

The Developmental Pathways Of Malaysian Tennis Players

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ABSTRACT: *The purpose of the study was to examine the developmental pathway of Malaysian tennis players. A total of 14 sub-elite and 16 elite tennis players participated in this study. Participants completed the Participation History Questionnaire to indicate their age when commenced tennis related milestones, hours engaged in structured and unstructured tennis activities and involvement in other sports, retrospectively. The results showed that the elite male players started significantly earlier compared to sub-elite males, sub-elite females and elite females in terms of age started playing tennis, supervised training, participated in competitions, and self-training. The elite male players engaged significantly more hours in structured activities of the age range of 7-12, 13-15 and 16-17 years old while sub-elite males engaged significantly more hours in unstructured activities at 16-17 years old only. In conclusion, the Malaysian elite players followed the early specialization pathway by commencing their playing career at a young age and engaged in more hours of structured activities such as participating in competitions, training with coaches and self-training.*

Keywords: *Developmental pathway, practice histories, tennis players*

1. INTRODUCTION

For the past decades, many sport researchers have begun concentrating on examining elite athletes' developmental pathways before achieving their highest level of performance. The understanding of developmental pathway of high performing athletes contributes to the knowledge of sport development and success for future athletes. Previous researchers have reported that numerous athletes who started specializing on one sport from young contributed to their excellent achievement for a particular sport later on in their career [1, 2].

Early specialization refers to individuals who engaged in specific sport at early age between 6 to 12 years old and continued to increase the amount of the sport's related training and competitions until adulthood. The ingredient for early specialization involves engaging in *deliberate practice* activities from young [3]. Ericsson and colleagues [1] defined the theory of deliberate practice as involvement in structured, planned and specific of training programme through out the year from early stage of age with the mission to improve performance and achieve expert skill level. Based on the theory, an individual requires more than 10 years or 10000 training hours of incremental and effortful practice before attaining elite performance in a specific sport [1].

According to the findings on English soccer players by Ford et al. [2], the professional soccer players followed an early specialization pathway in which they engaged significantly more in sport specific practice and matchplay when compared to other players who did not

achieve professional status. According to another study on the role of sport-specific activities and participation in competitions in the development of adolescent Finnish team sport athletes, revealed that athletes with more sport-specific activities and matchplays during childhood had more sport-specific play and practice during adolescence, had better technical, tactical, and psychological skills, and were more likely to be selected for national youth teams by the age of 15 [4]. As a conclusion, specific sports activities and participation in competitions play an important role in achieving expertise level of sport.

On the contrary, there were studies showed that absence of engaging in specific activities and sport indicated that an athlete was still able to achieve elite performance. Côtè, Baker and Abernethy; Côtè, Horton, MacDonald and Wilkes [5,6], found that successful athletes competing at the international level did not follow a specific and structured sport developmental pathway from a young age as suggested by the theory of deliberate practice. Instead, they followed an alternative developmental pathway of involving many unstructured sports activities during their young age. Thus, these researchers introduced the theory of deliberate play as an alternative to the theory of deliberate practice. Deliberate play refers to unstructured activities such as playing with friends with modified rules, equipment and playing area. The involvement of deliberate play can increase the intrinsic motivation and enjoyment among children through physical, cognitive, affective, and psychosocial environment [5, 6]. The concept of deliberate play provides indirect positive impact in which they gained skills from early development stage to young adulthood in order to achieve elite performance.

Due to the different findings of previous research, Côtè, Baker and Abernethy [5] developed Development Model of Sport Participation (DMSP) with the purpose to describe clearly regarding the transition role from early to later stages of sport development in relation to age. There are three stages of sport development in the DMSP which are sampling stage between age 7-12 years old, specialization stage between age 13-15 years old and investment stage from ages 16 years old and above. The roles of deliberate practice and deliberate play are different in these three phases. Individuals who followed the early specialization pathway will experience more deliberate practice compared to deliberate play from early young until adulthood in order to achieve elite level.

For individuals who went through early diversification will involve in the three stage transition. Sampling stage is a phase where they will engaged in more deliberate play compared to deliberate practice activities such as participating in various sports and unstructured activities with the main purpose of having fun and enjoyment. Specialization stage is where there is a balance of involvement in deliberate practice and deliberate play. Children at this stage began to choose a few sports they intend to concentrate on and less involvement in other sports. Finally the Investment stage is where they start focusing on deliberate practice activities on a specific sport to achieve elite level.

Gullich [7] conducted a study to compare the development of activities between medal-winning and non-medal-winning German athletes who were involved in Olympic Games. The findings showed that the medallists started training in their main sport at an older age than non-medallists and engaged more in a variety of other sports than non-medal-winning athletes. Another study conducted in Portugal revealed that highly skilled volleyball players' involvement in unstructured activities contributed in realizing their expertise achievement [8]. The findings of these studies showed that deliberate play can also contribute to higher sports achievement. Another study on sport specialization among professional baseball players revealed that most players engaged in various sports until late adolescence.

A total of 25% of players specialized before the age of 12 [9]. A recent comparative study by Swindell and colleagues [10] on the age of sports specialization between individual and team sports athletes from the American Division 1 National Collegiate Athletic Association (NCAA), showed that 82.6% of athletes followed late specialization at the age of 14.9 years more than the athletes with early specialization (17.4%) at the age of 12 years or below. Most of the NCAA Division 1 team sports athletes did not follow early specialization in order to archive elite level while individual sports such as swimming, tennis and fencing were more tend have the early specialization. However, in addition to differences the pattern of athlete's developmental pathway, there are other factors that need to be identified which contribute to different levels of achievement among high performing athletes.

Low, Mohamad, Ong, Aziz, Abdullah and Maliki [11] conducted a study regarding the developmental pathway of Malaysian elite youth badminton players. Their research involved national back-up and youth state badminton players that selected based on their performance in previous Malaysian Games. The total of training involvement in badminton activities throughout the player's career showed that although the national players achieved higher badminton performance than the state players, the total of structured and unstructured activities between national and state players were almost similar with more emphasis on structured practice. The conclusion of the study was that the national and state players went through the early specialization pathway.

Tennis is one of the more popular individual sport played all over the world, including Malaysia. Various national and international tennis tournaments are held. The players who are selected to represent the country also took part in international tennis tournament such as Davis Cup, SEA and Asian Games. However, there is still lack of research conducted to identify the developmental pathway among tennis player in Malaysia.

Therefore, the purpose of this study was to identify the developmental pathway among Malaysia tennis players. The researched focused on milestone achievement related to tennis, type and the total of hours of engagement in tennis activities and also a total of other sports involvement between elite and sub-elite tennis players. This research expected elite tennis players started earlier milestone achievement and engaged more hours in tennis activities compared to sub-elite tennis players. On the other hands, the total of other sports involvement for elite players much lesser compared to sub-elite players tennis.

2. RESEARCH METHODS

2.1 Participants

Participants from a state open tournament held in 2019 were selected randomly for the study after having met the criteria of representation set by the researchers. The intention of the study was explained to the participants and consent was obtained before the collection of data. A total of 16 participants (9 males, 7 females) categorized as elite players from the other teams in the mentioned tournament with at least a level of representation at state or national level and 14 participants (7 males, 7 females) who represented a university were categorized as sub elite players. The mean age of the participants was (19.1 ±3.0 years).

2.2 Instrument

The Participation History Questionnaire (PHQ) by Ford, Low, McRobert and Williams [12] was used to examine the developmental pathway of elite and sub-elite tennis players. The questionnaire consisted of three sections. The first section was the information on tennis

related milestones such as age when they first started to playing tennis, followed by the age when they started training and supervised by coach, age when they joined competition, age when they started their self-training and age when they first represented school, district, state etc. The second section referred to structured (i.e., competitions, coach-led, individual training) and unstructured tennis activities (peer-led play). Participants were required to provide the number of hours of trained per day, the number of days trained per week, the number of months trained per year based on each of these activities from the most recent year to the year that participants began to participate in tennis. The third section was the information on total of engagement in other sports.

2.3 Procedure

Data was collected during the participants’s free time after their matches. Participants were informed of the purpose and procedure of answering the questionnaire. The main researcher guided the respondents in answering the questions.

2.4 Data Analysis

One-Way ANOVA test was used to compare the age archived on tennis players. While, Three-Way ANOVA was used to analyse the type of activities and the number of hours involvement in tennis activities. The Kruskal-Wallis test was used to analyze the amount of other sports involved between elite and sub elite tennis players. Statistical analyses were run using Statistical Package for Social Science (SPSS) version 20 (IBM, New York, USA).The significant level for all tests was set at <0.05.

3. RESULTS AND DISCUSSION

3.1 Demographic data

The average age for the participants in the study were sub-elite males (M=20.3, SD=1.0years), elite males (M=17.8, SD=2.5years), sub-elite females (M=22.0, SD=1.8years old) and elite female players (M=16.9, SD=3.3years). A total of 11 elite players represented national level and five at state level.

3.2 Milestones

One-Way ANOVA was used to analyse tennis related milestones (age started played tennis, supervised training, participated in competition, self-training, representing school) between sub-elite males, elite males, sub-elite females and elite female tennis players.

Table 1

Age achieve on tennis related to milestones between group

Male				Female				<i>p</i>
Sub Elite		Elite		Sub Elite		Elite		
<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	

1. Age of tennis players	20.3	1.0	17.8	2.5	22.0	1.8	16.9*	3.3	.001
2. Age started playing tennis	13.9	1.3	8.0*	3.2	14.9	1.0	13.0	1.0	.001
3. Age supervised training	15.0	1.7	9.2*	2.9	15.3	1.0	12.7	0.8	.001
4. Age started competition	14.9	1.8	9.8*	2.3	16.0	2.0	12.9	0.4	.001
5. Age self-training	16.0	2.8	10.4*	2.8	17.1	2.7	12.9	0.4	.001
6. Age represented school	15.3	1.6	10.7	2.1	13.4	6.0	12.9	3.5	.06

M=mean, *SD*=standard deviation

* $p < .05$

Table 1 revealed that there was significant difference in the age of started playing tennis between sub-elite male, elite male, sub-elite female and elite female tennis players, $F(3,29) = 19.99$, $p < .001$. Post hoc analysis showed elite male players ($M=8.0$ years, $SD=3.2$) started playing tennis five years earlier than sub-elite males ($M=13.9$ years, $SD=1.3$), sub-elite females ($M=14.9$ years, $SD=1.0$) and elite female players ($M=13.0$ years, $SD=1.0$). There was no significant difference between sub-elite males, sub-elite females and elite females.

Similarly, the elite male players ($M=9.2$ years, $SD=2.9$) started engaging in supervised training by coach significantly younger than sub-elite males ($M=15.0$ years, $SD=1.7$), sub-elite females ($M=15.3$ years, $SD=1.0$) and elite female players ($M=12.7$ years, $SD=0.8$), $F(3,29) = 18.04$, $p < .001$. There was no significant difference between sub-elite males, sub-elite females and elite females.

There was a significant difference in the age of started participating in competition between group, $F(3,29) = 18.32$, $p < .001$. Post hoc analysis showed elite males ($M=9.8$ years, $SD=2.3$) started joining competition significantly younger than sub-elite males ($M=14.9$ years, $SD=1.8$), sub-elite females ($M=16.0$ years old, $SD=2.0$) and elite females ($M=12.9$ years, $SD=0.4$). No significant differences between sub-elite females with sub-elite males and elite females.

There was a significant difference in the age of started self-training such as gym and jogging to improve physical performance between group, $F(3,29) = 12.04$, $p < .001$. Post hoc analysis showed elite males ($M=10.4$ years, $SD=2.8$) started self-training significantly earlier than male sub-elite males ($M=16.0$ years, $SD=2.8$), sub-elite females ($M=17.4$ years, $SD=2.7$) and elite females ($M=12.9$ years, $SD=0.4$). No significant difference between sub-elite females with sub-elite males and elite females.

Overall, the findings showed that there was significant differences in age started playing tennis, age started training that supervised by coaches, age started self-training and age started joining competition between group. However, there was no significant differences were found in the age of represented school, $F(3,29) = 2.80$, $p > .05$.

3.3 Total hours accumulated in tennis

One-Way ANOVA was used to analyse the amount of hours in tennis between sub-elite males, elite males, sub-elite females and elite female tennis players.

Table 2

The Amount of Total Hours Accumulated In Tennis Activies Between Group

GROUP	<i>M</i> (hours)	<i>SD</i>
Sub-Elite Males	1838.6	1175.1
Elite Males	10005.4	5617.0
Sub-Elite Females	2022.3	1330.6
Elite Females	2898.6	1711.4

The amount of hours accumulated by the elite males ($M=10005.6$ hours, $SD=5617.0$) significantly higher than sub-elite males ($M=1838.6$ hours, $SD=1175.1$), sub-elite females ($M=2022.3$ hours, $SD=1330.6$) and elite females ($M=2898.6$ hours, $SD=1771.4$), $F(3,29) = 11.49$, $P < .001$. No significant differences between elite males, sub-elite females, and elite female players.

3.4 Hours accumulated in structured and unstructured according to age range 6-12, 13-15 and 16-17 years old

Three way ANOVA was used to analyse 4 groups (sub-elite males, elite males, sub-elite females and elite female tennis players) x 3 range of age (6-12, 13-15 and 16-17 years old) x 2 activities (structure and unstructure).

Table 3

Hours accumulated in structured and unstructured according to age range

Group	6-12 years old			
	Structure <i>M</i> (hours)	<i>SD</i>	Unstructured <i>M</i> (hours)	<i>SD</i>
Sub-Elite Males	0	0	0.618	163.7
Elite Males	4245.6	3295.5	240.6	721.7
Sub-Elite Females	0	0	0	0
Elite Females	317.9	841.2	0	0
Group	13-15 years old			
	Structure <i>M</i> (hours)	<i>SD</i>	Unstructured <i>M</i> (hours)	<i>SD</i>
Sub-Elite Males	358.2	428.7	335.9	472.6
Elite Males	2953.9	1385.0	433.0	416.5
Sub-Elite Females	530.0	603.0	174.4	186.6
Elite Females	1729.5	1093.2	401.4	416.9

16-17 years old				
Group	Structure		Unstructured	
	<i>M</i> (hours)	<i>SD</i>	<i>M</i> (hours)	<i>SD</i>
Sub-Elite Males	572.3	516.5	571.6	525.5
Elite Males	1970.7	1580.5	161.7	195.2
Sub-Elite Females	1085.3	818.9	232.6	382.7
Elite Females	180.6	477.9	17.3	45.8

There was a main effect for activities (structured and unstructured), $F(1,26) = 17.55$, $p < .001$. The participants engaged in more hours of structured activities ($M=1162.0$ hours, $SD=1756.1$) than unstructured activities ($M=235.1$ hours, $SD=395.0$).

There was a main effect for age (6-12, 13-15 and 16-17 years old), $F(2,52) = 3.29$, $p = .045$. The total of hours accumulated for the age range of 13-15 years old ($M=896.0$ hours, $SD=933.1$) was significantly more than the age range of 7-12 years old ($M=600.6$ hours, $SD=1509.2$) and 16-17 years old ($M=599.0$ hours, $SD=784.5$). No significant difference between 6-12 and 17-17 years old.

The elite male players ($M=4245.6$ hours, $SD=3295.5$) engaged significantly more hours in structured activities compared to elite females ($M=317.9$ hours, $SD=841.2$) from 6-12 years old. Both sub elite male and female players have not started playing tennis at this age range. No significant difference in structured activities between the other groups. Similarly, for the group age range of 13-15 years old, the elite male players ($M=2953.9$ hours, $SD=1385.0$) engaged significantly more hours in structured activities than sub-elite males ($M=358.2$ hours, $SD=428.7$) and sub-elite females ($M=530.0$ hours, $SD=603.0$). No significant difference between elite males and elite females; sub-elite males and sub-elite females. There was also no significant difference in unstructured activities between groups from 6-12 and 13-15 years old.

The elite male players ($M=1970.7$ hours, $SD=1580.5$) engaged significantly more hours in structured activities compared to sub-elite males ($M=572.3$ hours, $SD=516.5$), sub-elite ($M=1085.3$ hours, $SD=818.9$) female and elite females ($M=180.6$ hours, $SD=477.9$) from 16-17 years old. No significant difference in structured activities among other groups. While, the sub-elite males ($M=571.6$ hours, $SD=525.5$) engaged significantly more hours in unstructured activities compare to elite female ($M=17.3$ hours, $SD=45.8$) from 16-17 years old. However, there was no significant difference in unstructured activities among other groups.

3.5 Involvement in other sports

Kruskal-wallis test revealed that there was a significant difference in median between sub-elite males, elite males, sub-elite females and elite female tennis players, $\chi^2(n=30) = 8.671$, $p=.034$. The elite males engaged significantly more in other sports compared to sub-elite males and sub-elite females. Meanwhile, the elite females engaged significantly more in other

sports than sub-elite females. No significant difference between among elite males and elite females; sub-elite males and sub-elite females.

Table 4

The involvement of other sports between group

	Male		Female		p
	Sub-Elite	Elite	Sub-Elit	Elite	
Median	2	1	3	1	.034*

The purpose of this study was to examine the developmental pathways of Malaysian tennis players in order to identify the milestones related to tennis, type and amount of hours of engagement in tennis activities between elite and sub-elite tennis players. The first hypothesis predicted that elite tennis players archived milestone related to tennis earlier compared to sub-elite players was accepted as the studies found that elit male players started earlier compared to sub-elite males, sub-elite females and elite females in term of age started playing tennis, age started supervised training, age started joining competition, age started self-training, exclude the age represented school between malaysian elite and sub-elite tennis players. The results supported the findings from previous studies [2,9,11]. However, it contradicted previous studies [5,6] in which the athletes who attained success at international level did not follow the developmental pathway of a specific and structured sports from a young age, (i.e., early specialisation). We suggest that environment factors such as easy access to sport facilities as sports complexes or courts encouraged male elite players to play tennis from an early stage. The sub elite male players may have not been able to emulate their elite male counterpart due to their childhood enviroment which may not have such facilities. As the elite male players represented their schools at a younger age, would have encouraged them to continue playing and increase their training hours. In addition, the local culture of allowing boys to engage in sporting activities more than girls might have allowed them to continue playing tennis upon achieving preliminary success at school level.

The second hypothesis was that the elite players engaged more hours in tennis activities compared to sub-elite tennis players was accepted as the study found that the elit players engaged significantly having more tennis activities hours in total compare to sub-elite players. The elite players engaged more hours in structured activities of the age range of 7-12, 13-15 and 16-17 years old compare to sub-elite players. The findings of this study supported the model DMSP and early specialization in which elite tennis players started structured activities (deliberate practice) from childhood. We predicted that the ambition of becoming an elite player motivated players to work persistently in training and competition. The statement was supported by Swindell et al. [10], who conducted a study related to identifying motivations for sports specialization among National Collegiate Athletic Association (NCAA) Division I athletes participating in individual and team sports. The research showed that the ambition of becoming a professional player was the main factor for the sport specific. In addition, the socioeconomic of family background might allow players to be able to train under supervision of coaches and make them having the apportunities to participate in competitions. The findings of this study also revealed that there was no significant difference in unstructured activities for the age range of 7-12 and 13-15 years old between group. However, sub-elite engaged more hours in unstructured activities for the age range of 16-17

years old. It showed that the sub-elite players followed the late specialization and deliberate play. This finding was supported the findings by Ginsburg et al. [9] and enhanced the description of the late specialization pathway based on the DMSP.

The third hypothesis in which the elite tennis players involved in other sports was fewer than the sub-elite tennis was rejected This is because of focused training on specific sport is an important factor in archiving elite performance level. By focusing on one sport over a period of time, it is proven to be able improve sports skills or performance faster than engaging in a variety of sports. Researcher also predicted that elite players had limited time to participate in other sports.

4. CONCLUSION

In conclusion, the findings of this study showed that elite male tennis players followed the early specialization pathway earlier because they started training with coach earlier, participating in competitions, self-training, and representing schools earlier than sub-elite males, sub-elite females and elite females. One limitation of this study was that there was an age gap among the participants as data was collected during a tournament, with the elite female players being significantly younger than the others. Future research could be conducted during national age group tournaments where the age gap could be controlled and more in depth qualitative data could be elicited such as the reasons for the high performing players to engage in tennis and other factors that are unique to the development of tennis players in Malaysia.

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