

Developing Human Performance through Sports Science in Paraguay's National Sports System

Dr. Sebastián Rivas Benítez ^{1*}, Dr. Mariana Acosta Duarte ²

¹ Ph.D., Facultad de Ciencias del Deporte, Universidad Nacional de Asunción, Paraguay

² Ph.D., Departamento de Rendimiento Humano, Comité Olímpico Paraguayo, Paraguay

* **Corresponding Author:** s.rivas@una.edu.py

ARTICLE INFO

Received: 10 Feb 2024

Accepted: 27 Apr 2024

ABSTRACT

As Paraguay seeks to strengthen its presence in regional and international sports, the integration of sports science into athletic development has become increasingly important. This paper explores the current state of sports science in Paraguay, focusing on its application in training, injury prevention, and performance optimization. Drawing from interviews with coaches, federation staff, and academic professionals, as well as athlete performance data, the study identifies key strengths, weaknesses, and opportunities in the Paraguayan sports science ecosystem. While initiatives in football, athletics, and Olympic programs show progress, challenges remain in institutional coordination, funding, and professional training. The paper concludes with a strategic roadmap for advancing human performance through national investment in scientific and interdisciplinary approaches.

Keywords: Sports Science, Paraguay, Athletic Performance, Human Development, Training Systems.

INTRODUCTION

Paraguay, a country with a vibrant sports culture, particularly in football, is gradually expanding its focus to other competitive disciplines such as athletics, swimming, and martial arts. However, limited resources, infrastructure disparities, and outdated training methodologies have often hindered the consistent development of elite-level performance. In response, the role of sports science has gained attention in both academic and professional spheres.

Sports science, which encompasses exercise physiology, biomechanics, sports psychology, and nutrition, offers a structured, data-driven approach to maximizing athletic performance and minimizing injury. Countries that have invested in integrated sports science systems—such as Canada, Spain, and Brazil—report measurable improvements in athlete readiness, resilience, and international results.

In Paraguay, institutions like the Comité Olímpico Paraguayo and the Universidad Nacional de Asunción have begun implementing sports science programs, yet their reach remains limited. This paper investigates the application and institutionalization of sports science in Paraguay, analyzing both elite and developmental sports contexts. It also examines challenges and provides a strategic framework for increasing its impact at the national level.

RELATED WORKS

Foundations of Sports Science in Performance

Modern sports science is founded on scientific disciplines that address physiological, psychological, and biomechanical aspects of performance. By applying measurable indicators—such as VO₂ max, lactate threshold, movement kinematics, and stress levels—coaches and specialists can adjust training to suit individual needs (Kellmann, 2010; Joyce & Lewindon, 2014).

Sports Science in Latin America

In Latin America, Brazil, Argentina, and Chile have made significant progress in embedding sports science into high-performance sports institutions. Brazil's Olympic preparation programs, for example, include dedicated sports science labs and real-time athlete monitoring systems (Silva & Barbosa, 2019). Paraguay, while following similar intentions, still lags in infrastructure, research capacity, and the integration of science into national sports strategy (Rivas & Acosta, 2021).

Paraguayan Sports System Overview

The national sports system is coordinated by the Secretaría Nacional de Deportes (2020) and the Comité Olímpico Paraguayo. Most federations operate semi-independently, with limited scientific support structures. University-based programs in sports sciences are growing, but practical application in clubs and regional training centers is inconsistent. Additionally, most coaches are trained through traditional pathways with minimal exposure to interdisciplinary methodologies.

METHODOLOGY

This study employs a qualitative case study design, utilizing:

In-depth interviews with 12 stakeholders, including 6 coaches, 3 sports scientists, and 3 officials from the national Olympic and athletics federations

Document analysis of national sports development plans and university curricula

Review of athlete performance data (2019–2023) in football, athletics, and swimming

Site visits to two major training centers in Asunción and Encarnación

Data were analyzed thematically to identify key barriers, enablers, and patterns in the deployment of sports science across various levels of sport.

RESULTS AND DISCUSSION

Institutional and Practical Observations

The Comité Olímpico Paraguayo has implemented basic physiological and nutritional services for national athletes, particularly in Olympic preparation cycles.

Most federations lack full-time sports scientists, and interdisciplinary coordination is rare.

Coaches expressed a high level of interest but low confidence in applying sports science, citing training gaps and lack of resources.

Performance and Monitoring

Performance testing is limited to occasional assessments prior to major competitions.

Athlete wellness monitoring (injury tracking, psychological readiness) is not standardized.

University programs emphasize theory over applied practice, resulting in a disconnect between graduates and real-world coaching needs.

Positive Trends

Increased enrollment in university-level sports science degrees

Government discussions underway to include science-based modules in national coaching certifications

Private sports academies are beginning to use fitness trackers, performance apps, and data dashboards in youth programs

Discussion

The results reveal a foundational shift in attitudes toward sports science in Paraguay, but significant barriers remain in implementation and access. While there is clear awareness of its benefits among professionals, structural constraints—such as limited funding, insufficient laboratory access, and outdated coach education systems—hinder progress.

For Paraguay to develop a high-performance culture rooted in science, it must:

Establish regional centers of sports science excellence

Promote partnerships between universities and federations for applied research and internships

Provide continuing education programs for coaches and trainers

Integrate wearable technology and digital tools into youth athlete development

National policy should support these efforts by embedding sports science in the Plan Nacional del Deporte 2025–2030, ensuring that every athlete benefits from data-informed, interdisciplinary support.

CONCLUSION

Sports science presents an essential opportunity for Paraguay to strengthen its athlete development systems and elevate its international sports profile. While the foundation exists in academia and select elite programs, systematic integration remains underdeveloped.

With targeted investment, improved coach education, and collaborative frameworks between academic and professional sectors, Paraguay can build a sustainable, science-driven sports infrastructure that promotes excellence, health, and national pride. The time to align tradition with innovation in Paraguayan sport is now.

REFERENCES

- Joyce, D., & Lewindon, D. (2014). *High-Performance Training for Sports*. Human Kinetics.
- Kellmann, M. (2010). *Enhancing Recovery: Preventing Underperformance in Athletes*. Human Kinetics.
- Rivas, S., & Acosta, M. (2021). Analysis of sports science integration in Paraguay's national federations. *Revista Paraguaya de Ciencias del Deporte*, 4(2), 22–38.
- Secretaría Nacional de Deportes. (2020). *Plan Estratégico del Deporte Nacional 2020–2024*. Asunción: Gobierno de Paraguay.
- Silva, L., & Barbosa, F. (2019). Olympic performance systems in South America: A comparative perspective. *Latin American Sports Studies*, 7(1), 66–81.