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Developmental Pathways of Malaysian National Sports School Athletes

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ABSTRACT

Substantial research compared between specializing and diversifying in a particular sport but few scrutinised across multiple sports. This study examined the developmental pathways taken by individual sport (IS) and team sport (TS) athletes from two Malaysian national sports schools. Student athletes (N=117) aged 16 and above completed the Participation History Questionnaire. Information pertaining to the participant's main sport and other sports he/she was engaged in was obtained. In comparison with TS athletes, the IS athletes were found to have a significant later start for most of their sport-related milestones ($p < 0.05$). However, the IS athletes (M = 14.3 y, SD = 1.7) started competing in international competitions significantly earlier than the TS athletes (M = 15.3 y, SD = 1.1; p = 0.004, d = -0.72) and only the IS athletes reported competing in the Commonwealth, World and Olympic championships. Interestingly, the IS athletes (M = 2.5 sports, SD = 1.3) participated in significantly more other team sports compared to TS athletes (M = 1.7 sports, SD = 0.7), $t(95) = 4.03$, $p < 0.001$, d = 0.80, 95% CI [0.40, 1.19]. The results suggest that athletes who started specializing later and participated in more diverse sports attained higher performance level.

Keywords: Athletes, diversify, specialise, sports school

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INTRODUCTION

Many athletes desire to be on the Olympic podium but current knowledge still does not indicate exactly how athletes attained such status. Among the factors known to affect the development of elite performance in sports involves the athlete (birthdate, heredities, physiological and psychological traits, temperament), the ecosystem (birthplace, support from significant others, athletic support), and practice (type and amount of practice, early specialisation, early diversification; Rees et al., 2016). Of these factors, practice, heredity and psychological traits have been identified as the principal factors influencing the achievement of elite performance in sports (Baker & Horton, 2004). Heredity is unchangeable, psychological state is abstract, whilst practice is tangible. This makes practice-related factors such as the type and amount of practice to be highly manipulated and analysed.

The Developmental Model of Sport Participation (DMSP) (Côté, 1999; Côté et al., 2007; Côté & Fraser-Thomas, 2007) described two pathways from the start of sport participation to elite performance in sports by differentiating the type of activity (deliberate play or deliberate practice) and number of sports engaged in (one or several). Deliberate play refers to activities engaged primarily for enjoyment, while deliberate practice are effortful activities with the sole purpose to improve skill (Ericsson et al., 1993). According to the DMSP, both specialising and diversifying pathways may lead to excellence in sports, though the authors advocated early diversification. An early specializing pathway would focus on one sport, with many hours of training, commencing from a young age, as opposed to the early diversifying pathway which involves participating in various sports during the early years, before gradually specializing in a single sport. The diversifying pathway involves three distinct linear stages; sampling at ages 6-12 (engage in various sports for enjoyment), specialising at ages 13-15 (engage in a few sports involving both deliberate play and deliberate practice), and investment at age 16 and above (focus solely on one sport with many hours of deliberate practice; Côté et al., 2007).

Numerous studies have been trying to identify the pathway taken by elite athletes. A review provided support for both pathways; specialising or diversifying early equally helps to develop expert sport performers (Coutinho et al., 2016). However, negative outcomes eventuated from specialization (e.g., Bergeron et al., 2015; DiFiori et al., 2014; Jayanthi et al., 2013; LaPrade et al., 2016). These consensus statements and reviews showed that athletes who specialised early experienced injuries, burnout and early retirement from sports, advocating youth athletes to diversify instead. In another study, Fraser-Thomas, et al. (2008) compared 25 competitive adolescent swimmers who dropped out with 25 counterparts who were still swimming, and found that the former achieved success at an earlier age (junior competition level), accumulated more structured swim-related

training and participated in fewer co-curricular activities. The authors suggested that early specialisation may be counter-productive to long term athlete development programmes.

Furthermore, multifarious pathways, beyond just specializing or diversifying, have been established. A study involving 256 elite adult athletes from 27 sports identified a non-linear progression of competition pathways (Gulbin et al., 2013). Most of the respondents started engaging in their main sport around the age of 9.1 and followed a mixed pathway to reach elite level. Some progressed directly from junior competitions to senior competitions (akin to early specialisation), some skipped the junior phase and entered directly at the senior phase (playing other sports of varying levels in between; early diversification), and some experienced a down-up progression (from a higher junior level down to a lower senior level before advancing to higher senior levels; early specialisation with later success). A similar varied pathway was also found in another study encompassing 73 Australian track and field athletes who have competed in Olympic and World championships; there were six different pathways distinguished, some started with junior competitions, some started with senior competitions, among others (Huxley et al., 2017). A majority of these track and field athletes began specialising in their main sport between 15-17 years of age (late specialisation) and continued to represent their country for another 8-10 years before retiring at an average age of 32.

Drake and Breslin (2017) compared higher and lower performing international field hockey players and found the former accumulating significantly more practice and competition hours, and commencing consistent coach-led practice and international competitions earlier (analogous to early specialisation) than the latter. Sieghartsleitner et al. (2018) recently identified a specialised sampling pathway that was beneficial for promising footballers. This pathway suggests that those who specialise and engage in varied football-related activities, such as beach soccer, playing with school/club/friends/self, playing for leisure, and not just deliberate practice in that sport, are more likely to become renowned footballers. A multi-sport longitudinal research involving Olympians found that the higher achievers were late specialisers, having a later start in their main sport, participating in more other sports, and having a more sustainable sport career (Güllich & Emrich, 2014). A fifth of the athletes in the study by Gulbin et al. (2013) were Olympians but there was no significant difference compared to the other four-fifths. Olympian or not, there is a wide-ranging pathway to elitism. It also implies that studies have yet to determine what sets the Olympian medallists apart from the others.

Malaysia invests a considerable amount of money into sports development with the hope of winning an Olympic gold medal which is still elusive to date. One of the avenues to develop sporting talent is by emplacing students with athletic potential into the national sports schools. Getting

selected into a national sports school would denote one's athletic prowess over the multitude. The student athletes are then groomed exclusively in their main sport and expected to be the next generation of sporting calibre to represent the nation. At present, there are five national sports schools, with the oldest being more than twenty years old and the newest just over two years old. By now, the first cohort of student athletes from the first national sports school would have reached the pinnacle of their sporting career amid some who may have retired since, with a continuous stream of athletes being produced annually. Yet, there is no research on the development and progress of these student athletes. Little is known as to how the athletes developed their sport skills in order to be selected into the sports school. In addition, most research focused on one sport (e.g., Drake & Breslin, 2017; Ford et al., 2010; Fraser-Thomas et al., 2008; Haugaasen et al., 2014; Huxley et al., 2017; Roca et al., 2012; Sieghartsleitner et al., 2018), few studies conducted multi-sport research (e.g., Gulbin et al., 2013; Güllich & Emrich, 2014), which did not involve youth athletes. It is unknown if Malaysian sports development is in line with current literature findings. As such, this research aimed to identify the developmental pathways undertaken by the individual sport (IS) and team sport (TS) athletes in the Malaysian national sports schools.

METHODS

Participants

Student athletes aged 16-21 from eight sports were recruited from two national sports schools in Malaysia. In order to evaluate their sporting history before enrolling into the sports school and while being in the sports school, 16 was set as the minimum age requirement for this study. This allows for retrospective assessment of the sampling and specialising stages (Côté et al., 2007). The two schools selected were at least 20 years old to ensure that the system is established and sufficient number of student athletes are enrolled. These two schools also have classes for tertiary level, contributing to participants being up to the age of 21, albeit in small numbers. Most student athletes leave the sports school after age 17. It was therefore unsuitable to consider the investment stage for this cohort. The eight sports were further grouped as team and individual sports. The IS and TS categorisation was chosen as it best differentiates the nature of the sports and type of training, creating mutually exclusive groups. 138 participants volunteered in this study. 21 participants were excluded from data analysis due to lack of responses on many items. The remaining 117 participants (70 males, 47 females) were then grouped according to their sports. Breakdown of the number of athletes and their respective sport are listed in Table 1. Permission to conduct the research was granted by the lead institution. Participants provided informed consent prior to commencement of study.

Instrumentation

The Participation History Questionnaire (PHQ; Ford et al., 2010) was adapted to

Table 1

Number of participants based on type of sports

Individual sports	*n*	Team sports	*n*
Archery	7	Hockey	33
Athletics	27	Netball	15
Fencing	17	Volleyball	10
Squash	4		
Swimming	4		
Total	59	Total	58

enable responses from multiple sports and within a local sports context. The PHQ was originally developed to elicit response from English academy cricket players. This retrospective questionnaire contained three sections; sport-specific milestones, engagement in activities related to the main sport, and involvement in other sports. The first section obtained the age when the participants started significant milestones in their main sport; playing, training and competing at various levels. The second section described the type of activities (coach-led practice, peer-led play) in the main sport and the amount of time (hours per week and months per year) the participants spent in it. The concluding section encompassed other sports that the participants have engaged in; the age when they started and stopped playing, the amount of time spent in those sports, and their highest level of involvement playing that sport. In addition, the participants were also asked what age they were when they enrolled into the national sports school.

The questionnaire was translated into Malay and validated by language and content experts. A pilot test was conducted at a state sports school. Test-retest was conducted for reliability whilst the athletes' parents and coaches were asked to fill in the same questionnaire to validate the athlete's data. The pilot test data were analysed for intra class correlations (ICC) and percentage agreement (PA) to ensure that the data are strongly related and similar. Reliability and validity measures ranged; reliability ICC, $r = 0.667$ to 0.933, $p < 0.05$ and PA 50-80%; validity ICC, $r = 0.538$ to 1.00, $p < 0.05$ and PA 50-100%. The PHQ have been used by studies involving youth athletes (aged 16-22) and validated (e.g., Ford et al., 2010; Drake & Breslin, 2017; Roca et al., 2012).

Data Collection and Analysis

The questionnaire was completed under the guidance of the lead researcher, at a time to the participant's convenience (non-training and non-studying hours) at the school. Standardized instructions and explanation to complete the questionnaire were provided. Participants were briefed prior to completing each section. For the second section, participants were asked to recall their main sport activities from the present year, working backwards, until the year they first started their main sport. The same reliability and validity tests were

conducted as per the pilot study; retest and validation by the parents and coaches, respectively. The data sets completed by the athlete, parent, and coach were compared statistically. The reliability and validity tests yielded similar outcome as the pilot test and were deemed sufficient; retest ICC, r = 0.727 to 1.00, $p < 0.05$ and PA 50-100%; validity ICC, r = 0.721 to 0.966, $p < 0.05$ and PA 60-70%.

The athletes were grouped according to their respective sports; team or individual. The data was analysed for two age periods: i) 6-12 years, and ii) 13-15 years, based on the DMSP's sampling and specialising stage (Côté et al., 2007). The investment stage (age 16 and above) was excluded due to incongruent data among the participants as the minimum age set for this study was 16 years. Independent t-tests were conducted on the mean for chronological age and developmental milestones (age when first started playing, training, and competing at various levels). The hours for sport activities in main sport for each year between 6 – 15 years of age were calculated by multiplying the hours per week by the weeks per year, for each year. Separate 2 groups (team sport, individual sport) x 2 activities (coach-led practice, peer-led play) analysis of variance (ANOVA) with repeated measures on the last factor were performed for 6-12 years and 13-15 years of age. Independent t-test was conducted on the number of other sports. Effect sizes were determined using Cohen's d formula with pooled variance for group means and partial eta-squared (η_p^2) for ANOVA. Effect sizes were based on Cohen's classification; small, medium, large (d = 0.2, 0.5, 0.8; η_p^2 = 0.01, 0.06, 0.14). The alpha level required for significance for all tests was set at $p < 0.05$. All analyses were conducted using SPSS 20.

RESULTS

Age

The IS athletes' age (M = 17.8, SD = 1.7) was similar with the TS athletes' age (M = 17.8, SD = 1.3). There was no significant difference between IS (M = 14.9 y, SD = 1.7) and TS athletes (M = 14.3 y, SD = 1.8) for the age when they enrolled into the sports school, $t(114) = 1.68$, $p = 0.09$, $d = 0.31$. The athletes enrolled into the sports school at the average age of 14.6 (SD = 1.8). The biggest majority enrolled at age 13 (40%), followed by age 14 (16%), age 16 (15%), age 18 (10%), and the remainders at age 15 and 17 (less than 10% each).

Main Sport Milestones

The IS athletes attained most sport-specific milestones significantly later than TS athletes. The IS athletes started playing their main sport later, $t(115) = 3.82$, $p < 0.001$, d = 0.71, 95% CI [0.64, 2.03], started training later, $t(115) = 4.08$, $p < 0.001$, $d = 0.76$, 95% CI [0.70, 2.03], started competing later, $t(115) = 3.56$, $p = 0.001$, $d = 0.66$, started non-sport specific training later, $t(115) = 2.53$, $p = 0.01$, $d = 0.47$, started representing their school later, $t(105) = 2.56$, $p = 0.012$, $d = 0.49$, and started representing their state later, $t(114) = 3.38$, $p = 0.001$, $d = 0.63$. However, the IS athletes started representing the country earlier than the TS athletes, $t(74)$

= -2.96, $p = 0.004$, $d = -0.72$. No significant differences were found between IS and TS athletes for the age when they started representing their district and competing at Asian level. No analysis was conducted for Commonwealth, World and Olympic championships as only the IS athletes had participated in those competitions. The details for main sports milestones are displayed in Table 2.

Main sport activity hours

There was main effect between group and activity for the specialising stage, $F(1, 115) = 4.47$, $p = 0.04$, $\eta_p^2 = 0.04$. The TS athletes accumulated significantly more hours than the IS athletes for both coach-led practice and peer-led play between ages 13-15, as shown in Figure 1. All the athletes displayed significantly higher total amount of time spent for coach-led practice than peer-led play for both sampling, $F(1, 115) = 37.45$, $p < 0.001$, $\eta_p^2 = 0.25$, and specialising stages, $F(1, 115) = 585.93$, $p < 0.001$, $\eta_p^2 = 0.84$.

Involvement in Other Sports

No significant difference was found for the total other sports engaged in by both IS and TS athletes. The other sports were further analysed under the following categories: other sport-individual sport (OS-IS), other sport-team sport (OS-TS), other sport-sampling stage, other sport-specialising stage, other sport-competitive,

Table 2

Age of athletes for main sport milestones (sample size, mean, standard deviation)

Milestones (athlete's age)	IS athletes			TS athletes		
	n	M	SD	n	M	SD
Start sport***	59	11.5	2.3	58	10.2	1.4
Start training***	59	11.6	2.2	58	10.2	1.3
Start competing**	59	11.7	2.2	58	10.5	1.1
Start non-sport specific training*	59	13.2	1.7	58	12.4	1.4
Start representing school*	50	11.3	1.9	57	10.5	1.1
Start representing district	52	11.8	1.8	58	11.2	1.1
Start representing state**	58	13.0	1.8	58	12.1	1.1
Start representing country**	45	14.3	1.7	31	15.3	1.1
Start Asian competition	23	15.0	2.2	9	15.9	0.6
Start Commonwealth competition	3	16.3	1.2	-	-	-
Start World championship	11	15.7	1.8	-	-	-
Start Olympic competition	2	16.5	0.7	-	-	-

Significant difference between IS and TS athletes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

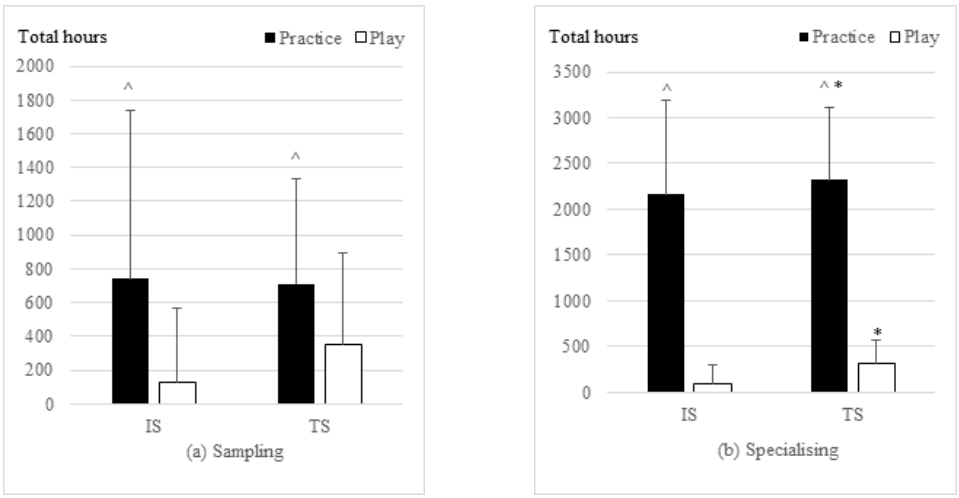

Figure 1. Total hours accumulated for coach-led practice and peer-led play among individual sport (IS) and team sport (TS) athletes in (a) sampling and (b) specializing stages. *Significant difference between IS and TS athletes for specializing stage, $p < 0.05$. ^Significant difference between coach-led practice and peer-led play, $p < 0.001$.

other sport-recreational and highest level represented. The IS athletes ($M = 2.5$, $SD = 1.3$) participated in significantly more OS-TS compared to TS athletes ($M = 1.7$, $SD = 0.7$), $t(95) = 4.03$, $p < 0.001$, $d = 0.80$, 95% CI [0.40, 1.19]. Supplementary analysis was conducted for the IS athletes to determine if the OS-TS was similar with the main sport. Only athletics and fencing athletes were subject to this supplementary analysis as they had more than 10 participants each who engaged in OS-TS (athletics – 22 participants, fencing – 17 participants), to ensure sufficient sample size for meaningful statistical interpretation. Breakdown into single sports was necessary to compare the actual main sport and OS-TS. Among the athletics and fencing athletes, each OS-TS that had five or more participants were identified. For athletics athletes, the OS-TS were football, handball, hockey, rugby, softball and volleyball. For fencing athletes, the OS-TS sports were handball, hockey, netball and volleyball. In addition, descriptive statistics indicate that the IS athletes participated in more OS-TS, whereas TS athletes participated in more OS-IS; as shown in Table 3.

Table 3

Sample size, mean and standard deviation for the other sports engaged by IS and TS athletes

	IS athletes			TS athletes		
Type of other sport	n	M	SD	n	M	SD
Individual sport	50	2.0	1.3	55	2.5	1.4
Team sport	44	2.5	1.2	53	1.7	0.6

No significant difference was found for the remaining categories of other sports. Almost all the athletes (104 participants) engaged in other sports competitively, seven athletes participated in other sports only for leisure, and two athletes did not engage in any other sport. The highest level represented by the athletes in other sports were school (29 athletes), district (48 athletes), state (26 athletes), and nation (one athlete). The top five most popular other sports were the same for both IS and TS athletes, albeit in differing ranks; these sports are listed in Table 4. Ranking was based on the highest number of participants in each sport.

DISCUSSION

This study found that IS athletes commenced in their main sport later, but progressed to international competitions earlier, and went on to higher levels of competitions, compared to the TS athletes. In addition, the IS athletes participated in significantly more OS-TS than the TS athletes. These findings seem to imply that the IS athletes adopt the early diversification pathway.

More than a third of the IS athletes (39%) competed at the Asian level but only 16% of the TS athletes have similar experience, with no TS athletes competing in the Commonwealth, World and Olympic championships. This infers that the IS athletes have higher achievements at this point of time, for being able to qualify to enter major world competitions, but it is unknown if the current performance will reflect future successes; junior success does not necessarily produce adult world champions (Güllich & Emrich, 2014; Huxley et al., 2017).

The athletes reported significantly more hours for coach-led practice, compared to peer-led play, during both the sampling and specialising stage. The early diversification pathway infers that the sampling stage would consist of more deliberate play, whilst the specialising stage would consist of both deliberate play and deliberate practice (Côté et al., 2007). The higher amount of practice hours since young reflects the early specialisation pathway; specialisation require more hours of deliberate practice (Ericsson et al., 1993; Güllich & Emrich,

Table 4

Most popular other sports according to IS and TS athletes

No.	IS athletes	TS athletes
1	Cross country	Athletics
2	Handball	Football
3	Football	Cross country
4	Athletics	Badminton
5	Badminton	Handball

Note. Numbers indicate the popularity rank of the sport for each group.

2014). Conventionally, play was the main activity in the early years, though people are overtly unaware of the benefits derived from playing. Due to urbanisation such as shrinking of public playing spaces, heightened concerns over safety, and the increase of sport-specific developmental hubs at schools and community centres, children tend to engage in more structured activities. This may explain the high amount of practice hours during the sampling stage.

No difference shown in total other sports participation between groups was similar to previous studies (e.g., Drake & Breslin, 2017; Haugaasen et al., 2014). However, further analysis by categorising the other sports suggests that most of the national sports school athletes participated in more other sports that are in different domains than their main sport. For fencing, the only similarity between the main sport and OS-TS would be that they are all non-cgs sports [i.e. sports that are not measured in centimeters (c), grams (g), or seconds (s)]. For athletics, all the OS-TS may have provided avenues to develop basic multi-lateral movements that contributed to higher mastery of specialised athletics events. It is possible that a variety of sports contribute to an athlete's mastery in their main sport, as shown by the early diversification pathway (Anderson & Mayo, 2015; Güllich & Emrich, 2014; Huxley et al., 2017).

More than half the athletes (56%) enrolled into the national sports schools between ages 13-14. This is slightly earlier than what is propositioned by the DMSP's investment stage (age 16 and above). It is possible that sports school enrolment is linked to academic milestones, rather than sport specialisation, as sports schools are under the Ministry of Education. The majority of the athletes enrol at the age of 13 likely as it coincides with the start of the secondary school year. Presumably, those who miss the first principal intake (at age 13) overflow to the following year (at age 14). Similarly, the third and fourth largest enrolment also coincide with student related milestones, whereby age 16 is when students get categorised based on their preferred academic streams (science or art stream), and age 18 is the start age for tertiary education. Age 15 and 17 are the ages when major school examinations take place, hence, few would embark on a major change to their school.

In Malaysia, organised sports commence in school, with annual competitions between schools, districts and states based on age groups (under 12, under 15, and under 18) for a variety of sports. The national level competitions are a common hunting ground for coaches seeking potential athletes. Selected athletes are offered a place in the sports school. The athletes may choose to take the offer or remain where they are. With this sports system, there is a linear, chronological pathway provided for student athletes. However, neither the IS nor TS athletes conform completely to the proposed DMSP pathways, as shown in Table 5. This agrees with other studies that an athlete's career does not adhere to a single pathway alone (Coutinho et al., 2016; Gulbin et al., 2013; Güllich & Emrich, 2014). The athletes

in this study started their main sport before the age of 12, with more hours of deliberate practice, but they also participated in more other sports that were different from their main sport since young.

Developmental pathway refers to the route taken in the process of embarking on an athletic career. Although the analysis was only up to age 15, the term developmental pathways was embraced as this study includes where the athletes were before enrolling (sampling stage) and while being in the sports school (specialising stage). Furthermore, the inclusion of the investment stage will not alter the pathway features stated in Table 5, apart from their current competition level, which may change at any time, not just within the investment stage.

CONCLUSION

The main aim of this study was to identify the developmental pathway of IS and TS athletes in the Malaysian national sports school. A combination of both sampling in other sports and specialising in main sport from a young age was found among elite junior athletes, some of which have competed in senior international competitions. Those who excel better at the current age start their main sport later. This study is limited by the athlete's age whereby the minimum age of 16 provides an overview of the sampling and specialising stages of the DMSP, but not the investment stage. Follow-up study on the athlete's current sport activities will be conducted.

Further research on adults who have previously enrolled in a national sports school is indispensable to determine long term effects of specialised sports participation. Similarly, a comparison between athletes who have been through the sports school system versus those who did not is needed to establish the effectiveness of the sports school programme. In addition, it is possible that student athletes may benefit from a later enrolment into sports school, as advocated by multiple consensus statements for youth sports, but this requires additional research.

Table 5

Main characteristics of the pathways taken by the IS and TS athletes

Features	IS athletes	TS athletes
Start main sport	Later	Earlier
Start representing country	Earlier	Later
Deliberate practice	Start young	Start young
Current highest competition level	Above Asian level	Asian level and below
Other sport involvement	More team sports	More individual sports[a]

[a]Based on the mean and standard deviations, without statistical significance.

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REFERENCES

Anderson, D. I. & Mayo, A. M. (2015). A skill acquisition perspective on early specialization in sport. *Kinesiology Review*, *4*(3), 230-247.

Baker, J., & Horton, S. (2004). A review of primary and secondary influences on sport expertise. *High Ability Studies, 15*(2), 211–228.

Bergeron, M. F., Mountjoy, M., Armstrong, N., Chia, M., Côté, J., Emery, C. A., ... Engebretsen, L. (2015). International Olympic committee consensus statement on youth athletic development. *British Journal of Sports Medicine, 49*, 843–851. doi: 10.1136/bjsports- 2015-094962

Côté, J. (1999). The influence of the family in the development of talent in sport. *Sport Psychology*, *13*(4), 395–417.

Côté, J., Baker, J., and Abernethy, B. (2007). Practice and play in the development of sport expertise. In G. Tenenbaum and R. C. Eklund (Eds.) *Handbook of sport psychology* (pp. 184–202). Hoboken, New Jersey: John Wiley & Sons.

Côté, J., & Fraser-Thomas, J. (2007). The health and developmental benefits of youth sport participation. In P. Crocker (Ed.) *Sport psychology: A Canadian perspective* (pp. 266–294). Toronto, Canada: Pearson.

Coutinho, P., Mesquita, I., & Fonseca, A. M. (2016). Talent development in sport: A critical review of pathways to expert performance. *International Journal of Sports Science & Coaching. 11*(2), 279–293.

Difiori, J. P., Benjamin, H. J., Brenner, J. S., Gregory, A., Jayanthi, N., Landry, G. L., & Luke, A. (2014). Overuse injuries and burnout in youth sports: A position statement from the American Medical Society for sports medicine. *British Journal of Sports Medicine, 48*(4), 287–288.

Drake, D., & Breslin, G. (2017). Developmental activities and the acquisition of perceptual-cognitive expertise in international field hockey players. *International Journal of Sports Science & Coaching, 13*(5), 636-642.

Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review, 100*(3), 363–406.

Ford, P. R., Low, J., McRobert, A. P., & Williams, A. M. (2010). Developmental activities that contribute to high or low performance by elite cricket batters when recognizing type of delivery from bowlers' advanced postural cues. *Journal of Sport & Exercise Psychology, 32*(5), 638–654.

Fraser-Thomas, J., Côté, J., & Deakin, J. (2008). Examining adolescent sport dropout and prolonged engagement from a developmental perspective. *Journal of Applied Sport Psychology, 20*(3), 318–333.

Gulbin, J., Weissensteiner, J. R., Oldenziel, K., & Gagné, F. (2013). Patterns of performance development in elite athletes. *European Journal of Sport Science, 13*(6), 605–614.

Güllich, A., & Emrich, E. (2014). Considering long-term sustainability in the development of world class success. *European Journal of Sport Science, 14*(Suppl.1), S383–S397.

Haugaasen, M., Toering, T. T., & Jordet, G. (2014). From childhood to senior professional football: Elite youth players' engagement in non-football activities. *Journal of Sports Science, 32*(20), 1940–1949

Huxley, D. J., O'Connor, D., & Larkin, P. (2017). The pathway to the top: Key factors and influences in the development of Australian Olympic and World Championship track and field athletes.

International Journal of Sports Science & Coaching,12(2), 264–275.

Jayanthi, N., Pinkham, C., Dugas, L., Patrick, B., & Labella, C. (2013). Sports specialization in young athletes: Evidence-based recommendations. *Sports Health, 5*(3), 251–257.

LaPrade, R. F., Agel, J., Baker, J., Brenner, J. S., Cordasco, F. A., Côté, J., ... Provencher, M. T. (2016). AOSSM early sport specialization consensus statement. *Orthopaedic Journal of Sports Medicine, 4*(4), 2325967116644241. doi: 10.1177/2325967116644241

Rees, T., Hardy, L., Güllich, A., Abernethy, B., Côté, J., Woodman, T., … Warr, C. (2016). The great British medalists project: a review of current knowledge on the development of the world's best sporting talent. *Sports Medicine, 46*, 1041–1058. doi: 10.1007/s40279-016-0476-2

Roca, A., Williams, M., & Ford, P. R. (2012). Developmental activities and the acquisition of superior anticipation and decision making in soccer players. *Journal of Sports Sciences, 30*(15), 1643–1652.

Sieghartsleitner, R., Zuber, C., Zibung, M., & Conzelmann, A. (2018). "The early specialised bird catches the worm!" – A specialised sampling model in the development of football talents. *Frontier in Psychology, 9*(188) 1-12.