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COORDINATION ASPECTS IN THE HANDSTAND JUMP IN MEN'S ARTISTIC GYMNASTICS

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Abstract: *Coordinative capacity in men's artistic gymnastics is an essential factor in performing all elements and element structures across all six apparatuses. In vaulting, coordination is fundamentally important due to the short duration in which the effort takes place in this event. Besides the physical factor, specialists emphasize that execution aspects such as rhythm, coordination, and spatial orientation play a crucial role in vault performance. This research involves the analysis of a group of gymnasts based on coordination tests that contribute to improving technique in the vault event in men's artistic gymnastics.*

Key words: *coordination, gymnastics, test, technique*

1. Introduction

Coordinative capacity is a fundamental aspect of artistic gymnastics. In both men's and women's artistic gymnastics events, coordinative capacity plays a crucial role [2]. Spatial orientation, as well as balance and coordination aspects, help gymnasts perform complex motor structures with minimal energy consumption and effort. Due to the short and intense execution time in the vault event, coordination benchmarks create the perspective of a technically superior execution with higher accuracy indices [1].

Specialized literature does not provide detailed coverage of this aspect, and the available materials related to coordinative capacity in executing the handspring vault are limited.

In men's artistic gymnastics, coordinative capacity plays a crucial role in the vault event, influencing precision, efficiency, and execution safety [7]. It refers to the athlete's ability to control and adapt body movements in time and space to perform complex vaults [9].

Components of Coordinative Capacity in Vaulting [6]:

- Intersegmental coordination – the ability to synchronize the movements of different body parts to generate the necessary force for takeoff and landing [8].
- Spatial orientation – essential for recognizing body position in the air, especially during multiple rotations and acrobatic elements.

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- Balance – crucial both during the vault preparation phase and at landing to avoid penalties.
- Rhythm and movement precision – necessary for an effective takeoff on the springboard and correct execution of the vault.
- Quick reaction – important for fine-tuning movements in the air and correcting posture before landing.

The Importance of Coordinative Capacity in Vault Performance [6], [9]:

- Enables the precise execution of vaults with multiple rotations and twists.
- Reduces the risk of injury by controlling movements and maintaining balance.
- Helps optimize impulse and landing, both essential for achieving a high score.

The handstand salto or handstand press is an advanced gymnastics element that involves performing a jump or acrobatic movement from the handstand position, followed by a full rotation of the body in the air and returning to the feet or another controlled position [5].

This jump combines balance, strength, technique, and coordination and is frequently used in various gymnastics disciplines such as artistic gymnastics, rhythmic gymnastics, or acrobatic events [3][9].

The purpose of this research is to highlight the importance of coordination in the vault event of men's artistic gymnastics. We consider that if we incorporate balance exercises on reduced surfaces into gymnastics training and apply evaluations to them, we can identify improvements in coordination capacity indices [4].

The main objective of this research is to highlight the essential role that motor coordination plays in the effective execution of the vault event in men's artistic gymnastics. In this context, we aim to demonstrate that the systematic integration of balance exercises performed on unstable or reduced surfaces into specific training programs significantly contributes to the development and optimization of gymnasts' coordination ability [8]. At the same time, by applying evaluation tools adapted to these exercises, we seek to quantify the progress achieved and identify a direct correlation between the level of coordination and the performance in vault execution.

2. Material and Methods

The research focused on analyzing a group of 6 gymnasts, who underwent an initial and a final evaluation of the proposed coordination exercises. The study aimed to test, analyze, and interpret the results obtained from the two assessments.

The research took place in January 2025 over four weekly microcycles of training. The initial testing was conducted in the first week, while the final testing took place at the end of the fourth week. Between the two assessments, the athletes followed a training program specific to the preparatory period, with an emphasis on acquiring new motor skills.

The evaluation included 3 coordination tests applicable to the vault event in men's artistic gymnastics:

Description and explanation: **Coordination Test 1**: The balance test on the central point of the gymnastics springboard. It was performed by standing on one foot at the center of the springboard, while the other leg was extended laterally over an obstacle placed

on the ground. The evaluation was measured in seconds until movement occurred in the supporting leg.

The evaluation was measured in seconds from the moment of maximum support until the gymnast changed the body position and, implicitly, the position of the supporting leg on the springboard.

Description and explanation: **Coordination Test 2:** The springboard jump test. It was conducted by reducing the contact point with the springboard through the placement of a foam block on its upper part. The jump was performed from a higher surface positioned at a height of 1 meter. The evaluation was carried out by assigning scores from 1 to 4 (1 point representing landing and bouncing on the trampoline outside the designated boundaries, 2 points for the area closer to the center, 3 points for the area closest to the center, and 4 points for landing in the center of the trampoline's maximum impulse circle).

The scoring from 1 to 4 was done by delineating each zone on the springboard and assigning a score to each contact zone. A maximum score of 4 points was given for the center area, while 1 point was assigned to the area furthest from the maximum impact point of the springboard.

Description and explanation: **Coordination Test 3**: the two low trampolines test. It involves positioning two trampolines one over the other, with the lower side of both trampolines on the ground. From a run-up of up to 5 meters, the gymnast performs a handstand jump with landing in a standing position, with feet together and arms extended sideways. The evaluation is performed through execution penalties according to the International Scoring Code of the International Gymnastics Federation (0.1, 0.3, 0.5, 1.0 points penalty) for each component of the handstand jump.

For Test 3, the evaluation was based on the FIG standards, with a penalty of 0.1 being the minimum and a penalty of 1.0 points representing the maximum (the mentioned penalties may be cumulative).

2.1. Research Methods

- Testing Method

This method was used to assess the gymnasts' coordination ability at the beginning and end of the intervention period. The selected tests aimed to highlight essential skills in the vault event, such as static balance, jump accuracy, and body control during flight and landing.

- Pedagogical Experiment Method

This involved the implementation of a specific training program carried out over four weekly microcycles, focusing on developing coordination through balance exercises and controlled jumps. The comparison of results from the initial and final tests allowed the identification of progress achieved.

- Observation Method

Used throughout the execution of the tests and training sessions to monitor the quality of movements, body posture, and technical correctness of the performed exercises.

- Statistical Analysis Method

Employed to process and interpret the results obtained from the two assessments in order to determine the significance of the differences observed after the intervention.

3. Results and Discussions

Table 1

Centralization of results from the initial and final testing

Gymnast	**Test 1**(Evaluation in seconds)		**Test 2 (**Evaluation 1-4 point scale)		**Test 3** (F.I.G. execution penalty point)	
	Initial testing	Final testing	Initial testing	Final testing	Initial testing	Final testing
1	8	15	2	2	1,25	0,7
2	4	10	1	2	0,75	0,4
3	12	15	2	3	0,6	0,3
4	17	18	4	4	0,3	0,1
5	15	22	2	4	0,75	0,5
6	11	17	2	4	0,8	0,75
Average	11,16	16,16	2,16	3,16	0,74	0,45

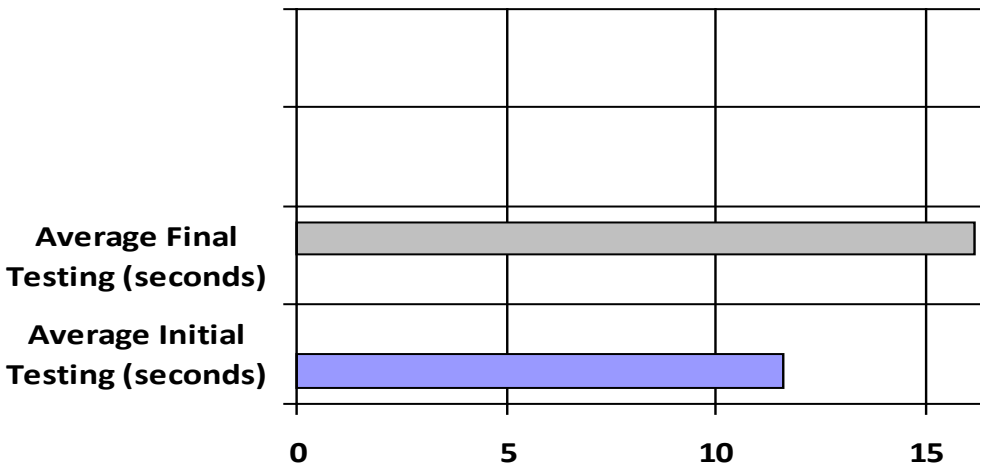

Fig.1. *Evaluation of progress between the initial and final assessments for Test 1*

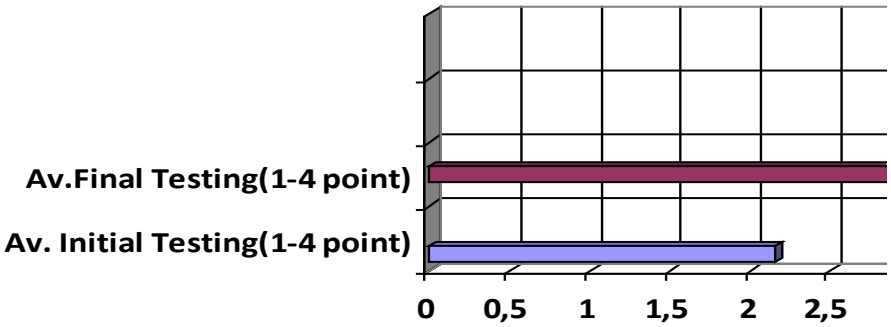

Fig.2. *Evaluation of progress between the initial and final assessments for Test 2*

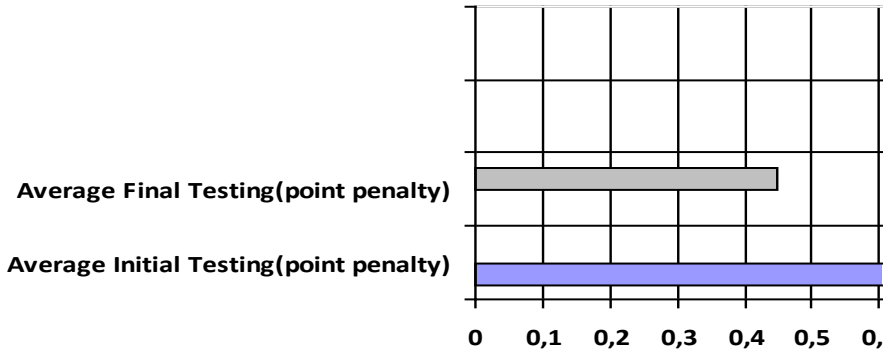

Fig.3. *Evaluation of progress between the initial and final assessments for Test 3-Execution level*

3.1. Description/Interpretation of Table and Figures

The study on coordinative capacity in the handspring vault in men's artistic gymnastics revealed significant improvements in athletes' performance. The initial and final evaluations conducted on a group of six gymnasts allowed for an analysis of progress in terms of stability, execution precision, and movement efficiency.

Test 1 recorded a significant increase in the time spent on the trampoline in the specified position, from an initial average value of 11.16 to 16.16 in the final test. This improvement indicates better coordination and an enhanced ability to maintain control during the preparation for the vault.

Test 2 showed an improvement in the quality of the take-off on the trampoline,

with an increase in the average score from 2.16 to 3.16. This demonstrates a more efficient execution of the impulse necessary for the jump, which can contribute to greater height and stability in the air.

Test 3 indicated a significant reduction in execution penalties, from an initial average of 0.74 points to 0.45 points in the final evaluation. This decrease suggests improved technique and greater precision in vault execution, confirming the gymnasts' progress in terms of control and movement accuracy.

Following the implementation of this specific exercise, a significant decrease in the level of execution penalties was observed, suggesting a considerable improvement in the precision and correctness of the gymnasts' movements. This reduction in penalties can be interpreted as an indicator of the gymnast technical progress, reflecting a better understanding of the requirements of each movement and a more precise application of technique. As a result, the gymnasts demonstrated an improvement in their fine motor skills, which translated into cleaner and more controlled execution of movements.

3.2. Statistical Analysis

To determine whether the observed improvements between the initial and final assessments were statistically significant and not due to chance, a paired samples t-test was performed for each of the three measured parameters: execution time (Test 1), qualitative evaluation score (Test 2), and execution penalties (Test 3). This test is appropriate because it compares two related groups (the same participants measured at two different time points). The level of statistical significance was set at $p < 0.05$, a conventional threshold in performance and behavioral sciences.

Test 1 – Execution Time (seconds): The mean execution time increased from 11.16 seconds to 16.16 seconds. The paired t-test indicated a statistically significant difference, with $t(5) = -5.00$ and $p = 0.0041$. This result suggests that the observed improvement in execution time is highly unlikely to be due to random variation, and likely reflects a real increase in performance control, pacing, or endurance.

Test 2 – Qualitative Assessment (1–4 point scale):Scores improved from a mean of 2.16 to 3.16 points. The t-test yielded $t(5) = -2.74$ and $p = 0.0409$, indicating a statistically significant enhancement in movement quality, including precision, posture, and expressive elements. While the effect is somewhat smaller than in Test 1, it still meets the criterion for significance.

Test.3. Execution Penalties (F.I.G. deduction points): The average penalty points decreased from 0.74 to 0.45. A statistically significant difference was also found here, with $t(5) = 4.17$ and $p = 0.0087$. This suggests a meaningful reduction in technical errors and an improvement in execution accuracy.

3.3. Discussions

Based on the analysis above, it is clear that the significant improvements in the athletes' performance can be attributed to several factors. The increased time spent on the trampoline during the preparation phase indicates notable progress in coordination and control over the body. This improvement is essential for

executing a successful vault, as a proper preparation ensures a stronger push and better control in the air. Additionally, the increase in the average score for the take-off quality reflects a significant enhancement in the technique of the jump, demonstrating a more efficient use of energy and greater precision in the impulse needed for a successful vault. This contributes to higher jumps and better stability in the air, both of which are key components of a successful performance.

The improvements observed also emphasize the relevance of specific training programs that focus on enhancing coordination and execution skills. Such targeted training appears to be effective in improving the athletes' performance. Continuous monitoring and periodic evaluations are crucial for identifying areas that still require improvement, allowing for adjustments in training plans to support consistent progress and help the athletes reach peak performance.

The results of the study highlight the importance of systematic evaluations in the progress of athletes. The tests applied provided an effective method for monitoring the gymnasts' development throughout their training, and periodic evaluations are essential for identifying both the strengths of the athletes and areas that require improvement. These evaluations allow for better direction of the training and continuous improvement of performance.

In addition, the study revealed a collective evolution within the team, alongside the individual progress of each athlete. While each gymnast made significant progress in terms of coordination and execution of the vault, there was also a general improvement in the team's performance. This suggests that coordination training not only has a positive impact on individual performance but also on synchronization and collaboration between team members, which are crucial factors in collective competitions.

Another important aspect is the potential for extending the research to apply the coordination-specific training methods to other gymnastics disciplines. The positive results obtained from the handspring vault suggest that these techniques could be effective in other apparatuses, such as the high bar or floor exercise. Further research in this area could confirm the applicability of these methods across various gymnastics events, thus contributing to a more widespread development of coordination in the entire field of artistic gymnastics.

4. Conclusions

The study on coordinative capacity in the vault event of men's artistic gymnastics revealed significant improvements in athletes' performance throughout the research. Following the application of three tests on a group of six gymnasts, both the initial and final evaluations allowed for the analysis of individual and collective progress.

The results confirm that systematic training and the use of coordination-specific methods have a positive impact on vault execution. The differences recorded between the two evaluations indicate an increase in precision, stability, and movement synchronization, highlighting the importance of developing coordinative capacity in artistic gymnastics.

Thus, it can be concluded that the tests used are effective in measuring and

improving gymnasts' coordination, and their application in training can contribute to optimizing athletic performance. In the future, extending this type of evaluation to larger groups of athletes could provide a more detailed perspective on how coordination influences performance in vault events.

In conclusion, the study results demonstrate the effectiveness of the applied training methods in developing the coordinative capacity specific to the handspring vault. The increase in trampoline time, improvement in take-off, and reduction in penalties suggest a safer and more precise execution of the vault. These findings highlight the importance of incorporating specific coordination exercises into gymnasts' training, as they have a positive impact on overall performance.

The study emphasized both the importance of coordination for success in the handspring vault and the positive effects of specific training in its development. The application of these methods in future training sessions could optimize gymnasts' performance, directly impacting the quality of the vault execution and, consequently, the results achieved in competitions.

References

1. Byvalkevych, L., Yefremova, O., Hryshchenko, S.: *Development of Technical Creativity in Future Engineering Teachers.* In: Romanian Journal for Multidimensional Education 2020, 12(1), p.162-175. Accessed:15.12.2024
2. Corlaci, I.: *Calitățile motrice în gimnastica artistică* (*Motor Qualities in Artistic Gymnastics)*. Bucharest art. A.N.E.F.S. , 2010, p.164.
3. Crețu, M.: *Gimnastică de bază, metodologia cercetării, dezvoltare fizică generală și capacitate aplicativă* (*Basic Gymnastics, Research Methodology General Physical Development, and Applied Capacity).* Pitești, Editura Universității din Pitești 2010, p.42-47.
4. Cristea, D.I.: *Metodologia predării gimnasticii în școală – Gimnastica artistică – Note de curs pentru anul II*I, (*The Methodology of Teaching Gymnastics in School Artistic Gymnastics – Course Notes for Year III)*. Bucharest, 2017, p.25-32.
5. Fernandes, S., Carrara P., Serrao J., Carlos, A.: *Kinematic variables of table vault on artistic gymnastics*. In: Brazilian Journal of Physical Education and Sport (2016), 30(1): p.97-107.
6. F.I.G -The International Code of Points of the International Gymnastics Federation (2025-2028), p.75-83. Accessed: 5.01.2025
7. Grigore, V.*: Gimnastica artistică-Fundamentele teoretice ale pregătirii sportive (Artistic Gymnastics – The Theoretical Foundations of Sports Training).* Bucharest, Ed. Signe, 2001, p. 10-12.
8. Popescu, G.: Gimnastica (*Gymnastics)*. Bucharest, Ed. Evisavaros, 2005, p.22-25.
9. Vieru, N.: Manual de gimnastică (*Artistic Gymnastics Manual*). Bucharest, Ed. Driada, 1997, p.69-75.