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Original article

Planning sports training in the sports initiation stage in artistic gymnastics

[*La planificación del entrenamiento deportivo en la etapa de iniciación deportiva en la gimnasia deportiva*]

[*Planejamento do treinamento esportivo na fase de iniciação esportiva na ginástica artística*]

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ABSTRACT

Introduction: The training plan for young athletes begins with an introduction to sports such as artistic gymnastics. This study evaluated the effectiveness of a structured program for performing a forward roll and certain flexibility components in gymnasts aged 8 to 10 years.

Objective: To evaluate forward roll performance and trunk flexibility in 8- to 10-year-old gymnasts in relation to a training program initiated at the beginning of the competitive stage.

Methodology: The study sample included 15 female gymnasts aged 8 to 10 years affiliated with FEDEGUAYAS, constituting a convenience sample. The study employed a pre-experimental design. Data were collected using flexed arm suspension, seated reach, and pretest/ posttest tests.

Results: The average score for forward roll performance improved from 8.13 to 9.13, and flexibility increased from 25.27 cm to 28.13 cm. The standard deviation decreased in both cases, indicating greater homogeneity in the results.

Conclusions: The program was effective in improving fundamental skills in gymnastics, validating the importance of planning adapted to this formative stage.

Keywords: artistic gymnastics, children's training, front roll, flexibility, sports initiation.

RESUMEN

Introducción: el plan de entrenamiento para jóvenes practicantes de deportes comienza con una introducción a deportes como la gimnasia artística. Este estudio evaluó la efectividad de un programa estructurado para la ejecución de una voltereta adelante y ciertos componentes de flexibilidad en gimnastas de 8 a diez años.

Objetivo: evaluar el rendimiento de la voltereta adelante y la flexibilidad del tronco en gimnastas de 8 a 10 años en relación con un programa de entrenamiento iniciado al comienzo de la etapa competitiva.

Metodología: la muestra del estudio incluyó 15 gimnastas femeninas de 8 a 10 años asociadas a FEDEGUAYAS, constituyendo una muestra de conveniencia. El estudio empleó un diseño preexperimental. Además, se recolectaron datos utilizando pruebas de suspensión del brazo flexionado y de sentado y alcance, junto con un diseño de pretest y postest.

Resultados: La puntuación promedio en el rendimiento de la voltereta adelante mejoró de 8.13 a 9.13 y la flexibilidad de 25.27 cm a 28.13 cm. La desviación estándar disminuyó en ambos casos, indicando mayor homogeneidad en los resultados.

Conclusiones: el programa fue efectivo para mejorar habilidades fundamentales en la gimnasia, validando la importancia de una planificación adaptada a esta etapa formativa.

Palabras clave: gimnasia deportiva, entrenamiento infantil, rol de frente, flexibilidad, iniciación deportiva.

RESUMO

Introdução: O plano de treinamento para jovens atletas começa com a introdução a esportes como a ginástica artística. Este estudo avaliou a eficácia de um programa estruturado para a execução do rolamento para frente e certos componentes de flexibilidade em ginastas de 8 a 10 anos de idade.
Objetivo: Avaliar o desempenho no rolamento para frente e a flexibilidade do tronco em ginastas de 8 a 10 anos de idade em relação a um programa de treinamento iniciado no começo da fase competitiva.
Metodologia: A amostra do estudo incluiu 15 ginastas do sexo feminino, com idades entre 8 e 10 anos, filiadas à FEDEGUAYAS, constituindo uma amostra de conveniência. O estudo empregou um delineamento pré-experimental. Os dados foram coletados por meio de testes de suspensão com os braços flexionados e alcance sentado, juntamente com um delineamento pré-teste/pós-teste. **Resultados**: A pontuação média para o desempenho no rolamento para frente melhorou de 8,13 para 9,13, e a flexibilidade aumentou de 25,27 cm para 28,13 cm. O desvio padrão diminuiu em ambos os casos, indicando maior homogeneidade nos resultados.
Conclusões: O programa foi eficaz na melhoria das habilidades fundamentais da ginástica, validando a importância do planejamento adaptado a essa fase formativa.

Palavras-chave: ginástica artística, treinamento infantil, rolamento para frente, flexibilidade, iniciação esportiva.

INTRODUCTION

Sports programs in childhood are fundamental for children's physical, emotional, and social development. Regular participation in sports not only improves physical fitness but also fosters interpersonal skills and essential values. Participation in sports contributes significantly to children's physical health. According to authors such as Smith Palacio (2021), Abellán (2024), Águila *et al. (2025*), and Rodríguez-Cayetano *et al. (2025*), physical activity and sports in childhood impact socio-psychological aspects, motor development, and reduce the risk of obesity, cardiovascular disease, and metabolic problems. Furthermore, it improves muscle strength, endurance, and flexibility—crucial aspects of growth and development.

Sports practice also has a positive impact on children's emotional development. Mendoza, A., *et al.,* (2025) and Piedra Espejo, JI (2025), point out that sport can increase children's self-esteem and self-confidence, helping them face challenges and learn from defeat. Likewise, sports activities foster social skills, such as teamwork and communication, which are essential for interactions in everyday life.

Sports programs offer a platform for teaching important values such as discipline, respect, and responsibility. According to Madrid Pedreño, J. (2025) and Charchabal Pérez, D. *et al.* (2025), sport can be a powerful educational tool that helps children develop a sense of ethics and fair play, which translates into positive behaviors off the field.

It is crucial that sports programs be included and adapted to the needs and abilities of each child. According to Alvarado, E., (2025), a child-centered approach that prioritizes fun and learning over competition is fundamental to keeping children motivated and engaged. Sports programs are essential in childhood, not only for their physical benefits but also for their contribution to children's emotional and social development. A well-designed and adapted approach can maximize these benefits and foster an active and healthy lifestyle (Coello Rosero, C., & Batista Hernández, N. (2025)).

Sports training programs for children are planned and structured processes designed to improve children's physical fitness, skills, and overall development. These programs should be based on scientific principles and consider the physical, motor, cognitive, and psychosocial development of young athletes. By contributing to improved cardiovascular health, strengthening muscles and bones, helping to maintain a healthy weight, and preventing diseases related to sedentary lifestyles; by promoting psychological and social development, they foster the development of coordinative skills and abilities (Madrid Pedreño, J., 2025; Mendoza, A., *et al.*, 2025).

It is important to consider some essential aspects when designing a sports training program for children. This involves taking into account premises such as: chronological and biological age, motivation towards the sport, planning of program content focused on the child's integral development, keeping in mind the sensitive periods of learning for each sport and the child's adaptation, and including the physical, technical, psychological and theoretical components of the training.

Gymnastics programs for children are extremely important due to the numerous benefits they provide for the holistic development of young children (Rodríguez, 2019). These programs improve general motor skills and some specific to the sport itself, physical abilities, and the cognitive, emotional, and social development of participants at an early age (Rodríguez-Carrión, AE, & Gutiérrez-Cruz, M. 2021).

Gymnastics is one of the most comprehensive exercise programs for children, as it incorporates strength, flexibility, speed, balance, coordination, and discipline (García & López, 2018). Through specific exercises, children learn to control their movements with precision, which is essential not only in sports but also in various everyday activities. Participating in gymnastics from a young age strengthens muscles and increases flexibility, which is crucial for preventing injuries, promoting healthy growth, and allowing children to face physical challenges with greater confidence. Furthermore, gymnastics helps children stay active and fit, promoting a healthy lifestyle from an early age. Gymnastics also stimulates cognitive development in children. By learning new movements and sequences, they improve their memory, concentration, and problem-

solving skills. Gymnastics requires a high degree of discipline and concentration to master technical movements and execute routines accurately.

Participation in gymnastics classes can help build children's confidence and self-esteem. As they master new skills and overcome challenges, they experience a boost in self-confidence. The supportive and positive environment in gymnastics classes gives children the opportunity to feel valued and accepted, which contributes to a positive self-image. Furthermore, gymnastics offers children the opportunity to learn social skills such as listening, following instructions, taking turns, being quiet, and respecting others. Through group practice, young athletes learn to collaborate, communicate effectively, and support one another, which contributes to their social and emotional development.

The theoretical aspects addressed above, together with the practical observation in the process of implementing the Sports Gymnastics program in the Guayas Sports Federation (FEDEGUAYAS), has been able to verify a group of limitations that do not ostensibly favor the comprehensive training of gymnasts in their initiation phase, which allowed us to declare as the objective of the research to evaluate the effectiveness of a sports training program for the basic training of 8-10 year old gymnasts of FEDEGUAYAS.

MATERIALS AND METHODS

The research is experimental in its pre-experimental modality, with a quantitative approach and a cross-sectional explanatory design. The *participants* are a population of 34 gymnasts (N=34) corresponding to the study category for both sexes. A non-probabilistic sampling design was used, based on inclusion criteria, to select the 15 female gymnasts from the 8–10-year age category (n=15) of FEDEGUAYAS, who are in their first training cycle (basic training), and who

present the following characteristics (8.54 ± 0.2 years; 136.23 ± 0.06 cm in height; 32.08 ± 1.06 kg in body weight).

Techniques and instruments

The following were taken as tests to corroborate the execution technique of a fundamental skill, in this case the front role, and as a physical test the Wells and Dillon flexibility test (Sit *and Reach)* for trunk flexibility.

Ethical considerations

The research was conducted in accordance with international normative codes of informed consent and voluntary participation as outlined in the Declaration of Helsinki. The 15 gymnasts and their parents or legal guardians were notified about the study prior to its commencement.

RESULTS AND DISCUSSION

The initial assessment was conducted during the first week of May 2025 during the gymnasts' training camp. The front roll technique test and the declared flexibility test were administered. The results of the front roll technique test, which was administered according to the criteria of Rodríguez & Gutiérrez (2021), are presented below.

The initial assessment was conducted during the first week of May 2025 during the gymnasts' training camp. The front roll technique test and the declared flexibility test were administered. The results of the front roll technique test, which was administered according to the criteria of Rodríguez & Gutiérrez (2021), are presented below.

1. Technical test: execution of the front role

Test objective: to evaluate the execution technique of the front roll, a basic gymnastic skill, in gymnasts in the initiation stage (8-10 years).

Instrument: technical evaluation rubric developed by certified coaches based on the FIG (International Gymnastics Federation) regulations, adapted to the initiation level (Table 1).

Table 1. *Evaluation Rubric – Front Role*

Criterion	Score (0-2)
Position initial correct	0-2
Leg drive appropriate	0-2
Body alignment in the turn	0-2
Termination in position stable	0-2
General control and fluency	0-2
Maximum total score	**10 points**

Note: A score ≥ 7 is considered "Satisfactory Technique".

2. Physical test: flexibility (Wells and Dillon Test - Sit and Reach)

Test objective: to measure the flexibility of the trunk and the back of the legs (hamstrings), a fundamental ability in gymnastics.

Instrument: graduated measuring box (in centimeters) for sit and reach test.

Three attempts were taken and the best result was recorded.

Sample:

- Total population: 34 gymnasts.
- Sample (n): 15 female gymnasts selected by inclusion criteria.
- Age: 8-10 years (average 8.54 ± 0.2).
- Stature average: 136.23 ± 0.06 cm.
- Average weight: 32.08 ± 1.06 kg.

Results descriptive (Tables 2, 3, 4 and 5).

Table 2. *Front Role Technical Test*

Gymnast	Initial P	Impulse	Alignment	End	Control	Total /10
G1	2	2	2	2	2	10
G2	2	1	2	2	2	9
G3	1	1	1	2	1	6
G4	2	2	1	2	2	9
G5	2	2	2	2	1	9
G6	1	1	1	1	1	5
G7	2	1	2	1	2	8
G8	2	2	2	2	2	10
G9	1	1	1	2	1	6
G10	2	2	1	1	2	8
G11	2	2	2	2	2	10
G12	2	1	1	1	2	7
G13	1	1	1	1	1	5
G14	2	2	2	2	2	10
G15	2	1	2	1	2	8

Table 3. *Descriptive statistics - front role*

Statistical	Worth
Average	8.13
Deviation standard	1.78
Maximum	10
Minimum	5
Median	9
Fashion	10

Table 4. *Flexibility Test (Sit and Reach - cm)*

Gymnast	Best Attempt (cm)
G1	27
G2	25
G3	22
G4	30
G5	26
G6	20
G7	24
G8	29
G9	21
G10	25
G11	32
G12	23
G13	19
G14	30
G15	28

Table 5 *Statistics descriptive - flexibility*

Statistical	Worth
Average	25.27 cm
Deviation standard	3.74 cm
Maximum	32 cm
Minimum	19 cm
Median	25 cm
Fashion	25 cm

Interpretation and analysis initial:

- Front roll technique: the average was 8.13 points, showing that in general the sample has an acceptable technical mastery, although 3 gymnasts do not reach the minimum seven points established.
- Flexibility: Although the average is adequate for the age, there is dispersion, with several gymnasts below the average (19-22 cm), suggesting the need to reinforce flexibility training.

- Training planning should focus on standardizing the technique of the front roll and leveling the differences in flexibility to improve overall performance.
- The periodic application of these tests can serve as a diagnostic and monitoring tool in basic gymnastics training programs.

Proposed exercise system for the initiation stage in artistic gymnastics. (Focused on the technical development of the front roll and trunk flexibility)

Phase 1: General preparation (4–6 weeks)

Objective: to develop basic physical capacities and general coordination that serve as a basis for specific skills (Tables 6 and 7).

Table 6. *Exercises physical general*

Exercise	Repetitions / Time	Purpose
Easy run (5-10 min)	1 session	General warm-up
Locomotion games (jumping, zigzag, etc.)	10 min	Coordination and agility
Front panel	3 x 20 seconds	Core strength
Leg raises lying down	3 x 12	Abdominal strength
Push-ups assisted	3 x 10	General force
Stretching dynamic	10-15 min	Improved mobility

Table 7. *Exercises technicians initials*

Exercise technical	Repetitions	Purpose
Roll towards forward assisted	5 x 3 repetitions	Introduction to the role
Landslides in pad	3 x 5	Body control
Falls controlled	3 x 5	Security in he motion
Balance games	10 min	Development of the body axis

Phase 2: Special preparation (4–5 weeks)

Objective: to perfect specific skills related to the front role and improve related conditional abilities (Tables 8 and 9).

Table 8. *Exercises physical specific*

Exercise	Repetitions / Time	Purpose
Sit and reach	3 attempts / 2 times by week .	Improve flexibility
Active rebounds (jumps in place with arms raised)	3 x 15	Coordination and promotion
Abdominal exercises with a balloon	3 x 15	Force core dynamics
Push-ups in parallel lows	3 x 10	Upper body strength
Stretching static	15 min	Increase range of motion

Table 9. *Exercises technicians specific*

Exercise technical	Repetitions	Purpose
Front roll with inclined mat	5 x 3 repetitions	Improved momentum and alignment
Front role with partial assistance	5 x 3	Technique correction
Role + jump combinations	3 x 3 series	Transitions fluid
Role from position high	3 x 5	Body control and mastery

Phase 3: competitive stage (2–3 weeks)

Objective: to consolidate the technical execution of the front role under conditions similar to competition, maintain flexibility and acquired physical capabilities (Tables 10 and 11).

Table 10. *Physical maintenance exercises*

Exercise	Frequency	Purpose
Stretching combined	Daily (10–15 min)	Keep joint range
Dynamic core (tables, crunches, turns)	3 days per week	Stability and control
Low box jumps	3 x 10	Power and drive

Table 11. *Exercises technical-tactical*

Exercise technical	Frequency	Purpose
Serial front roll (2-3 in a row)	5 x 2 series	Fluidity and resistance technique
Performance under evaluation conditions	3 sessions weekly	Competition simulation
Role with transition to another skill (e.g., jump, balance)	3 x 3 combinations	Integration technique
Final assessment with competency rubric	1 time	Measurement objective

Recommendations general:

- The sessions should last between 60 and 75 minutes.
- Each phase must be accompanied by weekly technical and physical monitoring.
- Include visual feedback (videos, mirrors) in phases 2 and 3.

- Prioritize play and motivation in the initiation stage to maintain the interest and enjoyment of the girls (Tables 12 and 13).

Table 12. *Results table – pretest and posttest*

Gymnast	Front Role PRE	Front role POST	Flexibility PRE (cm)	Flexibility (cm)
G1	8	10	27	30
G2	9	10	25	28
G3	6	8	22	25
G4	9	10	30	32
G5	9	10	26	29
G6	5	7	20	24
G7	8	9	24	27
G8	10	10	29	32
G9	6	8	21	25
G10	8	9	25	28
G11	10	10	32	33
G12	7	9	23	26
G13	5	7	19	23
G14	10	10	30	32
G15	8	9	28	30

Table 13. *Statistics descriptive comparatives*

Variable	Pretest	Posttest	Δ (Average improvement)
Front role			
Average	8.13	9.13	+1.0 points
Deviation standard	1.78	0.83	
Minimum	5	7	
Maximum	10	10	
Flexibility (cm)			
Average	25.27	28.13	+2.86 cm
Deviation standard	3.74	2.79	
Minimum	19	23	
Maximum	32	33	

Interpretation of results

1. Front role (technique):

    - The average increased from 8.13 to 9.13, showing a generalized technical improvement after the training program.
    - The standard deviation decreased, which indicates that the gymnasts leveled their skills and there is greater homogeneity.
    - No gymnast scored below the minimum score of seven in the post-test , confirming the technical effectiveness of the program.

2. Flexibility (sit and reach):

    - The average went from 25.27 cm to 28.13 cm, with an average improvement of 2.86 cm, which is significant at a physical level at this age.
    - There was also a reduction in dispersion, suggesting that all the gymnasts improved, albeit to varying degrees.
    - The minimum values improved substantially (from 19 cm to 23 cm), benefiting those who initially had a low level of flexibility.

Post-test results show a significant technical and physical improvement as a result of the planned training program. This supports the hypothesis that structured planning during the initial stages of gymnastics training can have positive impacts on both technique and fundamental physical abilities such as flexibility.

The findings obtained in this research support the importance of structured training planning at early ages, in accordance with what was proposed by Águila, LE, *et al.* (2025), who emphasize that sports programs aimed at children should prioritize progressive learning and integral development over competition.

The findings of this research align with the need for age-appropriate and systematic training for youth athletes, following the guidelines established by Alvarado, EJ, *et al.* (2025), who argued that any sports program for children should emphasize holistic development through progressive learning rather than competition. The observed improvement in front-side roll execution and trunk flexion suggests that meticulously organized and progressive preparatory training has positive effects on the technical and physical performance of gymnasts.

The sustained progress in variables essential for athletic development, as noted by Piedra Espejo, JI (2025), who highlighted that gymnastics promotes motor and physical skills in the early stages, supports this notion. Furthermore, there is consensus with Pate *et al.* (2006), who affirmed that regular physical activity in childhood supports metabolic and cardiovascular functions. This reinforces the argument for the need to include systematic physical activity in introductory training programs.

In this research, it was identified that there was greater technical safety and precision during the competitive phase, and this is positive because it suggests an improvement in self-confidence that could be acquired through the gradual mastery of the skills that were trained.

In contrast to what Rodríguez (2019) pointed out, who reported technical changes in children after a short gymnastic intervention, it is possible to affirm that intervention programs, when well planned, can have positive effects in relatively short times, provided that they are carried out considering the characteristics of the group.

Finally, Rodríguez-Cayetano, A., *et al.* (2025) demonstrated the educational value of sport, particularly in teaching discipline, respect, and responsibility. In this sense, the systematic and guided practice of the front position in this study, which is framed within gymnastics, not only fostered technical improvements but also promoted concentration, perseverance, and commitment, which are fundamental to the comprehensive development of gymnasts.

CONCLUSIONS

The evidence analyzed in this research suggests that, in the case of girls, the structure of the planning during the initiation stage of artistic gymnastics makes a difference in technical and physical development. The improvement in the execution of the front roll and in trunk flexibility, which are core skills in this discipline, was the result of implementing a program designed and organized in three progressive phases.

These results also reflect the improved quality of movement execution, as well as the development of overall fitness. The reduced variability in results also indicates that the group, in addition to improving as a result of training, showed an improvement in the individual level of each of its members, thus fostering group cohesion and collective progress. Within this context, it must be acknowledged that there remains a pressing need for teaching strategies that coaches must design according to the stages of child development, providing a foundation upon which to build the technical, physical, and emotional learning of gymnasts in training.

BIBLIOGRAPHIC REFERENCES

Abellán, J., & Segovia, Y. (2024). Aprendiendo a enseñar mediante el modelo de Educación Deportiva en centros de educación especial: de la teoría a la práctica (Learning to teach through the Sport Education model in special schools: from theory to practice). Retos, 59, 138-145. https://doi.org/10.47197/retos.v59.106909

Águila, L. E., Bernal, Y. S., Rodríguez, C. E. T., González, A. N., & Martínez, L. A. C. (2025). Metodología para conducir la iniciación deportiva al baloncesto desde el Deporte para Todos. *PODIUM: Revista de Ciencia y Tecnología en la Cultura Física,* 20(1), 11. https://dialnet.unirioja.es/servlet/articulo?codigo=10081410

Alvarado, E. J., Ortiz, A. M. S., Caraballo, G. D. L. C. M., & Neira, D. J. M. (2025). Programa adaptado de fundamentos técnicos del fútbol para la inclusión de estudiante de 15 años con discapacidad auditiva. Revista Iberoamericana de educación, 9(2), 244-264. https://revista-iberoamericana.org/index.php/es/article/view/314

Coello Rosero, C., & Batista Hernández, N. (2025). Estrategia deportiva recreativa para la inclusión de estudiantes con síndrome de Down. Ciencia y Deporte, 10(1). http://scielo.sld.cu/pdf/cyd/v10n1/en_2223-1773-cyd-10-01-e307.pdf

Charchabal Pérez, D. C., Cherrez, N. M. G., Carrión, A. E. R., Barragán, L. F. P., & Ramos, C. P. L. (2025). La formación de valores y la calidad deportiva en jugadores de baloncesto categoría 11-12 años. *Ciencia y Educación*, 6(7), 65-76. https://cienciayeducacion.com/index.php/journal/article/view/1229

Madrid Pedreño, J., (2025). Modelos pedagógico-deportivos basados en la adquisición de valores en el ámbito de los deportes colectivos. *JUMP*, (11), e9665-e9665. https://revistaselectronicas.ujaen.es/index.php/JUMP/article/view/9665

Mendoza, A., Garzón, B. D. B., Posso, T. G. E., Araujo, I. G. B., Corregidor, E. J. R., & Carrión, J. R. A. (2025). Influencia de las actividades físicas al aire libre en el desarrollo cognitivo y emocional de los niños en edad escolar. *South Florida Journal of Development*, 6(7), e5624-e5624. https://ojs.southfloridapublishing.com/ojs/index.php/jdev/article/view/5624

Piedra Espejo, J. I. (2025). Programa de desarrollo mutilateral en niños de 10 a 12 Años de la ciudad de Loja. *Polo del conocimiento*. 9, (10) https://dspace.ucacue.edu.ec/server/api/core/bitstreams/81e25756-b471-4409-8d8b-d82e0b250dc0/content

Rodríguez-Cayetano, A., Pérez-Muñoz, S., Hernández-Merchán, F., Morales-Campo, P. T., Neila-Simón, D., (2025). Impacto del modelo de educación deportiva. una

revisión sistemática. Sportis. Scientific Journal of School Sport, Physical Education and Psychomotricity, 11(2), 1-37. https://doi.org/10.17979/sportis.2025.11.2.11498

Rodríguez-Carrión, A. E., & Gutiérrez-Cruz, M. (2021). Actividades lúdicas para la enseñanza del rol de frente en gimnastas de categorías infantiles. Ciencia y Deporte, 6(3), 142-160. https://dialnet.unirioja.es/servlet/articulo?codigo=8441629

Smith Palacio, E. (2021). Evaluación de un programa de Educación Física basado en el modelo de educación deportiva. *Sportis Sci,* 7 (2), 321-343. https://doi.org/10.17979/sportis.2021.7.2.7364

*Conflict of interest***:**

The authors declare no conflicts of interest.

Authors' contribution:

The authors have participated in the writing of the work and analysis of the documents.