

Enhancing Technical Performance in Junior I Dancers Through Optimized Physical Training Programs

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ABSTRACT

Background and Study Aim: The significance of physical training in dance sport is widely acknowledged by both practitioners and specialists. However, the practical experience indicates that physical training is often underemphasized in training plans for junior athletes. This observation prompted the development of a program aimed at optimizing the physical training of Junior II dancers. This study seeks to enhance motor and functional capacities and improve technical training through a structured physical conditioning program.

Material and Methods: The study utilized a range of research methods including a comprehensive bibliographic review, pedagogical observation, experimental methodology, measurement and evaluation techniques, statistical-mathematical analysis, and graphical/tabular presentation of data. The sample consisted of 20 athletes (10 boys and 10 girls) from the ACS Top Dance Sports Club 2007, all participants in FRDS-organized competitions. To objectively assess the technical expression quality under specific physical demands, we employed an evaluation method characterized by arbitration, with grades awarded by five evaluators during both initial and final tests. The evaluators, all instructors at ACS Top Dance 2007, assessed performances in both standard and Latin sections using a 40-second musical collage for each section, with uninterrupted choreography execution.

Results: The statistical analysis of the results from the initial and final tests revealed significant differences, indicating that the physical training strategy was effective. Improvements were observed in both motor and functional parameters, as well as in the technical expression of the dancers.

Conclusions: The findings demonstrate that a rigorously directed physical training program can significantly enhance both the physical and technical performance of junior dancers. The successful integration of structured physical conditioning into dance training programs is crucial for optimizing performance outcomes in competitive dance sport.

Keywords: Dance Sport, Physical Training, Technical Training

Introduction

Dance sport performance is built upon several structural components: technical, tactical, psychological, artistic, theoretical, and physical. The technical component involves executing dance actions with high precision and efficiency, essential for achieving top results in competitions. Techniques differ between Standard and Latin dances, requiring distinct motor executions, rhythms, and positions, though some technical elements overlap across dances [1]. The foundational technical

skills in dance sport consist of elements, procedures, and figures, executed based on specific biomechanical and physiological frameworks developed through rigorous training.

The physical component encompasses both effort capacity and motor qualities. Its development is crucial for successful training, involving methods that enhance morphological indices, functional capacity, and basic motor skills specific to dance sport. Leading theorists underscore the significance of physical training in achieving superior sports performance [2,3]. In dance sport, there is a direct relationship between

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motor qualities and technical skills; high technical and artistic performance is contingent on well-developed motor qualities and morphological-functional indices.

Physical training aimed at developing motor skills is integral to all athlete categories, tailored to each discipline's demands [4]. Similar to rhythmic gymnastics, dance sport requires complex and simultaneous manifestation of coordinating factors and other capacities [4].

The interdependence between motor skills and technical execution in dance sport has been well-documented, emphasizing the need for comprehensive training programs [5,6].

Recent studies have shown that targeted physical conditioning can significantly enhance performance outcomes [7].

In this study we aim to demonstrate that the strategies for optimizing the physical training of juniors II, by improving the functional capacity of the dancers and the various components of the motor capacity, will be reflected in a more efficient technical expression [8,9].

In this context, the objectives of our experimental approach aimed at:

- The evaluation of the level of the physical training of the dancers, juniors II, in terms of functional capacity, thrust (expansion) in resistance mode, combined motor qualities [10].
- Establishing the place, the proportion and the content of the physical training program, for juniors II, in an annual training cycle;
- Elaboration of a method for evaluating the technical component of the training.
- The Experimental demonstration of the efficiency of the application of our training programs in improving the indices of manifestation of motor qualities specific to dance sports, also the effect on the technical training.

We propose in this study the verification of the following hypotheses:

- An efficiently elaborated physical training program will contribute to the optimization of the functional capacity, the thrust (expansion) in resistance mode and of other combined motor qualities involved in practicing dance sport.
- Against the background of an improved physical support, the technical expression of the dancers, juniors II, will be more efficient.

Materials and Methods

The Research Methods

Our research utilized a combination of methods to achieve the study's objectives:

Bibliographic Study: A comprehensive review of existing literature to establish a theoretical framework.

Pedagogical Observation: Continuous observation of training sessions to gather qualitative data.

Experimental Method: Implementation of a structured training program with pre- and post-intervention assessments.

Measurement and Evaluation: Utilization of standardized tests to measure motor and functional capacities.

Statistical-Mathematical Analysis: Processing data using statistical tools to determine the significance of results.

Graphical and Tabular Representation: Presentation of data in graphs and tables for clear visualization and interpretation.

The Methods of Measurement and Evaluation

In the case of the experimental approach we used tests and trials that we considered the most appropriate for our purpose, aiming at indicators for general motricity:

The functional evaluation – the Harvard Test [11].

The motor evaluation:

- The Burpee Test - Composed of a sequence of fast-moving movements, this test is used to measure agility, coordination and strength [12].
- The test for measuring the thrust (expansion) in resistance mode:

The maximum amplitude at which the jive kick is executed is tested and this measure is marked on a wall, as well as half of this value.

Kicks will be executed without a break, as fast as possible, at the height between the two values marked on the wall. The number of the executed kicks in 1.15 min is recorded.

The Technical-Physical Evaluation

In this sense, in order to achieve a more objective assessment of the quality of technical expression against the background of the specific physical demands, we used in the research an evaluation method with characteristics of the arbitration, by awarding marks to both initial and final testing [13]. The 5 evaluators who were part of the team are instructors at the ACS Top Dance 2007 Sports Club.

Thus, for both the standard and the Latin section, a musical collage was made comprising 40 seconds of each of the 4 dances, the athletes having to perform the specific choreography without interruption.

We specify that, both at the initial and at the final testing, the athletes were filmed while performing the choreography for evaluation, respecting the same conditions, respectively the location, the outfit, the music. Thus, the judges had the opportunity to view the records several times, scoring as objectively as possible for each criterion and sub-criterion subject to evaluation.

The evaluation team assigned scores ranging from 1 to 10 based on the following criteria movement to music (timing, rhythm, musical structure, musicality), posture and coordination (upper limb alignment, coordination), quality of movement and balance, partner relationship and leadership (physical connection, collaboration without connection, leadership according to the dance character, efficiency, consistency), choreography and presentation (content, space, difficulty level, atmosphere, creativity, interpretation), and quick response to dance changes [14].

The figures that composed the choreographies specific to each section were the following [15,16].

The Standard Section:

Waltz: Natural spin turn, reverse pivot, progressive chasse, outside change ending in promenade position, running cross chasse, open right turn, back whisk, wing from PP, double reverse spin, reverse turning lock, basic weave, outside change ending in close position, natural turn, hesitation change, closed change.

Tango: walk x2, promenade link, natural twist turn, close promenade, reverse turn, open promenade, outside swivel, rock, close promenade, back whisk, fallaway promenade, four step, close promenade.

Viennese waltz: natural turn, forward change step natural to reverse, reverse turn, forward change step reverse to natural.

Quickstep: natural spin turn, quarter turn to left, forward lock, natural turn, hesitation change, double reverse spin, telemark, fishtail, four quick run, running cross chasse, open right turn, running finish, natural turning lock, weave, tiple chasse.

The Latin Section:

Samba: natural roll, open rocks, argentine crosses, stationary samba, shadow botafogos, circular volta, dropped volta, criss cross volta, reverse turn, whisk.

Cha-cha-cha: cuban break, syncopated side link, three cha cha to left and to right, alemana, open hip twist, hockey stick, shoulder to shoulder, natural top.

Rumba: aida, cuban rocks, fan, hockey stick, progressive forward walks, opening out, new york, open hip twist, curl, natural top.

Jive: simple spin, double cross whip, change of places R to L with double spin, rock to simple spin, promenade walks slow, promenade walks quick, american spin, stop and go, miami special, hip bump.

The Experimental Sample

The sample of our research was composed of 20 athletes (10 boys and 10 girls), legitimated at the ACS Top Dance Sports Club 2007, all participants in the competitions organized by FRDS.

The Stages of the Research

The experimental approach took place between January 2019 and June 2019, with 4-5 training sessions per week and competitions on weekends (competition period), our study having the following stages (table no. 1).

Table 1: The stages of the research

Period	Stages
January 2019	The initial evaluation
January - June 2019	The implementation of the training program
June 2019	The final evaluation
	The processing of the data

Our methodology was designed based on established research practices in sports science [17, 18]. The experimental approach allowed for precise measurement of motor and functional improvements [19]. Evaluations were conducted using validated tools to ensure reliability and accuracy [20].

Results

The Functional Evaluation Results

The calculated statistical indicators are presented in table no. 2

Table 2: Statistical indicators, functional evaluation

HARVARD INDEX	Statistical Indicators (n=10)					
	I.T $\bar{X}$	F.T $\bar{X}$	Statistical T	Tabular T	p	Significant/insignificant at p=0,05
Boys	79	85.7	8.6	2.26	<0,001	significant
Girls	79.1	85.2	12	2.26	<0,001	significant

In the case of the measured functional indicator, the Harvard index, there was an average value of 79 at the initial test and 85.7 at the final test, values that place the boys at a "good" effort capacity. The t-student test indicates a value of 8.6 for $p < 0.05$, which leads to the validation of the hypothesis, so the differences are statistically significant. In other words, both the means used, but especially the dosing of the effort during the training period significantly led to the improvement of the cardiovascular resistance of the boys included in the research.

In the case of girls, the average value of the Harvard index recorded at the initial test, respectively 79.1, classifies the athletes to an average to poor adaptability to the effort. The situation is different in the final test, when the average value of this index is 85.2, and the significance test with a value of 12 for $p < 0.05$, confirms the research hypothesis that the effort capacity of girls recorded a statistically representative improvement, thanks to our training strategy.

The Motor Evaluation Results

The calculated statistical indicators are presented in table no. 3 (boys) and in table no. 4 (girls).

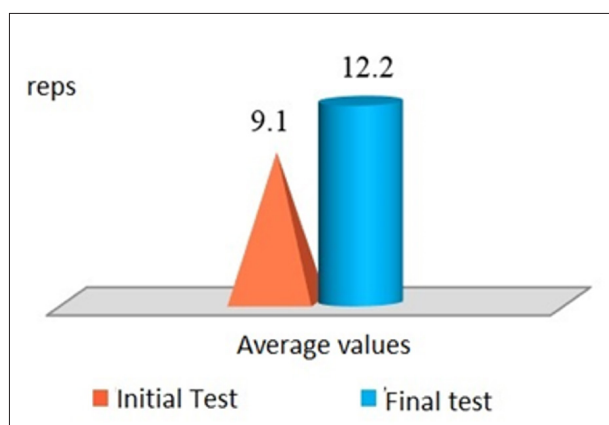
Table 3: Statistical indicators, motor evaluation, boys

Test	Statistical indicators (n=10)					
	F.T $\bar{X}$	Statistical I T	F.T $\bar{X}$	Statistical T	F.T $\bar{X}$	Significant/insignificant at p=0,05
Burpee (rep./30sec)	9.1	12.2	5.89	2.26	<0.001	significant
Thrust (expansion) (reps.)	148.3	155.4	5.52	2.26	<0.001	significant

Table 4: Statistical indicators, motor evaluation, girls

Test	Statistical indicators (n=10)					
	I.T $\bar{X}$	F.T $\bar{X}$	Statistical T	Tabular T	p	Significant/insignificant at p=0,05
Burpee (rep./30sec)	8	10	7.75	2.26	<0.001	significant
Thrust (expansion) (reps.)	128.9	130.8	4.67	2.26	0.001	significant

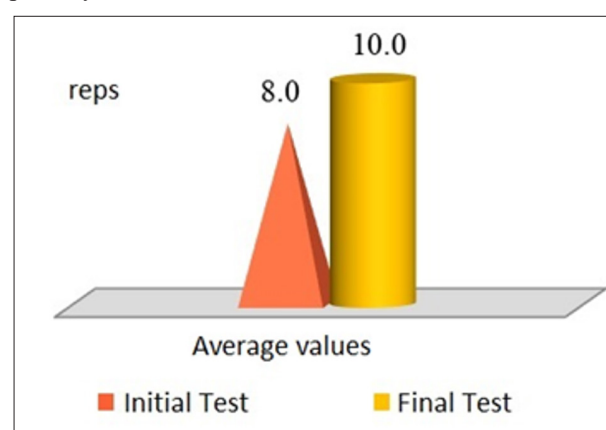
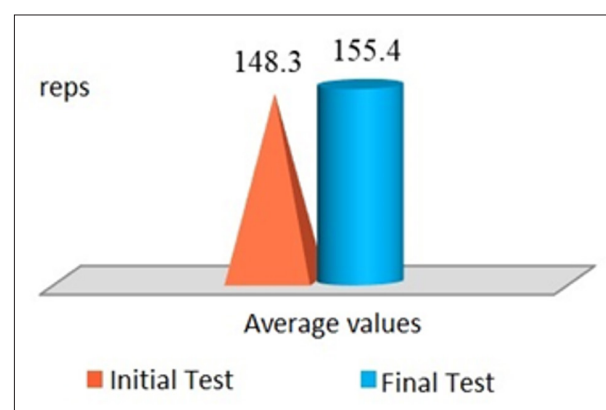
In the boys final test, the average on the Burpee test increased by 3.10 repetitions (34.1%). The difference in averages is in the confidence interval (1.91; 4.29). In the two tests the results are homogeneously dispersed. The effect size (1.86) indicates a very large difference between the averages. The difference of the means is statistically significant, the value of the significance threshold $p < 0.001 < 0.05$, for $t = 5.89$ and 9 degrees of freedom. The null hypothesis is rejected. In figure. 1, the average values of the results obtained by the boys at the two tests are presented graphically.

**Figure 1: Burpee Test, average results of the boys**

Regarding the girls, the average value at the final test increased by 2 repetitions (25.0%). The difference in averages is in the confidence interval (1.42; 2.58). The results are homogeneously dispersed in both tests. The effect size (2.45) indicates a very large difference between the averages. The difference of the means is statistically significant, the value of the significance threshold $p < 0.001 < 0.05$, for $t = 7.75$ and 9 degrees of freedom. The null hypothesis is rejected. In figure. 2, are presented graphically the average values of the results obtained by the girls at the two tests.

The average value for the thrust (expansion) in resistance mode increased, in the boys' final test, by 7.10 repetitions (4.8%). The difference in averages is in the confidence interval (4.19; 10.01). In both tests the results are homogeneously dispersed. The effect size (1.75) indicates a very large difference between the averages. The difference of the means is statistically significant, the value of the significance threshold $p < 0.001 < 0.05$, for $t = 5.52$ and 9 degrees of freedom. In figure. 3, the average values

of the results obtained by the boys at the two tests are presented graphically.

**Figure 2: Burpee Test, average results of the girls****Figure 3: Thrust (expansion) Test, average results of the boys**

At the same test, the average value of the girls in the final test increased by 1.90 repetitions (1.5%). The difference of the averages is in the confidence interval (0.98; 2.82). The results are homogeneously dispersed in both tests. The effect size (1.48) indicates a very large difference between the averages. The difference of the means is statistically significant, the value of the significance threshold $p = 0.001 < 0.05$, for $t = 4.67$ and 9 degrees of freedom. In figure. 4, are presented graphically the average values of the results obtained by the girls at the two tests.

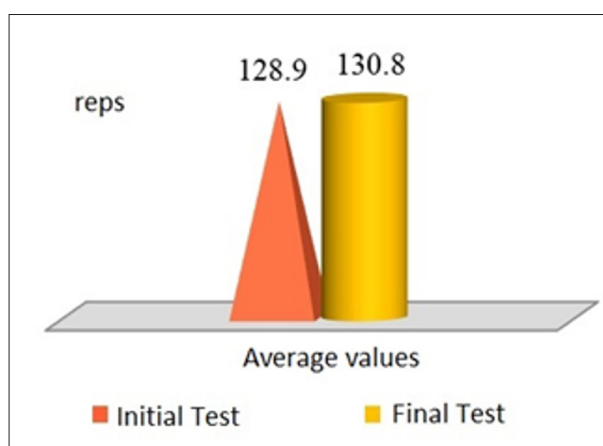


Figure 4: Thrust (expansion) Test, average results of the girls

The Technical- Physical Evaluation Results

The calculated statistical indicators are presented in table no. 5 (boys) and in table no. 6 (girls).

Table 5: Statistical indicators, technical physical evaluation, boys

SCORE	Statistical indicators (n=10)					
	I.T $\bar{X}$	F.T $\bar{X}$	Statistical T	Tabular T	p	Significant/insignificant at p=0,05
Standard	7.46	8.30	9.00	2.26	<0.001	significant
Latin	7.24	8.16	10.17	2.26	<0.001	significant

The average marks in the standard section at the boys' final test increased by 0.84 (11.3%). The difference in averages is in the confidence interval (0.63; 1.05). The results are homogeneously dispersed in both tests. The effect size (2.85) indicates a very large difference between the average grades. The difference of the means is statistically significant, the value of the significance threshold $p < 0.001 < 0.05$, for $t = 9.00$ and 9 degrees of freedom. The null hypothesis is rejected. In figure. 5 are graphically presented the average values of the results obtained by the boys in the two tests.

The average score in the Latin section for the final testing of boys increased by 0.92 (12.7%). The difference in averages is in the confidence interval (0.72; 1.12). The results are homogeneously dispersed in both tests. The effect size (3.22) indicates a very large difference between the means. The difference of the means is statistically significant, the value of the significance threshold $p < 0.001 < 0.05$, for $t = 10.17$ and 9 degrees of freedom. The null hypothesis is rejected. In figure. 6 are graphically presented the average values of the results obtained by the boys in the two tests.

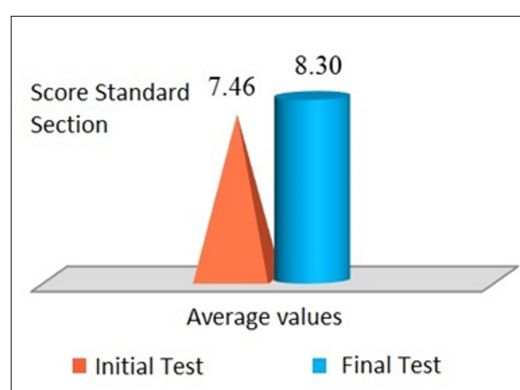


Figure 5: The average scores, Standard Section, Boys

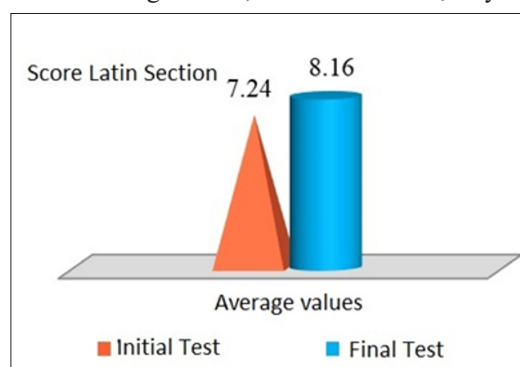


Figure 6: The average scores, Latin Section, Boys

Table 6: Statistical indicators, technical-physical evaluation, girls

SCORE	Statistical indicators (n=10)					
	I.T $\bar{X}$	F.T $\bar{X}$	Statistical T	Tabular T	p	Significant/insignificant at p=0,05
Standard	7.06	7.66	8.22	2.26	<0.001	significant
Latin	7.24	7.60	5.01	2.26	0.001	significant

The average score in the standard section for the girls' group, the final test, increased by 0.60 (8.5%). The difference of the averages is in the confidence interval (0.43; 0.77). The dispersion of the results is homogeneous in both tests. The effect size (2.60) indicates a very large difference between the averages. The difference of the means is statistically significant, the value of the significance threshold $p < 0.001 < 0.05$, for $t = 8.22$ and 9 degrees of freedom. In figure. 7 are presented graphically the average values of the results obtained by the girls at the two tests.

In the group of girls, the average marks in Latin dances increased by 0.36 (5.0%) in the final test. The difference in averages is in the confidence interval (0.20; 0.52). In the two tests the results are homogeneously dispersed. The effect size (1.59) indicates a very large difference between the averages. The difference of the means is statistically significant, the value of the significance threshold $p = 0.001 < 0.05$, for $t = 5.01$ and 9 degrees of freedom. The null hypothesis is rejected. In fig. 8 are presented graphically the average values of the results obtained by the girls at the two tests.

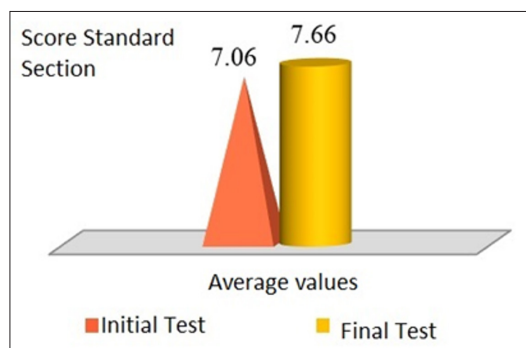


Figure 7: The average scores, Standard Section, Girls

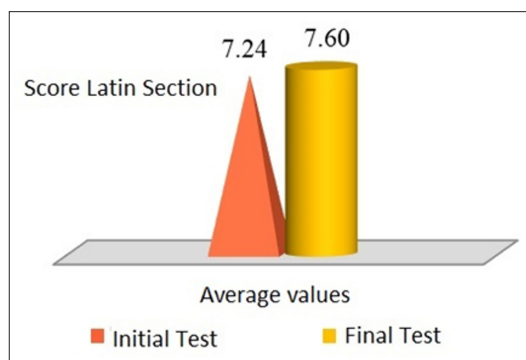


Figure 8: The average scores, Latin Section, Girls

We wanted to show that against the background of a high level of motor qualities, the quality of the execution of Standard and Latin choreographies designed by us also increases, within the technical-physical tests by awarding grades by a team of experts.

Both girls and boys, in all tests (Standard and Latin) significantly improved their grades from one test to another, as evidenced by the representative differences between the averages of the grades obtained by our subjects, at a threshold of significance greater than t critical, for $p < 0.05$, which rejects the null hypothesis and validates the research hypothesis.

Discussion

Our findings underscore the importance of integrating a structured physical training regimen into the overall training program for

junior II dancers. The enhanced motor skills and functional capacities observed in our study participants contributed to their improved technical performance, which is critical for success in competitive dance.

The significant improvements observed in our study align with findings from other research on the benefits of physical training in dance [21]. Incorporating physical training into dance sport regimens is supported by evidence suggesting that it enhances both physical and technical performance [22].

Technical and Functional Improvements: The physical training program was designed to target specific motor qualities essential for dance, such as strength, flexibility, endurance, and coordination. The significant improvements in these areas indicate that the program effectively addressed the physical demands of dance sport. Enhanced strength and flexibility, for instance, likely contributed to better execution of dance movements, while improved endurance allowed the dancers to maintain high performance levels throughout their routines.

Implications for Dance Sport Training: Our study suggests that physical training should be a core component of dance sport training programs. Coaches and trainers can use these findings to develop more comprehensive training plans that balance technical, artistic, and physical elements. By doing so, they can ensure that dancers are not only technically proficient but also physically prepared to meet the demands of their sport.

Conclusions

Choosing the most appropriate means, optimal dosing of the effort proved their effectiveness in terms of the functional assessment, the statistically representative differences between the values recorded in the two tests confirming that the adaptability to effort of our subjects has made significant progress. In the same time, both thrust (expansion) in resistance mode and the combined motor qualities assessed by the Burpee test have seen significant improvements with obvious positive consequences on the performance capacity, thus validating the first research hypothesis.

The influence of technical training by the functional and physical sphere is highlighted by the superior performances obtained by the subjects of our experimental approach to the technical-physical test designed by us, the quality of the technical expression being much better at the final test than at the initial test. The statistically significant differences between the marks obtained in the two tests thus validate the second hypothesis of our approach.

Consequently, a coherent physical training strategy, in accordance with the competitive schedule, the training stages and the proposed objectives will not only lead to higher indices of manifestation of the specific motor qualities, but will positively influence the other factors of training and, by default, the performance capacity.

Limitations of the Study

The limitations identified in our study are consistent with those reported in similar research, highlighting the need for larger, long-term studies [23].

While our findings are promising, there are several limitations to this study that should be acknowledged:

1. **Sample Size:** The study was conducted with a relatively small sample size of 20 participants. Future research with larger sample sizes is needed to confirm the generalizability of our findings.
2. **Short-Term Assessment:** The study measured the immediate effects of the physical training program. Long-term follow-up studies are necessary to determine whether these improvements are sustained over time.
3. **Lack of Control Group:** Our study did not include a control group, which limits the ability to attribute improvements solely to the physical training program. Future studies should incorporate a control group to better isolate the effects of the intervention.
4. **Specificity to Dance Sport:** The physical training program was tailored specifically to the demands of dance sport, which may limit its applicability to other sports or dance forms. Research on similar programs across different sports and dance disciplines would be beneficial.

Despite these limitations, our study provides valuable insights into the role of physical training in enhancing the performance of junior II dancers. Future research should build on these findings to further refine training programs and optimize performance outcomes in dance sport.

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