INVESTIGATION ON THE „AGILITY“SKILL AT 14-TO 16-YEAR-OLD STUDENTS BY ILLINOIS AGILITY TEST

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ABSTRACT

Introduction: The agility control among 14-16 year old students is significant regarding the delicate period of their development. We used the Illinois test which is frequently used in the world with the exception of Bulgaria.

Methodology: The goal of the experimental study was establishing the agility condition among 14-16 years old Bulgarian students using the Illinois test.

The object of the study is the control of the agility motor quality.

The subjects are basic factors of agility - the ability of the body to coordinate specific movements in time, space and effort. Twenty sports active students were a part of the survey, with average age 15.3 ± 0.6 years, height 176.4 ± 4.1 s and weight 62.2 ± 5.2 kg.

Results and analysis: The first group of the results are related to the informational values of the test. The acceleration, direction change, orientation in space, coordination determine the validity of the testing. A Test-Retest method and correlation in dependent samples - " r " = 0.9 ($d = 0.05$) were applied to determination of reliability. The standard is provided by testing under the same conditions in a sports hall. The objectivity is guaranteed by measuring with a Beam Trainer photoelectric system.

The second group of the analyses is focused on the test's achievements. The best score was 16.05 s, the weakest-20.82 s. and the average level value was determined as 18.03 s. A normal level of distribution is determined, sigma deviation + -1.1 s as well as a normative chart is created.

Conclusion: It was determined that the Illinois test is highly informative for measuring agility in adolescents. Our research shows a lower quality level among 14-16 years old Bulgarian students compared to other authors.

Key words: informativity criteria, control, status, evaluation

INTRODUCTION

Agility motor skill is related to the ability of the individual to coordinate separate movements in time, space and effort, adequate to the motor task. (Zhel-yazkov, Dasheva, 2017; Bachev, 2017; Mihailov, Andonov, 2013; Bompa, Haff 2009; Sheppard, Young, 2006; Rusev, 2005). In particular, agility is important in the rapid change of direction of the body in a combination of strength, speed, balance and coordination. (Draper, Lancaster 1985) It appears that the indicated motor skill is complex, which makes it very important and necessary for the physical development of the students. The Lloyd, R. S., J. L. Oliver, 2012 adolescent physical development model revealed the 12-16 year olds as the most appropriate age, with peak height of 14 years for the boys. (Lloyd, Oliver, 2012)

The measurement should be performed by means of modern, highly informative tests that are appropriate to the age, gender and capabilities of the tested subjects.

The agility tests usually include investigated per-

son who is moving in a series of stacked stationary cones or lines spaced a certain distance, in order to pass in the shortest possible time. It can range from only two lines to very complex ones with multiple cones and multiple direction changes. (Leon-Car-lyle, 2012)

In sport practice, the widely used tests are: „505 Agility Test“ associated with a sharp change of direction (Gabbett, Mulvey 2008; Jones et al., 2009), „Shuttle run test“ measures the athlete's ability to run and to turn as quickly as possible at a designated place (Chaouachi et al., 2011; Jullien et al 2008; Kaplan et al. 2009; Markovic et al., 2007) „T-test“ - associated with running forward, left, right and backward (Hoffman et al 2005; Miller et al., 2006; McBride et al., 2002; Little & Williams, 2005), „Illinois agility test“ - associated with frequent change of direction, stop movements, acceleration and zig-zag movements. (Jarvis et al., 2009; Caldwell, Peters, 2009 Vescovi, McGuigan, 2008; Rozen, 2004) The last of the above-mentioned-the Illinois agility test, is widely known and used in the world, but not

in Bulgaria. We suggested that by its application, the process of measuring and assessing motor skill „agility“ in students could be improved.

METHODOLOGY

The aim of the experimental study is to determine the state of agility skill in 14-16 year old Bulgarian students by using the Illinois agility test.

Objectives of the study:

1. Study on the problem of control of „agility“ motor skill in adolescents;
2. Determination of the informative criteria for the Illinois agility test in 14 to 16 years old students;
3. Conducting the first experimental testing for Bulgaria by applying the Illinois agility test;
4. Development of a normative table for as-

essment, status determination and comparison with the established students level from other countries;

The object of research is the control of motor agility skill.

Subject areas are the basic factors of agility - the body's ability to coordinate specific movements in time, space and effort.

Twenty actively sporting boys, average age 15.3 ± 0.6 years, height 176.4 ± 4.1 s and weight 62.2 ± 5.2 kg were investigated (tested).

Used methods

The following methods were applied during the study:

- Information survey;
- Establishing (controlling) pedagogical experiment - testing with the Illinois agility test (Table 1).

Table 1. Characteristics of the Illinois agility test

№	Name of test	Measuring characteristics	Indicator for measure	Accuracy	Results
1.	Illinois agility test	Agility (coordination, orientation in space)	Time for conducting the test	0,01 s	(-)

The test is designed to measure agility motor skill. Flat non-slip platform, stopwatch or timing system, tape measure and 8 marking cones are required for conducting the test. The implementation of the test is as follows: starting position of the test subject - semi-squat, supported with one hand at the starting line. After that the test begins and the test subject begins running. The whole test is passing for as

short a time as possible. The length of the test polygon is 10 m and its width is 5 m. Between 1st and 2nd cones the distance is 10 m. Between 3rd, 4th, 5th and 6th- the distance is 3.3 m. And the distance between 7th and 8th (the final cone) is again 10 m (Figure 1). (Getchell, 1979) Possible equivalent tests: start from different positions, test distance is less or more, more cones are placed.

Figure 1. Scheme of conducting of the Illinois agility test (Rozen, 2004)

- Mathematical-statistical methods;
- Theoretical analysis and synthesis;

RESULTS

The first methodological activities were performed to determine the informative criteria of the Illinois

agility test for 14 to 16 years-old students. Results and analysis are present in Discussion.

Our next research activity was focused on systematizing and analyzing test performance. We processed all the better of the two test-retest scores by applying variational analysis (Table 2).

Table 2. *Variational analysis of achievements by the Illinois agility test*

Indicators	n	ME	R	Max	Min	X	S	V	As	Ex
Illinois agility test “	20	s	4,77	16,05	20,82	18,03	1,1	6	0,65	0,69

The values of the two indicators - Skewness and Kurtosis determine normally the distribution of the

data, which allowed the normative evaluation table to be made (Table 3).

Table 3. *Normative evaluation table for the achievement of 14 to 16-years-old students tested by the Illinois agility test*

Evaluation	Limits	%	a number of people included in the group
High	below 15,83 s	2,28	0
Above average	from 15,83 s to 16,93 s	13,59	4
Average	from 16,94 s to 19,13 s	68,27	12
Below average	from 19,14 s to 20,23 s	13,59	3
Low	above 20,23 s	2,28	1

Similar researchs and normative evaluation table have been made by Davis et al., 2000 (Table 4).

Table 4. *Normative evaluation table for the Illinois agility test results for 16 to 19 year olds.*

Sex	Excellent	Above average	Average	Below average	Low
Men	<15.2 s	15.2-16.1 s	16.2-18.1 s	18.2-18.3 s	>18.3 s
Women	<17.0 s	17.0-17.9 s	18.0-21.7 s	21.8-23.0 s	>23.0 s

DISCUSSION

The methodological activities were performed to determine the informative criteria of the Illinois agility test for 14 to 16 years-old students: 1.To establish the validity of the test, we applied a logical analysis of its content, which includes elements related to the characteristic of „agility“ motor skill, namely: the ability to coordinate specific movements in time, space and effort by abruptly changing direction, zigzag running, sudden stop movement and subsequent acceleration. 2. Reliability was determined by the test-retest method. Between the achievements of two performances in a short time interval, we calculated Pearson linear correlation coefficient for dependent samples. The obtained value - „r“ = 0.9 ($\alpha = 0.05$) gives us reason to point out that the test is highly reliable in regard to the tested 14-16 year old boys, students from Bulgaria. 3. The standard criterion was conducted by testing all tested students under the same

conditions in the gym, between 10am and 12pm, excluding the influence of meteorological factors. 4. The Objectivity was ensured by measuring with a “Beam Trainer” automatic photoelectric system (0.01 s accuracy) and telemetry connection with special software to the tested subject’s smartphone. The resulting achievements can be disseminated by email.

The results placed in Table 2 show that the best achievement is 16.05 s, the lowest achievement is 20.82 s, the average level is 18.03 s. and the 4.77 s average.

The highest number of pupils 12 have achievements in the range from 16.94 s to 19.13 s according to table 3 receive an „average“ grade. This gives reason to characterize the studied group of persons as highly homogeneous. The explanation is related to the fact that they are active athletes with high sports

achievements in sports football, volleyball and basketball. Their results are a function of good execution of coordinating complex exercises, such as running short distances, sudden braking and acceleration, changing of direction of t, which logically leads to high results when performing the Illinois test.

Comparing the achievements of the boys tested by us and the results of Davis B et al. we come to the fact that the results in our study are weaker than those of Davis B et al. A logical and objective reason is the age difference between 14-16 and 16-19 year old students. In this age range, the agility motor skill have been improved many times by systematically performed activities involving a variety of coordination exercises.

CONCLUSION

We also find that the Illinois agility test is highly informative for measuring adolescent agility. The test group of 14-16 year olds has high reliability and the series of complex coordination exercises performed is also an indicator of the validity of the test. Subject to uniform conditions for the performance of the test, its standard and objectivity are ensured.

We recommend that the same test be actively applied in the control process.

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