

## REVIEW

# The Sony Ericsson WTA Tour 10 year age eligibility and professional development review

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Concerns have long existed over the participation of adolescent athletes in professional sports. In 2004, the Sony Ericsson WTA Tour (WTA Tour) commissioned a Professional Development Advisory Panel (PDAP) to evaluate the WTA Tour's age eligibility rule (AER) and professional development programmes (PDPs) for female tennis players since their inception in 1995. More than 75% of the 628 respondents supported the principles of the AER, and 90% indicated a need for PDPs. Statistical analysis of WTA Tour players' careers found that premature retirements (players leaving the Tour at or before age 21) decreased significantly from 7% before the AER to less than 1% afterward, and median career length increased by 43%. The PDAP recommends that the WTA Tour continues a phased-in, developmentally appropriate AER, enhances the PDPs, and works with other sport governing bodies to coordinate rules and programmes at earlier ages to aid the transition of adolescents into adult sports.

## METHODS

The 10 year age eligibility review used four components: literature review, surveys, oral testimony, and statistical analysis of players' careers. A formal literature review about adolescent participation in elite sports was commissioned from an independent researcher. The WTA Tour gave standardised surveys to current and former WTA Tour players, members of professional and junior tennis communities (coaches, parents, agents, sponsors, officials, and media) and sports science and medicine professionals. The 16 item survey instrument contained questions about the AER and its components, the major stressors encountered by players, and the effectiveness of the PDPs. These were anonymously returned to and analysed by statisticians. The PDAP received direct oral testimony from 30 top current and former professional players, parents, coaches, and media representatives who appeared before the PDAP. Detailed statistical analyses of players' careers were performed by independent statisticians.

## RESULTS

### Literature review

A comprehensive literature review was conducted to determine if there was any research evaluating the growth and development and injury rates of young female tennis players. A systematic search over the previous 15 years through PubMed/Medline, Ovid, and SPORTDiscus did not find any specific study to answer the questions. Thirty six relevant review articles related to the topics were assessed. The literature review concluded that there are physiological risks associated with adolescent growth and development in young athletes who train and compete at elite levels.<sup>5–7</sup> These risks are exacerbated by lack of coaching education, conditioning and training errors, inadequate preparticipation physical examinations, and parents and coaches who drive young athletes too hard and/or fail to provide adequate psychological support.<sup>8–10</sup> The results of these factors include injury,<sup>11–13</sup> burnout, and dropout.<sup>14–15</sup> There is an increased risk of female athlete triad (disordered eating, menstrual disorders, and impaired bone mineralisation)<sup>16–17</sup> in women athletes pressured to be unrealistically thin or

The literature documents negative medical, psychological, and developmental effects on young athletes competing in professional sports.<sup>1–4</sup> To decrease the risks, many sport governing bodies have enacted age limits and invested in professional development programmes (PDPs) for athletes and their advisors. The 1995 age eligibility rule (AER) instituted by the Sony Ericsson WTA Tour (WTA Tour) allowed a player's amount of tournament play to be increased according to her age and performance capabilities. In 2004, on the 10 year anniversary of its original AER review, the WTA Tour launched what is believed to be the most comprehensive review ever undertaken in any sport on age related developmental programmes and AERs. The WTA Tour empanelled the Professional Development Advisory Panel (PDAP), an independent, volunteer body of seven international sports science and medicine professionals, to conduct a comprehensive review and make recommendations. The PDAP had reviewed the PDPs and the AER annually since their inception in 1995. The 10 year review was intended to be more extensive, scientifically studying data, trends, and programme results over time. Independent statisticians and professionals were commissioned to assist with the survey design and data analyses.

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overtrained and undernourished. Although psychological benefits exist in sports participation, there are also psychological risks. These are associated with many factors including competition, stressors, expectations, loneliness, and training loads.

### Survey results

The surveys were completed by 628 people. Response rates were 72% (226/315) for WTA Tour players, 67% (259/386) from WTA Tour tennis community, and 69% (81/117) from international sports science and medicine professionals. Fewer responses were received from the junior tennis community (26%, 50/199) and junior players (11%, 12/110), and these data are not included in this review.

### Support for the AER

WTA Tour players and members of the professional tennis and sports medicine and science communities strongly support the principles underlying the WTA Tour's AER. In particular, respondents agreed that the amount and level of professional play by girls under 18 should be limited. Limitations on the number and level of tournaments for young players were favoured by 90% of the sports medicine and science professionals, 85% of the tennis community, and 72% of the 226 WTA Tour players. Over 90% of retired WTA Tour players and 68% of players currently governed by the AER favoured age restrictions because it allows player growth and development and/or protects players from burnout and injuries. In addition, 87% of the tennis community and 83% of players favoured the WTA Tour's phased in approach to professional play, which gradually increases the number of tournaments each year that a player under 18 can play.

### The stressors in professional tennis

In 2004, all respondents ranked 25 different stressors on a 1–5 Likert scale from “not at all stressful” to “very stressful”. Injuries and expectations are among the top five stressors across all groups, with injuries being the top stressor, rated between 3.6 and 4.5. The top five stressors of the WTA Tour players are intrinsic performance based factors: injuries, travel, length of season, expectations, and competition. Of those players who cited expectations as a stressor, over half said meeting self expectations was stressful, and fewer commented on parental expectations. When surveyed during the first review in 1994, players identified their top stressors as external factors such as media, loneliness, and family. Table 1 lists the top five stressors from 1994 and 2004 as nominated by the players.

### Support for the PDPs

Adolescents competing in professional sports need a broad skill set to survive and thrive in this environment. The PDPs were designed to enhance the sports science and medicine support systems for the players and to address the stressors they identified (table 1). PDPs have been researched, developed, and implemented in stages since 1995 (see the appendix). The 2004 review allowed the programme recipients to assess the need and effectiveness of the PDPs. The

tennis community and the WTA Tour players overwhelmingly support the programmes. A need for the PDPs was indicated by 91% of the tennis community, and 89% of the players and over 85% of both groups felt the WTA Tour should provide programmes for young players. The top programmes cited by the players in order of their effectiveness are: sports science and medicine services, media training, athlete assistance, physical examination, and career development. These programmes are designed to operate cohesively and provide players with the opportunity to acquire the skills they need. The appendix contains details of the programmes.

### Analysis of the careers of players on the WTA Tour

Concerns exist that athletes who enter professional sports at the youngest ages have shortened careers and leave the sport prematurely. The WTA Tour implemented the AER and PDPs beginning in 1995 specifically to address those concerns. In 2004, the WTA Tour commissioned independent statisticians to analyse the careers of players.

### Comparison of career characteristics between 1993 and 2004

Data from the top 225 ranked WTA Tour players was compared between 1993 (before the AER) and 2004 (after the AER). Players in the latter era are making their professional debuts earlier than before the AER, and the average age of WTA Tour players is older. In 2004, the average age at which players turned professional was younger by half a year to a full year than in 1993, depending on the specific ranking level. Specifically, players ranked in the top 100 turned professional at a mean age of 15.2 years after the AER compared with 16.1 years before. Similar comparisons can be made at every ranking level from top 10 to top 225. In addition, the mean age of the top 225 players in 2004 is almost a year older than the mean age in 1993 (23.3 v 22.5 years). Since 1995, players have achieved their highest rankings at about the same age or slightly earlier than similarly ranked players before. Players in the present era are playing about 1.5 tournaments a year more than before the AER was introduced (14.6 v 12.9).

### Premature retirement

Since the 1995 implementation of the AER and PDPs, premature retirements (players leaving the Tour at or before age 21) have dramatically decreased. Independent statisticians analysed careers of all 527 WTA Tour players who began tournament play under the age of 18 and reached the top 150 in singles ranking in 1970–2004. Of the 527 players, 412 started before the AER (1970–1994), and 115 started after (1995–2004). There was a significant ( $p = 0.010$ ) reduction in premature retirements from 7% (29/412 players) before the AER to less than 1% (1/115 players) afterwards.

### Career longevity

Statisticians evaluated career longevity of WTA Tour players before and after the 1995 AER. Career lengths for retired players are completely observable whereas those still active in 2004 are only partially observable or “censored”. The high prevalence of censored data presented an obvious challenge to the analysis. The statisticians analysed the censored data using proportional hazards survival models suitable for estimating career length in the presence of censored data.

The analysis of censored data was approached three ways. The first approach, reflected in table 2, compared all 392 players who earned rankings in the top 150 at any time during the nine-year period 1986–1994 (277 players) with all players who earned top 150 rankings at any time during the nine-year period 1995–2004 (115 players).

This approach compares the two groups over nine-year observation periods and thus provides a plausible way of

**Table 1** Top five players' stressors in women's professional tennis in 1994 and 2004

1994	2004
Media	Injuries
Parents and family	Travel
Travel	Length of season
Competition	Expectations
Loneliness	Competition

**Table 2** Median WTA Tour career length before and after the introduction of the age eligibility rule

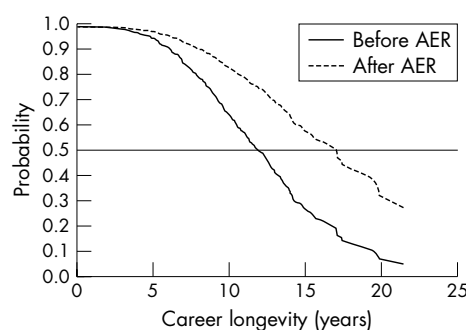
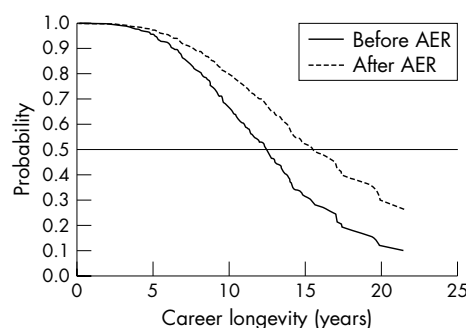
Age turned professional	Playing status	Before (on 31 December 1994)		After (on 10 April 2004)	
		Player count	Median years active professional	Player count	Median years active professional
≤ 14	Retired	33	4.9	1	2.6
	Active	49	3.2	43	6.5
	Total	82	4.2	44	6.5
15	Retired	55	5.7	2	6.8
	Active	40	3.2	39	6.5
	Total	95	4.7	41	6.5
16	Retired	47	6.3	1	6.4
	Active	28	2.7	20	6.4
	Total	75	5.4	21	6.4
17	Retired	13	5.3	2	6.1
	Active	12	3.9	7	5.9
	Total	25	4.5	9	6
All ages	Retired	148	5.8	6	6.1
	Active	129	3.2	109	6.5
	Total	277	4.7	115	6.4

estimating the AER effect through the ratio of median career lengths. The results show a positive AER effect: median career lengths increased by 36%, from 4.7 years in the period before AER to 6.4 years in the period afterwards. Although the results suggest a positive effect, this simple approach is inappropriate for estimating career lengths themselves because incomplete and complete careers are treated on an equal basis, and the former tend to be much shorter than the latter.

The second approach used a single predictor proportional hazards survival model designed to estimate true career lengths in the presence of censored data.<sup>18, 19</sup> The results from these survival models again show a positive AER effect: median career length increased by 43%, from 11.9 to 17 years ( $p = 0.034$ ) unadjusted for trend (table 3).

The single predictor model assumes that the 1995 AER was the only factor affecting career longevity. A third and most appropriate approach used a proportional hazards survival model adjusting for factors other than AER. Career lengths may have increased during the years 1970–2004 because of factors additional to AER, possibly related to changing trends in social and medical conditions—for example, increase in women in sport, improvements in sports medicine, increased prize money. The effect of AER was again positive: after adjustment for the factors additional to AER, median career length increased by 24% after 1995 from 12.4 years to 15.4 years ( $p = 0.181$ ) (table 3).

The effect of the AER can be measured in several other ways from the survival curves in fig 1 (unadjusted for trend) and fig 2 (adjusted for trend). The curves show the probability of career lengths of a given duration for the pre-AER and post-AER groups. Horizontal differences indicate

**Figure 1** Age eligibility rule (AER) survival curves (unadjusted).**Figure 2** Age eligibility rule (AER) survival curves (adjusted).**Table 3** Median career length and probability of a 10 year career or longer before and after the introduction of the age eligibility rule (AER)

Method	Group	Median career length (years)	Probability of 10 year career or longer (%)
Unadjusted and not modelled	Pre-AER	4.7	—
	Post-AER	6.4	—
Unadjusted modelled	Pre-AER	11.9	64
	Post-AER	17.0	83
Adjusted modelled	Pre-AER	12.4	66
	Post-AER	15.4	79

the effect on percentiles; the effect on the median (50th percentile: median) was an increase from 12.4 years to 15.4 years. Vertical differences indicate the effect on longevity; the probability of a 10 year career (or longer) increased from 66% to 79%, an increase of 20% after introduction of the AER (table 3).

To summarise, career longevity analysis using a proportional hazards survival model shows that since 1995 (the inception of AER and PDPs), professional women's tennis playing careers have lasted longer because of a combination of factors. Roughly half of the 43% increase in median career length since 1995 appears to be due to the effect of the AER. Premature retirements of players from professional tennis have decreased from 7% before to less than 1% after. The mean age of players was older in 2004 (after the AER) than in 1993 (before) and players are turning professional at younger ages since the AER. In addition, since implementation of the AER in 1995, a WTA professional tennis player now has a 20% greater chance of enjoying a 10 year career.

## RECOMMENDATIONS

The PDAP came to unanimous consensus on recommendations to the WTA Tour. On the basis of the strength and success of the AER and PDPs, the WTA Tour should continue the merit based, phased in AER allowing each athlete to earn her way into professional tennis at a developmentally appropriate pace in keeping with her level of play. PDPs should be expanded to provide all players, especially the youngest, with a solid foundation for dealing with the challenges of professional sport. Young tennis players compete on the WTA Tour, International Tennis Federation (ITF) Women's Circuit, ITF Juniors Circuit, and in the Grand Slams and national competitions. To provide a healthy and supportive environment for players, all tennis governing bodies should cooperate to implement professional development and educational programmes for young players and their teams. Programming and outreach are especially important for those young players who are not reached by the WTA Tour initiatives. The WTA Tour should work closely with the ITF Juniors Circuits and Grand Slams toward the goal of coordinating or combining rules and conducting further studies on all junior and professional tournaments and amount of training and play.

## CONCLUSIONS

The PDAP concluded that the AER and PDPs have eased the transition of younger players into the WTA Tour while at the same time increasing their career longevity and decreasing premature retirement. Since the 1994 AER, WTA Tour players are turning professional at younger ages, have longer careers, and fewer are leaving the game at or before the age of 21. Current and former WTA Tour players, members of the tennis community, and sports science and medicine professionals support the principles of the AER phased in approach to play for players under 18. The PDPs are recognised to be effective at dealing with the known stressors in professional tennis. They include initiatives such as: annual sport specific physicals; enhanced sport science and medicine services; proactive coach, player, parent, and agent education; mentor programmes; media training; and guidance on proper training, periodisation, injury prevention, and rehabilitation (appendix).

The WTA Tour's professional development approach is innovative within the sports community, providing experience, skills, abilities, and tools to help athletes prepare for and handle the physical and psychological demands of professional tennis. The PDPs and AER combined are helping to create a new generation of athletes with the opportunity to have a longer career, and with skills to mitigate external

## What is already known on this topic

There are no published studies or reports of any type on this topic.

## What this study adds

This study adds a unique longitudinal perspective on the implementation and outcomes of age limits and educational programmes for professional athletes.

factors (family, media) and to focus more closely on important performance factors (expectations, injuries) that maximise career potential.

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## APPENDIX

### SONY ERICSSON WTA TOUR PROFESSIONAL DEVELOPMENT PROGRAMMES

- **Sport sciences and medicine:** professional staff travel with players and provide comprehensive evaluation, treatment, and rehabilitation. They assist players with health problems when they are off the Tour.
- **Media training:** players learn how to be prepared, professional, and self expressive in front of the media, during interviews, and representing themselves on and off the court.
- **Athlete assistance:** players are provided with educational and preventive strategies for enhancing on-court performance and coping with challenges of professional tennis. Assistance is accessed through *Physically Speaking* (a newsletter), a twenty four hour confidential Athlete Assistance phone service and website, individual referral services, and on-site sport sciences and medicine and professional development teams. Athlete Assistance proactively addresses the entire gamut of stressors that players may experience from the common, winning and losing, to the most serious and debilitating conditions.
- **Physical examination:** players are required to have annual sport specific and performance based examinations.
- **Career development:** players use this programme to identify their on and off the court skills, values, work style preferences, and motivation.
- **Partners for Success:** Partners for Success, the first mentor programme in professional sports, pairs a protégé (a player 18 years or younger and ranked in the top 100)

with a mentor (a volunteer retired and trained player) who shares her wisdom and experience. The mentor has lived the tennis professional's life and has valuable experience to share. A mentor does not coach a protégé, but acts as a positive influence by assisting her protégé in dealing with stressors.

- **Player orientation:** players individually learn the on-site realities and responsibilities of the WTA Tour in a live environment known as "Rookie Hours." Paired with written and computer tools, the orientation helps a player gain a sense of the business and her roles and responsibilities on and off the court.
- **Coach registration and education:** coaches are required to participate in an orientation, agree to abide by WTA Tour rules, and sign a coaches' code of ethics. Coaches who complete the entire programme are eligible for registered coaches status. The WTA Tour offers an annual education symposium and one on one coach orientations to improve the skills of coaches, who are vital to the player's career.
- **Age eligibility rule:** the AER progressively allows players to play more and at a higher level, both as they mature and as they earn it. The phased in approach allows players to compete at the appropriate level, acclimatise to the extensive travel, and allows appropriate adolescent cognitive and physiological development.
- **Parent orientation:** this new programme includes one on one orientation for the parents to educate them about the demands of professional tennis.

## COMMENTARY

This paper about the professional female tennis circuit is an original design. The results of the survey show that those who organise professional tennis have an obligation to control the number of tournaments a year to allow the opportunity for players' careers to be prolonged.

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