

Investigating the Lack of Sustained Performance in Indian Sports: A Case Study in Tennis

Christian Bosse, Ramkiran Ballal, Prajnesh Gunneswaran, Hargun Singh Oberoi and Surojit Bhattacharyya

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ABSTRACT

In this report¹, we investigate the lack of sustained peak performance of professional Indian athletes on the international sporting stage, using Lawn Tennis as a case study. We present a data-driven analysis of sporting performance of Indian Tennis players as they age. We find that while Indian athletes perform relatively well when younger, they are unable to carry that momentum in their later years. We focus on the role of Strength and Conditioning during coaching as a key factor. We also suggest possible steps that could be taken to create a more reliable and long-term sports coaching environment for athletes to succeed.

Keywords: sports, performance, athletes, coaches, Olympics, sports education, Tennis, injuries, India, Long-Term Athlete Development

INTRODUCTION

India is a rising world power and is projected to be the most populous country within the coming decade. With GDP per capita up over six-fold from 1990 [1], Indians are, on average, making five times more and have greater access to technology, infrastructure, and facilities. A recent survey also suggests that Indian parents are keen to encourage their children in sports other than Cricket [2].

However, the performance of Indians at the world sports stage remains rather poor, except for in Cricket and a few isolated instances at the Olympics (with the likes of Neeraj Chopra, P. V. Sindhu, Mary Kom etc.).

A lot has already been spoken of this with reasons ranging from a lack of infrastructure, limited access to information, lack of cultural interest in sports [3], to corruption and poor policy implementation at the national level. [4]

¹This is a preprint version.

However, Indian athletes are benefiting from increased exposure to sports-related information (via international coaches, increased participation in international events, improved communication technology etc.), better community support, and a significant increase in funding by the government through various initiatives. [4]

In this report, we investigate the pertinent shortcomings in sports coaching that deny Indian athletes continued success on the international stage, and what steps could be taken to mitigate them. We focus on sports coaching and its role in long-term athlete development. We then present a case study of Indian players in Lawn Tennis, with a focus on performance as a function of age. We finally conclude and suggest possible improvements.

SPORTS AND COACHING

What constitutes sporting success?

In order to perform well in any sport, an athlete must excel in three broad aspects, i.e. Physical Preparation, Technical Competence of the sport, and Tactical Expertise. [5] [6] Excellence in each of these aspects is crucial to the overall development and future success of an athlete², especially in the early years of development.

To take Football as an example, the physical aspect entails the overall strength, agility, and fitness; the technical aspect involves dribbling, passing and shooting skills; and the tactical aspect involves team formations, set plays and attacking/defending strategies.

Similarly, in the case of Lawn Tennis, the physical aspect involves building stamina and endurance for the sport; the technical aspect involves the proper racket grip, positioning and swing; and the tactical aspect involves game strategies and

²A lot of research also puts an emphasis on an additional psychological aspect that determines the success of an athlete. However, these aspects become crucial at a later stage, once the athlete reaches optimal levels of physical, technical and tactical prowess.

stroke combinations.

Interplay of various aspects of sports

Different sports, whether individual or team-based, have different levels of requirement among the three aspects described above. Chess, for example, depends heavily on the tactical ability of the player whereas preparation for 100-meter sprints requires more physical preparation.

Even in the same sport, different players may need different levels of preparation. In Cricket, for example, a spin bowler needs a higher level of technical expertise, whereas a fast bowler's physical demands are more, in order to sustain a long and injury-free career. Recent studies suggest that young fast bowlers are almost three times as likely to suffer from injuries compared to spinners owing to the increased physical demands of fast bowling. [7]

Although young athletes could excel at junior levels without properly mastering each of the three aspects, possibly through benefits of early maturity or a superior genetic potential, a higher capacity in each of them becomes necessary for continued success at the elite level for most athletic sporting endeavors.

Long-Term Athlete Development

Based on extensive research in sports and athletic performance, elite sports science specialists have developed the concept of Long-Term Athlete Development (LTAD) [8] [9] to nurture sporting excellence from a young age.

The goal of this concept is to capture specific "windows of opportunities" in physical and physiological parameters spanning across the growth curve of a young athlete.

Recent studies [8] have shown that athletes exposed to such programs from an early age have shown a greater propensity to acquire more advanced technical, physical, and tactical abilities of a sport. These windows of opportunity during adolescent cannot be recovered later or at best may take much longer to recover at a later stage.

Thus, sports organizations from countries in Europe and America are now educating coaches to follow these modern and scientific methods to better train their young athletes. [10]

Importance of Coach's Education in Athlete Development

The importance of physical/physiological preparation for sports has been widely misunderstood and is often ignored.

A proper physical development program curated by an experienced sports performance coach could have compounding

effects on the overall growth trajectory of an athlete and even avoid potential future injuries.

Commonly confused, the roles of a sports-specific coach and a sports performance coach are quite different. Whereas the sports coach focuses on the technical/tactical requirements, a sports performance coach focuses on the physical demands of the sport.

Taking the example of Cricket, a bowling coach could help fast bowlers improve their technique, whereas a performance coach could help them improve shoulder strength, movement, and stability.

Thus, a sports performance coach adds tremendous value to the overall development of an athlete, especially in the formative years. But, in order to be effective, it is crucial for them to receive a formal education in the subjects of Kinesiology as well as Strength and Muscle Conditioning, in order to create effective programs tailored to the specific requirements of each sport. [11]

Common Myths about Sports Performance Coaching

Several myths exist regarding sports performance coaching, the most prevalent one being that there is no need for a dedicated experienced professional, and that a basic fitness regimen provided by fitness instructors, physiotherapists, or sports coaches themselves is more than sufficient [12].

Even if some academies identify its importance, there is usually no compulsion for sports performance coaches to undergo a proper education program. This has led to the proliferation of low-quality certification programs that do not adequately prepare the coach to assess the specific requirements of athletes.

Thus, a lack of qualified and experienced physical conditioning coaches denies athletes from reaching their full potential. The few who make it to the international stage, either suffer from recurrent injuries or fail to perform at the highest level, leading to shorter and less successful professional careers.

INDIA VS. THE WORLD: A CASE STUDY OF TENNIS

To take a specific case of this systemic failure, we analyze data from the sport of Tennis, which is one of India's fast-growing and popular sports. Sania Mirza, Leander Paes, Mahesh Bhupathi etc. are household names. There are several reasons for taking singles tennis (as opposed to doubles) as an example of optimal athletic performance.

Firstly, it is an individual sport played globally with a

massive participating population of 87 million tennis players across 195 nationalities. [13]

Many Indians (both women and men) have been competing at the international level for several decades and there is also an abundant source of data from both men's and women's professional tennis.

But most importantly, success in singles tennis requires a perfect balance of the physiological, technical and tactical aspects; and failure in any one of them would deny an athlete from achieving top-level performance in the sport.

For this analysis, we studied the WTA (Women's Tennis Association³) and ATP (Association of Tennis Professionals⁴) ranking of professional players from January 1990 till June 2022 [14]. Below are some interesting trends that emerged as we compared the performance of top professional Indian players as compared to the top professional players from the world.

WTA and ATP Ranking Progression

We analyzed the performance of Indian players in the current Top 1000, as of 22nd June 2022. WTA and ATP rankings are updated every week for professional tennis players participating in ATP/WTA tournaments across the world.

To be in the Top 100 is a milestone achievement for any professional player and can be achieved through consistent performance in global tournaments. We tracked the players' career ranking trajectories, taking the highest rank for a year as a metric for their overall performance for a given year. We then compared their trajectories with the current top 20 players of the world.

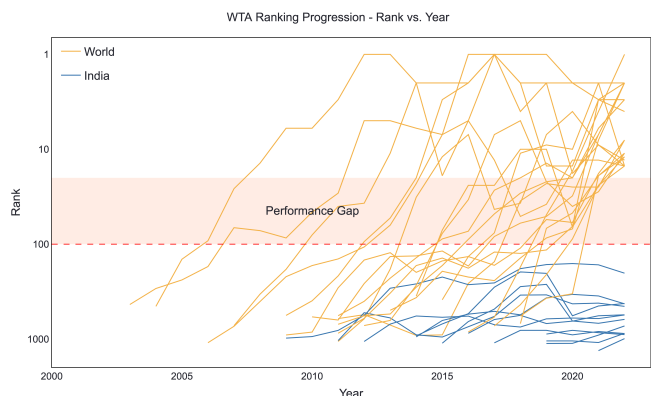


Figure 1

Plots (Figures 1 and 2) show the trajectories for the WTA and the ATP rankings of current Indian players compared to

³<https://www.wtatennis.com/>

⁴<https://www.atptour.com/>

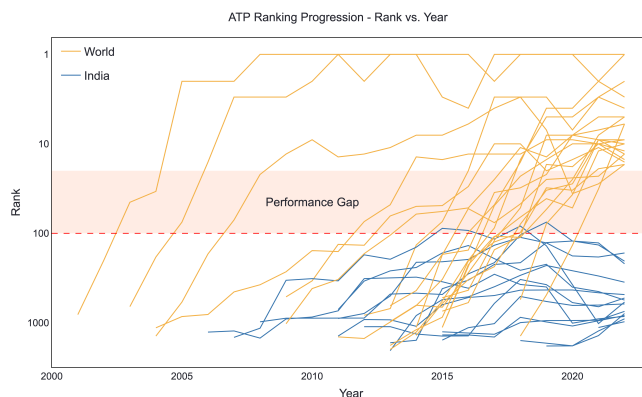


Figure 2

the best in the world. Note that the vertical axis has log-scale. We see a lack of Indian players breaking into the 20-100 ranks i.e. a "Performance Gap".

As not all players start their professional careers at the same time, we also compared their relative career progression with their age, in plots (Figures 3 and 4) for both women and men.

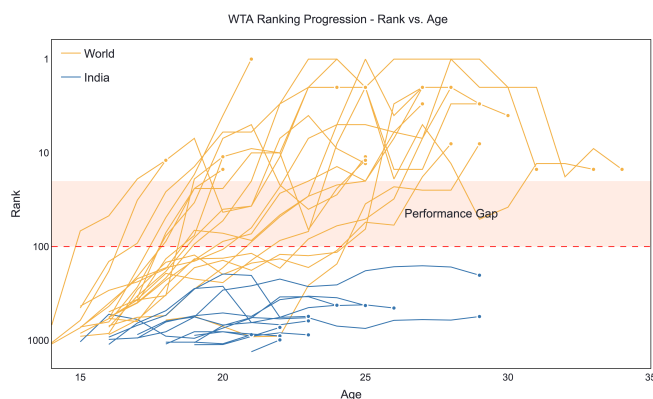


Figure 3

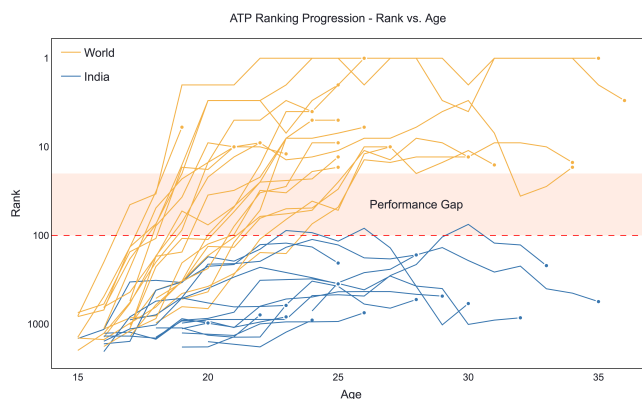


Figure 4

Based on these plots, we can make the following observa-

tions:

1. Most Indian players fail to break into the WTA/ATP Top 100, which is considered a prestigious benchmark for success in professional tennis.
2. The career progression of Indian players is slower than the top players of the world.
3. Most Indian players have single peaks and suffer an eventual decline in ranking whereas top world players have several peaks.

This shows a systemic underperformance of Indian players at the senior level. Many of the top Indian players have also reportedly suffered from recurrent injuries that have kept them out of the professional circuit for extended periods. [15]

Junior Champions, Senior Struggles

Table 1 Top-ranked ITF Indian Junior Girls

Junior Girls	Year	ITF Rank
Tara Iyer	2004	45
Sanaa Bhambri	2006	31
Shivika Burman	2007	125
Poojashree Venkatesha	2008	39
Kyra Shroff	2009	80
Rashmi Teltumbde	2009	81
Rishika Sunkara	2010	76
Kanika Vaidya	2012	122

Table 2 Top-ranked ITF Indian Junior Boys

Junior Boys	Year	ITF Rank
Tushar Liberhan	2004	29
Divij Sharan	2004	29
Navdeep Singh	2004	63
Jeevan Nedunchezhiyan	2005	9
Vivek Shokeen	2005	23
Sanam Singh	2006	4
Rupesh Roy	2007	23
Yuki Bhambri	2008	1
Sudanwa Sitaram	2009	46
Vinayak Sharma Kaza	2009	61
Sai Kartik Nakireddi	2010	67
Rishabdev Raman	2011	62
Arjun Kadhe	2012	34

Several studies have shown that success in the junior categories is a strong positive indicator of success at the senior level for both male and female tennis athletes [16] [17]. These

two studies examined the extent to which ranking in professional tennis can be predicted by performance in the International Tennis Federation's (ITF) Junior Circuit⁵. They found that 99% of top 20-ranked girls and 91% of top 20-ranked boys achieved professional rankings.

To further investigate, we traced the performance of top Indian junior players (Tables 1 and 2) from 2004 to 2012 in the senior category with the performance of top junior players from European/American countries in the same years. Based on the plots below, we see that most highly-ranked Indian junior players fizzle out in the senior categories (Figures 5 and 6).

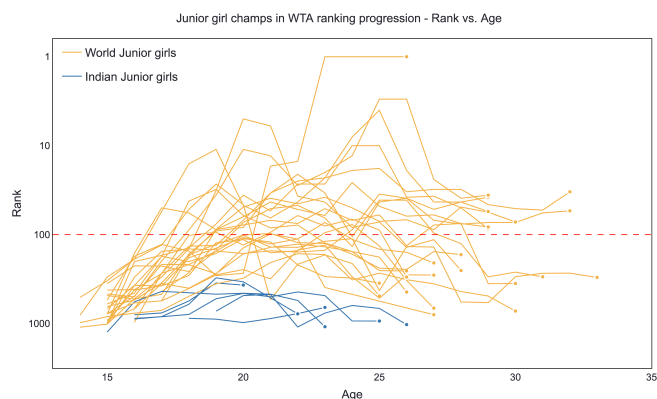


Figure 5

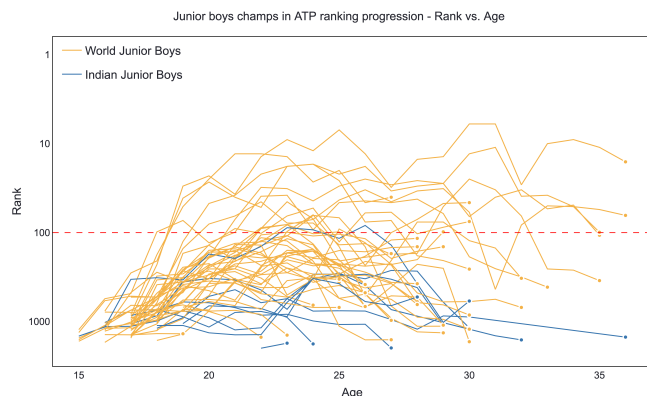


Figure 6

The one outlier separating from the rest in the junior boys' category is Yuki Bhambri, the former World Number 1 junior tennis player, who has also declined swiftly in rankings after the age of 26.

It appears that top Indian junior players fail to maximize their potential as they compete in senior categories and do not benefit from their successes in their younger years.

⁵<https://www.itftennis.com/en/itf-tours/world-tennis-tour-juniors/>

Regrettably, most of the junior Indian players considered for this analysis are no longer playing professional singles tennis and have either stopped playing completely or have continued as doubles players.

Prajnesh Gunneswaran - Fighting the odds

One of the most successful singles Tennis players from India's current crop is Prajnesh Gunneswaran⁶ who shows an unusual trend as compared to other Indian players, with a sustained late-age peak ranking lasting over several years (Figure 7).

Unlike the other Indian players, Prajnesh was not a top-ranked junior player and spent a considerable period of his early senior tennis career without much success against top international players of the world. Riddled with injuries, he could not break into the Top 500 rankings until the age of 26 and almost considered walking away from the sport. [18]

However, despite setbacks, he achieved his peak rank of 75 in the ATP rankings at the age of 29 and has had an upward trajectory quite comparable to European/American players, even beating top 20 players of the likes of Denis Shapovalov and Nikoloz Basilashvili along the way to a Top 100 ranking.

At the age of 32, he continues to play competitive singles tennis, and attributes his improved physical preparedness and recovery from chronic injuries, to the intervention of one of the co-authors, Christian Bosse, with whom he has been working for over several years. [19]

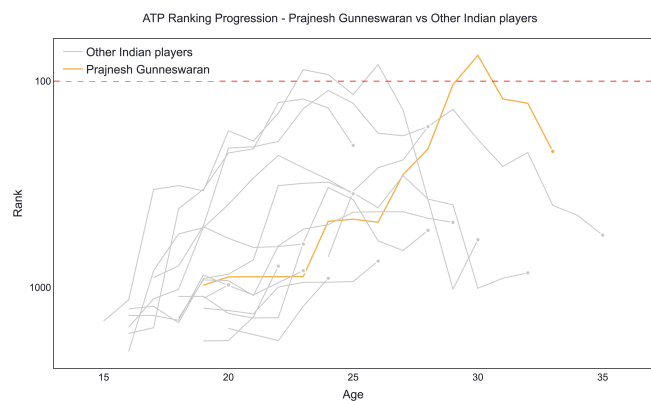


Figure 7

Thus, in some sense, Prajnesh could overcome the performance deficit [20] to a certain extent with his continued association with experienced sports coaches well-versed with the latest scientific methods and practical expertise, like the other top-ranking players of the world.

Prajnesh strongly emphasizes the application of advanced training methods to his continued success in the sport. His

⁶Prajnesh is one of the co-authors of this report.

in-depth interview is hosted on the SportShaala website⁷.

TENNIS, AND BEYOND

From our analysis of Tennis, we conclude that an important cause of failure of Indian athletes on the world stage is the lack of qualified coaches, notably in the domain of strength, conditioning and adherence to the long-term athlete development program.

Although this is visible in the case of Tennis because of its physiologically demanding nature, similar poor handling of young athletes could partially explain the failure in other sporting endeavors, such as track and field events, football and even with fast bowling in Cricket. These lead to varying degrees of performance deficits and athletic underdevelopment, leading to recurrent injuries and shortened professional careers.

This performance gap can be filled by qualified and specialized performance coaches with hands-on expertise.

Although lately, elite international coaches are available to Indian athletes [21], this is only at the highest levels, and such an intervention is "too little too late" as foundational issues are very difficult to correct after a certain age.

In order to succeed consistently, there is a pressing need for home-grown coaches who understand the subject and have practical experience in nurturing athletes using scientific evidence-based methods instead of just rules of thumb.

At the very least, we need our coaches, at all levels, to have a basic understanding of the long-term athlete development process, so that they can provide the right framework for budding athletes to succeed.

Although we see that recently there has been an increased interest in this performance gap and several initiatives, for e.g. the Abhinav Bindra Foundation [22], have taken measures to provide hi-tech facilities and educate Olympic-level coaches, we need to find a way to educate the coaches at the grassroots level who are currently working with our future athletes.

In a nutshell, based on our analysis, we believe that an investment in the education and development of local coaches would give the highest return on investment in increasing the pool of athletes with potential to consistently succeed on the international stage.

This focused approach could be the building block in enabling our country to produce elite athletes and sports stars through a structured process rather than by relying on isolated cases of raw talent, luck, or sheer accident.

⁷SportShaala is an initiative to improve sports performance by providing budding athletes and grassroots coaches with impactful tools and scientific techniques. The authors of this report are associated with SportShaala. Website: www.sportshaala.com

FURTHER READING

Articles

- Coaching Can Make or Break an Olympic Athlete [23]
- Long-term athlete development: Trainability in childhood & adolescence [24]
- Effects of Sport-Specific Training during the Early Stages of Long-Term Athlete Development on Physical Fitness, Body Composition, Cognitive, and Academic Performances [25]
- Strength and conditioning coach is most important role in athletic programs [26]
- Effects of strength training on muscle fiber types and size; consequences for athletes training for high-intensity sport [27]
- Muscle Fiber Type Transitions with Exercise Training: Shifting Perspectives [28]
- Ranking benchmarks of top 100 players in men's professional tennis [29]
- How Norway Won All That Olympic Gold (Again) [30]

Books

- Strength and Conditioning: Biological Principles and Practical Applications [31]
- Strength and Conditioning for Sports Performance [32]
- High-Performance Training for Sports [33]
- Advanced Strength and Conditioning: An Evidence-based Approach [34]

ABOUT THE AUTHORS

SportShaala Academy is an initiative to bring modern, scientific tools and training methods to grassroots coaches and aspiring athletes in India.

Christian Bosse, International Sports Science Specialist, is a Certified Strength and Conditioning Coach by the National Strength and Conditioning Association (NSCA-CSCS) and Certified Level 2 Tennis Coach by the German Tennis Federation. Over the course of his career, he has worked with several high-profile tennis coaches, ATP-ranked players and top European academies. He has been an integral part of a coaching team of Olympic medalists.

Ramkiran Ballal, Long-Term Athlete Development Coach, has over two decades of experience in the areas of

Health and Fitness for Adults and has trained children and young athletes in association with international coaches from Europe

Prajnesh Gunneswaran, Top Indian Tennis Player, achieved a peak ATP rank of 75 in 2019. He has won 2 ATP Challenger and 8 ITF titles in singles and 1 ITF title in doubles. He is currently the highest-ranked Indian singles player and represents India at the Davis Cup.

Hargun Singh Oberoi, Founder of SportShaala, has an integrated Masters degree from BITS Pilani University. He is a passionate tennis and football player, and believes in a future where more kids can pursue sports as a primary profession in India.

Surojit Bhattacharyya, Principal Developer at SportShaala, is a post-graduate in Physics from IIT Madras. He is currently developing a sports coaching management system at SportShaala and is interested in developing an AI-assisted injury prevention tool in the future.

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