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How did the Top 100 Professional Tennis Players (ATP) Succeed: an Analysis of Ranking Milestones

Abstract

Achieving a Top 100 Association of Tennis Professionals (ATP) ranking is one of the most important markers in professional tennis. The ATP ranking pathway that individual players progress through is used for benchmarking, funding, scheduling and other development purposes. The aim of the study was to develop a profile of the ages when athletes achieve major ranking milestones from the beginning of a professional career until a ranking inside the Top100. Data were collected from an ATP online source for ranking information. Descriptive statistics, t-tests and ANOVAs were used to analyze the data. The average age of the population was 27.9 (+3.55), the age when the athlete first reached a Top1000 ranking was 18.00 (+2.01); Top500 19.06 (+2.22); Top300 19.75 (+2.35); Top200 20.56 (+2.59) and Top100 21.96 (+2.98). The average number of weeks spent inside the Top100 was 249.70 (+178.73). The Tennis Evolution Time (TET) is the time it takes an athlete to improve his ranking from the Top 1000 to Top 100. The TET was 205.92 weeks +154.96 (or approximately four years). The Tennis Evolution Time for a tennis player to rise in the rankings from 1000 to 100 takes an average of four years for a male professional tennis player.

Keywords: benchmarks, player development, scheduling.

Introduction

The pathway to a successful professional tennis career requires long term development and a structured plan for training, competition and appropriate funding by private academies, private investors, national tennis federations, sport governing bodies and commercial agencies that all may have a vested interest in the success of the next great tennis athlete. Although the physical and psychological demands of the sport are vast and many factors contribute to a tennis player's success [1,2] in most tennis metrics, achieving a Top 100 Association of Tennis Professionals (ATP) ranking is one of the most important markers for success in professional tennis. This allows players to have direct entry into the four major Grand Slam tournaments and to be able to play a top level professional schedule. The financial benefits of having a ranking inside the Top 100 are considerable compared to individuals who do not achieve this threshold. The ATP ranking system has been in effect since 1973 and the ranking system is a highly transparent and measurable scale that can be utilized for a number of important decisions. Most of the major national governing bodies and sports federations evaluate the tennis strength of a country by the number of players in the top 100, and this is believed to provide an insight into the professional tennis depth of that Federation/country.[3] The financial investments to develop elite level tennis athletes are considerable. Many of the major tennis nations spend millions of dollars per year on athlete/player development programs. For example, in 2013 the Lawn Tennis Association of Great Britain spent £12,222 million;[4] Tennis Australia spent AUS$24 million [5] on athlete development in 2012. Other major countries like the United States and France also spend significant funds on the current and future development of top professional tennis players. Developing a professional tennis player has been calculated to cost between $121,000-$197,000 per year.[6] These fees include coaching, travel, equipment, training expenses, etc. No sports governing bodies and tennis federations can financially support all the best juniors for a 10 year development period. Therefore, it is important to use the best available data to determine how best to allocate the finite financial and human (coaches/trainers/medical, etc.) capital for the greatest long term success. Just like all the major professional sports teams (American football, baseball, soccer, basketball, etc.) use different metrics to determine how best to allocate

resources to have the best teams on the field, so must tennis federations and leaders and decision makers in the tennis industry.

Hundreds of studies now exist in nearly every sport helping teams, coaches and sports federations to make more informed and educated decisions about how best to select athletes during the development years and how certain metrics may correlate with future sports success.[7] Similar data has also been used to determine/evaluate career decrease in performance (which helps teams to have a better idea about when to release/cut a player).[8,9] Over the past decade a number studies looked at the tennis careers of tennis players over multi-decade periods.[10] This type of information is very beneficial when looking at long term changes in career paths, win/loss ratios and ranking type information over an extended period of time with a large dataset. One of the most critical periods for a prospective professional tennis player is the transition period between junior tennis and the minor leagues of professional tennis. The transition between junior and professional competition has been modeled using linear regression, and has found junior ranking to be a statistically significant, although minor, (5 and 13% of variance explained for boys and girls, respectively), predictor of senior ranking for girls [11] and boys. [12] Brouwers et al [13] also examined the relationship between junior success and the resultant performance in professional competition, and found that while junior success can be a predictor of senior success, it is not definitive. A study that looked at benchmark data for the Top 100 in male professional tennis was conducted on in 2009. The mean age of athetes entering the Top 100 was 21.5 (± 2.6 years of age) and 29 athletes entered the Top 100 as teenagers.[14] The need exists for more current data to evaluate any changes in this information as well as more in-depth analysis of ranking milestones along the pathway. The challenge in tennis is that the game has changed rather dramatically over the past decade and historic data may not be adequate for making decisions today and into the future. Therefore, the purpose of this study was to evaluate the current Top 100 ATP Professionals in 2014 and use ranking and performance milestones to analyze how they have achieved career success in professional tennis.

Methods

Data used in this study were obtained from the public domain at the ATP official website.[15] The 100 names, countries and date of birth information of players ranked 1-100 in the ATP rankings were extracted for the rankings listed on July 28th, 2014.[15] The year-end professional rankings of these players were tracked from the date that they first reached a Top 1000 ATP ranking to the July 28th, 2014 ranking. Date of birth information was obtained from the ATP rankings database.[15] This was used to calculate age data for all calculations related to ranking and age milestones. A random sample of 20 athletes (20%) was selected and manually checked for accuracy. 100% of these data were verified to be accurate. Rankings for athletes who were not ranked in the Top 100 at the time of the analysis were not otherwise considered. The variables used in this study are shown in Table 1.

Table 1

Demographic, physical, ranking and status variables analyzed

Demographic	Physical	Ranking Milestones	Status Milestones
Name	Height	Year Turned Pro	Current Ranking
Country	Weight	Age Ranked Top 1000	Career Best Ranking
Region	Handedness	Age Ranked Top 500	Weeks Top 100
Current Age		Age Ranked Top 300	Weeks Top 50
Date of Birth		Age Ranked Top 200	
Year of Birth		Age Ranked Top 100	

A series of key "milestones" in the careers of elite tennis athletes were determined. Five major ranking milestones were determined based on the age when the athlete first reached the following rankings: Top 1000, Top 500, Top 300, Top 200 and Top 100. Another milestone of interest was titled "Tennis Evolution Time" or "TET" defined as the first time the athlete achieves a ranking inside the Top 1000 to the athlete first being ranked inside the Top 100.

Statistical Analysis

Selected variables were subjected to descriptive statistical analyses to evolve a working profile of the players. All statistical computations and analyses were done using the R statistical platform (R Core Team, Vienna, Austria, 2014).[16] To facilitate comparisons and contrasts as a function of ranking, a new variable was introduced. This variable, ranking level, created three ranking bands: Top 10, Top 11-50 and Top 51-100. This division into three parts, which has been used in previous studies,[17] represents a slight departure from the usual top 10, top 50 and top 100 breakdown. From the standpoint of statistics it has the advantage of providing three independent subsets. Benchmark age variables (e.g., age at which top 100 ranking was achieved) were checked for normality using the Shapiro-Wilk Normality test as well as graphically. Ordinary Regression Analyses (ORA) were conducted between selected variables to check for associations that might exceed random chance. To compare the effects on players of being within different ranking bands, ANOVA analyses were performed where appropriate (i.e., data pass normality test) or T-tests.

Results

The average age of the Top 100 professional male tennis players was 27.9 (± 3.57) (Figure 1). This average was fairly representative across the three ranking bands although the average age of the top 10 and top 11-50 players was slightly older, 28.30 (±3.06) and 29.08 (±3.08), respectively (Table 2). For the current Top 100 players, the average career high ranking was 30.33. Of players in the Top 11-50 ranking band, 15 achieved Top 10 status as their best ranking at some point in the past. Only 2 players in the current Top 51-100 were Top 10 players at one time. However, 29 players in the current Top 51-100 achieved their best ranking in the Top 11-50 band previously.

Table 2

Mean, Standard Deviation and Range of Current Age, Height and Weight by ranking band and the total population (Top 100) ATP Tour Players

	Current Age	Height (cm)	Weight (kg)
Top 10	28.30 (3.06) 23-32	188.6 (7.03) 175-198	85.5 (8.06) 73-99
Top 11-50	29.08 (3.08) 24-36	187.2 (7.61) 178-211	79.97 (8.23) 68-108
Top 51-100	26.88 (3.78) 19-34	187.0 (6.53) 170-203	80.27 (6.63) 64-108
1-100 Combined	27.90 (3.57) 19-36	187.2 (6.97) 170-211	80.48 (7.62) 64-108

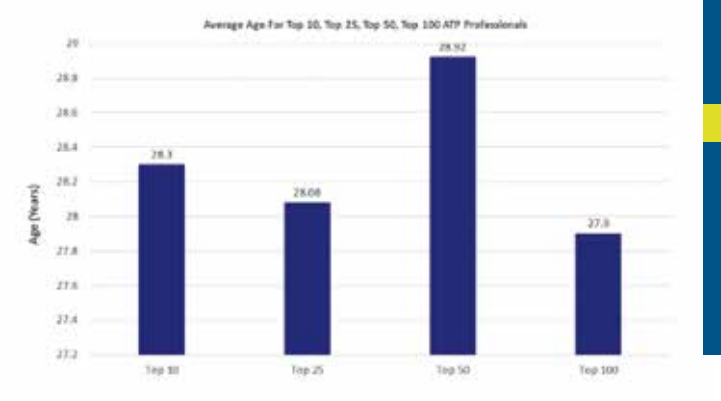

Figure 1

Average Age For Top 10, Top 25, Top 50 and Top 100 ATP Professionals

Table 3

Statistical Comparison of Age, Height and Weight Between The Different Ranking Bands of Top 100 Association of Tennis Professionals (ATP) Players

	P-VALUE	DF	T
Age (years)			
Top 10 – Top 11-50	0.4857	13.924	-0.7162
Top 10 – Top 51-100	0.2181	15.098	1.2852
Top 11-50 - Top 51-100	0.003151	87.97	3.0362
Top 10 – Top 100	0.7049	11.606	-0.3881
Top 11-50 – Top 100	0.05484	82.937	-1.9476
Top 51-100 – Top 100	0.1162	93.245	1.5856
Height (cm)			
Top 10 – Top 11-50	0.5878	14.753	0.5541
Top 10 – Top 51-100	0.5235	12.312	0.6566
Top 11-50 - Top 51-100	0.9058	77.208	0.1187
Top 10 – Top 100	0.574	10.85	-0.5797
Top 11-50 – Top 100	0.9714	66.655	0.036
Top 51-100 – Top 100	0.8429	104.016	0.1987
Weight (kg)			
Top 10 – Top 11-50	0.07389	14.087	1.9307
Top 10 – Top 51-100	0.06191	11.672	2.0647
Top 11-50 - Top 51-100	0.9533	75.068	0.0588
Top 10 – Top 100	0.0866	10.674	-1.8873
Top 11-50 – Top 100	0.7388	67.206	0.3348
Top 51-100 – Top 100	0.6247	109.179	0.4906

Table 4

Comparisons by t-test of mean ages and ranking milestone achievement for ranking bands of Top 100 Association of Tennis Professionals (ATP)

	P-VALUE	DF	T
Age At Top 1000			
Top 10 – Top 11-50	0.004272	37.232	-3.0436
Top 10 – Top 51-100	0.001017	15.752	-4.0203
Top 11-50 - Top 51-100	0.8953	56.041	0.1323
Top 10 – Top 100	0.002065	16.262	3.66
Top 11-50 – Top 100	0.6767	57.963	-0.4191
Top 51-100 – Top 100	0.6367	133.014	-0.4734
Age At Top 500			
Top 10 – Top 11-50	0.001109	43.147	-3.4952
Top 10 – Top 51-100	0.000003516	25.553	-5.888
Top 11-50 - Top 51-100	0.337	65.535	-0.9672
Top 10 – Top 100	0.00004353	22.067	5.0753
Top 11-50 – Top 100	0.901	61.635	0.1249
Top 51-100 – Top 100	0.2187	118.118	-1.2366
Age At Top 300			
Top 10 – Top 11-50	0.003763	32.744	-3.1197
Top 10 – Top 51-100	0.0000528	20.363	-5.0919
Top 11-50 - Top 51-100	0.2032	70.76	-1.2843
Top 10 – Top 100	0.0005194	16.641	4.2886
Top 11-50 – Top 100	0.7592	64.154	0.3078
Top 51-100 – Top 100	0.1724	112.251	-1.3732
Age At Top 200			
Top 10 – Top 11-50	0.000767	36.794	-3.6687
Top 10 – Top 51-100	0.000001048	27.83	-6.2177
Top 11-50 - Top 51-100	0.0781	77.336	-1.7855
Top 10 – Top 100	0.00003072	20.433	5.3221
Top 11-50 – Top 100	0.5771	68.189	0.5603
Top 51-100 – Top 100	0.1029	106.296	-1.6451
Age At Top 100			
Top 10 – Top 11-50	0.00004722	35.919	-4.6247
Top 10 – Top 51-100	0.0000002554	29.438	-6.6463
Top 11-50 - Top 51-100	0.1761	80.25	-1.3649
Top 10 – Top 100	0.000005373	20.836	6.0569
Top 11-50 – Top 100	0.8133	70.477	0.2371
Top 51-100 – Top 100	0.1509	103.878	-1.447

Table 5

Regional Data of Top 100 ATP Male Tennis Players

REGION	TOP 10	TOP 11-50	TOP 51-100
Africa	0	1	0
Asia	0	4	3
Australia	0	2	4
Caribbean	0	0	1
Europe	8	28	29
Middle East	0	0	1
North America	1	2	5
South America	1	3	7

RANKING RANGES WITHIN THE TOP 100

Country	*Total*	*1 - 25*	*26 - 50*	*51 - 75*	*76 – 100*
Argentina	6	1	1	2	2
Australia	6	0	2	2	2
Austria	2	0	1	1	0
Belgium	1	0	0	0	1
Brazil	1	0	0	0	1
Bulgaria	1	1	0	0	0
Canada	2	1	1	0	0
Columbia	3	0	1	1	1
Croatia	3	1	1	1	0
Czech Republic	4	1	2	1	0
Dominican Republic	1	0	0	0	1
Finland	1	0	0	1	0
France	11	3	4	0	4
Germany	7	1	1	2	3
Great Britain	1	1	0	0	0
Israel	1	0	0	0	1
Italy	4	1	1	0	2
Japan	1	1	0	0	0
Kazakhstan	2	0	0	2	0
Latvia	1	1	0	0	0
Luxembourg	1	0	0	1	0
Netherlands	2	0	0	2	0
Poland	1	0	0	1	0
Portugal	1	0	1	0	0
Russia	3	1	1	1	0
Serbia	2	1	0	1	0
Slovakia	2	0	0	1	1
Slovenia	2	0	0	0	2
South Africa	1	1	0	0	0
Spain	13	5	5	1	2
Switzerland	2	2	0	0	0
Taipei	1	0	1	0	0
Ukraine	2	1	0	0	1
United States	6	0	0	4	1
Uruguay	1	0	1	0	0
Uzbekistan	1	0	1	0	0

Table 6 Country distribution of the top 100 ATP male tennis players and stratified by ranking quartiles

Figure 2
The number of top 100 ATP men's professional ranking by country

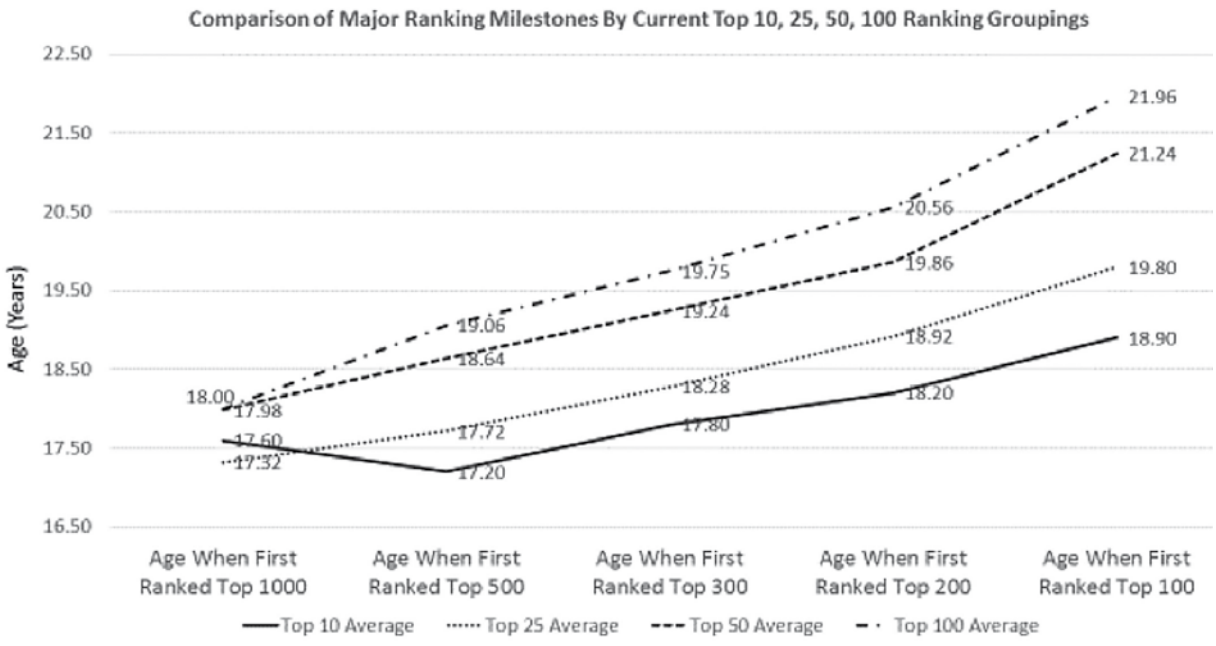

Figure 3
Comparison of major ranking milestones by top 10, top 25, top 50, top 100 ranking groups

Discussion

Professional men's tennis has undergone significant change since the mid-1980s. Perhaps the most influential has been the development of racket and string material technologies and the change in court surfaces.[18] These changes have resulted in a different game style. Also, the sport has become significantly more global (due in part to tennis being included as an Olympic sport), and at the time of this analysis 36 different countries had at least one representative in the Top 100 ranking list (Figure 2). Basic anthropometric data like the height of the tennis player is many times discussed as an important component to success as a tennis player, but the data from this study does not show significant difference in height between the different ranking ranges within the Top 100 (Table 3). Although athlete weight was provided in the analysis, caution must be taken when interpreting the data. The data is self-reported and is on the official ATP website. No verification of data or change in body weight over time is monitored. Also, the average number of years that the individuals in the current Top 100 have had a professional ranking has been more than 10 years and the average is around 28 years of age (Figure 1). However, the average age the players first entered the Top 100 was 21.96 (± 2.98) (Figure 3). This highlights the range in the average age of players and when they first entered the Top 100 (Table 2). This speaks to the longevity of most of the players within the Top 100 and also results in limited opportunities for individuals who are currently outside the Top 100 ranking (i.e. between 100-300) to move into the Top 100.

Tracking an athlete's progression from the early stages of his career until achieving the important milestone of reaching a Top 100 ranking is an important measure. Knowing whether differences exist in individuals who achieve the pinnacle of the sport (Top 10) vs individuals who are not ranked as high (see Table 4) is also very valuable. The top 10 players achieved the Top 100 ranking nearly three years earlier than the average at 18.90 years (Figure 3). Comparison of mean ages of milestone achievement by ranking band and entire Top 100 population is shown in Table 4. For the five milestones of interest (Top 1000, Top 500, Top 300, Top 200, Top 100), the Top 10 ranking range (1-10) is significantly different from the other two bands as well as the entire Top 100 population (Table 4). The top 10 players achieved the Top 100 ranking 3.06 years earlier than the average at 18.90 (± 1.22) years (Figure 3). In the sample analyzed the average career high ranking of the entire Top 100 was 30.33 (± 22.85).

The number of lower level tournaments played (Futures, Challengers) has also expanded.[19] This increases opportunities for more individuals to achieve a professional ranking, thereby increasing the opportunity for developing athletes to compete. [19] However, this increase in tournaments has increased the number of individuals with a professional ranking at the lower levels (<1000), but this data does not seem to support that this has made a significant impact on the higher ranking levels. For example, such countries as Mexico or Turkey have a large number of tournaments throughout the year, but neither country has a player in the Top 100. [19] Even though 36 countries are represented in the Top 100 player list, the majority of players (65%) hail from Europe (Table 5). Also, nearly half (44%) of all countries represented only had one male player in the Top 100 (Figure 2). Spain (13), France (11), Germany (7) were the countries that had the most players represented in the Top 100 (Figure 2). The country distribution shows that Spain (5), France (3) and Switzerland (2) are the only countries that have more than one player represented in the Top 25 (Table 6).

In a unique study looking at pooled ranking data since the beginning of official ATP rankings (1973 to 31 December 2010); the mean ± standard deviations for an athlete to go from his first ATP ranking point up to Top 100 was 134.0 (± 57.2), 209.5 (± 96.8) and 285.1 (± 129.2) weeks for Top 10, Top 11–50 and Top 51–100 athletes, respectively. [17] The time it took an athlete to progress from a Top 1000 ranking to a Top 100 (TET) was 205.92 weeks (± 154.96) for the current Top 100 players (Figure 3). The TET for the Top 10 was significantly different from the TETs of the other two bands and from the entire Top 100 population (Table 4). This approximate four year timeline (205.92 weeks or 3.96 years) compares to the 4.5 (± 2.1 years) seen in a similar study using data from the 2009 season [14] looking at the time it takes for an athlete to attain their first ATP ranking point to first achieving a Top 100. This is a similar number to what has been seen in the time it took players to progress from the attainment of the first professional ranking point to achieving a Top 100 ranking.[14] The data shows that it takes significantly more time to progress through the rankings compared to the historical data analysis,[17] but over the past five years the timeframe has been rather consistent. This comparison is also even more telling as this study chose to use the Top 1000 ranking milestone as the first major marker for a professional career rather than the marker of the first ranking point. Multiple reasons exist why the Top 1000 is a better marker for starting a professional career when determining milestone related data. Achieving a Top 1000 ranking requires approximately 12 ATP World Tour ranking points in 2014.[15] This can take between one and six tournaments at the minor leagues where the athlete is able to win at least one match. This is an important differential to other studies that just use the time point where an athlete achieved their first

ATP World Tour ranking point.[17] The negative with using the first ranking point is that many players may receive a wildcard (special exemption) into tournaments at a younger age before they have earned the level, and many times that there could be 12-18 months of time before the athlete then reaches the Top 1000 threshold. This is a result of many of these players competing predominantly at the national or international junior level and not playing enough tournaments to gain the points necessary. Therefore, the time periods are somewhat mixed depending on the tournament schedule chosen by the player/coach/federation. Therefore, we feel it is more appropriate to measure the TET from Top 1000 to Top 100 which is a better representation of the pathway. Juniors often tend to play professional events infrequently and sporadically making professional rankings at the early stages of a career unreliable. Dependency on wildcard entries and commitment to junior or college events may affect a young player's ability to consistently commit to a professional schedule. Also, since 1995 the number of individuals who have achieved more than four ranking points has not changed substantially. However, a major increase has been seen in the number of individuals who achieved less than four ranking points [17]. This increase is due to a larger number of lower level tournaments being offered throughout the world.[19] Also, entry age and the time taken to transition to the top 100 appear unrelated in the study performed by Reid and Morris [14] and the data from our study supports this finding. Figure 3 highlights the scenario that the age when an athlete achieved a Top 1000 ranking was not consistent with when they achieved a Top 100 ranking (Figure 3). However, the first time an athlete enters the Top 500, Top 300, Top 200 and Top 100 all show statistically significant differences based on the ranking groups within the top 100 (Figure 3 & Table 4). The data highlights that the age that a player reaches the Top 1000 ranking is not a great predictor of future ranking success within the Top 100 players. However, a clear separation is shown in the speed to reach the Top 500, Top 300, Top 200 and eventually the Top 100. At the time individuals reach the Top 500 ranking we see an average of 1.86 years difference in time between individuals who are in the Top 10 in the world and the entire Top 100 list (17.20 and 19.06 respectively) (Figure 3 & Table 4). This age differential is even more pronounced when the athletes first reaches a Top 100 ranking. The individuals who are currently in the Top 10 in the world achieve this ranking milestone 3.06 years sooner than the average for the entire Top 100 players (Figure 3).

Conclusions

In this study on the Top 100 ATP professionals in 2014was analyzed to evaluate and understand how trh they achieved career success in professional tennis. The objective ranking data allows for an unemotional analysis of the career pathway of current and future tennis players. Although many factors contribute to ultimate tennis success, utilizing an unbiased measure such as rankings can provide valuable information along the journey to career success in professional tennis. The major findings are that the age an athlete achieves a Top 1000 ranking is not a solid predictor of an ATP ranking in the Top 100, but the age when a Top 500, Top 300, Top 200 ranking is achieved does correlate with when an athlete may reach the Top 100. The Top 10 players in the world achieved a Top 500 ranking 1.86 years before the average of the Top 100. The Top 10 players in the world also first rank inside the Top 100 3.06 years ahead of the average of the Top 100 players. This data demonstrates that the Top 100 pathway of Top 10 players differs significantly from all the other individuals within the Top 100. This information may lead to better decision making regarding when an athlete should turn professional (or play college tennis) based on where the athlete is ranked at his 17th and 18th birthdates. This information is highly valuable for individuals or organizations that fund or benefit from better predicting the pathway to the Top 100 and specifically the Top 10 in the world. This information should be used by national sports federations, tennis associations, athlete agencies, parents, coaches and players to better plan tournament/training schedules and be more realistic about goal setting and results at different age groups.

Conflicts of Interest: none declared.

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