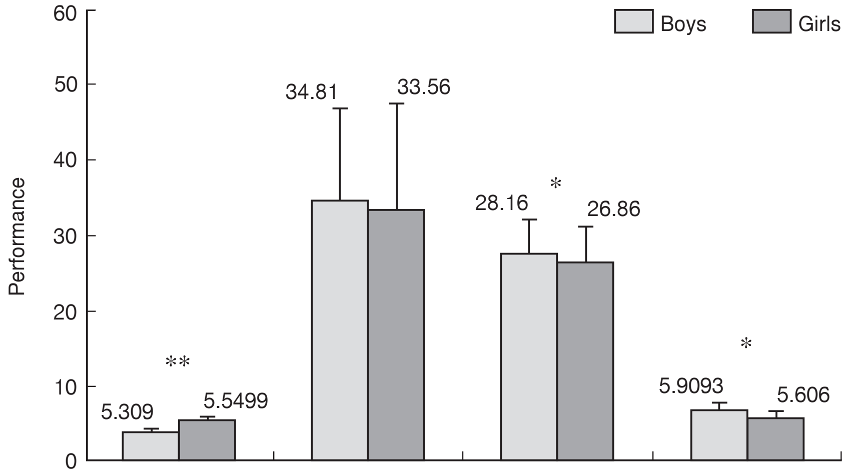

Figure 2: *Performances at the four tests in selected boys and girls, with the score and typical variation.*

Table 1. *Correlation among the four tests at GIRLS/BOYS (non-selected)*

		SPRINT	SHUTTLE RUN	VERTICAL JUMP
SHUTTLE RUN	Pearson Correlation	.291**/.218*		
	Sig. (2-tailed)	.002/.026		
	N	107/104		
VERTICAL JUMP	Pearson Correlation	.063/.264**	–.052/–.222*	
	Sig. (2-tailed)	.519/.007	.596/.023	
	N	107/104	107/104	
MEDICINE BALL THROW	Pearson Correlation	.336**/.202*	–.537**/–.430**	–.372**/–.341**
	Sig. (2-tailed)	.000/.040	.000/.000	.000/.000
	N	107/104	107/104	107/104

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Table 2. *Correlation among the four tests at GIRLS/BOYS (selected)*

		SPRINT	SHUTTLE RUN	VERTICAL JUMP
SHUTTLE RUN	Pearson Correlation	.234**/.348*		
	Sig. (2-tailed)	.009/.000		
	N	125/129		
VERTICAL JUMP	Pearson Correlation	.225/.142**	–.325/–.301*	
	Sig. (2-tailed)	.012/.109	.000/.001	
	N	125/129	125/129	
MEDICINE BALL THROW	Pearson Correlation	.169**/.270*	–.129**/–.227**	–.371**/–.400**
	Sig. (2-tailed)	.060/.002	.153/.010	.000/.000
	N	125/129	125/129	125/129

* Correlation is significant at the 0.01 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).

DISCUSSION

This research found out that at the age of 8-9 the more performance increases, the less the differences between boys and girls are decreased. This general inclination that when ability levels are low then the differences between the sexes is big, seems to be interpreted mainly by the fact that girls in general are inferior, concerning their physical abilities, and maybe this happens due to lack of training. Furthermore, in selected girls it seems that the display of a talent is more a one-dimensional parameter, in correlation to boys, where the distinction of upper extremities abilities seems to correlate with the abilities of lower extremities. This amounts to a more specialized observation for girls for whom things are generally more difficult, in connection to the selection of talents.

References for differences in kinetic abilities between boys and girls of younger than 6-9 year old children in this research are included in Greek literature (Derri, 1999). Researchers found out that boys and girls older in age (9 years old) are faster and the respective children of smaller ages (6-8 years old).

Concerning the strength of upper extremities, boys presented better results than girls. In contrast, in overweight teenagers, the results of the research were exactly the opposite, i.e. girls presented statistically better performances (Daynel, 2008).

Concerning throwing strength (medicine ball) and at the age of 10-11 years old, another research, agreeing with the findings of this research, found a statistically important difference between sexes, $p < .01$ (Anagnostou, 2007).

Another parameter of interest, when one examines the development of physical abilities, is the different, possibly image, based on place of residence. A research of 11 and 12 year old children, concerning shuttle run test and speed test (Tsimeas, 2005) did not show variations among performances of children from civil centres in connection to children from rural areas ($p = 0.187$ and 0.974 for shuttle run and speed test, respectively). Furthermore, there are literature references, which agree with the findings of this research and for other more specialized abilities. Therefore, the ability of "ball handling" at this age is better in boys than in girls at statistically important levels ($p < .001$) (Mavvidis, 1997).

In the age group that was studied at this research (8-9 years old), boys were better at basic physical abilities and the better performance they had, the more complex talent they presented in correlation with girls. Study programs of general or more specialized talents at sports, as it results from the above reports, show that the evaluation of boys is more feasible at this age, in connection to girls.

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