International Journal of Sports Science & Coaching

Original research article

Adolescent player development within institutional constraints in academy football

International Journal of Sports Science & Coaching
1–12

DOI: 10.1177/17479541241312280
journals.sagepub.com/home/spo


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Abstract

This study aimed to investigate academy football coaches' perceptions and experiences of managing adolescent growth and maturation within the constraints of an English Premier League academy. Using a longitudinal mixed method design, 98 under 12–16 players were assessed for maturity status, growth velocities and match performance grade. Interviews were conducted in parallel, with their nine respective coaches. The quantitative and qualitative data were then combined to generate a rich, contextualised understanding. One case study is also presented as an archetypal example. Findings are presented in three themes. Coaches described the conflict between the value of winning and player development, difficulties in judging potential and performance, and the challenges of developing players in an elite competitive environment. Findings emphasise the intricacies of managing and developing adolescent athletes in academy football. Coaches in this study were challenged by the individual differences in growth and maturation and the elite, competitive and selective nature of football academies and the constraints of this environment exacerbate these challenges.

Keywords

Growth velocity, maturation, soccer, talent identification

Introduction

In England, soccer/football is the highest participation team sport, with 2.49 million boys aged five- to fifteen years old participating.[1] Within this cohort, approximately 10,000 are recruited into professional football academies, with the aim of playing professionally.[2] Academy players are recruited from as young as five years old, and each year approximately 1000 players aged nine to sixteen are offered academy contracts.[3] Very few players, however, secure professional contracts, with less than 1% of academy footballers playing professionally as adults.[4]

In 2012, the English Premier League introduced the Elite Player Performance Plan (EPPP), a long-term strategy for elite youth development. The strategy was implemented to raise the standard of youth development and aid the transition of youth players to the highest level within English Football.[5] Designed to provide holistic development, the programme promotes a player-led approach[6] within the four corners of the Football Associations curriculum (physical, technical, social, and psychological).[7] The EPPP aims to create a more effective and efficient system for talent identification and development to better recruit, develop and transition athletes from the academy programme into first team and international football.[4,8] A ten-year audit of the EPPP reported notable successes in the number and quality of homegrown academy players no playing professionally in the Premier League.[9]

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The globalisation of football encourages football academies to identify and develop young players in return for financial rewards.[10] Today, the game is characterised by the inflation of players' wages, transfer fees, and the frequent movement of players across teams and leagues; thus, a football club's capacity to identify and develop players may guarantee a club's sporting and financial success.[10–12] Identifying young players with the potential to become elite and providing those players with the most appropriate environment to fulfil this potential, is a key objective in academy football.[10–13] In England, a highly established footballing nation, there are high participation rates, a large talent pool and considerable financial and logistical resources to create an effective talent pathway.[14] Research indicates however, a thinning supply of English youth players,[15,16] and consequently, the interest and development of talent identification pathways has expanded.[10,11,13,17]

Talent identification and development pathways are challenging and complex by nature; confounded on a global and individual level; by factors such as population size, talent pool, financial and logistical resources and coaching biases, location effects, and individual differences in relative age and biological maturation.[13] In the past, talent identification employed a solely subjective approach, where managers, coaches and scouts used their personal opinion to assess players.[12,18,19] Subjective approaches to talent identification can, however, lead to inconsistencies and misjudgements.[11,19] Accordingly, there has been a push for talent identification and development pathways to use a science-based holistic system,[11,20,21] such as the EPPP. Common measures and indicators of potential within talent identification systems include anthropometrics, physiological factors, psychological characteristics, technical skills, and training history.[11,13,19] Many of these factors are however, confounded by individual differences in biological maturity.[20–23]

Biological maturation refers to the process of progression towards the mature state, defined in terms of status, timing and tempo, and determined primarily by genetics.[20] Players of the same chronological age vary greatly in the timing and rate at which they mature physically[24] with children of the same age varying in skeletal age by as much as five to six years.[25] Evidence shows early maturing boys are more likely to be selected in youth football academies from 11 years of age, due to their physical and athletic advantages gained in puberty (size, strength, speed, power).[19,23,26] This bias increases with age and level of competition.[19,23,27,28] To address this bias the EPPP to assist academy staff in the identification and development of youth footballers by educating, assessing, and monitoring adolescent growth and maturation.[29,30] The screening programme was integrated with a series of battery physical performance tests, education, and injury surveillance.[6] The collection and assessment of this type of data has allowed the effects of maturation in youth footballers to be further explored through variables such as match running performance,[31] functional capacities,[32,33] injury,[34] and selection biases.[23,27,28]

Academies within the EPPP are able to identify and recognise differences in maturity status and timing and determine when players enter specific stages of development such as the adolescent growth spurt.[35] The adolescent growth spurt, a rapid increase in stature occurring in all healthy adolescents around 14 years of age in boys, is also worthy of research and understanding.[20] There is a body of literature describing a period of adolescent awkwardness,[36,37] a peak increase in injury incidence[38] and peak development of many physiological and functional attributes[39,40] aligned with the adolescent growth spurt. It is thus best practice to identify and adjust training load around the adolescent growth spurt to safeguard players from injury.[25,41] However, the extent to which football academies understand, monitor, and adjust for the adolescent growth spurt is unknown.

The need to monitor growth and maturation in adolescence has been intensified by the increasing physical demands and competitiveness of the game. Around puberty, the game format changes; there is a shift from small-sided games to the adult format, where the pitch, ball and goal sizes increase, and the intensity and level of training and competition increases.[38] Alongside this increasing intensity, talent selection decisions occur at 12, 14 and 16, where maturity associated differences in size and function are at their greatest, and the majority of players will experience their adolescent growth spurt[20,42]; Understanding growth and maturity within talent identification pathways is vital in ensuring no athlete is overlooked, or equally, selected, for attributes in adolescence that will be attenuated in adulthood.[22,23] Youth coaches and talent selectors are therefore uniquely challenged, and little research has explored how they navigate and manage adolescence within football academies.

Identifying and developing adolescent athletes is therefore a challenging task for any talent identification and development pathway. Youth scouts and coaches must be aware of selection biases associated with individual differences in biological maturity. Further, coaches need to understand and monitor the adolescent growth spurt in their players, where within one chronological age group, players may span pre-, during- and post-growth spurt.[25,31]

Although research recommends multidisciplinary approaches to talent identification and development, many talent pathways and academies still rely upon coaches' subjective evaluations.[43,44] While coaches' assessments are highly subjective, they are inherently holistic; a coach can integrate information on various factors and assess the player as a whole, such as technical skill, psychological ability, and familial support.[44] The ability and expertise of a coach to integrate variables in their assessments means coaches evaluations show high prognostic validity, whereby coaches' assessments of players' game performance have been shown to be a strong predictor of later success in

football.[44,45] However, coaches' talent identification and evaluations can be swayed by personal feelings, intuition, and experiences.[46] How growth and maturation influences youth coaches' experiences and evaluations is relatively unknown, however. When the success of youth players reaching the next level of the game depends so heavily on a coach's assessment[44] it is important to understand how growth and maturation influence coaches' evaluations. Accordingly, this study aims to better understand coach's knowledge and experiences regarding the management of growth and maturation in academy soccer. More specifically, it seeks to explore how coaches' experience, perceive, evaluate, and understand this complex adolescent phase within the contextual constraints of an English Premier League Academy.

Methodology

Ethics

Approval for this research was sought and granted from the University of Bath Research Ethics Approval Committee for Health (REACH, BATH, 2019). Additionally, the objectives, rationale and procedures were explained to the Football Club for approval.

Design

The study used a mixed methods approach to explore youth football coaches' perceptions, experiences, and management of 98 male adolescent academy football players in the Youth Development Phase (YDP) (aged 12–16) over 12 months from one Premier League academy (category one).[47] Players in the YDP generally compete once a week and train between 8–12 h per week, although the training schedule may increase with age.[48] Players in this academy participated in a varied games programme that included formats such as age group competition, bio-banding, and futsal. Academy players may have the opportunity to participate in additional cup competitions or international tournaments.[48]

Quantitative and qualitative data were collected simultaneously in three phases, and the data were combined to gain a comprehensive understanding of the coaches' perceptions and experiences. Quantitative data pertaining to players' maturity status, growth velocity, match playing time, and game performance (see supplementary file 1) were recorded every four months to contextualize and interpret the coaches' descriptions, beliefs, and experiences. Semi-structured interviews with nine coaches were conducted in parallel (ranging from 47–90 min). Inductive thematic analysis was used to identify patterns and themes within the data, with coding led by the first author before being verified by the research team to aid rigour and trustworthiness.[49] The thematic categories and key findings were subsequently discussed and validated with the academy coaches and sports science team. The quantitative player data was used to supplement the interview data and provide context, without influencing the discussion, to understand the complex phenomena of biological maturation in adolescence, in a youth football context.[47] Data are combined and presented to explore the coach's experiences, perceptions, and management in different contexts, for individual players, utilising both qualitative and quantitative data.[47] For a detailed research methodology, please see previous two papers from the same programme of work.[28,47]

Results and discussion

This paper describes and interprets the coaches' perceptions pertaining to the challenges of developing adolescent players within a competitive restrained environment within three sub-themes. Coaches explained the value of winning in conflict with player development (1), difficulties in judging potential and performance (2) and the challenge of developing players in an elite competitive environment (3). Further supporting quotes can be found in supplementary file 2.

Player development versus winning

Coaches described managing players in a competitive environment, where winning is an important outcome. While the primary goal of academy football is player development, some coaches highlighted an emphasis on winning, potentially at the expense of long-term player development. This highlights an underlying conflict in the academy model between the team's success, coach reputation, and the long-term development of players.

Coaches described the importance of the competition and the value of winning across all academy age-groups for building players' self-beliefs and team cohesion. They expressed that winning was something players and coaches strived for and enjoyed: "…tough to keep them confident and together…just not winning. Not winning is literally that simple" (Coach 5) and "Because I want to win, and I know the kids want to win" (Coach 1).

> This team winning as a group in games this season has been one of the biggest factors in them all coming together, feeling confident and pushing on. I couldn't have created that out of nothing, that's them doing it (Coach 5).

In a highly competitive, selective, environment, it is no surprise coaches and players strive to win.[4,50] Coaches have described competitiveness as a key factor in influencing success, and a need for a winning mentality to succeed professionally.[42] Winning is also an integral part of competition and youth sport, and it would be unrealistic to state

that winning is unimportant; However, player development should be the primary goal of academies and winning should result because of development.[51] Coaches' perceptions of the importance of winning may be problematic if winning is not positioned in a healthy perspective for adolescent athletes.[51] Research, albeit at a less competitive level, has demonstrated that coaching behaviour and climate is more important than winning in terms of predicting player learning and enjoyment.[51,52]

The importance of winning has consequences for adolescent players. For many athletes, winning or losing is equated with success or failure, respectively, therefore experiencing failure can be a common occurrence.[53] Outcomes considered as failures can adversely influence perceived competence and emotional states.[15] Elite adolescent footballers within academies are subjected to continuous performance evaluations, and successive failures can lead to deselection.[15] Sagar and colleagues suggest academy players are likely to fear failure, due to the highly competitive environment and the pressure to succeed.[15] Fear of failure adversely impacts athletic performance, thus, it is recommended football academies should focus upon development rather than the match result.[15] Coaches should focus on creating a mastery-involving motivational climate, focusing on player development and 'being competitive', rather than the absolute outcome of games.[42,51]

Maturation was described as a contributing factor in match outcomes. Specifically, teams were more likely to lose when competing against opponents who were more advanced in maturation. Losses, in turn, impacted the confidence and morale of the team and individual players.

> "…the lads have struggled to experience winning a lot, to experience the right level of challenge and support, it's just hard, because the games you're sending them out into are an absolute war [because they are later maturing] (Coach 5).

Many coaches perceived their players to be less mature than their opponents. It is well established that in academy football, advanced maturity status positively predicts identification, selection and retention, leading to overrepresentation of early maturing players.[19,23,24] Previous research from the same academy[27] demonstrated that the majority of players were 'on-time' and the odds ratios associated with a maturation selection bias are smaller than the equivalent values reported from another Premier League Category One academy.[23] Thus, coaches' beliefs that their team were later maturing than their opponents has some evidential basis.

Aligned with the importance of winning, coaches discussed fielding their strongest team involving a bias towards early maturing boys because their athletic advantages provided the best opportunity to win.[28] Coaches explained they had to make conscious decisions to counter to this bias when selecting squads, even though they may be detrimental to the result: "I would say the strongest team generally has the biggest, earliest, strongest kids in because it's easy for them to compete" (Coach 1). Coaches indicated that fielding their strongest team meant excluding later maturing players or giving them less playing time.

> His challenge is lack of power and lack of strength at the moment and the impact that has is he has very little impact on a game… in the midfield, the opponents are often bigger and stronger, so struggling to really deal with that, not because of attitude, or effort, simply because they are bigger and stronger, so that has led to him coming off a few times and trying to manage his load through games (Coach 3; player- 90.7% PAH, performance grade 2.47).

Coaches noted that winning was of greater importance in cup games and tournaments and that a player's growth and maturity status especially impacted team selection in these games (See Case Study: The Benched Late Maturer). Early maturing players usually playing in the older chronological age-group, were returned to their age-group to assist the team in winning. This finding is consistent with Gilbert and Trudel, where coaches often make decisions in critical matches with the primary focus on winning.[54] Late maturing players, who were described as less impactful, were less likely to play in important games (See Case Study).

> We have been consistent in providing equal game time, however the Cup games could skew that a little bit because you play them to win, therefore probably at times the best performing players in those moments have been early maturing players, and so the lads that haven't impacted games like [late maturer] have missed out…I would suggest the early's have probably had more game time (Coach 6).

The Premier League offers several different competitions and tournaments across all academy age-groups.[7,48] It is in these games where coaches describe an added importance on game outcome, compared to normal academy fixtures. Although coaches described the result of the cup games to be of upmost importance, within the interviews some coaches used the result of all games, including general fixtures, as a rationale for their coaching decisions and a marker of team performance. The desire and interest in winning games may arise from the coaching context.[55,56] Academy football comprises of performance coaching, where there is an "intensive commitment to a preparation programme for competition and a planned attempt to influence performance variables".[55,56] Within this context,

coaches may feel their effectiveness or expertise to be defined by their team's success (win-loss percentage).[56] The reasons behind the academy coach's desires to win requires further investigation.

> We played [Category 1 Academy] at the weekend and we drew, should have won really but we had [Late Maturer] playing [position] just to get game time and things like that, and we scored two own goals and he was one of them…its funny it just shows if we had stuck with our strongest team and players in the best position we would have won that game quite comfortably but it was a good test for the boys (Coach 6).

The above quote highlights that coaches do not play all games to win, and player development remains central to this academy philosophy, however coaches were aware focusing on development contributed to the game outcome. The continued use of the win/draw/loss outcome reduces the broader element of player development and learning. The importance of the game outcome for coaches may reflect the professional nature of the sport, where winning is the primary goal.[50] Often in competitive environments, the stability of a youth coaches' employment is based upon their athlete and team's success.[57]

The conflict between the player development and winning games was central to the coach's experiences of the academy games programme during adolescence. Coaches described the biases in game time between their early and late maturing players to stem from their competitive nature; "but clearly if you play them [early maturing players] more minutes you have a chance of doing well so that is a bias" (Coach 5). Equally, coaches discussed another bias in playing time for the exceptional 'A grade' players. Coaches described needing these players within their squad in order to win games, even if the player was not currently performing well. Coaches desired talented players experiencing the negative 'signs and symptoms' of the growth spurt[47] to still play in games, despite demands to reduce their load, in order to win the game.

> "If the lad going through a growth spurt is a top player, they are less likely to want him to rest, because they want him because he is going to impact the game" (Coach 5)

Coaches reiterated the importance of player development despite the importance of the result. Coaches discussed the notion of reframing winning away from the result of games, towards the development of players. "I always say the winning bit is important, but it shouldn't take the place of development" (Coach 5). Coaches proposed reframing "winning" away from the result of the game:

> "…maybe winning is player development rather than winning the game…or ticking these individual challenges or finding a way to compete against a bigger boy, but it's, it's like a thirty second conversation but when you are living it it's so tough, like you can be winning a game and make the right changes from a player development point of view and then lose the result, and then go I knew that was going to happen, but that is fine, but does everyone know why it is fine" (Coach 1).

The quote above highlights that although coaches value winning and success, player development is the primary goal. Within a development model of sport the measure of success should involve delivering maximum effort, developing of skills, and enjoying and learning from the competitive element of winning and losing.[51] Youth sport programmes should be structured to ensure continued participation, high levels of performance, and importantly, personal development.[58] The Developmental Model of Sport suggests within childhood and adolescence, coaches should not overemphasise performance; however, often within youth sport programmes, performance is overstated at the expense of participation and personal development.[59] Coaches can reframe winning away from the win-loss result towards more developmental outcomes, however many described this as difficult. Despite the quote above showing coaches prioritise development over winning, the preceding quotes in this sub-theme highlight inconsistencies between coaching philosophy and coach actions.

Coaches emphasised the greater importance of player development, however, several examples of actions contrary to this also arose; Biased game time towards early maturing and high potential players, leaving late maturing lower impact players on the bench, and requiring 'A grade' players to remain within the team are just a few examples (See Case Study). Often, despite the coach's best intentions, the findings of this study show an ego-involving climate exists within the academy where the coaches' favour more talented players to achieve success.[51] This is not the first study to show youth coaches inconsistences in winning and development.[50,54] Research suggests that teachers often have little awareness of their own behaviour and how it contributes to student experience.[60] It is important to know if coaches are aware of the discrepancy between their supposed values and their actions. Further research, education, and strategies should be applied to understand and reduce the inconsistencies between academy philosophy and coach behaviour.

Differentiating between performance and potential

When describing their players, coaches discussed judging potential. The definition of potential being, 'having or showing the capacity to develop into something in the future'.[61] Identifying and developing the players with the

most potential is thus central to an academy coach's experiences. Coaches described the process and challenges with judging the potential of their athletes.

Coaches' perceptions of potential often differed dependent upon a player's maturity status: "Typically, the lates tend to get a slightly lower potential grade than the early's" (Coach 5). When unpicking why early maturing players were generally deemed to have more potential, coaches explained that their current performance tended to be better than their later maturing peers.

> Yeah and he [growth velocity of 5.21 cm/year, 89.6% PAH, performance grade of 2.64] isn't that good, but he looks better than him [growth velocity of 10.80 cm/year, 86.9% PAH, performance grade of 2.5] because of all this (Coach 1).

Early maturing players in the younger age-groups were deemed to impact games more than their later maturing peers and were considered more talented by their coaches. In the quote above, the player with the greater percentage of predicted adult height and a smaller growth velocity had a higher performance grade from their coach than the less mature player in a higher period of growth. The perception of age-group coaches within academies is critical, as coaches play a central role in talent identification and selection.[11] Coaches influence selection and deselection decisions based upon their perception of an athlete's long-term potential.[62] Maturity status has been shown to bias a coach's perception of potential; coaches perceived later maturing players to have a significantly lower long-term potential, where 72% of late maturing players were predicted to go no further than the adolescent level of competition compared to 50% of early maturing players.[62] Consistent with the results from Cripps et al., academies should be aware that variation in performances associated with delayed maturity can influence coaches' opinions of potential.[28,62] As evidenced in the quotes above, coaches acknowledged their perceptions were swayed by maturity status. Potentially, the increased knowledge and awareness within this academy surrounding adolescent growth and maturation, influences coaches understanding the impact of their perceptions, however further research and education is required to mitigate any bias on selection decisions.

Coaches questioned the potential of early maturing athletes deemed talented in the younger age-groups, speculating that it was their advanced maturation making them talented footballers: "We debated signing him because he was so early" (Coach 1) and "that is not an A-grade player though is it, that's just early, the attributes in that moment of time" (Coach 8). Coaches in this academy appear knowledgeable of the transient advantages of early maturation and that by late adolescence or adulthood, maturity-associated advantages will be diminished or even reversed.[21,63] This increased understanding and awareness among these age-group coaches led them to question the selection of some early maturing athletes.

Conversely, some late maturing players were described as having higher potential[28] despite their grades being comparatively lower. For late maturing athletes, coaches described a need for patience and understanding of their delayed development for them to be retained and signed.[28]

> I would be putting him around the C bracket in an audit, someone who has got a chance, you just hope when we get to 16's that people can see he is late because I know that is a question that keeps coming up from a lot of people about how much he impacts the game. I see a fair bit of potential in him (Coach 5; player-growth velocity of 7.49 cm/year, 94% PAH, performance grade =2.46).

Coaches often perceived late maturing players to have more to 'give', therefore considered these players to have higher potential.[28] Findings suggest coaches understood late maturing players required more time to mature and develop as athletes before their full potential would be appreciated. It appears however, the highly competitive and selective environment that exists within elite youth football academies, pressures coaches into making selection decisions on players. Many late maturing players are still experiencing growth[47] and competing against early maturing players[28] when the competition and pressure to succeed are higher. As mentioned, despite coaches perceiving enormous potential in some late maturing players, it appears the risk in offering one of the few scholarships available to a late maturing player is too great.[57] This explains why few late maturing players are observed in older age-groups in football academies.[23,27] As adults, when maturity timing becomes irrelevant, late maturing players often outperform their peers.[63] Lefevre and colleagues showed that late maturing youth are often better performers in most motor performance tests in adulthood.[63] Excluding or deselecting late maturing players in adolescence is problematic, as it reduces the pool in which players can be selected from due to factors only relevant in youth age-groups.[23]

Potential grades were often described as fixed, whereby coaches felt once a player had been perceived as an 'A-grade player' this evaluation could not be changed. Early maturing boys were often described as fixed high potential 'A-grade' athletes in younger ages, despite successive age-group coaches disagreeing. Coaches described a conflict between grading future potential and the athlete's current performance. Grading and changing a player's potential was sometimes seen as a source of tension with other coaches and parents.

> If somebody comes into your group and they are an A, it's like yeah cool, or not, are you going to challenge that, it's just not what we think it is. The grade isn't something

> that is attached to you, it's similar to like an Olympic medal, so at one point Tiger Woods was an A, but he is no longer the best, he is not an A golfer anymore. But that is what we are doing, we are going this kid is Tiger woods, which he might have been at 12 but at 13 he is not now (Coach 1).

Finally, coaches explained their struggles with evaluating and grading potential of players: "…do we know what we are looking at" (Coach 1). Coaches highlighted several difficulties in judging potential including growth, maturity/physicality, relative age, and training age. Although generally potential grades were deemed to be fixed, for a few players big changes in potential grades were perceived: "Yeah progress in performance the highest, looks really confident, has gone from a C grade potential to A in the most recent audit" (Coach 6), causing further questions on the ability to identify talent.

> An A grade is an elite player, so we have to think about what an elite 12 year old looks like, I don't know what that means because there are many definitions of elite… you're already elite if you're within the academy because you're in the highest percentile, but I suppose elite in our mind would be playing for England that would put you in the top 0.0001% or whatever so calling 9, 10 year olds elite, why, you might have a higher training age or bigger physicality that isn't elite that's just circumstance (Coach 2).

With the aim of football academies being to identify and develop young athletes into professional players, talent identification and evaluation is crucial.[11,12,64] The process however, of identifying and developing talent, is challenging; talent identification programmes are shown to have limited success.[65] The challenge facing football academies and youth sport programmes, is only a limited number of athletes can receive resources and coaching. In agreement with the quote above, research shows talent identification at the youth level is often confounded by chronological age and maturational factors, whereby chronologically older and more mature players are identified and labelled as the most talented[19,24,65] and are thus offered more of the opportunities, coaching and resources to further develop.[22] Players graded an 'A', or elite, may therefore remain an 'A' due to the continued investment in their progress[66] even if the player does not improve. Coaches in this study questioned the process of labelling players as talented or elite at the youth level due to the uncertainty of evaluating talent, but also the danger of the talent label.

The labelling of talent is an interesting phenomenon. Across multiple different disciplines, children from young ages are evaluated and often labelled as gifted or talented.[57,67] However, research has shown early predictors of talent are weak[68] and more importantly, talent is not fixed and can change over time.[57] As the findings from this study and other research shows, early maturation, height, and weight indicate youth success, but do not determine adult success.[22,57] Labelling young athletes as talented is therefore challenging, because at younger ages talent is based upon innate fixed characteristics (maturity status, date of birth etc).[57] Malina suggests the impact of labelling children as talented requires further investigation.[67]

Injuries, especially growth-related injuries, were also deemed to confound a coach's evaluation of potential: "We haven't seen his full potential because of the injury" (Coach 3). Coaches expressed difficulty in judging potential of athletes that haven't been able to play, especially around selection/scholarship decision periods:

> Out with his knee so we haven't seen him at all, looks like he has shot up, looks like he has grown loads, but we haven't seen him play once since he came in (Coach 7).

Remaining injury free in adolescence is important to continue playing and developing.[69] However, the coach's perspectives also suggest injuries in adolescence complicate talent selection decisions for coaches. Players with injuries are not participating in training or games and, thus, coaches cannot evaluate their development or potential. It is therefore vitally important for academies to try to reduce injuries within adolescence and the growth spurt; monitoring the growth spurt, estimating maturity status and individualising training programmes are all strategies which academies should employ and research.[70]

Player development vs institutional constraints

Coaches outlined several institutional constraints in terms of being able to manage their adolescent team and the added complexities of growth and maturation. Problems and constraints were discussed by the coaches, as well as some possible solutions for better player management, development, and selection.

The timing of selection decisions was a limiting factor for some players. Some coaches explained they needed more time to make a decision due to injuries, change of position and uncertainty over potential: "…unfortunately, he is one of those in the 50–50 area, I have asked for more time on, I just feel like I need to see him playing more" (Coach 3). Equally, coaches described the need to expose their players to different challenges before any selection decision is made.

> Tough one to manage and to balance out but you have got to do what is right for them and you've got to put them in and take them out, you've got to give them the experiences and they have to succeed and fail, that's the only way (Coach 9).

One strategy to expose their players to new challenges was playing the athlete in a group more closely aligned to their biological age and maturity status rather than their chronological age. Bio-banding, a strategy of grouping players in terms of their maturity status rather than age,[22] was discussed as an approach used to better develop players and aid talent evaluation.

> I mean before we pull the trigger, again the wrong language, you know we should have a mechanism in place where we can go, he needs to play 12 games down and let's see whether he is any better in there (Coach 1).

Playing athletes in the age-group below or above for late and early maturing players respectively, was used for players at the extreme ends of the maturity spectrum. Coaches described playing boys up an age-group as mainly positive, but playing boys down an age-group in order to retain and develop relatively younger and later maturing players had a stigma for the parents and the player[28]:

> Joined the 13's around Christmas and we made the decision to completely move his schedule. We saw his testing and he was like so early we converted him completely which I think is the way to go, he is a 13 in every extent, in all of my sessions, plays all of the games, and it's you know, he is one of the team (Coach 1; player-growth velocity of 9.311 cm/year, 92.3% PAH).

> He is a late maturer, spent a lot of time last year with the younger group because of his physicality. We will have to consider that for him again this year, he is completely anti-it, parents are completely against it, really don't understand the rationale behind it (Coach 3; player-88% PAH, performance grade 2.08).

Most coaches in this study perceived bio-banding to be a positive strategy for the development and evaluation of players. The level of understanding throughout this academy related to bio-banding appeared comparatively high.[71] One of the perceived disadvantages of bio-banding is the interpretation by players, staff, and parents that late maturing players are being moved 'down'.[71] The language often used by coaches within this investigation was moving players 'up and down'; Coaches expressed players and parents were often against being played down. Although bio-banding aids player development, most coaches in this study described it as an evaluation tool, perhaps explaining the stigma and anxiety attached to playing in a younger age-group. To reduce the stigma associated with being played 'down' age-groups, academies need to provide education for all stakeholders and ensure transparency with the strategy.[71] Further, the language used by coaches is imperative in how parents and players perceive the strategy, therefore changing the terminology from playing down to playing across age groups may help reduce the stigma.

One coach described a few ways in which players can move age-group; numerous problems with moving players up and down the age-groups were discussed including group size, logistics and level of challenge, as well as being problematic for coaches.

> Three ways they can move, one is a full six weeks review… can move individuals down for six weeks if we feel it's going to benefit them… the challenge we have got at the minute with this particular group, the group below is so big in its numbers, lads could lose out if they go down, if I move a [Late maturing player] down who is thriving still even though he is late, he might end up getting 40 min instead of 80. So, although we gain a new insight into him and he gains a new challenge he could lose too much, but yeah we have the review process where we can move individuals down for six weeks if we feel it's going to benefit them, we can move them mid-review and the way we are doing it at the moment is probably the last minute one, where someone requires a player (Coach 5).

Coaches described the benefits of moving players up and down the age-groups, including exposure to new challenges, however, coaches also described some detrimental outcomes. In line with sub-theme 1 (player development versus winning) coaches explained the movement of players into different age-groups may impact the result of the game; players moved into different age-groups were perceived to play less minutes and be graded lower by their original age-group coach.

> I have noticed the lads that moved up didn't get as many minutes, so clearly they will play them up to challenge the early's, but actually they come into the team, and they only play for forty minutes because they don't want them to impact the result …it is their ego and they want a better chance of winning the game that's the truth…The interesting bit is the lads I notice down the bottom performance wise, are the lads that play up more, and (coach) rightly or wrongly doesn't really matter, just grades lower than me… they have a bias towards the lads they coach, I bet the data would back this up, 15's going in would have a lower match grade than the 16's and you know sometimes you cannot get away from that. I think I did It even last week with some 14's that came up, they got a lower grade than the ones I normally coach (Coach 5).

Coaches found the logistics of moving players up and down squads according to their maturity status challenging. Again, the importance of winning influenced coaches' perceptions on playing bio-banded squads; teams losing the

strong, powerful early maturing players and receiving chronologically older but later maturing players, were considered less likely to succeed. Equally, coaches described a bias in playing time for players who moved age-group in order to maintain competitive. Players remaining in their age-group despite their maturity status being better suited for another age-group, or playing those athletes reduced minutes, defeats the object of bio-banding. Coaches described the academy philosophy of a player-centred approach, however the quotes above highlight inconsistencies.

Athletes' playing time and performance grades were perceived to be affected when playing up and down an age-group with a new coach. Reeves and colleagues suggested a disadvantage of bio-banding was the coach-athlete relationship is less developed in bio-banded formats.[71] Research has shown as the knowledge of each other (coach and athlete) increases the ability of the coach to increase the athlete's development also increases.[71] Thus, the limited interaction between coaches and the players moving up and down the age-groups, may hinder the coach-athlete relationship and in turn hinder the players development. This may also explain the reduced game time and poorer performance grades for players moved into a new age-group for bio-banding. Further research is warranted to understand if these perceived disadvantages outweigh the perceived advantages of the bio-banding strategy.

Some coaches also explained moving players up and down the age-group can occasionally have detrimental effects for the player: "…we played him up all last year all season, which when you reflect on something, that was probably a mistake because he is just mentally shot" (Coach 3). This quote reflects the need for youth sport programmes utilising the bio-banding strategy to consider psychological skills and ability.[22,72]

> …obviously a few years ago he was in that older age-group permanently because at the time he was doing well and he could handle it, but that has shot him to bits so confidence is gone completely (Coach 9; player-, growth velocity of 6.31 cm/year, 89.3% PAH performance grade 2.55).

Bio-banded games were described as an occasional strategy used rather than the permanent moving of players up and down the age-groups. Coaches explained the desire to compete and play in bio-banded games more often, but logistical problems limited the ability to use this strategy. Playing in a bio-banded format more often may counteract the limited interaction, knowledge and relationship between coaches and athletes described earlier.

> In an ideal world I would say…. a quarter of their games would be in bio-banding, because I think it would give us enough data and enough subjective opinion… other teams won't do it, we can do it and play against an age-group but in bio-banded games we try every year and people won't do it (Coach 5).

Aside from bio-banding, coaches described squad sizes as a potential strategy to alleviate some of the problems and biases associated with adolescent players and growth and maturation. Coaches described working with bigger groups as a strategy to reduce injuries and game time, but harder to manage.

> Whether having a bigger group, so you can spread the minutes…is going to help you through this Youth Development Phase period… I have gone to games with 17 or 18 players and from a coaching point of view hated it because you can't get any flow and quarter to quarter is different and I can't give the kids the games time they perhaps deserve…the flip of that is then kids are regularly playing 40 to 60 min…but if we ran with bigger groups through the 13's, 14 and 15's you would get days where you could say we don't need to take him because he's got growth…you know it's that holistic. (Coach 1).

Smaller groups were described as easier to manage and better for player development, however on the other hand training load and game time were required to be higher.

> This group has got 18 or 19 players, I think, and they can hardly get a bare 11 out there it's just so many injuries consistently in that group. This group has lost three players already so they are down to 10 fit players, so it is easier and your programme can be more individualised, I can probably fly through their development plans quite easily now as it's such a small group so they get more focus, the down side is at the moment late or not they are close to playing 80 min every game…I don't think there is a perfect number for squads but probably around 16 is a decent number to operate off, gives you licence to have a couple of injuries and it means you can have a proper individualised programme, I think with a small squad like this, if S&C turn around and say he should only play 40 min this weekend because of his loading or growth, it isn't as easy to make that happen, you're almost having to get through, whereas a bigger squad you can go oh ok he doesn't play this weekend and you can move things around a little bit more (Coach 5).

Limited resources were a factor in running bigger squads or 'shadow squads': "…squad where you give these lads a chance but again what is their fixtures like, how could you fund that" (Coach 5). Talent development programmes are limited by financial and logistical resources provided by the National Governing Body (NGB) or professional club, such as quality of training facilities, number of staff and number of player spots available.[14] In some established

football nations, 'futures programmes' have been established to increase the talent pool and mitigate confounding factors such as the relative age effect and maturity biases.[13,33] The Royal Belgium Football Association are just one established footballing nation to create a successful futures programme, where late maturing players are retained within the talent pool.[14,33] Shadow or futures squads require added investment and resources; however, they do allow the talent pool to be maximised and late maturing players time to develop.

Coaches explained the limited resources and coaching was focused on the players who were deemed to have the most potential.

> Incidentally the ones that we have highlighted as needing a bit of help you know have had it, (A grade player) is on an individual programme as well, (him) and (him) are also A and B players, we put a big more focus on our better players because we tended to neglect the better players and always worked on the others but at 14 with it being a decision year when we get to December, January and we know more or less what is going to happen, my argument is we then have to focus on the ones we are keeping, still give them all practice time but really the extras should go to those who are staying (Coach 3).

Aligned with the sub-theme, differentiating between performance and potential, one coach wondered if the wrong players were provided with more opportunities and resources.

> What about that C grade player, if we give him an equal amount of resources he could prove himself to be an A, and maybe way back that player who was performing well but we never saw the potential (Coach 2).

The labelling and grading of talent in sport warrants further consideration. In line with the quotes above, coaches recognise their greater investment in players they perceive to be more talented and with greater potential (A grade). This finding is consistent with Pygmalion and Matthew effects in sport.[66,73] In line with the Pygmalion effect, the coaches offer more support, time, and investment into the athletes they regard as talented, thus the athlete rises to the coach's high expectations. Players regarded as less talented by their coaches, often the chronologically younger and later maturing, receive less support, resources and opportunities and therefore fulfil the low expectations placed upon them.[66,73] The Matthew effect proposes "the rich get richer and the poor get poorer", whereby players begin with an initial advantage which persists over time. For example, early maturing players have an advantage, which their peers do not, which begets further advantages.[73] These theoretical models explain challenges within talent identification systems. In this study there was disagreement among the coaches as to whether more resources and coaching should go to the identified A grade players or the lower potential C grade players.

Finally, coaches highlighted the challenge of grading potential and match performance in their athletes: "I am becoming less and less interested in the match grades, we make decisions in the face of them… are they a useful metric?" (Coach 1). Coaches described some pitfalls of the academies grading of potential and performance in terms of the effects of growth,[47] maturity biases,[28] and uncertainty of potential.[62]

This study explored coaches' knowledges, perceptions, experiences, and management of their team of adolescent academy football players, within the academy system. Only one professional football academy was utilised in this study and therefore results may not be generalisable to other academies with different working practices, values, and philosophies. Additionally, factors such as specific chronological age group and playing position were not recorded to protect the anonymity of the sample. Further, this research only focused on the male game; future research should explore this in the female game.

Conclusion

The findings from this study emphasise the complexities of experiencing and managing adolescent growth and maturation in academy football. The competitive nature of football and the coaches desire to win, further exacerbated selection biases towards early maturing players. Although coaches described the importance of player development, inconsistencies in their coaching actions showed the challenges associated with managing a competitive youth team where players differ in biological maturity status. The social stimulus value of growth and maturation, and how athletes are judged and perceived by others is highly dependent upon the environment and culture, and thus a biocultural approach is necessary.[74] The high-performance competitive environment of academy football exacerbates the social stimulus value of an athlete. This research highlights the complexity of growth and maturity within academy football and brings to light the various sociocultural layers that impact player development.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

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Supplemental material

Supplemental material for this article is available online.

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