

The relationship between speed and coordination ability with acro-dance performance in athletes 12-14 years old

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ABSTRACT: The study conducted on a sample of 100 girls, aged 12-14, practicing acro-dance for at least one year in Romania, we initiated it considering that their modest results in competitions express deficiencies of motor capacity. Speed and coordination are favoring/limiting skills of performance in this branch of sport. In order to verify the working hypothesis, we analyzed, on the one hand, the score of the target group of the research at the difficulty criterion and the ranking in the competitions they participated in in 2023, and on the other hand, we identified the level of speed and coordination capacity. For this we used three tests to evaluate, measure and assess the speed and coordination capacity: the 4-stroke test, the Adams test, the Denisiuk test, approved and standardized instruments, for which we scaled the results for awarding ratings.

The results recorded by athletes highlight their major deficiencies in specific physical training, poor values of speed and coordination, which limit the level of technique, the difficulty of choreography and consequently reveal the relationship between the level of these abilities and their performance in competitions. The conclusions of the study are solid arguments that require the adoption of specific physical training strategies designed to remedy these topics objectively highlighted by our research.

KEYWORDS: acro-dance; coordination; speed; performance.

I. INTRODUCTION

The motor content specific to acrobatic dance (technique) includes a varied and complex range of movements. The great variety of technical procedures is permanently combined in a multitude of dance structures or choreographic compositions (Abruzzini E, 1977). Practicing acrobatic performance dance in accordance with current requirements requires special skills from those who want to achieve high performances. (Nastase V., 2011). Motricity manifested by dance must respond to a wide range of body forms and a diversity of body-space-time ratios (direction, amplitude, shape of movement, speed, duration, rhythm, acceleration of movement, body energy). All these characteristics of motor behavior fully engage motor capacity (Grigore, V., 2001).

Our research is a quantitative one, in which we shared the opinion of author Predoiu (2020), who considers, based on the documentation carried out, that this type of research is a formal, objective and systematic process, in which numerical data are used (average scores for different groups for certain tasks, percentages, graphs and data tables, results expressed in different units of measurement, etc.) to obtain information about a certain aspect. It involves testing a hypothesis or trying to discover relationships between different aspects of a particular issue (Gagea A, 2010; Wilcox, R. R., 2017). Quantitative research has been designed to establish differences, associations, or causal relationships. This type of research summarizes particular situations to generate a general description, this involves evaluations and data analyzes, easily replicated by other researchers.

In conducting our research we took into account the characteristics of the evaluation expressed in 2000 by Radu.T.I. and Dragnea's opinion on motor capacity, which he considers "a complex of predominantly motor manifestations conditioned by the level of development of motor qualities, morpho-functional indices, psychic processes, biochemical and metabolic processes, all summed up, correlated and mutually conditioned, resulting in efficient performance of motor acts and actions required by the specific conditions in which motor activity is practiced." (Dragnea et al., 2006, p.4).

The evaluation tools used are described by Tudor V. (2005), are consistent with the age of the subjects and satisfy the specificity criteria of the field Sports Science and Physical Education.

II. MATERIALS AND METHODS

The purpose of the research was to identify the level of speed capacity and specific coordination capacity of athletes practicing acrobatic dance at the age of 12-14, in relation to their performances in competitions in 2023.

We considered that between the level of performance capacity expressed by the degree of difficulty and the place occupied in the rankings of competitions is related to interdependence with the level of speed and specific coordination capacity manifested by them. The subjects of the research were 100 sportswomen aged 12-14 who practice acro-dance in different sports structures of public and private law: C.S Ritmica - 7; Ballet Dance Studio Heart & Soul Association - 12; Athletic Dance Sports Club Association - 41; Straja Hojam Dance School -15; Millenium Art Association Giurgiu – 25. In order to assess the level of performance, we took into account the score at the difficulty criterion and their best position in the ranking at the various competitions at national level in 2023 and for the level of speed development and coordination the following measurement and assessment tools:

a) **4-stroke test**, for measuring execution speed in coordination and force mode.

From the sitting position, the subject performs the following exercise as quickly and correctly as possible:

- Time 1: from standing passage to squat with touching the floor with palms;
- Time 2: Bringing your legs back into support lying forward with elbows outstretched and feet close together;
- Time 3: return to the squatting position;
- Time 4: return to the sitting position;

Result: Note the number of complete cycles over 30 seconds

Based on our own experience and the results of other research in which this test was used, we made referentials for the ratings awarded based on the results recorded, as follows: 25 complete cycles – excellent; 20 - very good; 15 - good; 10 satisfactory; less than 10 unsatisfactory.

b) **Adams Test**, used for measuring execution speed in skill mode.

Draw 2 lines that cross, with a length of 1 m and number the 4 spaces created, top with 2 and 4, bottom with 1 and 3. The performer starts from space 1 with a jump on two legs, jumping in order of numbers, in order to achieve as many jumps as possible in 15 seconds. It is considered a mistake to reach the line or not touch the ground with both feet, count successful jumps and relate to those that were wrong. Based on our own experience, we made referentials for the ratings awarded based on the results recorded, as follows: 20 correct jumps - excellent; 15- very good; 13- well; 10- satisfactory; less than 10 unsatisfactory.

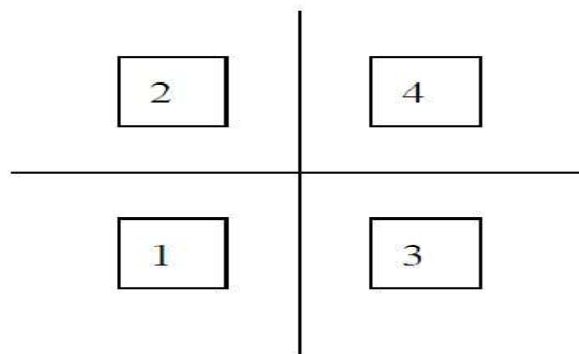


Figure 1. Graphical representation of the Adams test

c) **Denisiuk Test**, measures overall coordination in speed mode.

It consists of: running 5m, bypassing a 360 degree pennant, running, rolling forward, running, bypassing the second obstacle 180 degrees, running in bent support, rolling forward, bypassing the obstacle 360 degrees and arriving at where it started. The mattress is placed midway between the two obstacles. The round trip route measures 30 meters. The time to complete the route is timed. We analyzed the results recorded by the research

subjects by fitting into the following ratings: 15 sec. - excellent; 20 sec.- very good; 25 sec.- good; 30 sec.- satisfactory; over 30 sec. – unsatisfactory.

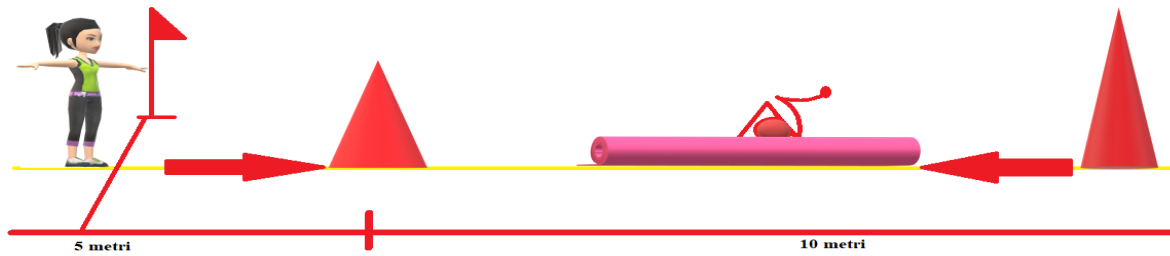


Figure 2 . Graphical representation of the Denisiuk test

III. RESULTS AND DISCUSSION

From the analysis of the scores obtained by the subjects in our research at the 2023 competitions, we have found that over 50% of them receive low scores, below 50 points, and only 20% achieve satisfactory scores, above 70 points, while the rest fall within the good rating. The competition results reflect these deficiencies in the difficulty of the athletes' choreographies, and the level of speed and coordination significantly impacts their performances.

In analyzing the results, the computer products used for statistical data processing were: SPSS V23 (Statistical Package for the Social Sciences); Microsoft Office 2019, Word and Excel. The statistical interpretation of the data was graphically illustrated with the help of Box Plot.

The statistical indicators of the results determined in the evaluation tests are recorded in the following table:

Table 1. Statistical indicators in coordination and speed tests

| <i>Statistical indicators</i> | 4-stroke test (full cycles in 30 sec) | Adams Test (Pass/Fail) | Denisiuk (sec) |
|-----------------------------------|--|-------------------------------|-----------------------|
| Average | 10.41 | 7.99 | 27.37 |
| 95% CI Average-Upper limit | 10.76 | 9.30 | 28.13 |
| 95% CI Average-Lower limit | 10.06 | 6.69 | 26.61 |
| Middle | 10.00 | 5.40 | 27.27 |
| Dispersion | 3.09 | 43.31 | 14.76 |
| Standard Deviation | 1.76 | 6.58 | 3.84 |
| Variation Coefficient (%) | 17% | 82% | 14% |
| Minimum value | 7 | 1.60 | 19.95 |
| Maximum Value | 14 | 32.00 | 35.42 |
| Amplitude | 7 | 30.40 | 15.47 |

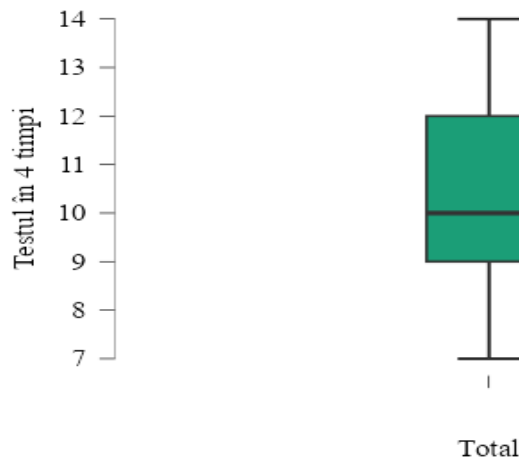


Chart 1. 4-stroke test Box-Plot

The statistical indicators determined for this test highlight the following: the arithmetic average obtained by athletes has the value of 10.41 cycles, result that places the group at the satisfactory grade. The results are dispersed relatively uneven. As the lowest value is 7 cycles and the largest is 14, the resulting amplitude is 7 cycles in 30 sec., the median value is 10 cycles. And the best result recorded in this test is rated good.

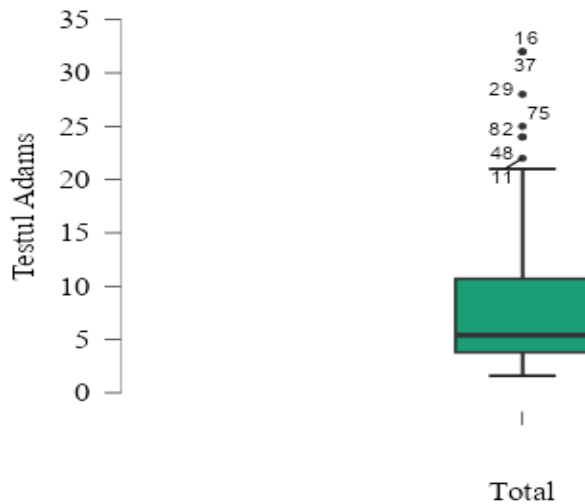


Chart 2. Adams Test Box-Plot

Adams test results show an arithmetic average of 7.99 successes/failures. The median value is 5.40. The results are dispersed uneven. The minimum value is 2 successes / failures and the maximum is 32. The amplitude has a value of 30. We notice on the box plot the presence of several "outlier" points.

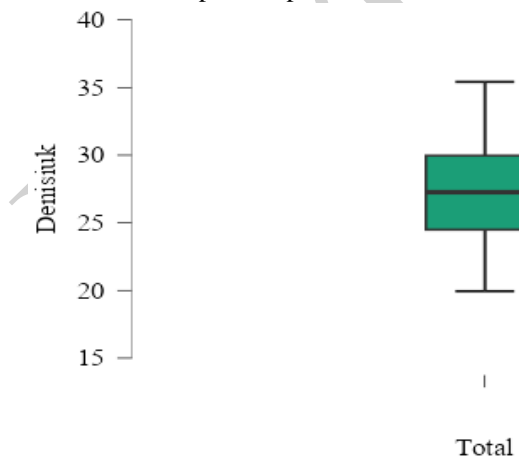


Chart 3. Denisiuk Test Box-Plot

On the Denisiuk test, the average result of the athletes is 27.37 sec., which puts the group in the middle of the time interval for the good and satisfactory grades. The results are evenly dispersed around the average. The minimum result is 19.95, which falls under the very good rating and the maximum 35.42 sec, at the satisfactory rating, resulting in an amplitude of 15.47 sec.

IV. CONCLUSIONS

The results recorded by the subjects of our research highlight the poor level of specific physical training. The assessment tools, tests used in measuring speed capacity and specific coordination have proven reliable for verifying the working hypothesis, providing objective results to identify the evaluated aspects.

Based on the modest results recorded by the research subjects at the technical difficulty, which is also reflected in the poor results in competitions, we consider that the unsatisfactory or poor level recorded in the tests for measuring the speed and coordination capacity is a limiting factor of their performance. Thus, the working hypothesis is confirmed, between the performance in the competition and the level of speed capacity, speed in the regime of other motor qualities and coordination is a relationship of interdependence. In a branch of sport where the level of aptitude capacity conditions the achievement of technical elements and especially of the choreography necessary to satisfy the difficulty criterion in refereeing, it is imperative that the training of athletes focus on objectives, methods and means of developing the motor qualities required by the specific effort.

In order to remedy the level of their training, a training strategy is required in which the specific physical training objectives are operationalized through an efficient integrative didactic design.

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