

From Tradition to Innovation: Enhancing Olympic Performance Through Research

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Success in high-performance sport recognizes individual or team skills and serves as a powerful means for disseminating information. Tradition and research drive the exploration of new strategies, technologies, and scientific approaches to gain competitive advantage.¹ Evidence-based practice is essential in sport science, and research shows that coaches with strong scientific foundations better guide athletes’ performance.² Many coaches now work at universities, which improves access to scientific knowledge and connections with sport scientists.³ A scientific approach is crucial, as it provides evidence-based methods to optimize performance, prevent injuries, enhance recovery, and develop training strategies tailored to individual athletes.⁴

In modern Olympic sports, certain countries are recognized as dominant forces. The United States has dominated swimming for years, thanks to athletes like Michael Phelps and Katie Ledecky.⁵ While tradition and a strong sport culture played a role, the United States’ dominance in swimming can also be attributed to its significant investment in sport science research, dating back to the work of “Doc” Counsellman. Beyond swimming, the United States also excelled in track and field, winning 34 Olympic medals in Paris.⁶ This success can be attributed to factors like a larger population, greater national investment, and detailed studies in biomechanics, physiology, sport science, and psychology that helped US athletes optimize their preparation and performance.

To identify potential relationships between Olympic success and scientific research, we examined original papers and brief reports published in the *International Journal of Sports Physiology and Performance (IJSP)* since Tokyo 2020 (held in 2021), focusing on elite athletes’ performances in summer sports in relation to the medal rankings from Paris 2024. We hypothesized that countries with higher medal rankings invest more time, funding, and resources into their athletes and supporting scientific research, suggesting a potential link between scientific investment and athletic success. An alternative hypothesis could be that countries with greater financial resources are able to invest in both athlete development and research, without their necessarily being a direct connection between performance and scientific output. Our map (Figure 1) shows the global distribution of *IJSP* papers, highlighting contributions from various countries (as noted in the

methods or by author affiliations), with darker colors indicating higher publication rates.

Australia and Great Britain demonstrate how a strong commitment to scientific inquiry may be associated with athletic success. Australia contributed almost 20% of *IJSP* papers, while Great Britain accounted for 11%, highlighting their high research output. In the Paris medals table, Australia ranked fourth (ninth when adjusted for population size) and Great Britain seventh (24th when adjusted for population size).⁷ While this suggests a possible connection between research output and success, it is important to recognize that the relationship between research and medal attainment is multifaceted, influenced by numerous variables such as population size, financial investment, and athletic traditions. However, countries like Kenya, which has lower research output but consistently strong results in track and field, demonstrate that scientific research is not the sole determinant of success. Furthermore, since English dominates academia, English-speaking countries like Australia and Great Britain may have an advantage in scientific publishing, while non-English-speaking authors might face additional challenges that can impact their research visibility and influence.

Within this framework, Italy presents an interesting case study. Italy contributed 5% of the papers published in *IJSP*, mostly focusing on cycling. This aligns with its recent successes in this sport, particularly at Paris 2024 (ranked ninth overall, 37th adjusted for population) where Italian cyclists secured 4 medals. Conversely, Italy’s achievements in fencing (5 medals in Paris 2024) provide a strong example of sustained athletic success despite limited scientific output. In fact, despite Italy’s history and success in fencing (being the global leader with a historic total of 135 Olympic medals), scientific research connected to this success is very limited, with only few (Italian and non-Italian) studies available. This success may still not simply be the result of tradition but of a broader commitment by Italian sport federations to scientific research: studying literature, investing in innovative research, collaborating with academia, and applying findings to training and athlete development. The contrast between Italy’s research in cycling and its longstanding success in fencing suggests that while tradition and expertise remain vital, there is potential in using scientific research to enhance outcomes across all sports, especially when researchers are closely connected with coaching teams. Italy also produced an “Olympic miracle” at Tokyo 2020, winning 5 gold medals in track and field.⁸

Clearly, the relationship between scientific research and athletic success is complex. Varying research output, the influence of language and country size, and sport-specific focus emphasize the need for a global approach to advancing sport science. Greater international collaboration and support for research across all nations are essential to raise the global standard of sport

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Figure 1 — Map of world distribution of published papers in the *International Journal of Sports Physiology and Performance* from Tokyo 2020 up to September 2024.

performance and ensure that scientific advancements benefit athletes universally. By exploring the connection between research and success, we highlight the vital role that researchers, authors, and *IJSP* play in advancing the field. This editorial provides just a snapshot, as it is limited to papers focusing on summer sports published in *IJSP* from the last 3 years. We encourage other sport scientists and practitioners to conduct similar investigations, in line with *IJSP*'s mission.

References

1. Reade I, Rodgers W, Spriggs K. New ideas for high performance coaches: a case study of knowledge transfer in sport science. *Int J Sports Sci Coach*. 2008;3:335–354. doi:10.1260/174795408786238533
2. Werthner P, Trudel P. A new theoretical perspective for understanding how coaches learn to coach. *Sport Psychol*. 2006;20:198–212. doi:10.1123/tsp.20.2.198
3. Reade I, Rodgers W, Hall N. Knowledge transfer: how do high performance coaches access the knowledge of sport scientists? *Int J Sports Sci Coach*. 2008;3:319–334. doi:10.1260/174795408786238470
4. Bishop D, Burnett A, Farrow D, Gabbett T, Newton R. Sports-science roundtable: does sports-science research influence practice? *Int J Sports Physiol Perform*. 2006;1(2):161–168. doi:10.1123/ijsp.1.2.161
5. International Olympic Committee. Olympic athletes. Accessed September 3, 2024. <https://olympics.com/en/athletes/>
6. International Olympic Committee. Medal table Paris 2024 Olympic Games. Accessed September 3, 2024. <https://olympics.com/en/paris-2024/medals>
7. Paris 2024 Olympic medals per capita. Accessed September 3, 2024. <https://www.medalspercapita.com/#medals-per-capita:2024>
8. International Olympic Committee. Medal table Tokyo 2020 Olympic Games. Accessed September 3, 2024. <https://olympics.com/en/olympic-games/tokyo-2020/medals>