Scottish FA

Review of Youth Development in Men's Football

October 2025

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Introduction & Background

Qualifying consistently for major competitions requires a strong and steady pipeline of talent. For the Scottish National Team to find a competitive advantage, we require a football ecosystem which enables all players to reach their full potential. For our clubs to reach financial sustainability and overachieve in European competition, developing high-value young players is the most proven model. In the words of Arsene Wenger, we require a system which is capable of 'giving every talent a chance, no matter where or when they are born.'

Following the publication of the 'Transition Phase Report (From Academy to First Team Football)' in August 2024 the Scottish FA board approved a Review of Youth Development in Men's Football, which aims to be a catalyst for progress, innovation and development towards improving our football ecosystem, enabling all talent in Scotland to thrive.

It is also worth noting that a separate strategy for the ongoing development of women's football, Accelerate Our Game, is already under way.

This review establishes key principles that will positively affect player development strategies within Scotland. Ultimately, we want to ensure the football ecosystem can be maximised, in order to ensure an ongoing and sufficient pipeline of talent to support our clubs and national teams in achieving success on the highest stage.

The review sought input from stakeholders within Scotland as well as from experts working around the world. Whilst every country has its own unique issues and challenges, we have analysed critical success factors in a player's journey which enables them to fulfil their potential. These principles will be used to underpin our own methodologies for future development programmes.

As a small country in terms of population, we must ensure we maximise our resources, and at every step of the development process, ensure that players are at the heart of the decisions we take – considered as individuals, developing at their own pace, and with their own unique potential.

Trends in Success in Elite Player Development

Compiled using visits to club academies and national associations around the world, alongside independent and review of academic studies.

Arsene Wenger, FIFA Conference, July 2025:

"We see a trend that in the top- 5 leagues and national teams: more and more young players. The best players who take responsibilities are between 17 and 20. It's the first time that we see a player with 100 games at 17 years of age in the history of the game.

"So that means that players are ready earlier. Why? Because they start earlier. And we see the trend all over the world is to start earlier with football schools. At some countries they start at 3 years of age."

The Key Stage of Player Development: Childhood.

Since 2000, substantial efforts and investments have been made to improve the development of Scottish talent. However, these have largely focussed on the stage of development between 12—16.

During this period, Scotland has qualified for **one** out of 39 possible UEFA Men's EUROS at Under-19 and Under-21 International level. There are fewer Scottish playing minutes in the Top-5 European leagues than 25 years ago, showing that attempts to improve the volume of elite players progressing through the development system has not been successful. The percentage of young players making it through to senior football in the Scottish Premiership has reached crisis point. Based on the available data, the concern is that we have not only failed to catch up, but we appear to be falling further behind.

This report will demonstrate why a focus on earlier-age development from childhood is an essential precursor to any player development strategy.

It is within our control to make changes that can allow our next generation to flourish.

> *"It is well known that specific technique training at an early age absolutely results in an excellent technique at a later age. The sensitive period for kinetic ability to differentiate is at 6-7 years of age and again at 10-11 years of age for both boys and girls."*
>
> **Sport Scientist & Conditioning Coach Rene Wormhoudt, 24 years at Ajax during the period that it was consistently ranked as Europe's most productive academy**

Case Study 1. Qatar – The Reverse Approach

Aspire Academy was founded by Emiri decree in 2004 to develop elite athletes, increase Qatar's standing in global football, and eventually to produce a competitive team for the (hosted) 2022 World Cup.

One of the world's best Performance facilities was built, including 38,000 m^2 training spaces with integrated science labs, GPS tracking, and biomechanical tools. The best U13 players moved to live at the academy until U18.

Aspire headhunted some of the best coaches and Academy Leaders in world football, including those who have led some of the top youth development programmes in Spain, Belgium and Netherlands.

Additionally, Qatar scouted more than 3 million children per year globally, relocating players from other nations to their country so that they would become eligible to play for the national team. The majority of the national team are not Qatari born.

However, in spite of having one of the best academies in the world from U13 upward, Qatar did not score a single point at the 2022 World Cup in group games against Ecuador, Senegal (both of which have no comparable elite programme) and Netherlands.

Currently Qatar is 55th in the World Rankings

Case Study 2. China – The Reverse Approach

The world's most populated country - estimated to be around 1.5Billion - had a government-led objective to develop a team capable of winning the World Cup by 2034 and significant investment was made into Chinese football.

The Chinese Premier League signed some of the world's best players and coaches, and clubs invested in state-of-the-art academy facilities, headhunting top-level staff from around the world. China also has a major Football Fan Culture with over 100million fans watching the English Premier League alone.

However, becoming a professional footballer is not seen as a priority goal by the majority of Chinese parents, and most children do not spend time mastering the ball at an early age.

China is currently 90th in the Men's FIFA rankings, below nations with no elite programme and a fraction of the population such as Haiti, Gabon, Oman, etc.

Case Study 3. Brazil – The Organic Successful Development Model

Excerpts taking from "The Goldmine Effect" by Rasmus Ankersen

Eurico Miranda – former president of Vasco de Gama says:

“95% of Brazilian players have been created on the street corners of the favelas. Just think how many times a Brazilian boy playing for hours on end every day in the street touches the ball. You can’t catch up with that kind of head start. Brazilian football is not a product of organised talent development. Our academies do not do anything different or better than those anywhere else. They just have to make sure not to ruin the raw materials they take in. The work has already been done for them.”

Rasmus Ankersen on his research: “Miranda was perfectly right. The story with the top Brazilian players – Pele, Ronaldinho, Robinho, Ronaldo, Zico and all the others grew up playing every day. Very little of their training was done in academies. They practiced on their own.”

Thiago Mendes, Director of a top Brazilian academy: “In reality, all we have to do is go and pick them up. No Brazilian club has to worry about what they have been doing up to the age of 13 or whether they have put in the necessary hours of training. If we didn’t have players with that level of skill by 13, we would have nothing.”

Consider the wide base effect – Cruzeiro alone rejects 4000 players under the age of 15 for every 1 it takes in.

Case Study 4. Iceland – Manufacturing the Successful Development Model

Iceland can be used as a comparative nation which addresses several of the ‘myths’ as to why Scotland does not develop more elite talent, namely:

1. The population is too small – Iceland has a population of around 350,000
2. The climate – Iceland has a more problematic climate than Scotland
3. Lack of resource – Iceland does not have professionalised clubs or academies with full time staff
4. Cultural problems – Iceland did not have an organic street football culture like Brazil, and in the late 1990s (before turning to football and sport as the solution), had considerable issues with alcohol, smoking, diet, and childhood inactivity
5. “The Transition Phase is the problem” – Iceland has no professional domestic league, meaning talents must leave the country at 16, taking on an even more challenging path in their development

In spite of all of the above, Iceland has, in the last 20 years:

1. Qualified for two U21 European Championships – Scotland has qualified for 0
2. Qualified for the World Cup – Scotland has not
3. Qualified for Quarter Finals of the European Championships – Scotland has failed to progress from the group stage
4. Been able to develop elite players

To emphasise the point once again, Iceland has no professionalised Youth Academy structure or pathway into professional senior football. Instead, the government invested in free-to-use, public-access facilities, including small pitches at almost every primary school, and indoor facilities allowing for year-round training.

This means that all children can play football any time they want, allowing for a large volume of practice in the key stage of development.

Additionally - all grassroots coaches have to be qualified, and volunteers are not allowed. In order to enable this, UEFA B license courses are subsidised, ensuring the ability to develop the wide base of grassroots coaches. Iceland has the highest amount of UEFA qualified coaches per capita. As we will discuss later in the report, this ensures that all children around the country receive a better standard of coaching in the key years of their development (from U5).

Finally, Iceland's community sports hub model means that children also play multiple sports, developing the key movement fundamentals.

As a result of focusing on the most important aspects of player development, Iceland is able to be incredibly competitive on the National stage, with around 70% of the population of Edinburgh.

Case Study from Outside Football – The Jamaican Sprinting 'Goldmine'

In Jamaica, kindergartens employ sprint coaches to engage with children from the age of 6. Sprinting is also on the school curriculum, meaning every child in the country sprints, which makes it possible to identify every talented child.

This system ticks **the three key boxes for elite sporting development** during childhood:

1. Creating the widest possible base through working with as many children as possible.
2. Creating a high volume of practice (in this case through the school curriculum, in addition to specialist clubs).
3. Giving quality coaching to as many children as possible from the youngest ages.

"Countries invest millions in academies and high-tech facilities. And yet the greatest advantage a country can have is a small ball, a child, and a parent who understands mastery begins at home.

The football world spends its time worshipping at the altar of Elite Youth Academies but ignoring the obvious truth – by the time a kid steps foot into an organised system, the development gap has already been established. The kids who has spent their time getting thousands of extra touches is already light-years ahead of the rest. No coach, no amount of money, and no state-of-the-art facility can compensate for that.

The tragedy is that countries invest billions into youth programs and wonder why they don't see results.

The beauty is that any country – rich or poor – can tap into the simplest and most overlooked concept in football development."

- Tom Byer

The ‘Golden Years’ for Early Engagement (0-5)

Player Name	***Direct Quote or Known Context***
Lionel Messi	“From the moment I could walk, there was always a ball. My grandmother gave me my first one. She was the first to believe in me.”
Cristiano Ronaldo	“My father worked for a local football club. From around the age of 3 I would go with him and play with the ball for hours. I slept with it like a teddy bear.”
Kylian Mbappe	“My dad was a coach, so a child my room was always full of footballs and posters. I think I started at 3 years old.”
Neymar Jr.	“My father was a footballer and he put a ball at my feet before I could even speak properly.”
Jude Bellingham	“My dad played non-league and there were always balls in the house. One day he gave me a little one and I just started dribbling around the living room.”
Eden Hazard	“We had footballs everywhere. My mum and dad were both footballers. I probably had a ball at my feet before I could walk.”
Ronaldinho	“The first birthday gift I remember was a football. I think I was 3. My brother tells me I used to sleep with it. As a child, my father used to tell me that it was better to practice with the ball in bare feet, in order to master the ball.”
Andres Iniesta	“My first ball was a gift from my father. I carried it everywhere, even to bed. He told me, ‘Treat it like a friend, and it will never leave you.’”
Erling Haaland	“I remember being very small and my dad rolling a ball to me in the living room. That’s probably my first football memory.”
Luka Modric	“We didn’t have much, but I always had a ball. My grandfather gave it to me when I was very small — I played for hours, even in war.”
Mario Gotze	“I was 3 years old when my dad gave me my first football. He was a coach and told me: ‘The ball is your friend — don’t be afraid of it.’”
Diego Maradona	“Maradona received his first football as a gift at age 3 and quickly became devoted to it.” – From the biography ‘Diego Maradona’
Theirry Henry	From age 3, training every day with the ball by his father in their Les Ulis neighborhood

Cesc Fabregas	His grandmother gave him his first ball age 3, by age 6 he was already known as a 'mini playmaker'
Carlos Tevez	As a toddler in Fuerte Apache, was described by neighbors as the 'little boy who couldn't stop kicking around bottles or balls'
Andriy Shevchenko	His father made him a goal from wood and netting at age 3, when he would constantly practice with makeshift balls in Soviet housing blocks
Phil Foden	Parents say that he was 'never without a ball' in early childhood, and that that had to move breakables out of the living room because he would constantly be dribbling around the house
Marcus Rashford	His mother and brother have commented that as a toddler, the ball was his only toy
Mo Salah	Was constantly with a ball around his village as a small child, and his parents commented that he would kick the ball against the wall for hours
Joao Felix	Parents said he used to juggle rolls of paper before he could control a ball, then would constantly practice in the house with his younger brother
Pedri	Family have commented that he started 'touching a ball before he could speak properly'
Gavi	Parents have commented that from around age 3 was 'constantly with a ball in the house or outside the restaurant' (family owned restaurant)

The above table mirrors research that was completed by Tom Byer on this topic, who found the same pattern in each of the world's best players.

There are several key trends from this research:

It seems to be unavoidable that, in order to become the best player in the world, 2-4 seems to be *the 'golden window' for early engagement with the ball*.

The world's best players commented that the *'ball was their favourite toy'* as a toddler – not that football was their favourite game (initially). Making the ball the favourite toy from the earliest age is the key trend in elite development.

Later, when these players started to play organised football, their early exposure meant they were seen as 'more talented' and thus excelled and fell in love with the game. In Scotland, there is a grassroots assumption that by making children fall in love with the *game,* this will inspire them to practice further. However, this puts the process in the wrong order.

A key takeaway from this research is that this fundamental phase in elite development happened within the house, and was inspired by a family member, usually a parent, and always

before the child was involved in any kind of organised activity. This shows that waiting for the child to enter organised programmes is not enough, and the Scottish FA must stimulate a culture shift that encourages children to master the ball at an earlier age and stage.

For this to occur, the Scottish FA strategy must shift away from thinking about elite development solely in terms of organised activity, towards the families of young children. *It is the family, most often a parent or guardian*, who decides whether a child will have this early opportunity to master the game.

There are several theoretical reasons why these players have an advantage from early childhood. The obvious one is that by starting earlier, they will have spent more hours mastering the ball and thus retain an advantage. However, this is only part of the story. It seems to be that this 'golden window' cannot be missed for true world-class performance, regardless of how many hours are spent practicing later.

There are likely two potential factors for this. Firstly, because the development of the brain and nervous system is such that whatever a child is exposed to in the early years tends to have a significant impact on their development. These years are fundamental in shaping many aspects of the child's future. Growing up in contact with the ball from such a young age seemingly makes manipulating the ball with the feet feel almost "natural" to the brain.

The other key factor is the impact early exposure to the ball has on all future football activity. Most organised activity begins around Under-5 or Under-6, where in Scotland for example, children will gather to participate in 4v4 games. What we find in all nations is that, when this first organised activity happens, one or two children within each team will appear "naturals" and dominate the game. Often, they take the ball alone and dribble past all the opponents before scoring.

Let's consider the child who has *not* been exposed earlier to the ball. Firstly, they barely touch the ball, because the child's brain at this stage cannot truly understand cooperation and team play. This means the most dominant player dribbles and does not want to pass. Often, when those children who are not yet comfortable do have the ball and are put under pressure, they kick the ball away from themselves as a reflex, or mis-control, thus surrendering possession, and failing to develop any of the other fundamental skills of the game (technically or decision making).

For these reasons, we must question whether 4v4 is the best format for earliest engagement in the game, given that any type of cooperation or team play does not align to the development of the brain at this age.

For example, the 1v1 +GK model utilised by Belgium seems more likely to allow every child the opportunity to be involved in a way that feels more natural to their phase of development.

Now let's consider the player who *has* already mastered the ball at home before their first training session. Not only do they dominate the ball in terms of touches, but they also constantly dribble, creating countless repetitions of taking on other players. This develops arguably the most valuable skill in football, and one which has been sadly lacking in the Scottish 'A' National Team in recent decades.

Furthermore, when pressured by another player, they are able to shift the ball, for example with the sole of the foot, rather than kicking it away from themselves. This is known as 'staying on the ball' – being comfortable to manipulate the ball in a tight space when under pressure. Staying on

the ball leads to various other benefits as the child grows – for example, this child now has many more repetitions of decision making, passing, shooting, etc – all by virtue of manipulating the ball instead of kicking it away when under pressure by an opponent.

Finally, consider the emotional impact on this child. Science shows that we like what we are good at. The child who shows up for the first time to an organised 4v4 activity and is ahead of their peers is immediately regarded as 'talented' by coaches, parents and peers. They experience success at an early stage which reinforces their enjoyment of the game and commitment to practice. Coaches then select them in advanced programmes at an early stage and so they receive exposure to higher levels of training. Parents see that they have a 'gift' and a more likely to put in the hours to drive them around the country to pursue their 'talent'. An entire cycle of elite development begins by practicing, at home, with a ball.

For the changes outlined above to occur, the Scottish FA strategy must shift away from thinking about elite development solely in terms of organised activity, towards the families of young children. *It is the family, most often a parent or guardian*, who decides whether a child will have this early opportunity to master the game.

> *"As a kid, for me it was difficult to pass the ball.*
>
> *I kept forgetting to do it."*
>
> \- **Lionel Messi**

Early Engagement is not Early Specialisation

As will be discussed in the section on "The Importance of Movement Fundamentals", early engagement in a skill is not necessarily the same as early specialisation. It presumes that one must start early to become world class but does not propose that a child should focus *only* on one skill throughout childhood. In fact, being exposed to a variety of different movement patterns is beneficial for the development of coordination.

A Consistent Trend in Elite Sports

In order to examine whether the evidence gathered in footballers was in some way coincidental, a further analysis was conducted of those who could arguably be considered one of the greatest of all time in their sport.

Athlete	***Context***
Tiger Woods	Father started coaching him before the age of 2, and exclusively until the age of 5
Steph Curry	Surrounded by the sport since an infant – joining his NBA player dad to games/practices and warming up with the team
Wayne Gretzky	Father (a keen Hockey analyst) built an ice rink for his kids and had them practicing from the age of 2
Venus & Serena Williams	Coached tennis by their tennis coach father from the age of 4
Andy Murray	Coached tennis by his mother (a tennis coach) from the age of 3
Floyd Mayweather	Uncle a champion boxer & trainer, father a professional boxer & trainer, started training as an infant
Michael Schumacher	Most world championships F1 - started go-karting aged 4 – father owned the local racetrack and built him his first go-kart
Ayrton Senna	Fastest recorded times F1 - started go-karting aged 4 – father owned a car factory and built him his first go-kart

In the table above, we can see several trends – early exposure to the skill aged 2-4, a family member who was influential, and additionally, a family member with some knowledge of how to coach/guide their early development.

A Consistent Trend in ALL Skill Development

To further test this hypothesis, we can also look at those deemed to be one of the greatest of all time in their skill, even if it was not related to sport. Remarkably, the same trend occurred time and time again, across cultures and domains.

For example, Mozart's father was a composer who had him playing instruments by age 3, composing by the age of 5 and performing for royalty by age 6.

Similarly, Michelangelo, whose sculptures still rank among the most famous in history, was born to a father who owned a marble quarry and was quoted as saying: "Along with the milk of my nurse I received the knack of handling chisel and hammer, with which I make my figures."

Pablo Picasso was drawing constantly by the age of 3, and received formal training from his father – an art teacher – by age 4.

Frederic Chopin's mother was a pianist who taught him as a child – and he was mastering the piano by age 4.

The list continues, but the trend is clear.

> *"A child cannot make the decision to become a top performer by themselves. But that is not the same as saying that children do not eventually share the ambitions which were initially their parents. Many children come to enjoy the activities their parents chose for them because of the satisfaction inherent in mastering them."*
>
> - Rasmus Ankersen in bestselling book on high-performance 'The Goldmine Effect'

A Matter of Culture

> *"When you are born in Uruguay, the first gift from your father is a ball."*
>
> - Gustavo Banales, Technical Director of the Uruguayan Football Association. Uruguay is the most successful nation in football history per capita, with less than 3.5m people

> *They had a ball in their lives, too, for as long as they can remember, ever since they received that first gift around age 2. They'd toddle around their humble homes with a ball at their feet. If they ever didn't have one, "you try to make one with socks, paper," Lodeiro says.*
>
> *And if they ever didn't have a field, they'd play in the street. They'd play with neighbours and classmates, "everywhere," Rossi says.*
>
> *Then, at age 5, they stepped into Uruguay's famed "baby fútbol" system, and bloomed.*
>
> - Excerpt from an article on Uruguayan football

While the examples of top-level athletes provide individual cases where a parent or guardian, armed with some level of expertise, was able to propel the early development of their child, the example of Uruguay provides a context more relevant to the national scale.

Uruguay is in fact, a perfect example of a number of trends we will examine within this report, namely: National Team achievement and developing Elite players is not correlated with factors like population size, elite level facilities, or innovative youth academies.

Instead, it depends much more on a culture where as many children as possible have contact with the ball, as much as possible, throughout their early childhood.

In Uruguay, clearly, this *is* the culture. The question is – *can this culture be created where it doesn't exist?*

Creating the Culture. Japan Case Study Part 1 – Football Starts at Home

Japan provides an interesting case study. Unlike Scotland, Japan is not a nation steeped in the history and tradition of football. However, in recent decades, they have:

- Qualified for 7 consecutive Men's World Cups, reaching the last 16 in 4 of them.
- Become the most successful Asian team in the modern era, winning 4 AFC Trophies.
- Won the FIFA Women's World Cup in 2011, becoming the first Asian nation to do so.

Furthermore, Japan excelled as an elite footballing nation, not due to an organic culture like exists in South America, but due to conscious decisions to improve their footballing level. They have done so while also being recognised for a technique-based, possession game across both Men's and Women's football that does not depend on genetic physicality, but instead, on repetitive mastery of the ball.

As a result – we can analyse how Japan *created* this footballing culture where it did not organically exist.

Tom Byer can be regarded as the leading expert in developing a programme which encourages early engagement in a football. He calls this programme "Football Starts at Home", and implemented this in Japan, where he has lived and worked for the past decades. Football Starts at Home has a few key central pillars to its root philosophy:

- It argues that a key part of elite development happens in the home, at the youngest ages, between the parent and the child.
- The project is targeted at parents – convincing them to engage their children in early practice with the ball, and teaching them how to do so successfully.
- It recommends putting 2 or 3 balls in every room in the house.
- Parents should discourage kicking from day 1 – instead, focus first on the child manipulating the ball. Parents can model how to do this, for example, rolling the ball with the sole of the foot. This allows children to 'stay on the ball' instead of instinctively kicking the ball away when under pressure in organised games.
- Children at this stage are motivated by their parents' approval and attention. By giving attention to their children when they are practicing, and noticing their improvement, this both motivates the child to practice further, and strengthens the bond between parent and child.
- A two-year-old controlling a ball with their feet requires a deep concentration and focus, triggering a response in the cerebellum and creating deeper learning.

Additionally, Tom Byer has conducted research with the University of Houston, which showed in a study with 600 children who had never played football before, that children demonstrated substantial improvements in maths and reading from practicing ball mastery!

A further study by Harvard Professor Dr. Ratey found the programme improved children's cognition, emotional control, and numerical skills, showing further holistic benefit.

Finally, and particularly relevant in a Scottish context, research shows that if a child can avoid obesity by age 5, they have a good chance of avoiding it for the rest of their life.

“Kicking shouldn’t be the first technique you teach a child. In fact, it’s detrimental to them. If you take a soccer ball and give it to a little Latin child and try to dispossess the child by lunging at them to try and take it away, they’ll either pull the ball back or he or she will try to dribble past you.

Now you give that ball to a typical American child, or Canadian child, or Chinese child, and challenge them for the ball, and they’ll either bend over and pick it up or they’ll kick it and chase after it.”

- Tom Byer

The Key Factor: Volume of Practice & Play (6-12)

Player Name	***Direct Quote***
Lionel Messi	“Every day I played football with my friends in the street or the park. I didn’t want to do anything else.”
Cristiano Ronaldo	“I would skip homework, sneak out to play. I always had a ball. I kicked everything — bottles, stones, anything.”
Andres Iniesta	“I didn’t want video games. I wanted a ball. I would go outside and pretend to be Laudrup or Guardiola.”
Ronaldinho	“I played futsal every single day. It was magic.”
Kylian Mbappe	“As a child, I would go to sleep with my boots on. I watched Zidane clips, then ran outside to copy them. I was always playing.”
Eden Hazard	“We played in the garden all day. Me and my brothers would create matches, goals, and even trophies.”
Robert Lewandowski	“After school, straight to football. My mum said I’d only stop when it got dark and the ball wasn’t visible.”
Zlatan Ibrahimovic	“I played for hours every day. Concrete pitches, dirty shoes, broken fences — that was my childhood.”
Luis Suarez	“We played barefoot in the street. The ball was old and flat. But we didn’t care. We played every day after school.”
Antoine Griezmann	“Football was my world. I wasn’t tall, I wasn’t fast, but I played more than anyone else. That’s what made the difference.”
Wayne Rooney	“All I did as a kid was play football. In the street, in the park, in the house — everywhere. I even broke lamps kicking the ball around the living room.”
Riyad Mahrez	“We played all day in Sarcelles. In the streets, the court, the schoolyard. No rest. It’s how I developed my style.”
Samuel Eto’o	“We used to play from morning until the sun went down. I would only go home when I could no longer see the ball.”
Mesut Ozil	“We played in the streets of Gelsenkirchen every day. Tight spaces, no rules, just football.”

Vinicius Jr.	"I played futsal and football every day. I would train with Flamengo in the morning, play futsal in the afternoon, and then play again at night with friends. It was football 24/7."

During his travels to Brazil to study the development of elite footballers, Rasmus Ankersen calculated that a young child in the Brazilian favela practices football a total of around 22 hours per week between, school, clubs and unorganised activity.

That is more than 3 hours per day, 7 days a week.

Now let's say that both the Brazilian child and the Scottish child have been exposed to the 'Golden Years' for early exposure to the ball – both had parents who inspired them to play with the ball between ages of two and four.

With the same starting point at 5 years old, let's compare this to a Scottish child who practices around 6 hours per week.

By age 13 (when the elite youth development process starts)- the Brazilian child will have amassed around 10,000 hours of football, while the Scottish player will have amassed 2,544.

Regardless of the exact number of hours, there is a clear trend of the world's best players talking about playing football (or futsal) every day in their childhood. A key question from this report should be how Scotland, as a nation, can strategically stimulate an environment that was once the norm when we developed our greatest players.

Within our country, there is almost a defeated *acceptance* that children no longer play unstructured football as much as they used to, or indeed are as physically active as they should be. But as the case study of Iceland has shown, and as the case study of Japan shows, **this culture can be stimulated in the modern era**, even where it does not organically exist.

It must also be noted that, it is a sign of the times in Scottish society that the notion of a child playing or practicing sports for more than 3 hours per day may seem like a lot. As will be discussed elsewhere,", this is simply how much a child *should* be active for their physical and mental wellbeing. In fact, to return to the example of Iceland, the very purpose of the government investing in free-to-use facilities and grassroots football was to improve the physical and psychosocial wellbeing of the nation. Football was simply the vehicle.

Strong evidence supports benefits when children get more than two hours per day of physical activity, and not only physically (Janssen & LeBlanc, 2010). A Swedish cohort of 16,000+ children found that **each additional hour of daily activity in childhood** reduced psychiatric diagnosis risk by 12%; anxiety by nearly 40% and depression by 23% in boys (Lundgren et al., 2025). In summary, practicing football or other sports for several hours per day can lead to improved physical and mental health, alongside superior cognitive development, for our nation.

The Power of Repetitive Practice

Studies into high performance have long tried to establish what separates those who go on to achieve great things from the average person. One common suggestion has been that those who attain the highest levels rely not only on organised practice, but countless hours of 'self-training' – repetitive work which is often quoted as being "far from enjoyable".

As far back as 1993 Ericsson, Krampe and Tesch-Romer proposed this theory of "deliberate practice" based on their research into high achievers. In 2009, Dan Coyle's bestselling book 'The Talent Code' translated the findings to show that this kind of "deliberate practice" allows signals to travel from the brain to the body at much greater speed. In a practical sense, it takes a difficult repetitive task an instinctive one.

Similar to Ericsson, Coyle discussed how the neuroscience showed that "struggle is not optional — it's neurologically required… you must make mistakes and pay attention to those mistakes; … keep firing that circuit — practicing — in order to keep myelin functioning properly," before adding "It is hard. It is boring. But it is absolutely necessary."

Similarly, Dutch Professor Marjie Elfering-Gemser has authored many studies on elite athletic performance and found that work attitude and resilience at the ages of 6-8 were the **two key determinants of future elite sporting success**. This phenomenon is known as 'Self-Regulation' – which includes the ability to regulate emotions, such as the impulse to stop doing something boring and move on to something fun instead.

Furthermore, a host of evidence shows that 'Self-Regulation' is like a muscle – it gets stronger the more we practice. That means that children can, from an early stage, improve their willpower.

This study found not only that those who had the discipline to spend longer on unenjoyable, repetitive tasks went on to achieve the most successful careers in elite sport, she identified the ages of 6-8 as the key window. This means that she was able to tell, already by this age, which children are committed to repetitive practice. This aligns with research showing that the key window to develop resilience occurs between the ages of 3-9. It seems, therefore, that it is **not only the technical foundation which is developed at the earliest stage, but also the mental skills** which are linked to elite performance.

In many ways, this research reflects common logic. Those who practice more will get better, and sometimes what we need to do get better is not fun. Those who are willing to practice more or longer than the average person (who gets bored or only wants to do something which is 'fun'), will over time, become better than the rest.

The Scottish Context

Based on the evidence, a central pillar of the Scottish FA's strategy should be to encourage children to spend countless hours mastering the ball on their own, not *only* through organised play and coaching sessions. Making a large part of the childhood experience fun is absolutely a positive step when coaching a group session but should not *ignore* the development of self-regulation – developing the perseverance to focus on repetitive practice.

Given that self-regulation is also correlated with success and happiness as an adult across all domains, sport – and football specifically – can only serve to develop this trait.

In summary, the key trend in elite player development is countless hours of **both** play, and repetitive practice, during childhood. Neither should be seen as competition to the other and both should be valued. The real debate in coaching should not be how much time to spend with children working on technique vs playing games. This debate misses the central point.

Based on countless real-life examples, the real debate should be **how we engage children to spend more time doing both.**

Developing Creativity in Team Ball Sports Requires High Volume of Both Practice & Play

What was summarised above was also exactly the findings of Memmert, Baker and Bertsch (2010) when it came to analysing the most creative athletes in team ball-sports.

Contrary to the argument that repetitive, deliberate practice somehow "removes creativity", scientific evidence actually shows the opposite. It is a **requirement** of creativity. Repetitive practice gives players more tools at their disposal to solve situations, while unstructured play gives them more opportunities to practice different solutions in different situations.

The same phenomenon occurs outside of sports – creativity requires both a form of imagination and method of execution. The musician must have the imagination to hear the melody in their head, but must also have spent the hours of repetition mastering the instrument to be able to transform it into a sound that others can hear. The artist must be able to visualise how they would like to transform a blank canvas, but it is the practice of mastering different brush strokes and artistic techniques which brings this image into the world.

Another musician, artist, or football player may have the same creative process, but without the deliberate practice required to *execute* their vision, they will never be considered "creative" in the practical sense.

To summarise the findings of the study: the most creative athletes spent more hours in **both** structured practice and unstructured play. The study also found that **the development of creativity requires both elements**.

> *"I don't believe skill was, or ever will be, the result of coaches. It is the result of a love affair between the child and the ball."*
>
> - Roy Keane

The Real Elite Development Facilities – Free-Access Space to Play

As we have already touched on in this report, elite youth development facilities have no correlation with elite player development. On the contrary, having spaces where children can play football any time they want, as much as they want, for free, is *absolutely correlated with the development of elite footballers*.

In every talent hotbed, we can find examples of this. Throughout Portugal's major cities, concrete courts are visible in almost every neighbourhood. In Barcelona, hard-courts with basketball hoops and football goals are everywhere, where children practice either football, basketball or tennis. In Croatia, all school multi-sport facilities are left open for the community to use. In France, a documentary was filmed called 'Concrete Football', showing how caged football courts in housing communities were the reason for the success of the National team. In Uruguay, children gather to play on dirt fields on every street corner. There are countless examples of this phenomenon – and in many cases, **such basic facilities can be built at minimal expense**.

What is interesting, once again, is that nations do not have to rely on an "organic" street football culture. In fact, nations such as Iceland, Denmark, Norway, and projects in South London provide examples that talent hotbeds can be stimulated where they previously did not exist, by providing access for children to play football, 24/7, 12 months of the year.

In Scotland, we face the opposite challenge.

The financial crisis affecting local authorities is well known. A recent study has shown that cost of play in local authority and other private facilities has risen by a third whilst quality of maintenance and upkeep has diminished.

Public spaces to play have been removed or fixed with "No Ball Game" signs. Primary schools have introduced rotas for who is allowed to play on the school pitch at lunch time. After school and at weekends, school facilities remain locked up.

Meanwhile, childhood obesity rates have continued to rise, and the nation faces a generation of children lacking in basic movement fundamentals.

In short, our young players are either being priced out, or locked out of playing the national game,

It should be noted that projects do exist to tackle this and that the Scottish FA is leading the way in overcoming these obstacles through its Pitching In campaign to improve facilities and access, whilst also discussing ideas such as Trusted Keyholders to open up public and school facilities outwith opening hours.

Clearly, addressing the space to play issue should be a key target for Scottish Government, local authorities and the Scottish FA.

The Organic Successful Elite Development Model: A photo from Rio de Janeiro. Public space to play does not require close to the same level of investment as modern, elite facilities. Despite this, they are the ***real*** *Elite development facilities, allowing children to practice for hours, 7 days per week.*

Manufacturing the Successful Elite Development Model: The Icelandic government built small football pitches at almost every school which are free to use and open 24/7. The government also built indoor facilities which were free to use for Children in the winter.

"These pitches are absolutely vital because nobody, in my opinion, becomes a good football player only showing up three times a week to a training session. You have to be able to play football 24/7. When these mini-pitches came, everyone could go out and play football anytime they want."

-Arnar Thorlakur, Technical Director of the KSI (Icelandic Football Association)

Denmark

Denmark, similar in population to Scotland, is the world's top comparable nation (less than 10million people) in terms of producing top 5 league footballers. 25 years ago, it had the same amount of top 5 league players as Scotland, showing that change can be made strategically.

Excerpt from FIFA Report on Danish talent development: Hesterine de Reus, a FIFA technical expert who has worked with the DBU, says there is much to admire in Denmark.

"It is a small football country, but the Danes perform very well on the international stage. This makes the Danish federation very interesting", added de Reus.

According to her, Denmark's success begins in childhood, in kindergartens, where children have ample opportunities to play.

Flemming Pedersen, Technical Director of Right to Dream Group (FC Nordsjaelland): "In the end, it's all about access for the youngest kids. We have access to facilities for children to play."

James Gow, Sporting Director at Aalborg: "Club-owned facilities are open all the time for public use when the teams aren't training. It's not like the UK, where someone is chasing children off the pitch."

In terms if facilities, a law introduced in 1972 requires local sports club to be given free access to facilities at specific times.

Furthermore, governmental investment into sport is secured and index linked which allows for long term strategic planning. This is very different from the current system in Scotland which sees facilities locked and Government investment via Sportscotland which in a football context has been static, and therefore reducing in real terms, for almost 10 years

Norway

Norway is another clear example of a nation with similar population which was arguably behind Scotland 25 years ago in terms of the number of top level talent, but due to strategic changes, is now one of Europe's top producers of elite players such as Erling Haaland and Martin Odegaard, with U21 domestic minutes in the top division dwarfing the Scottish Premiership. .

Copying from the Icelandic model, investment has been placed into mini-pitches to encourage "street football". 94% of mini-pitches are located on school grounds, heavily used during school hours, breaks, and evenings—often until 22:00–23:00.

Players are also encouraged to practice a lot on their own during and after school, which has a hugely positive impact according to Hakon Grottland, Head of Player Development at the Norwegian FA. "Without exception," he says, "the players who are the best have played a lot of extra football as children."

Erling Haaland was also known to have grown up in a region which allowed children free access to an indoor facility in the winter months. Erling and his friends were known to practice there daily when the weather was unsuitable for outdoor games.

South London Cage Football Project

South London provides another case study. In this example, caged football courts were built to tackle crime and other social problems related to deprivation. Groups began converting neglected estate courtyards, car parks, and derelict basketball courts into 5-a-side metal cages. In Scotland, data shows us that children in deprived areas are significantly more likely to be obese, or involved in crime. The Scottish FA's research also suggests that fewer and fewer of these children are involved in elite youth football in our country as the model of development becomes more structured, often requiring parents to pay to join local clubs and drive the child to training and games.

Huw Jennings, Head of Football Development at Fulham, conducted internal research which showed that since the Cage Football project began, these South London areas have become the zone where most of the talented players in England have emerged. Some recent high-profile examples include Rio Ngumoha, Jadon Sancho, Joe Gomez, Eberechi Eze, Wilfried Zaha, Callum Hudson-Odoi, Aaron Wan-Bissaka, Ruben Loftus-Cheek, Michael Olise, Trevoh Chalobah & Ademola Lookman.

Six of the 25 players called up by England in November 2023 came from the capital or the surrounding areas and were regularly found playing football in the cage when they were younger - Marc Guehi, Fikayo Tomori, Ezri Konsa, Declan Rice, Conor Gallagher and Bukayo Saka were the six. It's estimated that about 14% of English-born Premier League players come from within 10 square miles of South London, many with cage football roots.

What is notable is that this was not the case before these projects began. The same estates were known instead for high youth unemployment, gang activity and fractured communities.

A documentary describing the World Cup success of France was even titled "Concrete Football", and products of the French cages include: Zinedine Zidane, Paul Pogba, N'Golo Kante, Ousmane Dembele, Karim Benzema, William Saliba, Eduardo Camavinga and Kylian Mbappe

Furthermore, it is often quoted in Scotland that facilities are left locked up due to fear of vandalism. Caged courts with concrete floors remove that concern.

Mixing of Age Groups

A byproduct of these unstructured play environments is the organic mixing of age groups, something which is drastically removed through organised football programmes. Last year's

Scottish FA 'Transition Report' showed the majority of players who go on to a top career were either a younger sibling, or grew up playing against older players in their childhood.

"When I was 11, I used to play on the street against people who were 20, 1 against 1. That's why I have no fear of playing against those who are older than me."

- Lamine Yamal

Playing on the Hard Court

Player	***Direct Quote***
Zinedine Zidane	"We played in the street or on hard courts in La Castellane. There was no grass, only concrete. You had to control the ball, or it bounced away. That's how I learned."
Kylian Mbappe	**"**In Bondy, we played on concrete courts. No grass, no comfort. We played in cages, we copied Ronaldo, Henry, and did our own tricks. That's where it all started."
Johan Cruyff	"When you play on hard ground, you learn to control the ball properly. You have to think faster, move smarter, because the ball doesn't wait for you. You also learn to balance, to avoid contact, because you don't want to fall."
Robin van Persie	"In the cage, on concrete, it's just you, the ball, and a defender. If you lose focus, you get hurt. You learn quick."
Ronaldinho	"We played futsal and on the street. The surface was hard, so the ball was fast. You had to think and move quickly — there was no time to relax."
Jadon Sancho	"I loved cage football. It was like futsal — small space, creativity, show what you've got. That's where I built confidence, flair, and learned to entertain. I owe my style to those games."
Carlos Tevez	"We played in the streets, barefoot on concrete. That's how you learn to protect the ball, to fight for every touch."
Andres Iniesta	"I played on school courts with cement floors. The ball moved fast, and you had to move even faster. It shaped my control."
Gabriel Jesus	"We played on concrete all the time. Every game was intense. You had to be creative, or you wouldn't get the ball."
Marcus Rashford	"There was a concrete pitch near my house. I'd go there with my brothers and play all day. Sometimes until dinner was cold."

Furthermore, during the generations where Scotland produced world-class players, playing on a hard surface was routine.

Player	***Direct Quote***
Kenny Dalglish	"We played every day in the streets of Glasgow. Ash parks, concrete, whatever we could find."
Dennis Law	"We didn't have grass. We played on cinders and hard pitches in Aberdeen. If you went down, it burned. So you learned to stay on your feet."
Graeme Souness	"It was all gravel or ash parks. It made you develop."
Sir Alex Ferguson	"We played in the back courts with a tennis ball or a rubber ball. You learned control because if you didn't, it bounced away on the concrete."

There is no need for elite development facilities to be expensive or modern. Playing on a hard court offers additional developmental benefits compared with playing on grass or astroturf.

Evidence is clear that children do not need to practice on well-maintained grass or artificial fields.

Developing hard-court, caged facilities costs significantly less than other facilities and is therefore a realistic option to provide greater access for children to play for hours every day.

> *"It is not ideal for the development of the player to grow up only knowing perfect artificial and grass surfaces. At Barcelona, Cruyff would sometimes send the academy players to train in the car park on the concrete instead."*
>
> - Adoni Zubizarreta, Former Sporting Director of Athletic Bilbao, FC Barcelona and FC Porto, three of Europe's best talent developers

> "*Playing on varied surfaces, including surfaces which are uneven or more challenging, is absolutely beneficial for development*."
>
> - Sport Scientist & Conditioning Coach Rene Wormhoudt, 24 years at Ajax during the period that it was consistently ranked as Europe's most productive academy

Kennington, South London. £80m player Jadon Sancho is a product of this environment.

Club Models: Grassroots & Academies (6-12)

In Brazil, street football happens organically. Children gather together to play in public spaces, often without the need for parental supervision required in the neighbourhood.

In other countries, the culture has changed. Parents seek activities that are supervised by an adult, and unstructured play has become less common. In this scenario, the grassroots club plays a key role to fill the void. Not only do they become a provider for the child to practice, they also become the setter of the early habits.

If the coach understands the key aspects in the development of the child, and can give feedback which actually *speeds up* the learning process, the grassroots coach can 'shortcut' the development process and help prevent bad habits which can occur in unstructured play.

Changing habits becomes more difficult as the player becomes older. The right coaching in childhood can therefore have a significant influence on the player.

For this reason, where a high volume of unstructured play is limited and the population is significantly smaller, as in Scotland, the role of the coach in the early years becomes more important than it does in Brazil.

Pockets of quality practice do occur in Scotland, and "mini-goldmines" appear. It is common to hear of one grassroots age group that suddenly has several good players because the volunteer dad happened to be an educated coach, or of professional academies mentioning that many of their best players come from the same grassroots or futsal club. Ian Cathro's Box Soccer was a perfect example – providing quality coaching to a small group of children at an early age resulted in two Men's 'A' National Team players – Ryan Gauld and John Souttar - from a single grassroots programme. Unfortunately, many other well-meaning volunteers are without support, and many grassroots clubs are not able to offer a high degree of mentorship.

One of the biggest differences between Scottish Academies and successful nations is not the type of training exercises they use in an Elite Youth session. It is the way that the professional clubs work with the grassroots base to ensure a higher quality of coaching, for all children, from the youngest ages.

Countries who do not have an organic, highly competitive mass-participation football culture like Brazil understand the importance the early childhood coach has on the foundation of the elite footballer, and they work to ensure that young players receive a higher quality of service.

When researching for this report, there was no example of a successful nation that did not have a thriving grassroots football culture.

"In my opinion a key difference between European culture and British culture is the professionalization of grassroots sports clubs. In Britain your amateur sporting culture is more like, 'let the kids have fun and maybe someone will turn out to be a good player'. In Europe the local sports clubs are much more professional and much more organised.

In the Basque region, for example, the local grassroots football club in a small village will have a Sporting Director, a Methodology Coordinator, and partnerships with local athletics clubs for physical development."

- Adoni Zubizarreta, Former Sporting Director of Athletic Bilbao, FC Barcelona and FC Porto, three of Europe's best talent developers

"No way! The dad volunteer coaching the kids the most forbidden thing in Portuguese football. If the dad wants to coach, he has to complete his qualifications and then he can send his CV. Here, the top clubs like Benfica, Sporting and Porto are developing and sending coaches trained with their methodology to work with the kids from U6. That means most of the children around Portugal receive a high quality of development from the very beginning. This is also how we develop young coaches – I started with the youngest kids in the Benfica program at the same time as Filipa [Patao, Ballon D'or Nominated Women's coach]."

- Valter Dias, Portuguese former assistant coach of Egypt & Spartak Moscow, when asked if children in Portugal are coached by parent volunteers

"In Iceland, we don't do anything different or special in our coach education. The difference is that every player has access to an educated coach from the youngest age. There are no volunteers in our grassroots football.

Most four-year-old children have at least a UEFA B licensed coach and many have an A Licensed coach, plus someone with a university degree in physical education.

Even from four years old you get good quality coaching."

- Arnar Gunnarson, former Technical Director and Head of Coach Education, KSI

"Given that the golden age for development starts before that, why would your clubs wait until U11 to start coaching players? To me, it sounds like the model is about waiting and hoping that someone talented shows up rather than making it happen. That only works if you have a significant street football culture.

The idea of a dad volunteer coaching the kids was a shock to me. How is my dad going to know what to do? In Croatia even the local U6 team in a small town will have a licensed coach."

- Ivan Kepcija, Author of Crotian Football Federation Curriculum

Case Study from Outside Football – Spartak Tennis club

In the early 2000s, this run-down club with one indoor court was credited with developing more Top-20 Women's Tennis players **than all of the United States – including Elena Dementieva, Anna Kournikova, Anastasia Myskina, and Dinara Safina -** in addition to two Men's World Number 1s, Marat Safin and Yevgeny Kafelnikov. Unquestionably, it is one of the top elite training schools in the world, in any sport.

The secret? They start training 5x per week with top coaches from age 5.

Children's Head Coach Elena Kosiskya: "In the US they only start that level of training when the child is 9 or 10, and for the first years they only want them to have fun. Here, we give them proper training from day one. We coach the technique in detail.

That's why they cannot catch up."

Key Trend – The Partner Club Model

When considering how to improve the level of coaching in Grassroots football, the model that is found the majority of the time around Europe's top nations is the 'Partner Club' Model. This entails a Professional Academy providing detailed training curriculums, support in recruitment of the appropriate coaches, and offering ongoing coach education to grassroots clubs in their region.. In return, these Academies ensure a high-level of development for a wide base of children at the key stage of their development journey.

Some Examples of Europe's Best Academies Working with the Partner Club Model:

Club	***Context***
Benfica	Nationwide scouting and training with partner clubs from U6 (See Case Study)
Barcelona	100 Partner Clubs
Ajax	60 Partner Clubs (See Case Study)
Real Sociedad	100 Partner Clubs – Project costs 1m Euros Per Year, plus 5% of Future Sale for each player, Academy doesn't start until U13 due to success of this model
Athletic Bilbao	"And we also have 150 brother-clubs in the region that monitor the progress of youngsters and send them to Lezama if they feel they possess the qualities to play here. We trust our coaches and local clubs to develop the kids so much that we don't even start our academy programme until they're under-10; just last year we had 1,500 nine-year-olds train here, it's not difficult to find players."
Real Madrid	200 Partner Clubs
FC Kopenhagen	75 Partner Clubs
FC Nordsjaelland	24 Partner Clubs (See Case Study)
Aalborg	105 Partner Clubs (See Case Study)
Inter Milan	50 Partner Clubs + 6 Regional Development Centres
AZ Alkmaar	150 Partner Clubs
FC Porto	8,000 players in Dragon Force grassroots programme, starting at U3 and training up to 4x per week – the parent can pay per session and choose the volume
Norway (nationally)	No academy football until U15, every professional club works with partner grassroots clubs until then.

Partner Club Case Study 1 – Aalborg – The Smaller Resourced Academy

Aalborg is a smaller professional club in Denmark which is based in a rural part of the country and has yo-yoed between the top two divisions. A comparable Scottish club in terms of size and geography would be Ross County.

In spite of these challenges, Aalborg has shown they are able to develop a number of young players worth significant sums. In January alone two academy players were sold for 7 figures, with one player moving to Genoa for €3.5m and featuring in Serie A. Aalborg is anexample of how a smaller club can still create an effective grassroots strategy to ensure profitable player development.

Aalborg have only 1 full time staff member plus 1 part time staff member overseeing the partner club programme, but show that many things can be done without significant resource.

- Players don't join the academy until U13, staying with the partner clubs until then
- Coaching is very professional within the partner clubs, like 'mini academies'; the aim is to "give every player the best chance to develop"
- The club is connected to 105 grassroots partner clubs in the region
- The aim is to start with the children from the age of 2 - not just football, but getting connected to the club and community. This involves some basic play with the ball and also gymnastics and other movement games, as well as dinners and social activities with the families
- Some grassroots clubs are multi-sports and offer memberships where the child can join several sports clubs at once
- Between the ages of 7 and 12 particular attention is paid to the quality of the training and developing "good habits" – "this is very important for us"
- Aalborg offer the best players an extra session every week from U10 – usually they train with the grassroots clubs separately 2-3 days per week, plus another sport until U11 or U12, when they begin to focus on one sport
- They also run a "goalkeeping school" at U10 – U12 – currently 60 goalkeepers in the region from the partner clubs – 12 sessions every five months
- Aalborg provides a lot of support to the grassroots clubs free of charge
- They also develop their own coaching academy for players aged 15-20 at the partner clubs, inviting them to the club for development, and in return they have to coach the younger teams at the partner clubs
- "Without the support of the grassroots club's technical director and the professional club, the standard of the parent volunteer coach would not be good enough"
- Aalborg give free access to the following:
    - Digital training exercise platform
        - Web version and app
        - Week by Week curriculum – content for 2 sessions for each age group each week
        - Video examples of exercises
        - A very structured curriculum with breakdown of technical tools to develop from the youngest ages

    - Free participation in goalkeeping courses
    - Free participation at their "children's coach leader forum"
    - Free coach education through Aalborg
    - Free external Child Development Coach – who works with 10 to 12 clubs every 6 months
    - Free inspirational demo training from Aalborg staff at their grassroots club
    - Free observation of training at the Aalborg academy as well as training content
    - Clubs can request involvement of our advisory board
    - Opportunity for players from Aalborg first team to visit club activities
- In Addition:
    - 2 partner clubs are invited to each home game according to rotation – a max of 150 tickets (or as requested) to each club
    - Applies to players and coaches as well as others associated with the partner club
    - Two home games per season there is a partner club day with 2,000 tickets across the partner clubs, a prize given to the "volunteer of the year", and 3 nominees get a VIP experience and vouchers for sports equipment
    - Also, they nominate a partner club of the year, creating a short film documentary about them and how they operate the club as inspiration
    - "Teammate of the year" award pays tribute to children who give something extra to the team and environment
        - Each partner club can nominate one candidate for teammate of the year
            - Winner will have one unique experience in connection with a home game with the 1st team (such as speaking at half time on the microphone, for example)
    - Club tribute – Aalborg emphasises strong visibility of the first team players who came from a partner club when a player achieves matches at first team level – when a player reaches 10 games, the partner club is contacted with symbolic act, with the player coming back to the partner club to speak to the children, staff etc.
- Compensation
    - When a player signs a contract with the 1st team, a small amount of money goes back to improving the quality of the grassroots club

Future Plans:

- Cooperation with Aalborg Athletic Clubs for rounded physical development – a package which includes coordination and movement training - "we have some good footballers who are not moving correctly"
- Organise tournaments in the region with different game formats/stimulus

Partner Club Case Study 2 – FC Nordsjaelland – The Medium Resourced Academy

FC Nordsjaelland is considered one of the top talent development clubs in Europe, but in terms of resource, the Academy budget is lower than that of the biggest Scottish clubs, or than domestic rivals FC Copenhagen. They are an example of an Elite level academy without the resources of Europe's biggest clubs. Their partner club model is achievable for Scottish clubs like Aberdeen, Hearts and Hibs and Dundee United.

- The Partner Club department has 2 full time staff plus 4 part-time staff (18.5 hours each)
- 28 Partner Clubs - FCN strategy is to work closer with the bigger clubs, rather than have a KPI to target the most amount of clubs
- They divide the grassroots clubs into 3 categories – "to make sure we hit the right clubs with the right amount" – the biggest clubs get the closest attention
- "We work very closely with 6 or 7 of them – where we visit minimum of 1x per week & secure the right coaches for their teams. We are also visible for Boards, coaches and players who want to speak and ask questions."
- FCN helps the grassroots clubs with strategy and training content via a central online platform
    - "We ask the board as part of their strategy if they are going to make it mandatory for every coach to follow our curriculum. 4 or 5 do and we can see a huge impact of that. Volunteer coaches are very happy because it takes the preparation time away from their role."
- FCN has 2 'Power Centres' (larger grassroots clubs in different areas) 'Play Labs' (the 4-5 satellite clubs around them)
- The concept is to turn a few large grassroots clubs into knowledge hubs for coach education, and players from surrounding clubs are invited into additional sessions at the Power Centre - one grassroots hub is developing players from other clubs in their region with training from FCN coaches
- Coach development typically means following the same age group for 3 weeks, following the 3-step process below
- "It is important that the coach developer is strong in building relationships with these coaches"
    - 1. Observation session (meet and feedback) >
        - 2. Inspiration session (on pitch example, feedforward) >
            - 3. Supervised session (assist and feedback)
- Free additional weekend sessions and tournament activities are offered through the partner clubs in different formats and mixed age groups – "players come in and play lots of football in a festival format, they don't feel like it's about playing for a team"

Partner Club Case Study 3 – Benfica – Europe's Top Academies

Unsurprisingly, the world's most profitable academy has one of the world's most comprehensive development system for children, with key club figures calling the partner club model "the secret of their success".

Benfica aim to scout *every high potential player in Portugal* by U6 and invite them to one of their 6 regional partner clubs, where they are trained by a Benfica-employed coach during the week, up to 4 times per week. They then play for the grassroots club at the weekend.

Benfica also have an additional 48 football schools around Portugal to work with a wide base of children from the youngest ages. Coaches of these programmes are given the "bible" of Benfica exercises and methodology to ensure high-level coaching from the youngest ages, and this also serves as the development platform for future academy coaches.

Benfica have additional open trial sessions 3-4x per year for U9 and below to detect talented players who may not be part of an organised grassroots programme and therefore not be visible to traditional scouting.

Benfica then operate a residential academy where they invite the best talents from around Portugal to Lisbon from the age of 13.

Partner Club Case Study 4 – Ajax – Europe's Top Academies

Ajax has consistently been ranked as one of Europe's most productive academies in recent decades. It has a comprehensive Partner Club programme which supplies around 80% of the Academy players.

- 60 Partner clubs in Netherlands
- Partnerships department has 20+ full time staff
- "No club in Netherlands invest as much as we do in our surroundings"
- "We tell the grassroots clubs, since we know our training model works, if you do everything we do, your chance of success goes up substantially"
- Potential coaches for the academy are also identified through the partner club development
- "Our ambition is to win the Champions League again with players from our academy and in our style of play. We can't compete with other teams based on money, our only chance is to be smarter."
- "The local clubs can tell the parents that if you come to us, you have a chance to trial in Ajax" – this ensures the best talent goes to the Partner clubs

National coverage is divided in zones:

Ring 1 – 40km radius from Amsterdam – 30min drive

- The goal is for every club in the Amsterdam region to be included in the network – the goal is 133 which are all the clubs in Amsterdam area

Ring 2 – within 80km of Amsterdam

- "We have 10 clubs which are designated as Talent Hubs"
- Ajax has contracts with the partner clubs and is strong about how they need to work:
    - "For example, if the best club in the world trains 4x per week at u10, you need to train 4x per week at u10 – and not only the 20 kids you have selected as your best, but all the kids – because you will be biased by Relative Age Effect and other things – and later Ajax will come and decide who has the future potential. Your job is to develop every player."
- In return, Ajax provide a comprehensive education resource – with a professional and extremely detailed online curriculum detailing the Ajax Methodology
- The end of U12 is the decisive moment – all the resource for the partner clubs goes into the 6-12 age group
- "**The ideal model is that everyone has access to activity within the local club 6 days per week** – but not always football training – sometimes movement training, sometimes freedom, but a few times per week it's the Ajax coaching model."
- "Many of our grassroots clubs would be seen as professional academies in other countries in terms of the way they work."
    - The coaches in these clubs are not volunteers, they are young professionals
- The local clubs have many teams at each age group – for example, four different U6 squads

Manufacturing the Grassroots Culture – Japan Case Study Part 2

When speaking to several key stakeholders in Japanese football over the past several decades – there was clear agreement on one topic. The development of Japan to one of the world's leading football nations has had little to do with professional clubs having high-level elite academies, and most top players have not come through this kind of European system.

Instead, the revolution was due to creating a culture where as many children as possible were in contact with the ball, as often as possible.

Well-organised grassroots football, alongside schools' football, is the place where most Japanese players train and play. There are 3,000 clubs registered with the JFA – with pay to play models – and they all form part of the same competition structure as the professional clubs, whose academies are often not at the same level as a grassroots team.

"Japan is a fascinating case study. They seem to be only nation without a football tradition that was able to strategically make a change in order to be successful consistently across both men's and women's football."

- Corné Groenendijk, Head of Coaching Academy & Club Partnerships, Ajax

"Usually countries have an obsession with elite youth centres and tactical curriculums. But we did it in a different way. It was about technical development and mastering the ball.

We opened over 150 Coerver schools around Japan – all the best players for the national team came through Coerver schools at a young age.

The focus of the sessions was 'one ball, one player' - mastering the ball on your own.

This is where the magic happens – where you take the best kids aged 6-12 and close the gap between the technical level of the weakest player to the level of the strongest player.

Then we ***created a cultural movement*** *to encourage as many kids to practice with the ball, as often as possible.*

Then, ***even with volunteer coaches and a lack of structure in terms of elite academies through the teenage years*** *– that is when the game becomes the best teacher. Elite players will develop even without professionalized coaching in the 12-16 age group.*

That only happens once the child has mastered the ball to a high level, though. They need the foundation at an early stage, and that's where many coaches these days get confused.

- Tom Byer

"Even a very small volunteer run club runs like a mini academy – the worst grassroots club in Japan will put a lot of effort into proper training."

- Thomas Randall, owner of a grassroots football academy in Japan

Creating a Cultural Movement

The other key aspect to Japan's development was stimulating a culture where young players wanted to practice with the ball as much as possible – at home, in the garden, or even in their spare time between games. Bearing in mind that Japan did not have an organic football tradition, creating this required a holistic approach to targeting parents and children via multiple avenues.

This 'marketing campaign' used health-related and cognitive benefits of practicing with a ball to bring parents and children on board. The most watched children's TV show in Japan started to feature, for 13 years, an insert which was focused on ball mastery exercises. Ball mastery and individual skills were detailed in magazines, newspapers, comic books, DVDs, and any other format which could reach the widest target audience. Schools started to incorporate ball mastery into their PE curriculum due to the academic benefits. Thousands of events were held around Japan for parents of infants, showing them the research and benefits of their children practicing with a ball.

The Elite Children's Academy

Apart from the partner club model and grassroots game, one of the starkest indicators of how differently children's football is treated in Scotland compared with successful nations is the level of investment across all areas of player development.

For example, **the highest number of full-time staff in the Children's Phase in Scotland is 2**, For comparison, **Ajax has 13 full time staff in the Children's Phase of the Academy alone** between U8 and U12 (not including the 20+ full time staff in the club partnership department).

Many of Europe's most successful academies also create opportunities for children to play substantially more often. For example, FC Barcelona will begin adding an additional 2 sessions per week for children from U7 alongside friendly games, in addition to their grassroots training and games, while clubs like Dinamo Zagreb begin training 4x per week at U8, offering a rounded curriculum of coordination development, technical repetition and free play.

Currently, Scottish clubs do not invest enough in the most important stage of player development, which is a key factor in the lack of talent coming through clubs and into the 1st teams.

Additionally, the Scottish FA is guilty of the same practice, investing significantly at a later age and stage, with not enough investment in earlier years.

This does not mean that the Elite Youth phase does not require investment to maximise the potential of the young players. It does, however, mean that significant investment is required at the Children's Phase to raise the foundational level of the player before they ever step foot in an Elite Youth programme.

Case Study – PSV Children's Academy – Manufacturing the Volume of Practice

PSV is the 6th most successful academy in Europe in terms of transfer revenue. Their approach to the development of the Children's Academy is very much aligned to the research in this report – to increase the amount of volume of both play and repetitive practice that a young player is exposed to until the age of 13.

PSV's U7s and U8s are known as the 'pre-academy' and the U9 to U12 phase the 'foundation phase'. PSV believes this period is the "golden years for development", a phrase commonly discussed in top European academies.

PSV work with the children 4x per week for 2.5 hours per session, on top of a game at the weekend and a substantial homework programme. There is no Scottish academy which comes close to offering this amount of practice for the young players. Additionally, PSV mix the U10 to U12 players together in the training rather than separating them by age group, another aspect which has proven to be developmental but is not commonly implemented in organised academy environments.

The core, coach-led part of the session is roughly the same as a typical Scottish academy session (90 minutes). The extra hour allows for a player to focus on mastering the ball on their own – walls are built on the side of training pitches to allow the young players to replicate the same type of repetition that many of the world's best players say was responsible for their development.

On top of this, PSV have created a the 'Skillbox', a substantial ball mastery & 1v1 skills programme which progresses in complexity through the levels, like a video game. This encourages players to practice at home, and they are able to benchmark their progress against their teammates. Foundation Phase players need to share their videos of their homework practice via WhatsApp to ensure they are completing the programme.

To further incentivise parents to encourage practice, they use their Instagram page to show players who are ahead of their peers in the homework tasks and skills programme. This manufactures the same type of competition between players to put in extra practice as exists organically in the Brazilian favela.

Furthermore, PSV have also created a large database of role model clips which young players can access. As many of the world's top players have spoken about, role models are those players who inspired them to go outside with a ball and practice, trying to copy the skills they have seen from their idols.

> "It is our vision, in the future, to have something available, but not mandatory, for the children 7 days per week until the end of U13."
>
> - Jose Miranda, Porto Head of Junior Academy

Focus on Coordination, Technique, and Small-Sided Games

Another clear trend is that the majority of top European academies, as in Japan, focus predominantly on technical development within their children's academies.

The other key trend in these academies at the children's stage is the development of coordination (discussed in the section on "Importance of Movement Fundamentals"), and always ensuring that there is significant time left for small-sided games.

Our research correlates with the findings of Nick Gearing, who is currently completing a PhD on Europe's most successful youth academies, and published research on this topic (Gearing, Bridge, 2024). Nick analysed the workings of Europe's top 20 most successful academies and found the common pattern was to begin with repetitive technical training (often a ball each) with substantial coach involvement/feedback on how to improve the execution, slowly progressing in complexity towards small-sided games.

"We look at how the brain develops. Focusing on decision making blocks the development of technique. Until the biological age of 13, we focus on 350 technical elements, from isolated to controlled situations. When we sign other players at the older age groups, we can tell the difference from those who have come through the Ajax system."

- Ajax Director on the Academy Methodology

"The point of simplifying the training drills is to make sure the brain is focused on the details of executing correctly. Technical repetition and specific feedback is the foundation of everything we do."

- Ivan Kepcija, Author of Croatian Football Federation

"I'm not sure. Maybe they aren't doing them correctly?"

- Former Barcelona Academy Director Albert Capellas when asked why some people think technical drills, a core part of La Masia, are not developmental

"From U7 to U13 we do a lot of unopposed technical repetition and have an individual focus. Playing the game has the potential for everything but also the potential for nothing. For example, maybe in a game you will cross the ball 15 times, or maybe you will only cross it once. You leave it to chance. By isolating different parts of the game, we ensure holistic repetition of all the skills."

- Jose Miranda, Porto Head of Junior Academy

Age of Academy Selection

Another fascinating factor to understand in the development of Elite players is the age of entry into the Academy system. A study by Platvoet et al. (2023) looked at how this differed across nations at the 2022 World Cup, with key findings below:

- The median age that a player at the World Cup joined an academy was 13.2, with the full breakdown below:
    - 33% joined a professional academy before age 12
    - 40% joined between 13–16 years
    - 27% joined at age 17 or older

- Players in Europe typically joined an Academy younger than other continents, with the full breakdown of European players below:
    - 58% joined a professional academy before age 12
    - 32% joined between 13–16 years
    - 10% joined at age 17 or older

- There was wide variation by nation on the median age of academy entry, reflecting different systems:
    - Japan was 15.8, Denmark 14, and Uruguay 14, reflecting a model which relies more heavily on a strong grassroots base until a later stage
    - England was the youngest with a median age of 8.4, while Spain was 9.4 and Champions Argentina was 11.8, showing that early selection can also lead to success

It should be noted that there was also a statistically significant difference per position – academies are more likely to identify those players who have attacking qualities younger, while defenders and goalkeepers are often identified later. This is logical in line with sensitive phases of the body (i.e. the sensitive phase for technical development comes before physical maturation, which is often linked to the latter two positions).

Position	Median Age of Academy Entry
Forwards	12.0 years
Midfielders	13.0 years
Defenders	13.5 years
Goalkeepers	14.3 years

This may also reflect the type of game being played, as a certain profile may excel in small-sided games, while other qualities (such as heading, for example) may only appear later, in the 11v11 format.

As was discussed in the Transition Report, top goalkeepers often play outfield in their younger years before switching positions.

Analysis of the Findings

Based on the data, a few findings can be hypothesised:

- Early entry to an academy is not a trend or necessity for elite development, but a strong grassroots culture is. This again shows that the key trend is a strong grassroots base.

- It is also not "wrong" for academies to select players early, as this model can also develop elite talent. However, in the nations which selected players the earliest, the professional clubs also invest in the years before the Academy (e.g. England), or the country has a strong organic street football/grassroots culture (e.g. Argentina), because even selecting at 8-11 years old is too late if key development milestones have not been achieved.

From our research, we can see that there are several ways a club can structure a successful elite development model *until the age of 12/13*:

1. Partner Club Model Only (no Academy selection) – e.g. Real Sociedad, Norway
2. Partner Club Model + Early Selection at U7/U8, with players continuing to participate in Grassroots football while training with Elite Academy – e.g. Ajax, FC Barcelona

Or

3. No Partner Club Model, but a large volume of Professional Clubs starting at U9 with Development Centres in the years prior, covering a wide base of children from the early years – e.g. England

While the Partner Club Model has previously been discussed, the English model sees 48 Category 1 & 2 Academies beginning at U9 and operating a 'Development Centre' model below.

For example, Chelsea has 11 Development Centres which take players from the age of six. Mason Mount, Tammy Abraham, Fikayo Tomori and Ruben Loftus-Cheek all came through this system.

As a result, 24 out of 33 players selected for the (wider) Euro 2024 squad were signed with a professional club academy by U9.

The trend from this section is clear – regardless of the exact model and how it occurs, a wide base of children getting access to higher quality coaching from the youngest ages is a key factor in elite player development.

"In the end you can say that there are only two ways to succeed.

The best way is to have a strong grassroots culture with many kids playing in well-organised clubs. This is one of the keys to the success of the Netherlands.

When I was Academy Director in Qatar (Aspire Academy), it didn't exist, so we had to start early with regional development centres and academy training from 6 years old.

It sounds to me like you currently have neither [in Scotland]."

- Ed Graper, Head of Elite Football, KNVB (Dutch FA)

Lack of National Games Programme in Childhood

Nation	***Age that National Competition Begins***
Scotland	U11
Spain	U19, but is mostly regional with the best teams from each region playing off at the end of the season
Germany	U17, but is mostly regional all the way up to (and including) U19, with best teams from each region playing off at the end of the season
France	U17
Croatia	U15
Portugal	U15, but is mostly regional all the way up to (and including) U19, with best teams from each region playing off at the end of the season
Netherlands	U15
Sweden	U17
Switzerland	U13, with strict rules on travel below U13
Uruguay	U14, no Academy registration allowed until U14
Norway	U15, no Academy registration allowed until U15
Denmark	U15, no Academy Registration allowed until U13

As this section of the report has demonstrated, the most important aspect of childhood development is the amount of hours spent mastering the ball and the game. Another clear trend which is visible around the world, is that the concept that an "Elite" Best v Best games programme in childhood produces better players can only be described as a myth.

It was notable when speaking to Heads of Children's Academies around Scotland that the national games programme is important for them. Clearly, they look forward to the challenge as coaches of taking their team to compete against other reputable clubs. This is understandable from the perspective of the coach. However, in some cases, it was also clear that the games programme, and preparing a team, was higher on the agenda than allowing the young players to spend as many hours as possible with the ball.

Given the evidence we have available, a Best v Best programme is not required at this stage for elite development and may be counter-intuitive. Time spent travelling means time spent away from mastering the ball, often to participate in a 7v7 or 9v9 game which offers a significantly fewer touches than the same young player would receive by, for example, playing futsal in their local community.

The Festival Format – Japan Case Study Part 3

In order to maximise the young players contact with the ball, Children's football in Japan operates a "games festival" format. Their belief if that a child is going to spent time travelling to a venue, it is important to maximise the development return.

Often, teams will stay from 8am or 9am to 5pm at the venue – they will play 3 x 40 mins games throughout the day with long breaks in between the games – tents are set up with food, refreshments, and parents are made to feel welcome.

It is *between* the games that it becomes evident what is different about their approach to player development. A player will typically have one ball each or participate in technical drills for the majority of the time, accumulating an incredible number of touches in the 7 hours that they are there.

They will repeat this format both on the Saturday and the Sunday.

> *"Kids don't mess about on the sideline- they use the time for continuous improvement. Coaches aren't trying to keep them fresh to win the game. Mastering the ball for hours is the Japanese culture.*
>
> *Foreign teams come over and can't cope with the work ethic and concentration levels of the Japanese kids, in terms of how much they practice with a ball on those weekend festivals."*
>
> - Thomas Randall, owner of a grassroots football academy in Japan

Importance of Movement Fundamentals (6-12)

> *"We watch how some players move, and the movement fundamentals are quite poor. If we could improve this, we think it would make a big difference."*
>
> - Academy Director of Scottish Elite Tier Academy

> *"My observation playing against Scotland at national youth level was that a lot of the players move 'on their heels'. The mechanics were poor. Clearly this comes from coordination in childhood. You need to improve their movement skills when they are younger, and it sounds like you are starting too late."*
>
> - Former National Youth Team Coach of one of Europe's top nations.

Dutch Professor Marjie Elfering-Gemser researched how young athletes develop into elite performers. She found that ability to learn new movement skills at ages 6-8 was one of the two key determinants of future elite sporting success across both individual and team sports.

This showed not only that well-coordinated children would go on to become better athletes, it also showed that there was a key window for this to occur, early in childhood

A Lifestyle Epidemic – The Role of Government

Research shows that, across Europe, today's generation of children are significantly less fit than their peers who lived 35 years ago (Vandorpe, Vandendriessche, Lefevre, Pion et al., 2011).

It concluded that children have stopped playing as much in the street or countryside, and that Physical Education at school has been too slow to recognise and address the issue, leading to specific lifestyle diseases such as obesity. This problem has clearly been prevalent within Scotland for a number of years, with a 2007 ScotPHO report highlighting the following:

- Scotland was second only to the United States in terms of obesity rates in OECD countries
- Obesity was clearly linked a wide range of negative health outcomes
- The cost of obesity to the NHS in 2001 alone was estimated to be £171m

Since then, the Scottish Government has targeted improvement in this area, with no success. An Obesity Action Scotland report in 2023 suggested that around 30% of all children in Scotland aged 2-15 are either overweight or obese.

In 2016, the Scottish government set a target of reducing childhood obesity to 7% by 2030. However, we are still far from reaching this goal as a nation.

A follow up report by The Behavioural Insights Team focused on how many calories per day a child should reduce, but did nothing to propose an increase in childhood movement, which is a key indicator of lifelong health and wellbeing, with a sedentary lifestyle in childhood a proven

link to obesity and a range of lifestyle diseases, such as cardiovascular disease, dementia and diabetes. Meanwhile, children who experience more movement activities tend to attain better academic results at school (Singh, Uijtdewilligen, Twist, van Mechelen, et al., 2012).

Moreover, a study by Davids, Brymer & Araujo (2016) suggested that playing with other children on sports fields, public spaces and playgrounds is essential for the broad development of children. In order to tackle this issue, various studies have concluded that sport and exercise should get more attention within the education sector, such as nursery and primary schools

Flipping this health and lifestyle epidemic to an elite sporting context, a longitudinal study of US Olympians concluded that they practiced 3.4 sports per person at school and 3.1 sports out of school (Hill, McConnell, Forster & Moore, 2002). In what is likely not a surprise to anyone, the world's top athletes spent a large volume of time improving their movement skills as children.

Scottish football should, in this regard, continue to take the lead in exploring a government-backed, cross-sport initiative to increase fitness and health but also create more rounded athletes at this key stage.

This also raises the question regarding focusing solely on football vs participating in a range of sports. From our research, it appears that both outcomes can be successful – for example, Lionel Messi claims to have focused on a combination of futsal and football "every day", while a number of other top players claim that participating in additional sports helped them on the pitch.

While we cannot conclude that there is only "one way" to develop as an elite footballer, there is substantial evidence to suggest that any and all movement development as a child, regardless of whether it is football-specific, has a positive impact on the potential of the elite player. A study of Ajax Academy players in 2008 showed the same pattern, with the average player having performed 1.7 sports until they were aged 14. This showed that some players were able to attain elite youth status only through playing football, but others participated in more than one sport.

Grassroots clubs around Europe are often multi-sport, while football clubs in Scotland tend to operate in isolation, meaning that children cannot access a wide variety of sporting activity within the same local hub.

For this reason, partnering with other sports organisations (such as Scottish Rugby), alongside government and Sport Scotland (and the currently operational Active Schools), to provide more multi-sport activities to children via the education sector, may provide a net benefit to the agenda of all parties.

> *"In the past, everyone rode a bike, children had physical education at school, and young people played at least 3 or more sports. Children now have less control over their body and it is noticeable that many have injuries. For this reason we opened the Cruyff Courts. We want to try to boost street football but since these courts are multifunctional, different sports can be played on the courts as well. In this way we try to let kids move in an all-round fashion."*
>
> - Johan Cruyff

Examples of Multi-Sport Developing Elite Footballers

Player Name	***Other Childhood Sporting Activities***	**Comments**
Marco van Basten	Several sports including platform diving	"Participating in several sports helped me a lot as a striker in football"
Zlatan Ibrahimovic	Black belt in Taekwondo	"Taekwondo gave me flexibility and control of my body. Many of my goals would not have been possible without a martial arts background"
Gareth Bale	Several sports including Rugby, Hockey and Athletics	"As a boy I took part in every sport I could and I'm sure that helped my development as an athlete"
Petr Czech	Ice Hockey goalkeeper	"Aspects like reflexes, mental focus and comfort under pressure carried over directly from ice hockey to football"
Robin van Persie	Judo	"What I learnt from doing judo is that even if someone is stronger than me, I can decide which way we go. I can use your strength to my advantage"
Andriy Shevchenko	Was talented at several sports as a child, particularly boxing, but chose football as a career path	
Phil Neville	Captained England u15 Cricket team	
Erling Haaland	Multiple other sports from an early age, including handball, track and field and golf	
Jari Litmaanen	Used to attend football training immediately after Ice Hockey practice	"After Ice Hockey, everything I perceived on the football pitch felt slowed down in comparison. Ice Hockey also taught me how to avoid duels and imbalance the goalkeeper before shooting."

"All the best players I worked with did something outside of football as children. From taekwondo, to ice hockey, to breakdancing.

And based on research, if you have a more diversified movement background you not only have better performance, you also suffer less overuse injuries, meaning more contact time in the long run."

- Sport Scientist & Conditioning Coach Rene Wormhoudt, 24 years at Ajax during the period that it was consistently ranked as Europe's most productive academy

Case Study – The City of Split

Croatia is renowned for its development of top footballers despite being a country of 3.5million people. However, an organic multisport environment exists within the Balkan culture, which produces top level athletes across a range of sports.

Take the city of Split. With **a population of around 180,000, the city has the highest number of Olympic medallists per capita**. Split has not only produced top level footballers (for example, UEFA Champions League winner Ivan Persic), but a range of other world class athletes, showing that a culture of movement and sporting participation is more important than population size. Below are some other world-class athletes who have come from the city.

Croatia Case Study – The Organic Successful Development Model

In Croatia, the culture means that government, parents and schools have an instinctive understanding that playing for hours is a vital part of childhood.

Children usually go to school for one hour less than in the UK, creating an environment where they can play more. School facilities are left open to the public and from kindergarten coaches from the likes of judo and football can be brought in to develop the foundations of a healthy and active child.

For a 6-year-old boy, a common pattern is to come home from school, eat dinner quickly, and immediately leave for football training with the local grassroots club. Immediately following the training session, the parents take the child to the park, where many other parents and children gather, and children play street football, occasionally changing activity to use the climbing frames and obstacle courses. This can last for more than two additional hours.

When the sun goes down, the child returns home for supper and then goes to bed. This cycle is repeated day in and day out, and weather means that this is possible the majority of the year.

If the same 6-year-old child is at home, they are often dribbling with small balls which have been left around the house while wearing a football kit of their heroes, while their father watches football on television.

This culture is a key factor why a nation with such small population produces such a high volume of elite athletes. They are always moving.

Finland Case Study – Manufacturing the Culture

Finland does not have the same culture as Croatia organically. Instead, a nationwide initiative was launched in 2010. Schools developed local plans: active break times, 15 minute movement breaks for every 45 minutes of lessons, sporting equipment loans, activity clubs, safe cycling/walking routes, free lunches, and sport-mentor programmes to promote after-school

activity. Children wear socks in the classroom, which develops proprioception. Furthermore, the weekly school hours have been reduced to allow more opportunities for play.

In spite of this focus on the holistic development of the healthy child, rather than strict academic study, Finnish students rank in the top 5 globally for reading, maths and science. Scotland, meanwhile, is below the OECD averages for academic achievement, and the numbers have been declining sharply of the last 25 years.

> *"School team sports were always the first stepping stone for me in what could become a pathway through sport. It is so sad that so few schools now are able to offer any team sports or have decent quality PE lessons within their curriculum.*
>
> *Sadly, sport doesn't seem to be a priority for this government."*
>
> \- Judy Murray, mother of Andy Murray

Case Study – The FPF (Portuguese Football Federation)

While solving many of the issues discussed in this section of the report require governmental involvement, Football Associations do not need to play a passive role. A clear example of this is the work being done in Portugal.

One of the FPF's projects has been to create a bespoke 12-hour course for football coaches at the 6-10 age group, teaching them how they can develop the functional movement skills and coordination of their players within their sessions.

The FPF worked together with the 4 biggest clubs, who already have expertise in delivering this type of content, to create video content which could be shared with all grassroots coaches.

Additionally, the FPF created sessions and content for Primary School PE teachers to follow, alongside a 12-hour specific training program for PE teachers.

Furthermore, drawing inspiration from the Japanese model, the FPF created a children's TV cartoon using the Super Quinas (national team mascots) to engage children from the youngest ages.

Finally, the FPF also started a project in pre-schools and primary schools to increase physical activity in the children and to improve motor competence. Known as the 'Super Quinas Hour', this involved delivering a one-hour class weekly, blending football and functional movement skills, to children around the country. Partner universities completed 22 pilot studies, with the results shown below.

PORTUGAL FOOTBALL FEDERATION STRATEGIC PLAN 2030

SCHOOL PROGRAM "SUPER QUINAS HOUR"

16 Universities

22 Districts

24 Municipalities

44 Schools

1,303 Children

12 Weeks
60'/session, 1x/week

Programme content
Motor skills

Motor competence ↑
Happiness ↑

Improving Motor Competence of Children: The "Super Quinas" Intervention Program in Portuguese Primary Schools

Luis P. Rodrigues, Rita Cordovil, Júlio A. Costa, André Seabra, José Guilherme, Susana Vale, Carlos Luz, Fábio Fiores, Maria João Lagoa, Gabriela Almeida, Vítor P. Lopes, Cristiana Marcé, Pedro Tiago Esteves, Sara Santos, Vanda Correia, João Serrano, Rui Mendes, Rui Matos, Vânia Loureiro, Carlos Neto, and MCA Research Team

PORTUGAL FOOTBALL FEDERATION STRATEGIC PLAN 2030

SCHOOL PROGRAM "SUPER QUINAS HOUR"

CONTEXT

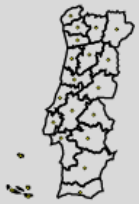
THE CHALLENGE OF MOTOR LITERACY

- The pandemic of physical inactivity, sedentary behavior, and motor competence in children is increasing.
- Primary schools' classes are held between 9am to 3pm. After that, from 3pm until 7pm, there is a "gap" in children's lives.
- During this time there are lack of opportunities for kids to do physical activity.
- Despite the existence of a governmental program to address this, reports indicate that in most schools, children are left with minimal guidance.

PILOT STUDY

1st PHASE - Jan-Mar 2023

PLAN
- 22 districts
- 24 municipalities
- 44 schools
- 25 experts/entities
- GD Education
- GD Health
- 16 universities



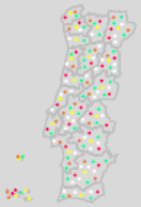
INVOLVE
- program training
- training teachers
- sports equipment

RESULTS
- inactivity ↓
- sedentarism ↓
- sleep ↑
- cardiorespiratory fitness ↑
- motor competence ↑
- happiness ↑

NATIONAL IMPLEMENTATION

2nd PHASE - Apr 2023-Jun 2024

PLAN
- 308 municipalities
- 2 schools per municipality



INVOLVE
- 15 district managers
- manual PE teachers training
- sports equipment

RESULTS
- municipalities: 285; schools: 570
- trained teachers: +1195
- involved children: ≈ 35 000

3rd PHASE - Sep 2024-Jun 2025

PLAN
- 308 municipalities
- 4 schools per municipality

CURRENT STATUS
- **municipalities: 302; schools: 1371**
- **trained teachers: +2000**
- **involved children: +75 000**

The Role of Professional Clubs

> *"I am trying to say that the football clubs should take the changes in physical development into account. In addition to technical training, they should focus on a more versatile physical education of their talents. The clubs cannot ignore this important part of development."*
>
> \- Johan Cruyff

It was also an observed trend as part of this research that most of Europe's top academies have placed an emphasis on developing the coordination of the children who attend the football sessions, whether the professional club starts the academy at the younger age groups or works via the Partner Club model.

Many European Academies will train for two hours per session during childhood, allowing additional time for functional movement development, and often employing specialist coaches in coordination training.

Case Study – Ajax Academy – *Excerpts taken from "The Athletic Skills Model" (2018)*

Ajax Academy players participated in four other areas apart from football training before their growth spurt – track and field, gymnastics, play/sports and judo – and also barefoot activities.

Track and Field – includes movement skills such as walking, jumping, landing, turning, balancing and throwing. During the execution of these diverse movements, a lot of attention is paid to posture and body position. Learning to run in a technically 'optimal' way is also important. It prevents overuse injuries and minimises the use of energy by enhancing movement efficiency. The athlete who moves more fluently will have more energy left at the end of training or a game. Better movers in sports and games react particularly on the mid-foot and forefoot (not from the heel).

Gymnastics – has a great variety of movement skills which are relevant for football. Key elements, like adaptability, balance, spatial orientation and kinetic ability get considerable attention. Gymnastics strongly relates to football skills such as agility, stability, flexibility and power. Within gymnastics, obstacle courses are very challenging and should be offered extensively.

Play and Sports – This involves fun, creative games which develop a variety of movement and perceptual skills; alongside the chance to try other sports, such as bossaball, dodgeball, badminton, table tennis, trampolining, dancing, lacrosse, and ultimate frisbee.

Judo – Focuses on the development of complete, versatile athletes. The Ajax judo programme emphasises games and agility courses more than regular judo training at local associations. Learning judo techniques like starting a throw, turning techniques and holds are included, but it is much less important to know the whole sequence of different hip and leg throws. In most cases, the transferable value lies in the preparatory movements or parts of movement which ensure the success of a throw or a turning technique. Performing judo barefoot can give high quality feedback to the brain regarding balance situations. Judo also improves the ability of players to fall and break and fall.

Barefoot Activity – Playing and practicing football skills with bare feet is important and supports a better sensory system, with enhanced proprioceptive and haptic information systems. This leads to better ball control and technique. The sensitive phase for kinaesthetic differentiation ability ('feel' for the ball) is age 6-7 and 10-11 for both boys and girls. Attributes such as haptic recognition will develop from early childhood until 8-14 years of age, depending on the individual. If circumstances are safe, training should be carried out wearing socks or barefoot – for example using a judo/gymnastics mat, trampoline, balance beam, or on sand or grass. An athlete can experience much greater stimuli from the ground when barefoot, and becomes more aware of the way the feet are used.

Practicing football skills barefoot develops spatial awareness for boys and girls from 12-14. By playing football in socks on a flat floor (e.g. wooden gym hall), the spatial awareness is connected to gliding, balance and falling skills. By playing seated football, the spatial awareness is connected to flexibility. By playing foot volley, the spatial awareness is connected to agility. These games can be played in socks or barefoot at any age, but especially during the sensitive phases.

Always check playing surfaces for safety and progress from easy to difficult exercises. Players should know how to glide, balance and fall before they start playing in socks, so these movement skills need to be learned first.

Futsal (6-12)

Player/Country	***Direct Quote or Known Context***
Ronaldinho	“A lot of the moves I make originate from Futsal and to this day my ball control is pretty much a Futsal players.”
Ronaldo Nazario	“Futsal will always be my first love.”
Neymar Jr.	“Futsal had a massive influence on me when I was growing up. It’s a very demanding game and it really helped to develop my technique, speed of thought, and ability to perform moves in tight spaces. I think futsal is a fundamental part of a footballer's life.”
Coutinho	"I played futsal from the age of six. Then when I was seven, I went to Vasco da Gama, I was playing futsal until I was 11 before I moved to the pitch.”
Cristiano Ronaldo	“During my childhood all we played was futsal. The small playing area helped me improve my close control and whenever I played futsal I felt free. If it wasn't for futsal I would not be the player I am today."
Lionel Messi	“As a little boy in Argentina, I played futsal. It was tremendous fun, and it really helped me become who I am today.”
Xavi	“Futsal is all about vision, speed of play, and technique. It’s how I learned to see the game before it happens.”
Andres Iniesta	“Futsal was all we had where I grew up. It was my introduction to the game as a child. It helped me to improve my control, my dribbling, my passing… It made me the player I am.”
Riyad Mahrez	“I used to play futsal every day. It helped my close control and dribbling — it’s more technical than outdoor football.”
Luis Suarez	“I loved futsal as a kid. It’s fast, intense, and you touch the ball all the time. It shaped my instincts in front of goal.”
Ederson	“I played futsal until I was 12. It made me comfortable with the ball at my feet — which is why I can play like an outfield player now.”
Paulo Dybala	“We played a lot of futsal in Córdoba. That’s how I learned to dribble and keep the ball close.”
Bruno Fernandes	“I played futsal from a very young age. That’s why I feel comfortable receiving the ball in tight spaces.”

Pedro	“Futsal gave me technique. I think every child should play futsal — it’s the perfect foundation.”
Kaka	“Futsal was important in helping me think quickly, make short passes, and play in tight spaces.”
Carlos Tevez	“I played futsal constantly in Fuerte Apache. Every day after school we played.”
Pablo Zabaleta	“We played futsal 3 or 4 times per week growing up in San Lorenzo.”
Pele	“I started playing futsal at 6 or 7. We played all the time, every day. It helped me improve my control in tight spaces.”
Zico	“We played futsal from morning to night. That was our life.”

Common complaints regarding Scottish football include the lack of facilities available, challenges with the weather in winter, and lack of creative attacking players. It seems strange, therefore, as a nation where every school has an indoor wooden court, that Futsal has not become the solution to many of our problems. Especially considering the fact that Futsal is credited by the majority of the world’s best players for developing their skills.

Within Scotland, few Futsal clubs exist for young players, but where they do, talent often emerges. Current Scottish internationalists John McGinn and Kenny McLean serve as two examples. Several Heads of Children’s Academies commented that their best players technically have come through a Futsal programme. Academies themselves have also attempted to incorporate Futsal, which is a positive step. However, this misses the key factor. The world’s best players did not play Futsal once per week at U11 and U12 – they played Futsal several times per week from the youngest ages, before they even reached a professional academy.

In essence, Futsal is to some countries, what we would consider Grassroots clubs. It is the breeding ground for young children to hone their skills 12 months of the year.

> *“In any football programme in any country, players should be playing futsal, because you get to a point where the coach cannot make you any better technically. It’s about repetition.”*
>
> - Roberto Martinez

World Champions – The Argentina 'Baby Futbol' Case Study

Baby Futbol, which is unique to Argentina, is futsal in an even more reduced size. It is generally played from the youngest years up to the ages of 13, when players tend to focus on organised football. Baby Futbol has some differences in rules that Futsal, showing that playing on a flat surface appears be developmental in different formats, without needing a specific knowledge of Futsal rules or tactics.

A Baby Futbol coach who works for River Plate academy says Baby Futbol has been the basis for the Argentina national team over the last 20 years:

> *"The truth is that most Argentine children play baby futbol and nowadays **ALL** the players of the Argentina national team went through baby futbol. It has been the basis of the national team for the last 20 years. This sport has categories up to 13-years-old and the top teams in our country recruit the most talented players from these teams.*
>
> *This is where most scouts focus on recruiting and there is close attention to the baby futboll leagues and tournaments. It doesn't have FIFA rules and you can play on a different size pitch. It is not played all over the world, it is only seen in Argentina."*
>
> - River Plate Academy Baby Futbol Coach

An example of how the Argentine grassroots system works is Parque Chas, a Baby Futbol club founded in 1929. It is officially linked to three professional clubs - River Plate, Independiente and San Lorenzo. Until the age of 14, young players who sign for the youth academy of any of these professional clubs continue to train twice a week with Baby Futbol at Parque Chas and play for Parque Chas in a Baby Futbol league each Saturday.

Additionally, academy players train three times a week with their professional club and play 11-a-side football for their academy on Sundays. Young players under the age of 14, affiliated to River Plate, Independiente and San Lorenzo are involved in both Baby Futbol or the outdoor format of the game every day, with no rest days.

This evidence also lends support to a dual registration model which allows young players to continue to train and play outside of their professional Academy, to ensure they are able to practice 7 days per week during childhood. It is also a perfect example of how blending a variation of Futsal and football in the early years can be the foundation for National Team success.

Futsal in the Children's Academy Environment

While many of the world's best players engaged in Futsal separately from football, a number of Europe's top academies have tried integrating Futsal within their own football programme. Scottish academies have also been doing so for a number of years, although the volume of Futsal is usually low, and not until later years than most top players begin engaging in the sport on a regular basis (between the ages of 6-8). However, engaging in Futsal more within the Academy environment is one way to increase the exposure of our young players to the game.

The majority of Heads of Children also expressed openness for Futsal to become an official part of any games programme for winter football, rather than continuing to train and play outdoors in suboptimal conditions. The examples of South American, Portuguese and Spanish players also demonstrates that a player can develop by playing football one day at the weekend, and Futsal the other, on a year-round basis, during childhood.

> *"We employ Futsal coaches to work with our children from U7 to U13 as part of the curriculum. At these ages, the kids play football on the Saturday and Futsal on the Sunday within the regional leagues, so that that they continue to particate in both.*
>
> *Our scouts are also watching the other Futsal games in the area, as we pick up a lot of players from these local clubs."*
>
> \- Jose Miranda, Porto Head of Junior Academy

Futsal in Primary Schools

The nature of Futsal means it is ideal not only for club-based activity, but for integration into the school curriculum. Because schools around Scotland come with an indoor wooden court, all that is required is a smaller weighted Futsal ball to play a variation of the game, making it a simple and cost-effective school sport.

Futsal is also more inclusive for different skill levels than outdoor football, making it easier for varied skill levels to enjoy the game. This is because the weighted ball allows for players to control the ball closer to their body. Finally, children report futsal to be highly enjoyable, including when compared to outdoor football.

Given the issues facing Scottish society discussed in the section on "Importance of Movement Fundamentals" - Futsal in Primary Schools provides an ideal way to work together with government and other government bodies to develop all round coordination, fight against obesity, and provide children with a greater volume of practice and play.

Based on current practice in other nations, Futsal in Primary Schools can take place via the following formats:

- As either the main part or an element of the core PE curriculum
- As an after-school activity in the school hall
- By organizing inter-school competitions and games

"We played futsal in school every day — that's where I learned to love the game." – Ronaldinho

"We had futsal every week in PE. That's how I first touched a ball." – Takefusa Kubo (Real Sociedad & Japan National Team)

Brazil – Core part of school PE from early primary years. Many players such as Ronaldinho and Neymar started futsal as part of school tournaments.

Portugal – Futsal is both part of the school curriculums and extracurricular activities once school finishes. My clubs run futsal in conjunction with the local schools.

Spain – Futsal is common in primary school PE classes.

Japan - Futsal is used in PE curriculums due to limited schoolyard space in urban areas. Many Japanese professional players developed technical skills through school futsal.

Argentina – Known as baby futbol, forms part of the school PE curriculum. Schools regularly host inter-school tournaments.

A large body of academic research has also been published supporting the benefits of Futsal in schools.

A 2016 study by Rabelo et al. on Futsal within the Brazilian school PE curriculum found that Futsal supports:

- Fundamental movement skills – coordination, agility, reaction speed
- Social maturity – respect, teamwork, leadership, autonomy
- Inclusivity – playable by varied skill levels, encouraging enjoyment, creativity and dialogue

Furthermore, a systematic review of **68 research articles** on Futsal was carried out in 2021 by Sanmiguel-Rodriguez and Arufe-Giraldez, concluding:

- Frequent Futsal practice results in significantly improved motor coordination in all studies
- Frequent Futsal practice results in better physical conditioning and cardiovascular health

Example of Evidence-Based 'Best Practice' in the Children's Phase

Excerpt from Training Ground Guru article

Brentford are encouraging all of their Foundation Phase players (9s to 12s) to take part in grassroots sport alongside their Academy activities.

In June 2022, the Premier League introduced a new rule allowing clubs to give approval "on an annual basis" for their registered Foundation Phase players to take part in grassroots football.

This was "subject to player-by-player circumstances and individual development plans." However, TGG understands that few clubs, especially at the top level, are giving approval for their youngsters to do this.

There can be a variety of reasons, including Academy matches clashing with grassroots fixtures and a lack of faith in grassroots provision. Brentford are going further than any other club in encouraging *all* of their Foundation Phase to take part in grassroots sport (not just football) as part of their quest to be "admired as the most caring and progressive Academy in the world."

Presenting at the TGG Live Conference, Brentford Academy Director Stephen Torpey said: "We've made the decision to give every single one of our U9s to U12s the opportunity to continue to play grassroots sport, because we believe this has unbelievable benefits.

"They have all got written permission – we are encouraging it, we want that to happen. Not only do we want them to play grassroots football, we want them to play more sport, because we know multiport can play a huge part in athletic development and has multiple benefits.

"We have reduced our training nights to allow this to happen, we are looking to move our games to different days, to allow them to continue to play grassroots football. This is a huge decision we have made as a club, because we feel this is not only morally correct but has so many benefits going forward."

“Until the age of 12, the only priority should be to love the ball. After that, you can start talking about the rest.”

- **Arsene Wenger, 2017 UEFA Grassroots Conference**

Birthplace Effect (0-12) & Residential Academy (12-16)

Player Name	*Birthplace Population*
Cristiano Ronaldo	105,000
Luka Modric	75,000
Kylian Mbappe	65,000
Lamine Yamal	47,000
Andres Iniesta	2,000
Antoine Greizmann	34,000
Toni Kroos	34,000
Thierry Henry	25,000
Thomas Muller	4,000
Mario Gotze	44,000
Eden Hazard	81,000

Player Name	*Age Moved Away from Home to Residential Academy*
Lionel Messi	13
Christiano Ronaldo	12
Kylian Mbappe	14
Lamine Yamal	12
Andres Iniesta	12
Carlos Tevez	13
Vinicius Jr	13
Thierry Henry	13
Neymar	12
Samuel Eto'o	12
Eden Hazard	14

A 2020 report by the CIES Football Observatory looked at the demographics of Top 5 League Players and found that in spite of population and scouting density (a clear advantage), **the majority of top players do not come from large urban centres**. A football-specific systematic review of 14 studies (Hernández-Simal et al., 2024) came to the same conclusion. It may well be the case that children from smaller towns are more likely to experience the high volume of play and practice, alongside other factors discussed earlier in this report.

This phenomenon has been found time and time again in Olympic champions and other sports and is known as the "Birthplace Effect". Top athletes tend to come from towns of 250,000 or less, with those born in places of 100,000 or less particularly overrepresented. Meanwhile, children born in cities of more than 500,000 are particularly under-represented.

> *"Small and mid-sized towns often provide fertile ground for player development."*
>
> - CIES Football Observatory (2020)

The Key Detail – Transition from Smaller Towns to Elite Development

> *"While small towns support early development, athletes must eventually transition into more resourced, specialized environments to fulfil their potential."*
>
> - Baker & Logan (2007)

> *"Athletes from small towns moved to sports boarding schools or urban elite centres between ages 14–16 — often supported by federations or scholarships."*
>
> - Güllich (2014)

> *"When I was at Dinamo Zagreb over 10 years ago, we completed a study which showed that most of the talented players were coming from the rural areas and not the city. The lifestyle is different, and they tended to play outside more as children.*
>
> *That meant we had to start younger and do more training with the kids from Zagreb at the youngest ages, but we also had to look wider around the region from around the age of 12, and by 15 we wanted to collect the best players from all over Croatia."*
>
> - Ivan Kepcija, Author of Croatian Football Federation Curriculum

While growing up in a small town often means children are free to play more in in their early years, which is the most important factor in childhood development, there also comes a stage where the child requires elite coaching and daily competition to fulfil their potential. Usually, these elite academies do not exist in the local village, and that means having to move from home in order to fulfil their potential.

Wimbledon Champion Andy Murray is a perfect example of this phenomenon. Born in a small town in Scotland of less than 9,000 people, he famously asked his mom to be allowed to move to Spain to train together with the best players on a daily basis (in this case, Rafa Nadal) and have access to elite level coaches. At 15, Murray moved to the Sachez-Casal Academy in Barcelona.

A 2024 study by Hernández-Simal et al. looked at 1,411 Spanish football Academy players and found an unmistakable trend: 79% were born in a different location than their academy development took place, and **players who relocated to a different town/city than they were born were 38% more likely to make a professional debut**.

This pattern has long been understood in other nations. For example, **the French FFF academy model** is based on the Federation's scouting of villages and towns all over France, before bringing them together to a full-residential academy at the age of 13 or 14, with one built in every

region of the country. Children in this programme train Monday-Friday with the FFF before returning to play games with their local club at the weekend.

The **DFB (Germany)** commissioned a youth study which concluded that many top players were born in small towns, but should relocate to Elite centres by age 14-15.

The sacrifice of these players must also be noted. Messi's family moved continent, while Ronaldo moved 970km from his hometown to Lisbon, at the ages of 13 and 12 for example. Iniesta has written in his autobiography of missing his parents – who were 300km away – when he first moved to La Masia. Eden Hazard and Antoine Griezmann attended academies which were in another country than where they lived. Such decisions are monumental for any parent and teenager; however, the trend is undeniable when it comes to elite sport.

The potential for introducing residential-style academies in Scotland could help children, especially in remote locations, to maximise their potential. During the research for this project, coaches in the North of Scotland constantly commented on how young players from the Scottish Islands had high potential. They played outside a lot more as children, had better movement fundamentals and were mentally resilient, according to feedback. In short, they had the ideal childhood conditions for elite performance, conditions that would likely be optimised with a concentrated residential-style offering.

However, these players have no access to a best with best training environment or elite coaching during their youth. Instead, they would travel only for a game at the weekend with an Academy but received none of the training experience or elite programmes of their teammates do during the week. As a small country who cannot afford to lose such talents, it is clear that as a nation we do not provide them with the optimal experience.

Even more striking is that one of the two best players of the past generation, Cristiano Ronaldo, also grew up on an island. Ronaldo would never have been able to fulfil his potential if he had not moved to Lisbon aged 12. This obviously does not mean that if children from the Scottish islands move to a residential academy that they will also achieve the same feats, as there are a multitude of factors which makes Ronaldo unique. It should not be misunderstood. However, it **does** mean that if there was a player with similar potential somewhere else, without that opportunity, they would **not** be able to fulfil it.

This model is more commonly implemented by clubs than federations and offers more benefits than simply collecting the best players together. Because the clubs employ professionals to look after the holistic development of the young players, moving to an elite residential academy often means access to a higher level of education, nutrition and personal development. A pertinent example of this is **La Masia**, which is not only one of the finest producers of Elite footballers in the world, but also known for developing individuals who remain humble and possess exceptional values despite their early fame and success.

Lamine Yamal, for example, was born in a small, economically deprived area close enough to La Masia that he could have travelled every day for training without moving away from home (around 30km). However, when FC Barcelona approached the parents to sign, Yamal's father insisted that if Barcelona wanted him, they would have to offer him a place in La Masia. The father understood that La Masia offered something more than just an excellent training environment. It offered a holistic development programme with a level of education, nutrition and lifestyle support that would not be on offer in Yamal's town, regardless of whether he made a career as a professional player.

Benfica, the world's most profitable academy, is an example of an ultra-aggressive residential model. Coaches from rival clubs have remarked how whenever they speak to the parents of an identified 5-year-old child in their area, the parents inform them that the Benfica scouts have also been in touch. They aim to work with children across the entire country from the age of 5 until the age of 13 through regional partner clubs, when they assemble those deemed to have the most potential together in Lisbon.

These models exist and succeed across all cultures in different forms. When Russia won the Euro U19s in 2005, 66% of the squad came from the same residential academy (Konoplev Academy). One of the authors of this report was Sporting Director at the club which owned that Academy and observed the model of inviting players from around Russia at the age of 12 to live, train and study on-site, often far from home, until the age of 18.

In Ghana, the Right to Dream Academy begins inviting children as young as 10 to live on-campus, often taking children from poverty and providing them with an opportunity in life they would never experience without it. The Right to Dream Academy is globally renowned not just for producing professional footballers, but also for securing academic scholarships to top universities. This is a core part of their mission: to develop well-rounded leaders — not just athletes. Over 70 players who did not make a full-time career in football received full academic scholarships, some at the most prestigious Universities in the United States, and often from a background of poverty which is unimaginable to the people born in the United Kingdom. **85% of children who attend the Academy either leave with a professional contract or scholarship.**

This model shows that Residential provision is not only about the training session – it is a chance to significantly impact the young person for the better in a holistic manner.

In Scotland, coaches often remark how talented adolescents fail to fulfil their potential due to the social influence that surrounds them, particularly in the West of Scotland. There is no doubt that many players from other nations grow up in equally as challenging environments. The residential model gives the opportunity not only to work with the players on the pitch, but to create a culture outside of it. **Teenagers are well known to try to 'fit in' with their surroundings. The surroundings they find themselves in are therefore key to their development**, not only as a player, but as a young adult.

> *"Characteristics of the mid-adolescent phase include wanting to be part of a group without attracting too much attention. They will display behaviours to become part of that group. Adolescents also need structure in lifestyle choices by parents and trainers, and a lack of structure can lead to a feeling of neglect alongside poor decision making."*
>
> - Crone (2008)

Scottish Context

Consider the North of Scotland as a case study. The largest city has a population of around 227,000 (less than the 250,000 benchmark) but with adequate access to sports and recreation for children, making it ideal for developing elite athletes. Outside of this, many smaller towns exist, which again, could provide a potential 'goldmine' of untapped talent. The entire North of Scotland plus the Scottish Isles has a population of 672,000, **almost double the population of Iceland**, which has three players valued €15million or above according to Transfermarkt.

While there may be a perception issue regarding difficulties in talent development outwith densely populated areas such as the central belt, the report suggests it may actually be an advantage.

Based on our research, we can draw the following conclusions:

1- Iceland has absolutely no starting advantages to Scotland in any measurable domain. The key difference is that every child from the age of 4 has access to a knowledgeable coach and is given the chance to develop their potential, alongside access to free-use facilities for additional practice, 7 days per week.
2- Sporting Lisbon had absolutely no natural advantages to Scottish clubs in terms of selecting players who lived on the islands off the mainland. Cristiano Ronaldo lived in an island three times the distance of Aberdeen to Shetland from Lisbon. The only difference is that Sporting had a residential academy to invite him there at age 12.

What we can see here is that . a well-organised grassroots coaching environment and residential academy has the potential to turn the Scottish Highlands and Islands into a hub for player development.

It should also be mentioned that the Dumfries & Galloway region, with a combined population circa 149,000, presents another part the country where improved grassroots provision and player pathways could unlock a potential talent hub.

‘Best with Best’, not ‘Best v Best’ (12-16)

> *“The density of talent is more important than the size of the population, because they train against each other every day, they stimulate each other. That explains countries like Netherlands, Croatia, Uruguay.”*
>
> \- Arsene Wenger

This section follows closely to the previous section on “Birthplace Effect & Residential Academies”. Let’s analyse each of the countries mentioned by Arsene Wenger – all three were researched as part of this report.

Uruguay is one clear example of Wenger’s statement. Starting with a wide base and grassroots-only football in childhood, at U14, **every top player in the country moves to Montevideo** to live and train in the same city, at one of the nation’s top 3 or 4 academies. This also allows the Federation to bring together all the nation’s best players to train together in national camps, 3 days per week, from U15.

This concentration of talent phenomenon can also be seen inside individual academies. For example, **more than half of the Croatian World Cup Final squad** passed through Dinamo Zagreb Academy, and almost every player came through either Dinamo or Hajduk Split. At U15 level, a Dinamo squad can contain 13 of the Youth National Team.

In the Netherlands, an ECA report claimed that **30% of all players in the top division** have, at some point, been part of the Ajax Academy.

> *“We understood in France a long time ago that when development starts to become serious you need to put the best with the best.*
> *That was the reason for the French regional program (15 regional residential academies operated by the Federation) and Clairefontaine (national residential academy).”*
>
> \- Arsene Wenger

Analysing Academy Models in Europe’s Top ‘Smaller’ Nations

This analysis examines youth development systems across six European nations by evaluating all players valued over €12 million (via Transfermarkt) as the definition of ‘High Value Players’ and studying where they were developed before the age of 16.

This project identified a clear concentration of talent – the observed pattern is that the vast majority of high-value players enter one of the nation’s top academies at some stage in their

journey. Each nation had between 1 and 4 'top' academies that was involved in the development of most of the elite players, creating a 'best with best' environment.

It is also notable that these top academies are also the clubs with the largest financial resources in the country, and so the ones who are able to provide the level of staff and infrastructure that was identified earlier in this section, as well as investing in the recruitment of the nation's best players.

Talent Concentration in Youth Academies

Country	% Involved in Top Academies	Academies Involved
Portugal	80	Sporting CP, FC Porto, SL Benfica
Netherlands	72	Ajax, PSV Eindhoven, Feyenoord, AZ Alkmaar,
Croatia	100	Dinamo Zagreb, Hajduk Split
Belgium	94	Anderlecht, Genk, Club Brugge
Serbia	60	Partizan
Denmark	81	FC Copenhagen, Brondby, Midtjylland, Nordsjaelland

Elite Academy Per Capita

This metric shows how many people each nation has per top elite academy, helping reveal how densely or sparsely talent becomes concentrated in top youth systems.

Country	Elite Academy Per Capita
Serbia	6.62 million
Netherlands	4.47 million
Belgium	3.93 million
Portugal	3.53 million
Croatia	1.93 million
Denmark	1.49 million

Age of Entry into One of the Above Top Academies

Country	Median Age
Belgium	13
Portugal	12
Netherlands	15
Denmark	15
Serbia	15
Croatia	15

The final table, however, also shows that most of these players did not start in these top academies from the youngest age groups. Therefore, the trend in development for high-value players is for a wide base of talent to be nurtured in many different clubs local to the player at the younger age groups, but to begin to concentrate into a 'best with best' environment at the 12-16 stage.

This also shows that top academies are not necessarily able to identify and recruit all the highest potential players from the youngest age groups, and that ongoing recruitment is a bigger trend than early prediction of talent.

Norway – The Exception to the Rule

Norway was the only notable nation which did not fit this pattern, which is likely down to operating a different model than the other nations. As was discussed in the section on "The Elite Academy System", Norway operates a model which spreads a considerable resource around a large number of well-funded, well-organised academies, with players remaining in their grassroots clubs until U15, when they move to the partner Academy (meaning talent is developed locally, rather than moving to a residential academy or concentrating in professional clubs from an early age).

High Value Players = 7

No patterns at all in terms of concentration of talent.

However, not 'Best v Best'

One clear takeaway from consultations with a number of coaches around Scotland during this past 12 months is a preference for 'Best v Best' games as the main driver of elite development. The importance of games, particularly against high level opponents, is mentioned frequently.

While admittedly this approach seems instinctively logical, it is nevertheless shown to be incorrect both in real life practice, and in the opinion of experts in youth development around Europe.

Just take one example as the Right to Dream Academy in Ghana. Within the last few seasons alone, four young players have been transferred for €20-€45million who spent their entire youth development at this Academy with no 'best v best' games programme. On the flip side, the Academy is a clear example of Best *with* Best, scouting an entire country and bringing the players together to train daily in a residential model.

As will be discussed in the section on "Prediction of Talent", many of the world's best players were not selected for games – or even academy programmes altogether – during their youth. These stories occur time and time again. There was no equal game time. They improved while watching their peers perform on a weekend.

During one club visit, Porto described how Vitinha needed time to mature, spending a year on loan outside of Porto Academy at a smaller club at age 15 and starting on the bench while his teammates won the U19 UEFA Youth League final. Today he is considered one of the best players in the world. In another club visit, AZ Alkmaar remarked how Koopmeiners went a full year without playing as a youth – another typical late maturer story – before being sold for

€30million to Juventus. Scott McTominay, another late maturer, is currently the highest-valued Scottish player on Transfermarkt and made only 7 Academy appearances between 2013 and 2015, and only 11 appearances the following season.

The same pattern occurs with the best athletes in other sports – Michael Jordan and Tom Brady were often left out of the starting team for High School games during their teenage years. They are now considered the greatest of all time. This is not even mentioning the large number of world class players who were not even selected for an elite programme and thus had no access to 'best v best games'.

The example on the right of a recent news article about one of the Club World Cup's breakout stars- Joao Pedro – is typical of the elite development journey.

Because he grew so quickly as a teenager, João struggled to adapt his game to his own body quickly. Coach Eduardo Oliveira remembers this period well, which helps explain why the striker has such great quality coming out of the box today.

" JP went through a difficult time," coach Eduardo Oliveira, who worked with him at Fluminense's youth academy, recalled to **FIFA** . "He arrived in Xerém at 11 or 12 years old, very popular, everyone was talking about him. But when he reached 15 or 16, he grew up a lot and lost a lot of the skills he had. He was a number 10."

"He went a long time without playing minutes; it was a blow to him. At that moment, he said, 'Edu, I don't want to miss another game,'" the coach recalled.

Many of the world's best players were not exposed regularly to a 'best v best' games program.

Meanwhile, their former teammates, who accumulated a lot of minutes in the youth phase, often do not reach high levels of adult performance.

Although it may seem counterintuitive, the evidence is clear. If the games were vital, **it would be impossible for so many world class talents to develop without these games.**

In a Scottish context, the most expensive player in history is Kieran Tierney, who played in the 2nd tier of Celtic's academy system at U17. Eight of his club mates of the same generation participated in the U17 European Championship Semi Final and the 'Best v Best' top tier academy games programme, yet none of them have achieved full international honours.

The same occurs at Youth National Team level in countries around the globe. Very few of the those who play for the A National Team collected any minutes at all at the U15-U17 age groups.

Again, if the theory that these experiences were so valuable in the development of youth players were true, it would be impossible for the majority of top international players to have missed this "important experience".

Furthermore, the majority of top European nations have no best v best games programme until U15, and often even until U19 the leagues are full of mis-matched regional games.

Like many topics, this is particularly uncomfortable for some coaches themselves, as it often clashes with what stimulates them. Many coaches find the games programme one of the highlights of their week, in the same way that many Youth National Team coaches enjoy being in camp and testing themselves against other top nations at U15, or a U19 Coach who believes the UEFA Youth League is more developmental than sending a player out on a senior loan.. However, the evidence simply does not support it.

Indeed, the question should not be whether a best v best games programme is a key part of development (because it clearly is not), but instead, **what the risks are** on focusing on this type of programme:

1. It increases the number of short-term decisions a coach may take, for example in terms of training content or style of play, to perform well in the game rather than take a long-term approach
2. It increases the risk of injury and long-term issues with talented individuals being encouraged to overplay during the period of growth — to achieve a result in a game
3. It further increases the bias on current performance being important in terms of evaluating player potential (see the section on "Prediction of Talent"), the classic cause of errors in identification in youth sports
4. Finally, it over-exposes the nation's best talents to early praise, pressure, recognition, agents and even media hype before they have even signed their first professional contract. This is a key factor in why we see so many youth 'gold medallists' fail to reach their potential in all youth sports around the globe

The Scottish FA support games as a **part** of the development process and experience, however, evidence clearly shows it is **not** one of the most important parts and should not be prioritised over individual player development and developing the fundamentals.

As was discussed in The Transition Report (2024) – between ages 16-18, this situation reverses, and exposure to playing with and against adults is the key driver in development. This is why each club must operate with a clear strategy that is age and stage specific in order to maximise the potential of each player.

"We limit travel and competition because development isn't about matches, it's about repetition.

"We focus on training more than playing. Games are a bonus, not the foundation."

- Arnar Þór Viðarsson (Former Iceland National Team Head Coach)

“A young player who touches the ball 500 times in training learns more than one who plays in a 3–4–3 on Sunday.”

- Albert Puig (Former Barcelona Academy Director)

“Children don’t learn by playing 11 vs 11 every weekend. They learn by touching the ball hundreds of times in training. They need repetition to develop feel and control.”

“It’s not about games on a big pitch. They should be touching the ball constantly, not chasing it.”

“Repetition is the mother of learning. You learn control by repeating it 10,000 times.”

- Johan Cruyff

“In the Right to Dream Academy in Ghana they are not playing in any real games programme – just friendlies. It’s a safe educational environment, strictly about learning and development. We don’t focus on performance or results. Our players start playing competitively at International Academy from age 16 – and most of the high-value players from Right to Dream are coming from that system.

This shows that youth development is not about playing games against other teams, but instead, having a ‘training-focused’ approach.”

- **Flemming Pedersen, Technical Director, Right to Dream**

“A child can play 100 games and not improve if the environment is wrong. One good training session with repetition and feedback is more valuable.”

- **Ståle Solbakken (Norway National Team Head Coach)**

“You don’t get better by just playing. You get better by training hard, repeating actions, and understanding space and the ball.”

- **Xavi Hernández**

“I didn’t always need a match — I needed a ball and some space to practice.”

- Erling Haaland

“Just playing isn’t enough. You need training with repetition and correction.”

- **Zico**

“From a physical perspective, the best way to burn the candle at both ends is to focus on playing game after game instead of giving a balanced and well-rounded training program.”

- **AZ Alkmaar Head of Physical Performance**

“In Academies, we could do with 25 games per year and more individual-focused training. I was always promoting young players, yet I got many players at 18 years of age who had huge flaws in their game. No left foot, no ability to head the ball, because they had no time to improve these aspects of their game. After this age, it gets very late to work on these elements, because from 18 onwards, you go into top-level competition and have even less time.”

“The basis of a good education in football is technique. Not tactics. Not winning. Technique.”

- **Arsene Wenger**

Case Study 1 from Outside Football – Eastern European Basketball

Several small Eastern European nations are known to produce some of the world’s best basketball players with only a fraction of the population of the US, and without Basketball being the most popular sport in Europe. For example, Yugoslavia was a 3-time world champion and 5-time finalist before the country separated, while the likes of Lithuania and Slovenia have produced top NBA stars with small populations.

Notably, the way of training basketball in these countries is very different to the American approach. **In the same way that the Croatians develop footballers**, Basketball training contains a lot of repetition of the fundamentals and small-sided formats, focusing on developing the basic skills and not on the physicality of the game. In the US system, the focus is on selecting physically dominant players and playing a large number of competitive games during the teenage years. To summarise the Eastern European approach:

- Training includes lots of drill-based technical repetition, small-sided games, and athletic development, not just Matchplay.
- Matches tend to be local, low-pressure, and not results-driven.
- Coaches emphasize fundamentals over athleticism: footwork, shooting form, spacing, passing, and reading the game.

FIBA Europe Coaching Manual:
“In Eastern Europe, children spend 70–80% of their training time on fundamentals before they play organised 5-on-5 games regularly.”

Sarunas Marčiulionis (Considered one of the all-time greatest players):
“It’s not about playing the most games. It’s about knowing what to do when you play.”

Rađa (NBA Hall of Famer):
"We were not allowed to play games until we could pass with both hands, use both feet. That's how we built our foundation."

Bogdan Bogdanović (LA Clippers)
"We don't play 50 games as kids. We practice. We learn how to pass, how to shoot, how to make the right play."

Nikola Jokic (7-time NBA All-Star)
"In Serbia, we don't play that many games. We learn the game first, then play."

Steve Kerr (Golden State Warriors Head Coach, winner of 8 NBA Championships):
"The best young players coming out of Europe understand spacing and ball movement far earlier than American kids."

Gregg Popovich (Head Coach of San Antonio Spurs, winner of 5 NBA Championships)
"They [Europeans] grow up learning how to play the game correctly. There's less emphasis on showmanship and more on skill, teamwork, and understanding the game."

Fran Fraschilla (ESPN European scout):
"Eastern European players are often more prepared fundamentally. U.S. players tend to be more athletic, but less polished."

Jay Bilas (ESPN college basketball analyst):
"What you often see in European players is footwork, feel, and decision-making that many American players don't develop until college—if at all."

Case Study 2 from Outside Football – Venus & Serena Williams

Given that Serena Williams is considered the greatest female tennis player of all time and competed in **no junior tournaments**, this case study clearly shows that formal match play is not important in elite development. Perhaps the opposite – her father recognised the potential for overexposure ('gold medallist' effect), early burnout, and the risk of picking up bad habits by focusing on winning rather than performing the fundamentals to the highest level.

In this way Richard Williams, father of Venus and Serena, also maintained control over their environment and avoided agents, sponsors, and press interference until they were ready.

It should be noted that both trained intensively from ages 4–14, often against each other, so they were certainly exposed to 'best *with* best' on a daily basis.

In the same pattern as Eastern European Basketball stars, the Williams sisters focused on a training regime that was highly repetitive, structured, and with a large amount of deliberate practice.

"They would practice for six hours and hit the same shot until they could do it with their eyes closed."

- **Richard Williams, Father**

“The repetition was brutal. But it made me what I am. We didn’t play a lot of matches. My dad would have us hit the same shot over and over and over again. We’d spend hours just hitting forehands down the line until it was perfect. That’s how we learned.”

- **Serena Williams**

Case Study 3 from Outside Football – Spartak Tennis Club

Similarly, Spartak Tennis club is one of the most successful developers of elite athletes in the world:

“At Spartak, we didn’t play matches. We just hit balls for hours. Forehand, backhand, over and over. It was brutal but necessary.”

- **Anna Kournikova**

“The Spartak courts were sacred. The red clay, the quiet, the relentless focus. You didn’t play matches. You repeated the same thing until you got it right. And then you did it again.”

- **Maria Sharapova**

Reduction in Training Load Around PHV (12-16)

This stage of development is critical and requires a high degree of specialist knowledge and understanding in order to ensure young talent is effectively managed and nurtured. Around the time of accelerated growth (PHV), evidence displays an increased risk of growth plate injuries, overuse injuries, hormonal imbalances, delayed growth, and psychological burnout.

Other factors such as sleep quality, caloric intake and training times are also critical factors than need to be analysed on an individual basis

Teenagers are then often subjected to too much training and game time during the 12-16 phase, when the body's capacity for training is at its lowest, limiting their potential as players.

It should also be noted that **players who suffer injury or overuse issues during the growth period are more likely to suffer injury problems in the future.** This means that the problem is not limited to the training time they miss 'in the moment', but also affects their long-term potential in the professional game, even if they survive this period.

> *"During puberty the motor system is disturbed through rapid growth and maturation. The capacity for loading the motor system decreases during this development period and injuries are caused in combination with clumsiness. Through appropriate intervention, it is possible to avoid injuries."*
>
> - Wormhoudt, Savelsbergh, Teunissen and Davids (2018)

Reducing Football Training Load Results in More Training Hours

At the 12-16 phase, when training intensity traditionally increases for those regarded as the most talented, research shows that there is an inherent risk in those players succumbing to injury and in turn practicing less often than others not on such a programme.

Quality rather than quantity is essential, and sessions should be tailored to the individual's needs to optimise their prospects. The right approach will reduce days lost to injury or illness and provide more quality involvement in training and playing.

Very active children and adolescents have increased energy (caloric) requirements compared to non-active peers due to higher energy expenditure. Inadequate nutritional intake can result in: delayed puberty, low bone mass, short stature, slow muscle development, menstrual irregularities and increased risk of injury.

"Sleep is also more important during the period of growth due to the increased energy demand. About 50% of boys experience sleep deprivation during this period."

- Wormhoudt, Savelsbergh, Teunissen and Davids (2018)

A key point is that the teenage player can, and most certainly should, still be physically active. It is not simply a case of giving up training hours, but of focusing not only on *football* within the training hours. Instead, lower-intensity exercises which avoid problematic movements, and a structured movement development programme are an important part of helping the player stay injury free and well-coordinated through the periods of rapid growth.

Research and medical observations provided below as a reference point suggest several potential risks:

1. Growth Plate Injuries – The growth plates (epiphyseal plates) in bones are still developing during puberty. Intense training, especially high-impact sports (e.g., gymnastics, weightlifting, long-distance running), can increase the risk of fractures and growth disturbances.
   The growth plate, or physis, is the area of developing tissue near the ends of long bones in children and adolescents. It's made of cartilage and is the last portion of bone to ossify, making it more susceptible to injury. Intense physical activity can lead to both acute and chronic physeal injuries, potentially resulting in growth disturbances.

   Boys tend to experience their growth spurts later than girls (typically between ages 12–16), making them vulnerable to growth plate fractures if they engage in high-impact or excessive training. Since boys also tend to participate in contact sports (e.g. football, basketball), they are at higher risk of traumatic growth plate injuries.

Physeal injuries in children's and youth sports: reasons for concern? | British Journal of Sports Medicine

2. Overuse Injuries – Repetitive stress on developing muscles, tendons, and joints can lead to conditions like stress fractures, tendonitis, and Osgood-Schlatter disease (a knee pain condition common in adolescents).
   Repetitive stress from activities like running or jumping can lead to overuse injuries in young athletes. These injuries are often due to frequent overloading causing

microtrauma to tissues, and children are more susceptible because of the presence of growing tissue and growth cartilage.

Excessive Physical Training in Children and Adolescents

3. Delayed Growth and Maturation – Extremely high training volumes, particularly in endurance sports, have been linked to delayed puberty and reduced growth potential, likely due to energy imbalances and hormonal disruptions.
   Excessive exercise can be a contributing factor to delayed puberty, defined as the lack of pubertal signs at an age that is 2 to 2.5 standard deviations later than the population mean. This delay can be functional, resulting from factors like excessive exercise, which affects the body's hormonal balance necessary for puberty.

Delayed puberty - Symptoms, diagnosis and treatment | BMJ Best Practice

4. Hormonal Imbalances – Excessive training can lead to a condition called *Relative Energy Deficiency in Sport (RED-S)*, where the body does not get enough energy to sustain both exercise and normal growth, affecting bone density, immune function, and reproductive health. In females, this can result in delayed menstruation or menstrual irregularities.

A study in *BMC Sports Science, Medicine and Rehabilitation* investigated the effects of high-intensity circuit training on muscle growth regulatory factors in adolescent male soccer players. The findings indicated that such training protocols could decrease resting serum myostatin levels, a negative regulator of muscle growth, suggesting potential hormonal imbalances resulting from intensive training.

High-intensity circuit training change serum myostatin but not myogenin in adolescents' soccer players: a quasi-experimental study | BMC Sports Science, Medicine and Rehabilitation | Full Text

5. Psychological Stress and Burnout – Overtraining can lead to increased stress, anxiety, and burnout in young athletes, sometimes causing them to drop out of sports or develop unhealthy relationships with exercise.

   Overtraining can lead to increased stress, anxiety, and burnout in young athletes. Recognizing signs of overtraining, such as fatigue, exhaustion, lack of interest in activities, mood changes, and decreased athletic performance, is crucial for preventing long-term psychological harm.

https://www.reidhealth.org/blog/signs-of-overtraining-and-overuse-injuries-in-young-athletes

Importance of Contextual Factors - Factors unrelated to the sport-specific training, such as stress around exams, problems at home, etc. cause an increase in the "Training Load" of the player but are typically not viewed holistically as part of the individual periodization during the most turbulent period in their development

A clear example of this would be to continue the **PSV Academy case study**. As discussed, PSV players have 2.5 hour training sessions 4x per week during childhood, in addition to a structured homework programme, in order to maximise player training volume during these years.

Then, during teenage years, total training time is reduced to 2 hours, 4x per week. However, within this, only one hour per session is spent on the field in traditional football training. The additional 4 hours are spent indoors, supporting the coordination, mobility and balance of the players.

As we can see, **the typical PSV player moves from more than 10 hours of on pitch football training to only four hours of on pitch football training per week** during this period.

Similarly, research at Feyenoord by Raymond Verheijen showed how individualising training load, reducing it from 6 hours of pitch training per week as required, had a positive impact on the healthy growth of the child.

A Scottish player, by comparison, typically trains 4.5 hours per week as a child, and then often increases the training hours during puberty.

Bournemouth Case Study

An excellent study on this was completed by Johnson, Williams, Bradley and Cumming (2023), who studied an intervention at Bournemouth.

Before intervention, U13/U14 players trained 5 hours and 45 minutes *including strength and conditioning*, with 3 full rest days.

U15/U16 players trained 7 hours and 15 minutes including S&C, with 2 full rest days.

The study identified high-risk players and implemented the following interventions.

Sessions replaced high-impact content (e.g., sprints, decelerations) with:

1. Technical drills (ball touches/passing)
2. Balance, coordination & landing exercises
3. Individualised strength work
4. Modified training load (lower high-intensity actions)

As a result, there was an **85% reduction in the total number of injuries** at the academy, and **a 92% reduction in number of hours lost** to injury.

The research is unequivocal about the importance and success of interventions at this crucial stage in player development. Detailed Case Studies from Athletic Bilbao and Ajax Academy, are included later at this section.

Bio Banded Strength and Conditioning

Best practice for strength and conditioning during the teenage years should involve splitting strength training groups based on biological age, rather than by playing squad. This approach can be seen in some of Europe's most successful Academies.

A study by Macmaster et al. (2021) on 319 players across 19 clubs in the EPPP English Academy system found that physical differences (height/weight) and fitness (speed, CMJ) were more homogeneous when bio-banded. The study also found that training sessions are safer and more effective, since late maturing players aren't overwhelmed and early maturers aren't under-challenged.

> *"During PHV, players experience rapid skeletal growth, but muscle and tendon remain underdeveloped leading to "adolescent awkwardness."*
>
> *Without appropriately monitored strength training, players may face coordination issues, injury risk, and technical deficits."*
>
> - Macmaster et al. (2021)

A recommended process for each stage of growth is as follows:

Pre-PHV: Focus on movement quality, functional strength, injury prevention.

Circa-PHV: Introduce resistance exercises with low-moderate loads, maintain coordination, emphasise technique.

Post-PHV: Progress to higher loads and power-based exercises as neuromuscular capacity increases.

Safe Training Guidelines for Adolescents:

- Prioritise varied physical activity (e.g. Coordination, Balance, Mobility work alongside sport-specific training).
- Ensure extra rest and recovery.
- Maximum of one intensive training session per day.
- Pay particular attention to the intensity and type of training exercises.
- Guidelines should be set by the Head of Football Science on the maximal amount of training volume/intensity for MD-1 and MD-2 and MD+1 and MD+2.
- Maintain proper nutrition and hydration to support growth.
- Limit intense strength training to moderate loads with proper supervision.
- Watch for signs of overtraining (persistent fatigue, irritability, frequent injuries, or poor performance).

FA-Led Expertise in this Domain

As a smaller nation who must maximise the potential of every young player, it is recommended that the Scottish FA employ a specialist practitioner to focus solely on the physical development of youth players until the age of 16. This individual should work together with Elite academies and Scottish FA projects to ensure specialised knowledge on this important stage in development.

Athletic Bilbao Case Study

Athletic Bilbao is another of Europe's best Youth Academies and has been at the forefront of research into the management of players during the growth spurt, led by noticing the spike in injuries around this phase.

Xabier Monasterio has published 20 years of research and data on the players from Bilbao academy, producing the most comprehensive case study in football. Below is an overview of how to follow a similar approach as Monasterio outlined in his studies.

Step 1: Set Up Monitoring Framework

a) Measure and Track Physical Growth Every 6–8 Weeks

- Record height, sitting height, weight.
- Calculate maturity status using:
    - % of predicted adult height
    - Estimated age at PHV using Mirwald's or Khamis-Roche method.

Key Indicator: Players growing >7 cm/year or reaching ~88–94% of predicted adult height are considered at PHV = high risk period.

Step 2: Classify Players by Maturity Status

- Early maturers = Skeletal age >1 year ahead of chronological age
- On-time maturers = ±1 year of chronological age
- Late maturers = >1 year behind

Bilbao found early maturers had ~3x the injury burden.

Step 3: Early Developers and Late Maturers Have Separate Training Programmes

- Early Developers receive additional skills and tactical training to compensate for them being able to rely on their physicality
- Late Maturers focus on specific physical work for injury prevention due the extra load placed on their bodies in having to compete with "older" players.

Step 4: Map Injury Risk by Maturity Stage

Use historical injury data to identify patterns:

- Pre-PHV = ↑ bone stress
- Circa-PHV = ↑ apophysitis (Sever's, Osgood-Schlatter), muscle strain, growth plate injuries
- Post-PHV = ↑ joint and ligament injuries

Step 5: Modify Training Load Based on Growth Status

For players identified at PHV:

- **Avoid**:
    - Repetitive sprints
    - Aggressive decelerations
    - High-volume plyometrics
- **Emphasize**:
    - Technical, unopposed ball work (low intensity)
    - Balance & coordination (landing mechanics, proprioception)
    - Core control & mobility
    - Strength training adjusted by maturity group (e.g., bio-banding)

Load is modified within the same session duration (e.g., 90 min stays 90 min), but the intensity and impact are scaled down.

Step 6: Biomechanical Evaluation & Intervention

- Regular biomechanical evaluations are conducted to identify movement patterns that may predispose players to injuries. Corrective exercises are then prescribed to address these issues.

Step 7: Implement Bio-Banded Physical Training Where Possible

- Group players by maturity instead of age for certain drills (especially strength or tactical load)
- Reduces physical mismatch and injury exposure

Step 8: Educate All Stakeholders

- Train coaches on growth curve concepts and modifying sessions
- Educate parents on signs of overuse injuries and growth-related pain
- Involve medical/physio staff in session planning during red-flag growth periods

Step 9: Track Outcomes

Monitor:

- Injury incidence (injuries per 1,000 hours)
- Injury burden (days lost per 1,000 hours)
- Training attendance
- Adjust intervention over time based on data trends

Ajax Detailed Case Study – *Excerpts from "Athletic Skills Model" (2018)*

- Divides the period in P1, P2 and P3, with the entire cycle lasting around 4 years.
    - Pre-adolescence (P1 – a year before the start of accelerated growth),
    - Adolescence (P2- measured from the onset of the PHV to circa 2-4 months after PHV)
    - Post adolescence (P3 – from 2-4 months after PHV to 1.7 years later)
- Training is differentiated based on which period of growth the player is in.
    - During P2 – the weekly training schedule at Ajax was 1.5 hours, 4x per week, meaning 6 hours in total.
      50% of this time was spent off the pitch, indoors, working on the coordination of the players.
      This means a total of 3 hours per week was spent training football on the pitch.
- Ajax was regularly regarded as the best-in-class football academy in Europe while using this methodology, producing many world class players.
- The emphasis of indoor training should be on coordination training. All coordinative capacities have to be trained, but movement adaptability should be central to the training programmes, along with balancing and barefoot activity, but also rhythm, spatial orientation, posture and non-preferred rotational patterns.
- Many of the former players still talk about what they call 'the fun time', showing that this process was enjoyable for top level players such as Patrick Kluivert, Wesley Sneijder, Nigel de Jong and Rafael van der Vaart
- A decrease in agility and mobility occurs during puberty, but sustained static stretches are not desirable due to the attachment between tendons and bones being less strong than other periods, due to the influence of hormones and enzymes.
- Variation during training considerably reduces the chances of overloading and repetitive strain injuries.
- All basic movement skills taught again from the beginning of the PHV phase, in a concentric manner.
- Moving to music was used to combine different themes like body control and muscle control during training. Aerobics, jazzercise, box aerobics are potential low impact options.
- Instructions can be given to players with respect to posture – such as how they sit, how they stand, and how they lift. Placing the body in a stable, functional position is an essential part of training. The most common habits in P2 are drooping shoulders and a collapsed chest , and bad habits remain when nothing is done to correct them.
- During the P2 phase, it is recommended to have 2-5 sessions with a Mesendieck/Cesar therapist (postural/functional movement therapy) for screening and tailored advice. This should be repeated in the P3 phase with 2-3 sessions, depending on the individual.
- Due to the high nutritional demand of the growing players, emphasis needs to be placed on nutrition and ensuring players are eating enough calories.
- Blood testing to determine whether Vitamin D levels are low, and whether supplementation is necessary to ensure the promotion of bone mass and mineralization.
- Education on sleep and asking parents to allow teenagers to sleep late at the weekends if possible.

Elite Academy Models (12-16)

One of the biggest questions that must be answered as part of this report is which path the Scottish FA should take with regards the national academy system Club Academy Scotland.

Over the past 10 years alone, the Scottish FA has invested more than £20million into clubs.

The current model is based on a criteria system which is low compared to other European countries standards.

We will address some of the challenges with the current approach below however consideration as to how we best use future resources towards elite player development is required.

Example European Benchmarks Based on Research

1. Top Level Academy Infrastructure – 35-50+ Full Time Staff
2. Elite Academy – 20-35 Full Time Staff
3. Smaller Professionalized Academy – 11-20 Full Time Staff
4. Local Academy – 5-10 Full Time Staff

Within the current CAS Elite Tier criteria (the highest standards in our current model), Academies are mandated to have a minimum of 10 full-time staff, with 2 additional positions recommended as full-time, but not mandated.

As we can see, our highest standards fall more towards the category of a local academy than an Elite system. To give an example of an Elite level academy in comparison – Porto U16s will have 10 full time staff and several part time staff working **with that single team,** and the U16s are an **additional squad** the club choses to carry on top of the U15/U17 national competition structure.

While we are a smaller nation within the European context, we can make clear comparisons to countries of a similar population size.

Within the Academies in Denmark, the minimum number of full-time staff is 14, and the average number is 21.86. There are 18 clubs who have more than 10 full-time staff.

Furthermore, **the Danish clubs do this with significantly less funding coming from the DBU** than the Scottish FA provides. This amount is self-invested by the club directors who see it as the only sustainable model for the club.

This report recommends a Benchmarking system for each individual Academy, rather than a blanket criterion across 3 tiers.

Fixing the Criteria-Based System in the Scottish Context

The most common model in nations with a criteria-based academy system sees the League body apportion part of the TV Revenue to against academy criteria which is only distributed once the club meets certain standards. This mechanism means clubs receive similar payments but with the academy being a forefront of their strategy.

A clear example close to home is EPPP in England, where the majority of Premier League clubs voted to use a portion of the TV Revenue to be distributed based on stringent Academy criteria. This process has clearly transformed the level of work happening within English youth development.

An example of a comparable nation is Norway, where the clubs agreed to use €8.5m of TV revenue, distributed to clubs according to the level of Academy, believing the only sustainable model for their league was to develop their own players. This process has transformed Norwegian football via substantially improved player development, profitability, and now club success in European competition (case study below).

Other options used abroad see national government provide funding for the same

A clear example close to home in a comparable nation is the Republic of Ireland, where the Government currently invests €6m per year in the FAI for elite development.

Another example of a comparable nation is Hungary, where state support allows the National Governing Body to provide the top 10 academies with around €3million per year, based on criteria which ensures academies operate at the highest levels of organisation. This includes residential provision and a significant full-time staffing infrastructure. The Government has also invested around €1.85B since 2010 in football overall, including modernising the infrastructure of the game.

Alternative Models

A number of alternative models are discussed below:

1. *Benchmarking & Competitions Role* – Rather than a monitoring system linked to funding, the Scottish FA could redirect resource and instead provide qualitative assessment and Benchmarking of academies based on a star system, alongside organising the competitions. It is therefore up to the clubs to decide how much to invest in their academy with a minimum criteria set for inclusion in the Academy games programme and to trigger UEFA solidarity funding.

2. *Licensing & Competitions Role* – In this model, the league body (in this case the SPFL) creates minimum standards for an Academy that each club must have to compete in the top two divisions. Beyond these standards, it is at the discretion of the club to choose how to operate. Such examples occur in the likes of Croatia and Germany. In Croatia, for example, it is a requirement to have a team at U9, U11, U13, U15, U17 and U19 to enter a senior team in the professional leagues (top two tiers), with the federation organising a national games programme at U15, U17 and U19.

3. *Output Based Incentive System* – Rather than investing in academies based on criteria, money can be distributed based on those clubs who play young talent in the 1st Team. This allows Academies the flexibility to operate as they wish and rewards those who do it well. Example Case Studies can be found below.

4. *FA-Led Elite Programmes* – Reducing the financial investment in the Academy System likely means only a small number of clubs will operate with a significant investment in their programme. The Scottish FA can then use the available resources to fund staff to work with these Elite Academies and run their own programmes for those players *not selected* by these top academies, such as regional groups, futures programmes or a National Residential programme.

5. *Grassroots Focused Approach* – As was discussed in the section "Childhood is the Most Important Stage in Development" – addressing the grassroots base is the most important facet of a future strategy to ensure national team success. Iceland and Japan are examples that Elite players will still emerge without a professionalised academy structure if significant investment is made to support grassroots football.

6. *Grassroots + Finishing School* – An extension of the previous model, Norway and Uruguay provide case studies below where Professional clubs can concentrate their limited resources on an Academy structure from U14/U15 upwards, ensuring a densely concentrated quality of staff and provision for each player, while also working to ensure the Grassroots base thrives in the years prior.

Case Study 1 – The Benchmarking & Competition Model – Denmark Example

Denmark is the country with the biggest improvement in national team rankings in the last 10 years, while at the same time, **it has moved from having exactly the same number of top 5 league players as Scotland, to becoming the biggest producer of top 5 league talent** of nations with less than 10 million people. Currently there are 55 Danish players in the top 5 leagues.

The country has no bigger population than Scotland, similar geographic challenges (mix of urban and rural areas), does not have the same income from fan support, and clubs receive significantly less funding support from the Federation, who invest just over £850,000 per year as part of the Academy Criteria system, compared to £2m annually in Scotland.

Investment in the Academies in Denmark has been driven instead by the clubs, who understand that they must produce a much better product than they did in the past if they are to be financially sustainable and competitive with larger nations around Europe.

The Denmark example highlights that significant change can be made in terms of player development if the right steps are taken.

The DBU focuses on a Benchmarking whereby a team (of 4 staff) complete comprehensive audits of how clubs *actually work* in all areas, and provide comprehensive feedback with specific details of how clubs can and should improve if they want to develop elite players.

In Denmark's Benchmarking system, there were no 5 star ranked academies 5 years ago. Today there are 3 – meaning they compare with the best run academies in Europe in terms of process.

For reference – 3 star criteria in Denmark works out to be equivalent to Club Academy Scotland Elite Tier. There were just 6 clubs with 3.5 stars or more five years ago (now 15) and 16 with 2.5 stars or more (now 26).

The DBU's model was not to focus on financial investment into the academies but to hire a team of educated staff who could give clear advice on how to improve their way of working. The decision was then left to the clubs whether to improve or not.

There are also a number of academy education programmes operated by the DBU, including a comprehensive development course for the Heads of Coaching and other academy leadership positions. It is mandatory for the academies to attend the education courses.

It must also be noted that clubs have welcomed (and requested) the Scottish FA having a team of experts who could visit the academy regularly and provide more specific feedback.

"There is not enough good coaches to allow them to work how they want if you want to develop top players. It's about taking the keys from the coaches to the clubs. It is the clubs who must decide that there is a coherent football program, with all the structure, strategy and process around it, regardless of which individual is the coach.

I am brutally honest with the clubs about what we see but they respect that. I can't help them if I don't tell the truth.

Since we started this project, we have anchored talent development at the highest level in terms of what we see in Europe from a club strategy perspective.

Since then, clubs have invested in their academies with fulltime employees, and integrated the academy into their strategic business model. The level of knowledge and research in specialist staff has gone up considerably, and we now have several academies at international level."

- **Jesper Sommer, Head of Auditing at DBU**

Case Study 2 – The Output Model – Netherlands and Hungary Examples

In the Netherlands, meanwhile, a very different system has been organised to Denmark. Here, the focus is not on the detailed processes of how the academies operate, but on the end goal – the players they produce.

The KNVB had a classification system similar to Scotland but decided that it was not an optimal way for the Federation to operate.

The KNVB instead evaluates the clubs on two simple criteria:

1. The player must be U21 and Dutch, and;
2. Has to play at least 35% of league minutes in one of the top two divisions.

At the end of the season, a pot of €1.25m is allocated to each of the top 2 divisions, and then divided between all of the players within the division who meet that criteria, meaning there is no "set amount" – as it depends on how many players achieve the criteria. The same player can only be rewarded twice in this system (meaning two separate years, if they start playing from a younger age).

As an example, season 23/24:

14 Players achieved these criteria in the top division, meaning over €100k to the clubs for each player.

There were 22 the second tier, which meant around €33,000 per player.

Hungary also operates a similar output-based system – rewarding clubs for U21 players in the top division only, but on a sliding scale. This means that reaching the maximum possible amount depends on having 2 x U21 Hungarian players on the pitch for the full game, for every league match.

Clubs then received a reduced amount, depending on a % basis of how many minutes they reach.

Case Study 3 – The Finishing School Model – Norway and Uruguay Examples

As an extension of the above, some nations operate the 'finishing school' model where academies only begin to work with players at an older age, leaving a high-quality grassroots base to take care of most of the development, and allowing the clubs to invest their limited resources in a concentrated way, ensuring that a smaller number of players receive an elite service.

In Uruguay, the most successful small nation in football history, the academy system begins at U14, where all the nation's best players move to Montevideo, creating a true 'best with best' environment at the handful of clubs which invest in elite development structures.

The Norway case study is perhaps a more relevant one for us, given that street football does not happen as organically as in Uruguay, and the nation has had to 'manufacture' a strategy for player development. In this case players are only allowed to join an Academy from U15, forcing the professional clubs to invest in developing the wider grassroots base to ensure quality arrives. From U15 upwards, clubs invest significantly to create an elite environment for a smaller number of teams and players. The criteria and licensing requirements for the academies is very strict, meaning that many clubs operate to high European standards at these ages. As was discussed, this funding comes via the league's TV revenue, as is the case in other nations.

On the right, the chart shows how the total Transfermarkt value of the 'top 20 players' in Norway has increased exponentially in recent years.

While this model is very different to the one seen in Scotland, it has undoubtedly been successful, due to clubs focusing on a wide base of grassroots players.

It should also be noted this model is the **only noted exception to the 'best with best' trend**, in that all of Norway's top players tend to develop in a wide range of different clubs.

In the 2016-18 period, the key stakeholders in Norwegian football met together to address the crisis. Norway was 30th in the UEFA Rankings, had no young players coming through, and clubs were not generating revenue from player sales. **Essentially the country was in the same position as Scotland is today**.

The Norwegian clubs agreed collectively with the league that they "did not want to be mediocre anymore". They knew a change was needed to become sustainable. They decided to apportion €8.5m from the TV deal towards Academy Criteria and employed Sporting Directors in their clubs. Subsequently, player development has exploded.

Norway is another example of a nation which was not ahead of Scotland in the recent past, yet by becoming more professional in their approach, have become recognised around Europe for talent development.

> *"For small countries like ours we have to build strategic club structures which are more robust than just looking at the league table every Sunday evening.*
>
> *We have now reached a high level of education on the Sporting Director side – we now have Sporting Directors in each of the top teams – this is extremely important and completely changes the dynamic in the boardroom in terms of how they look at player development.*
>
> *In an optimal world we would just have one criteria – it will be the end result – like the Netherlands. However, if the quality of the talent from the youth is not good enough because the Academies are not doing a good job, it doesn't matter that the young player got an opportunity to play. The players will not reach a high level because they have not been developed. That's why we still have a very detailed audit system on how the academies actually operate, because we needed to develop these standards, and we have 8 full time staff who work on this project."*
>
> \- Jens Haughland, CEO Norsk Toppfotball

Pay to Play Models

In must also be noted in that several of the countries researched, parents must pay a fee to participate in the academy in many clubs, with this money being reinvested into the academy. In Denmark this is around €800-€1,000 per year, but needs assessment can be completed to ensure talented players who cannot afford the opportunity are still included.

The top clubs with large budgets do not charge anything, but for some smaller clubs, this money can be useful to recruit additional full-time staff.

Pay-to-play models for academies also exist in Iceland and Japan. In Norway the players are participating in grassroots football until U15, which is of course a pay to play system.

Academy Competition Structure

The final area for consideration is the competition structure of the academy matches.

There are two potential models to determine which teams play in which youth league:

1. Based on a pre-set criteria, which assumes that such criteria means better standards for player development. In this model all age groups of the same clubs remain in the top tier regardless of performance.
2. Based on competition by age each age group with promotion and relegation (with some minimum criteria that all teams must meet to enter the league structure). In this model, one club could have an excellent U15 team that competes in the top tier, but a weaker U17 team who competes in the tier below, for example, depending on how that group of players performed in the previous year.

Naturally, there are pros and cons to each system. The pre-set criteria works well if the funding is available to the Governing body to enforce standards so that these academies are all run to a high level. In this model it means that most of the best talent eventually migrates to one of the top tier academies.

On the flip side, Dundee U18s in 2024/25 are an example of team which reached the Youth Cup final and would have been competitive in the top tier for that age group, but were not allowed to enter. This raises questions as to whether the league is as competitive as it can be, particularly for older age groups who are preparing to transition to the 1st team.

While Scotland currently operates with the first model, as do a number of other nations, many European countries use the competition model with promotion and relegation.

Another question is whether the games programme should be an open or closed system:

1. A closed system means that the Governing body determines a limited number of clubs who can enter the league structure, regardless of how it operates. For example, this is how Club Academy Scotland currently functions. Teams who are not in Club Academy Scotland cannot compete in the system.
2. An open system means that, hypothetically, a strong grassroots team could have a talented age group which is able to compete in the top tier against professional academies. This is a true pyramid system for all clubs, going regional below the top two tiers, much like the structure of the senior game in Scotland in England. Netherlands and Japan operate open systems.

A final question is whether age groups are mandatory or not:

1. A mandatory system means that the Governing body determines the age groups of competition, and every club must enter a team at those ages to be part of the competition structure.
2. A non-mandatory system means the Governing body organises leagues at the different age levels, but clubs have either *some* freedom (e.g. must run certain mandatory age groups, with others optional) or total freedom, i.e. one club in the structure can decide to run a team at every age group, while another may operate dual age banding, for example. Registration is submitted before every season for the leagues they would like to enter.

Case Study – KNVB Open Competition Model

- KNVB had a review of youth football in 2017 where they opted to create structure where "a team plays at their own level every week" – this structure starts at U13 with regional associations managing competitions below this.
- U13 and U14 are regional games programmes organised by KNVB moving to a national structure at U15 upwards. Other changes included:
    - Moving to less teams per league, from 14 to 8
    - 28 league games – 14 per half year (2x7) – although planning to reduce this number for U13
    - This means that a team should theoretically play against a similar level of opponent more often
    - Promotion/relegation twice per season instead of once – every half year – two teams down and two teams up
    - Grassroots clubs can promote all the way up the pathway – in Netherlands, many grassroots clubs operate at a level we may consider of an Academy
    - Teams start at same level they finish the season before for that group of players
    - When entering a new cycle, the new U13s will start where the previous seasons U13 finished
        - First season of implementation was based on how you finished in U17 competition
    - There is freedom for clubs to do what they like outside of these 28 weeks
    - Teams can choose which age categories to enter - KVNB runs all age group leagues
    - For a club that doesn't enter a team in every age category, the number of teams can be varied per year

Prediction of Talent

Player Name	***Rejection Circumstances***	**Current Career Achievement**
Antoine Griezmann	Rejected by French academies as being too small and weak, had to leave his country to sign for Real Sociedad age 14	World Cup winner, one of the world's most expensive players
Virgil van Dijk	Late physical maturer, overlooked by top academies and even at age 18 deemed not to have high level potential by Willem II's reserve team, who did not offer him a contract	UEFA Champions League winner, Ballon D'Or runner up, was the most expensive central defender in history
Robert Lewandowski	Late physical maturer, was not selected by any of the top clubs throughout this entire youth development, only moving to a professional club aged 17	UEFA Champions League winner, Ballon D'Or runner up, considered Poland's 'greatest ever player'
Declan Rice	Released by Chelsea aged 14 for lacking physicality and being poorly coordinated during the growth spurt	66 Caps for England National Team, one of the world's most expensive central midfielders
Luka Modric	Went on trial to Hajduk Split aged 10, was deemed too small and too slight by scouts	Ballon D'or Winner, Captained national team at World Cup Final
Miroslav Klose	Rejected by German Academies as a teenager due to lack of physicality, played for local club until age 20	German National Team all-time record goal scorer, record goal scorer at FIFA World Cups

Ronaldo Nazario	Rejected by Flamengo after he couldn't afford the bus fare for a 3rd trial at the club aged 10	World Cup winner, Youngest ever Ballon D'Or winner
Harry Kane	Released by Arsenal aged 8 for lack of athleticism, initially rejected by Tottenham after 6 week trial	England National Team Captain and all-time record goal scorer, one of the world's most expensive players
Jamie Vardy	Released by Sheffield Wednesday aged 16 for being too small, played non-league football until aged 25	English Premier League & Golden Boot Winner
Riyad Mahrez	Wasn't even in the first squad of his grassroots team aged 13-14, late physical maturer who was deemed too small, too slow and too frail. At age 18, St Mirren were not convinced during a two-month trial to offer a contract due to concerns over physicality.	UEFA Champions League winner, more than 100 national team caps for Algeria
Mohammed Salah	At age 19, top Egyptian club Zamalek deemed him not good enough to sign	UEFA Champions League Winner, Captain of Egyptian national team, fifth place in the Ballon D'Or on two occasions
Vitinha	Rejected by Benfica at age 9, always struggled to compete physically, was not a starting player in the Porto UEFA Youth League Fina victory at U19	UEFA Champions League winner, Nations League winner with Portugal
N'Golo Kante	Was always small in stature, trialed at 5 Academies between the age of 13 and 18, was rejected each time	UEFA Champions league winner, World Cup winner with France

Clearly the list above is shortened because it would not be possible to list all the players who fit the same trend. The first clear pattern is that **the majority of the world's best players were deemed not be top performers during their youth development years**.

The second clear pattern is that **the majority of the world's best players struggled with physicality during their youth development**. This would suggest that academies should deliberately select players who face these challenges, rather than deselect such players.

Conversely, a common theme which is raised by CAS Elite Academy staff is that a 'lack of physicality' is a key reason for why a young player in Scotland is deemed to lack potential.

It should also be noted that these 'athletic issues' are not *always* down to late maturation, but also potential accelerated growth patterns, which disturbs coordination and negatively impacts performance.

Within the Scottish National Team context, if we were to analyse the captains and highest value players of the recent generation – none of Scott Brown, Andy Robertson, Keiran Tierney, John McGinn, Lewis Ferguson or Scott McTominay were deemed to be 'top talents' in the youth phase – their individual case studies are well known throughout the Scottish football community.

Throughout consultations with CAS Elite Academies, it was mentioned on a number of occasions that clubs felt they 'only had a small number of talented players' at each group, and this led to them **wanting to carry smaller numbers of players to remove those without the apparent talent.** This is exactly the opposite approach of successful European academies, who deliberately carry larger numbers, because they are aware of how unpredictable development can be (as will be discussed).

The Typical Trend in Elite Development

These findings correlate with a 2025 study by Verbeek et al., into 2,986 Dutch players. The study found that for those who went on to reach the 'A' National Team level across both Male and Female squads, **96% had been deselected by the national youth team pathway at some point.**

This study shows not only that youth development is unpredictable. That is widely accepted and even the most experienced Academy Director will acknowledge that mistakes will be made. It is remarkable because there were so few examples of early talent evaluation being *right*.

The study also showed that 50% of Dutch 'A' National Team players had **no international involvement** whatsoever until the age of 19 – showing that it is often not until a much later stage that talent begins to flourish and show its true potential.

> *"The typical elite player is not the one who stays in the system from beginning to end — it's the one who overcomes interruptions, late starts, or re-entries."*
>
> - Verbeek et al., 2025

A comparable study was conducted by the DFB with German players in 2018 (Schrop & Lames, 2018). Similar trends emerged.

For example, **only half of all National Youth Team players went on to play for a professional club**. The younger the player made their debut for a National Youth Team, the less likely they were to play for a professional club. As players got older (after the growth spurt), things became more predictable. **Less than 1 in 10** German 'A' National players were selected for the U15 squad, while 67% were selected at either U19, U20 or U21. This data correlates with preliminary internal research by the Scottish FA. During the youth development phase (12-16), **the majority of senior national team players are not selected**. However, by U19s and even more so with U21s, the slight majority of 'A' National Team players have been identified, highlighting again that this key "Transition Phase" is the stage that requires most attention regarding the pathway into 'A' International Football.

It should also be mentioned that a number of players require even more time. The German study found that 18.8% of Senior National Team players were *never* selected for a youth national team at any age.

Another Germany study (Gullich, 2013) looked at trends in their Elite Academy system, with the following conclusions:

- On average, around 25% of players are de-selected from every age group, every year, in elite Academies
- The age of recruitment into elite youth academies (ages 5–22) is evenly spread across ages — not concentrated in early childhood
- Only 34.8% spent more than 6 years within the elite system before the age of 22
- 28.6% of players who became professionals had at least one full year outside the elite system in their youth years, then re-entered and succeeded

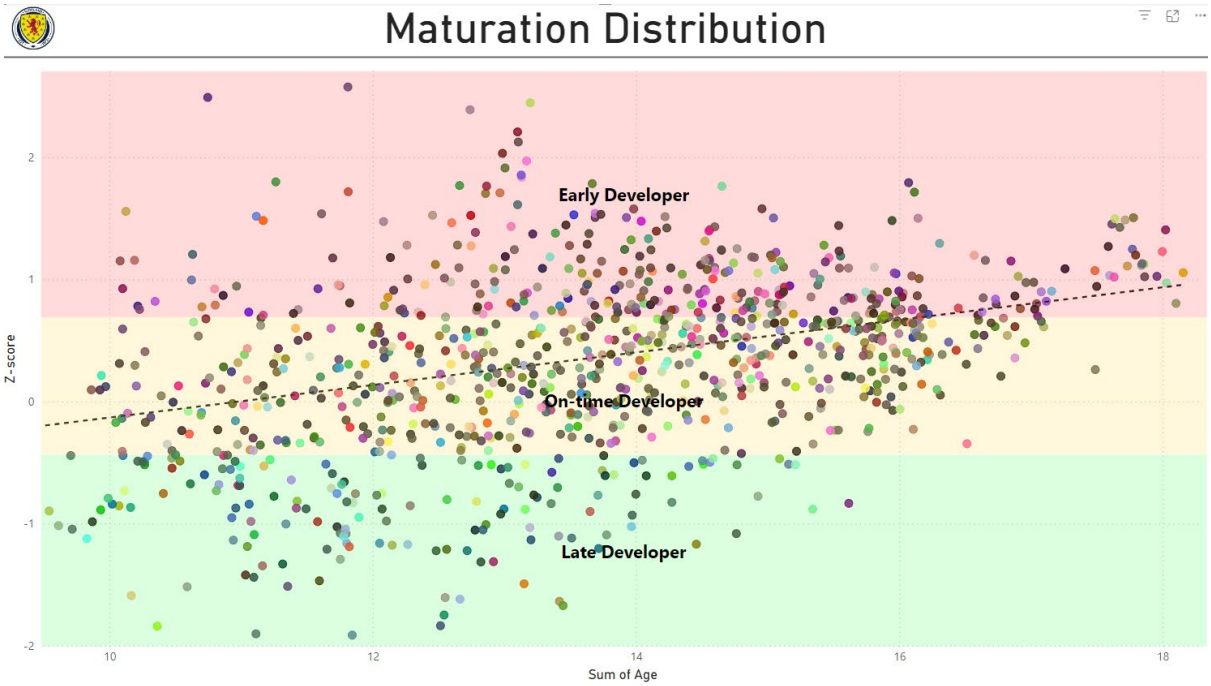
"If you want to assess whether a person has what it takes to be among the world's elite in their field – there is no point in looking at what you can see here and now: current performance."

- Rasmus Ankersen

"When Paul Scholes joined us at 13 years of age, he was 4ft 10, short-sighted, and he struggled with asthma. He could barely run."

- Sir Alex Ferguson

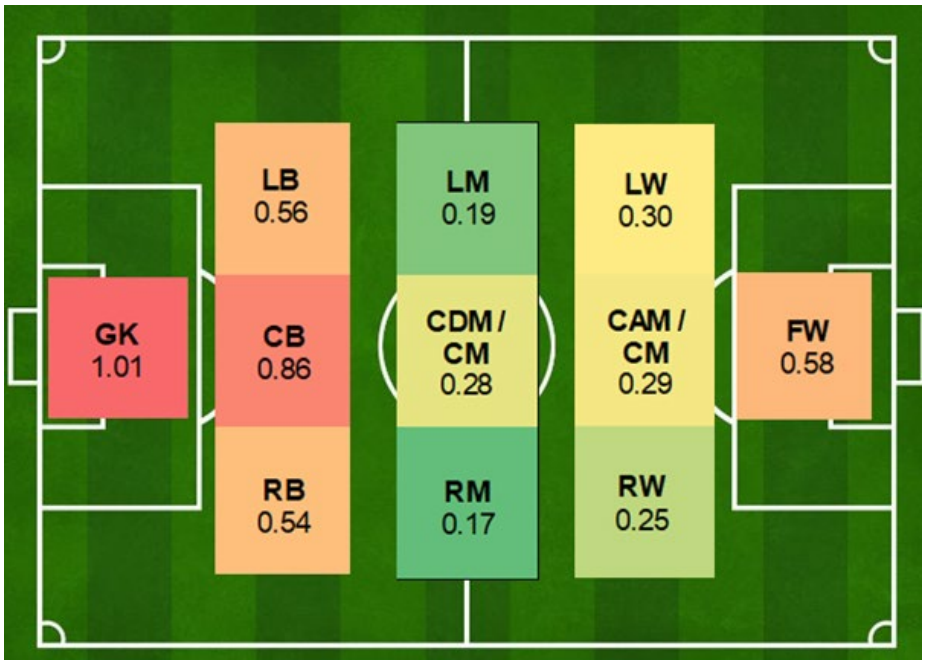
Selection Bias in Scottish Elite Youth Football



Many thanks to Steve Curnyn and Mark Leslie for their extensive work on this topic. Link to full study (Curnyn et al., 2025).

As we can see in the table above, selection bias is prevalent within Scottish football. As we know from the original table in this section, the majority of the world's best players were deemed to be too weak "physically" during their youth development years. In Scotland, we can see a clear trend that around the age of U12 (before growth), a healthy balance of young talent exists, and Academies are mixed between early, on-time, and late maturing players. However, once growth starts, Academies begin evaluating late maturing players on current performance.

Maturity Bias by Position (Club Academy Scotland)



Effect Sizes: Very large ≥1.5, Large 0.8-1.4, Moderate 0.5-0.79, Small 0.2-0.49

In the above image, we can see how maturation bias affects selection based on position. Somewhat logically, goalkeepers face the biggest selection bias followed by central defenders, and then strikers and fullbacks.

Midfield players and wingers have more chance to survive in the system without being an early maturing player.

The Scouting Bias

A 2021 study by Bergkamp et al. examined the processes used by 125 professional football scouts across all ages of the talent pathway.

One fascinating question which was asked to the scouts was: **what age do you think you can reliably begin to predict talent?** Keep in mind that evidence shows how flawed talent selection is within professional football at all stages of the youth development pathway. However, the study found:

- Scouts for U10-U12 thought the average age you could predict was close to 14. This is remarkable considering the very individuals that professional clubs employed as "experts" on scouting children themselves did not feel it was possible to predict their potential at this age, which reinforces developing a wide base, via a grassroots partner club model, before the age of 12.

- At every other stage, a clear bias was formed in the mind of the Scout:
    - Scouts for U13-U15 felt you could tell around age 14
    - Scouts for U16-U18 felt you could tell around the age of 15
    - Scouts for senior players felt you could around the age of 17

- In short, each scout felt that you could not predict talent at younger age groups, until the players reached the age that *they* were scouting. This bias shows that they backed their own ability to predict the future development of players, in spite of significant evidence showing how unpredictable talent development is.

Furthermore, the study showed the following:

- Agreement between scouts on the same group of players was typically low. This showed that scouting was very subjective, and clearly could not be accurate most of the time, since someone would have to be wrong no matter the outcome. Experience did not change this – very experienced scouts tended to disagree with each other just as much.
- The study also found that professional scouts tended to bias their opinion towards the very areas that this report has shown to cause the most errors in identification:
    - Taller
    - Faster
    - Physically dominant in youth football

Most scouts focused on what was visible – immediate performance and who played well 'today' – despite this having no correlation with future potential

Physical & Cognitive Testing for the Prediction of Talent

Another interesting area is, to what degree physical and cognitive benchmarking can help us predict the best players of the next generation. Prediction bias is not only limited to scouts themselves. Sport Scientists, for example, often believe strongly in the use of physical benchmarking for prediction. Data Analysts, meanwhile, believe that analysing player performance metrics can give us a reliable insight. The human bias hides in various forms that make the decision appear more "logical". However, they all fail for the same reason: **they evaluate what a player currently does, enhancing the performance bias.**

This is why data analytics can be very useful in identifying players for senior football, for example. They can give a subjective score on how the player performs compared to others. However, this is **exactly what should be avoided** in youth development – it is in fact the root cause of the mistakes that occur.

As was shown in the table at the beginning of this section, the majority of the world's best players were rejected on the account of their physicality as a teenager. It is not hard to imagine how **using physical tests to benchmark further enhances and adds to this bias**, all while giving the illusion of a "rational, scientific approach" to predicting future talent.

A great example of this is the NFL Scouting Combine. Rasmus Ankersen detailed this in his 2012 best-seller, "The Goldmine Effect".

First of all, we must clarify the following: the NFL Combine occurs with athletes who have already graduated from university – meaning these are not teenagers, but proven, physically mature performers around the age of 22. It is also must be noted the NFL is less of a technique-based sport than football, meaning raw physical characteristics matter significantly more, and the game is played in a format similar to "set-plays" in football, making it easier to break down and measure each situation. Finally, the NFL invests significant sums into this process, meaning

that they can access the world's leading technology with resources that would not be available to any Scottish academy.

All of the above means that it is **significantly** more likely that physical and cognitive testing can be predictive in the NFL Combine than in a youth development setting for any football club.

Players are tested in every imaginable way – how high they can jump, how much they can lift, how fast they can run – similar to benchmarks which are often used in football academies. All available data is analysed. The Wonderlic cognitive ability test is used for potential quarterbacks – after all, their ability to process information at high speed and make decisions under pressure is vital to the performance of such a position.

The problem is that these tests are shown to be as flawed as the scouts themselves. Over a four year period, from the top 40 players in terms of Combine testing scores, *half of them were not even still in the NFL*. From the cognitive assessment, two of the greatest quarterbacks of all time (Dan Moreno and Terry Bradshaw) *were among the 7 worst performers in the history of the test*.

It should be noted that physical testing *is extremely useful* for designing an individual training plan. This is because it is important to know the current maximum output of a player, in order to put them in the optimal zone to improve while avoiding overtraining or injuries. However, this is a separate topic from using such metrics in predicting future talent.

Colm O'Connell, Coach of 25 World Champions in Long Distance Running:

"The Europeans and Americans analyse everything. They break an athlete down into atoms. Here is your maximum oxygen uptake, here is your muscle fibre distribution type, over here you can see your pulse, and by the way, one of your legs is longer than the other. I think that kind of over-analysis destroys an athlete. I accept them as they are.

One of the most important lessons I have learned is to keep an open mind about their possibilities. They start at many different levels of commitment, enthusiasm and performance, and the rates at which they develop vary just as much. That means you have to be very patient as a coach. Very, very patient."

Jan Verbeek, Researcher, KNVB:

"Football is compensation sport. That means that the player is the aggregate of all the different parts. This means that there is not one "essential" quality.

For example, you can be cognitively very good, but also very slow, and vice versa. Coaches and scouts tend to have a bias towards what they think is more important. For example, they select only players who are fast, then later the player who comes out of that system is fast, and they use that as proof that they were correct."

Rasmus Ankersen, CEO of Sport Republic, Former Director of Football at Brentford FC,:

"Not only did Garrincha develop relatively late, he was born with crippled legs, with the left a full 6cm shorter than the right. After being rejected by several teams because of his abnormal physique, he was finally signed. He possessed none of the physical characteristics most people would believe a world class footballer needs. Under a system like the one in China or the USSR

that allocated players to the sport that best matches their physical profile, there's no way he would have been selected. Yet, Pele calls him the greatest ever Brazilian player."

Gustavo Banales, Technical Director, Uruguay Federation:

"We start to work with the best talent in the country in 3 day camps every week from U15, Monday to Wednesday. This collects the best players to train together. However, we rotate which players are invited every week, because we cannot tell who the future National Team players will be. This allows us to provide quality coaching to a wide base of players."

The Wide Net Within Elite Youth Academies

Many of Europe's best Academies are acutely aware of the challenges of predicting talent, and for that reason, have tried to develop mechanisms to keep more players at the club for longer, ensuring that many players receive the same training opportunities regardless of current performance.

This approach is very different to most Scottish clubs, who believe that they should reduce their numbers as much as possible to focus on what they believe to be the "players with quality".

The first notable difference is the number of players within Academies. In Club Academy Scotland, rules at Elite Tier prohibit the registration of more than 120 players from U11 upwards. An ECA Report on top European Academies found that the majority of them had around 220 players within the Academy. Barcelona, a club well known to develop talent which lacks in physicality, had 220 players at U17 and below. Sporting Lisbon, for example, had 340 players at their academy.

From personal club visits, the majority of top academies also carried squads at age groups where there was no national competition – for example U16. Depending on the country, the U16s either participated in the 2nd tier of the national U17 Championship, or in a regional competition, or in a bespoke club-designed games programme. Porto, for example, carried an additional 26 players in the U16s alone, outside of their "main" U15 and U17 squads, and had 10 full time staff working with this team, ensuring a maximum individual development opportunity for every player in terms of coaching, nutrition, psychology, analysis, and physical development.

At Dinamo Zagreb, for example, one particular age group which developed 14 professional players, had a squad of 24 players at U15. Clearly this was not detrimental to development.

Of course, a key factor in this is the work done in these countries before the age of 12. This develops a wide base of players with a high-level of foundation in technique and physical literacy. For Scottish Academies to see a wider base of talent enter their academy, the answer lies in developing it from the youngest age groups.

Within Scotland, on the occasions that clubs have tried to cast a wider net, it has usually led to success. For example, Celtic's decision to run a 2nd U17 team (which played in the second tier of the games programme) allowed them to retain Keiran Tierney, who would go on to generate the largest transfer fee ever received for a Scottish Academy player. Rangers have recently operated a regional 'futures' programme from U13s, continuing to work with a wider group of players who were not selected for the Academy. One such player made the transition from grassroots to the academy, to the National Youth Team, within the space of 18 months.

In other nations, more flexibility exists surrounding the registration of a player. For example, in Scotland, an academy player cannot also be registered to a grassroots club, something which would allow players to remain in the system while being allowed to play in regional leagues for a period. This would make perfect sense based on the evidence that many elite players found themselves outside of the Elite Academy system for a period of time. The question is how to intentionally develop a system that allows them to move in and out fluidly in a way that matches their non-linear development curve.

This also has the dual benefit of smoothing the 'exit process' – a potentially traumatic experience for many young players – if the player ends up being fully released by the club. In this case they have already begun to transition into another football environment, keeping them involved in the game.

Rules in some top European nations go further and allow sharing between two professional clubs, similar to a loan in senior football. For example, Ajax previously had a cooperation with Haarlem, a smaller professional club in the Amsterdam area. This meant they could 'loan' players from their Academy to develop. Vitinha, a typically late physical maturer who is now one of the best players in the world, was 'loaned' from FC Porto to Padroense FC at the age of 15.

This type of system benefits both parties. For Porto, it allowed Vitinha to remain in their system despite his physical challenges at that age, showing a long-term approach to his development (i.e. not releasing the player). For clubs like Padroense, it allows them to pick up players with potential who drop out of the system of the country's biggest academies, if they decide to release the player at a later stage. **Most importantly of all, it benefits the player.** This allowed Vitinha to stay engaged in an elite training system, while picking up match minutes at a level that was appropriate for him at that age and stage of his development.

"Based on what we know, why would clubs not have a bigger mass and select 30 players per squad, for example?

The clubs should not be fixed about what is a talented player, because history shows we don't know. We see that in our Youth National Team setup. Players who are deemed talented at U17 and below are usually not making it through.

Also, the clubs are all trying to compete for the same batch of players. If you are a smaller club, why would you not focus on Q3 and Q4 alongside late maturing players? We know that in the end, they have just as much chance of being successful, and they are often the ones the bigger clubs have missed, and are less likely to compete with you to sign."

- Kenneth Brogard, DBU Head of Talent Programme

Dealing with the Prediction Bias – DBU) Case Study

The DBU provides an excellent example of understanding the nature of youth football. The entire Federation strategy is built on the presumption that mistakes will always be made, but that **"in a country of around 5 million people, we cannot afford to lose any player".**

The DBU has set up a number of projects across different age groups which align to the evidence on Prediction of Talent discussed in this section.

> *"If we will have an Under 15 national team, I will leave, because I don't believe in it. We are also discussing whether U16 is worthwhile. You cannot predict who will be the best players at that age, and does giving them the spotlight, pressure and national jersey at that age really help them, or does that actually make it more difficult for them to succeed?*
>
> *Instead of selecting early, creating more pathways for more players is our winning edge!"*
>
> - Kenneth Brogard, DBU Head of Talent Programme

The DBU first of all work from what they call *the 4% rule* – this is based on studies and experiences in Danish, German, and Icelandic football, that around 4% of an age group can be estimated as players with high potential.

On average, they have 15,000 boys registered to play in one age group.

This means that the DBU programmes start by working with 600 players as a "wide base", before forming a pyramid system towards the 'A' National Team.

ATK+ Project – U10-U12

In Denmark, professional academies cannot register players until U13, which encourages them to work in a Grassroots Partner Club model.

However, from U10, coaches from the professional club can start to provide an additional training session every week for selected players from their partner clubs at no additional cost to the child.

The ATK+ programme works with approximately 600 players across the country – 4% of the age group.

There is a 50% rule employed to protect relatively younger players which means that **50% of the players in these centres have to be born in Q3 and Q4**. This, in turn, means the clubs have to push their grassroots partner clubs not to deselect these players, but to continue to develop them.

It should also be noted that there must be a ratio of at least 1 paid coach per 8 players at this age group, while some Elite Tier Scottish Academies have had 1 coach working with more than 20 players, alone.

DBU Talent Project – U13-U15

During these years, the selection of DBU-focused players begins to funnel in towards smaller numbers & National Team selection by continuing to cover a wider base than many other associations.

U13 Talent Training – Currently 300 players, but will be 600 by beginning of 2027

U14 Talent Training – approximately 240 players

U15 Talent Training – approximately 140 players

For the Talent Project, DBU trains with the selected players 8x per year – one day at U13 & U14, and for a two-day block at U15. From the 4th gathering onwards for that year, the second day for the U15 groups can involve internal games against the other regional selection.

U13/U14, is divided into 6 regional centres.

At U15, the country is divided into two regional centres (East and West). Additionally, the UEFA License courses use these U15 regional select groups as the 'training players'.

From U14, DBU begins working with an **additional Future Talent group,** which is composed only of late biological maturers. These players participate in 5 one-day gatherings.

Until halfway through U14, all selected Talent Project players are from outside of Denmark's elite academies.

"We don't think selecting the players already in an elite Academy at U13 is giving them anything extra. Most players who start there are not getting a professional contract. Our job is to make a better environment for the 2nd group of players who have missed that opportunity."

As research shows that many top players are not selected early by a top academy, this means the project specifically takes care of a wider net, helping maintain visibility on those players who were not selected. The elite academies select early, but continue to scout these DBU Talent sessions, and often deselect a number of their original players, instead selecting those from the Talent Centres as they scout their progress.

U16 – National Team & Futures Squad

At this age the DBU works with a total of around 65 players.

At U16, DBU aims to give opportunities to around 40 players to play for the 'regular' U16 Team, rather than shrinking the pool to who the coaches deem to be the best 20-25 players at that moment.

In addition, 25 players are selected for the U16 Future Squad. This squad is made up only of biologically late maturing players. DBU data shows that **more players make it through to U21 and A Squad level from the Future group than the regular U16 National Team, even though there are less players selected**. Some of Denmark's most famous players have come through this pathway and referenced this "really helped" them in a difficult psychological moment, where they were doubted by their coaches and peers. This aligns with research on a high challenge/high support environment – these players face a lot of challenges as late maturers in an organised Academy system (as we can see by the data provided for Scotland!), therefore still being involved in a national team programme can be the boost they need to keep working

through such difficult years. This also encourages the clubs to keep these players in the system, knowing that they have been selected for the national programme as being late bloomers with high potential.

DBU Talent Coach Project

The DBU employs 2 full time U10-U12 specialist coaches plus a full-time administrator for this phase, and 6 full time Talent Coaches for the U13-U15 Phase (although they also overlap).

These staff are responsible for visiting and supporting the ATK+ Projects and also organising the DBU Talent Project from U13-U15.

Outside of that, these coaches visit clubs regularly, and work to support the development of the academies. They organise seminars for elite academies on different topics, as well as delivering on-pitch training sessions, or observing and giving feedback to coaches at the Elite Academies. They also maintain communication with the Head of Coaching from each Elite Academy.

Finally, these staff also serve as the scouts for the young players from each region.

Growth & Maturation Project – Rasmus Hallander Porse

Denmark has a full-time Head of Growth & Maturation who focuses specifically on this phase. Rasmus is a predominant expert and researcher on this topic.

They apply the following rules for the selection of the U16 Future Squad:

- You cannot be heavier than 60kg
- You cannot be tall for the age, even if you are a late maturer biologically
- Some small players are just small players – not late maturers – they cannot be selected for this programme
- The strategy is to select players who are less advanced in growth than players in their own age group – this is about the percentage of how much you have left to grow. This means that a taller player might be selected over a shorter player, because he is actually behind in terms of the % of his expected height.
- "Bias can still exist within the late maturing group! Be careful that you don't just select the players who are the most mature of the late maturers."
- The DBU uses both the Camis Roach and PHV testing methods, and thirdly "the eye of the expert" to identify signs of testosterone. They note pros and cons to both testing mechanisms:
    - "The problem with PHV is that you are comparing players to European average"
    - "The problem with Camis Roach is, do you really know who is the real biological parent and do you have an accurate height for them? 95% of the height's parents report will be plus/minus 5cm"
    - "However, the methods are not the most important thing. The most important thing is to start doing something."

Research on Current A Squad Pathways (22 Players)

- 7 Players came from the U16 Futures, with only 5 involved at the traditional U16, despite it being a wider pool and 80% of the budget spent on U16s
- 9 players were not involved in the Youth National Teams until after U17s

“What we really did with the Future Squad was identifying these players for the clubs. This is where the development took place, but we helped to keep them in the system.”

From DBU research, the late maturing players start to catch up by U19, which aligns with research from other nations (and internal Scottish FA research) that is the first age group where the majority of A Squad players begin to emerge

“We need to support them until then – many players do not experience any success from U14 and will drop out or give up in this period if they have a normal mentality – this is where they need us.”

Sweden has also shared data – they have 7 A national team players come through the U16 Future group since they started a similar project

The DBU reference the Scott McTominay example as our most valuable ‘A’ National Team player, but a late maturer

“If you just bring the late maturer into the regular U16 or U17 national team, it doesn’t work in the same way. It’s not fair for him to play in those games because he will struggle and lose every duel. He is already facing a lot of challenge every week at his club. They need the chance to experience success.”

“Our job [the National Federation] is to look at the wide net of talent at an age group and make the talent visible.”

“For the early maturer, I don’t buy it that playing a national team game at U16 against a regular nation is developmental. If it is against a top nation like Germany or France, then it makes sense. Otherwise, he should be accelerated to the U17s if he is deemed to be talented.”

“For our U14 and U15 Futures groups in the Talent programme, we make the field dimensions smaller to adapt to their stage of maturation.”

Rasmus also noted how **late maturing players require extra attention in terms of training load,** because they have to exert themselves more than the rest of the group just to keep up. This topic was also highlighted in a study by Raymond Verheijen, and applies to players who train up with an older age group.

Finally, Ramus commented on **how vital an extensive dispensation is to keeping late maturers in the system**. “In the Danish U17 League, if you are a U16 and also a late maturer, there is almost no chance that you play in the U17s. That’s why it’s very important that you are allowed to play one more year with the U15s.”

Interestingly, the DBU **allows additional dispensation for Goalkeepers**. Not only late maturers, but also on-time maturers are allowed to play with a younger age group, as they also tend be deselected early in this position.

In Spite of, or Because of, Adversity?

As was discussed in the 2024 Transition Phase Report, 'Supercompensation' – the body and brain adapting to the level of challenge it faces – is a common theme in elite sporting performances.

Due to the evidence raised, a question can be asked – do so many of the world's best players survive to become the best *in spite of* the challenges they face, or *because of* the challenges they face?

- In terms of Relative Age Effect – a 2020 meta-analysis (Rubia, Lorenzo-Calvo, Lorenzo) across 19 team sports shows that those born earlier in the year have an advantage in youth competition, but that those born later in the year who make it through the system often excel in senior sports. A 2022 review by Swartz shows the 'Reverse Relative Age Effect' phenomenon in some cases – where, once senior competition is reached, players born later in the year may actually have an advantage.
- An 11 year study by Dr. Adam Kelly at one English profession club showed that players born in quarter 4 were **five times more likely** to earn a professional contract once selected for the academy.
- Another football study by Ford and Williams (2011) concluded that "Although relatively older players are more likely to be selected into youth national team squads, this advantage appears to dissipate and may even reverse by the time athletes reach the highest levels of performance."
- In terms of biologically late-maturing players, a 2012 study (Vandendriessche, Vaeyens, Vandorp, Lenoir et al.) suggested that this challenge can help them become better problem solvers and more resilient in competition with their peers. Wormhoudt et al. (2018) notes that physical pressure of more mature opponents can lead to rapid skill adaptations and proactive thinking, while Schorer, Cobley, Busch, Brautigam et al. (2007) concluded that late maturing players show superior technical skills.
- More strikingly, a 2007 study of professional players suggest that **late-maturing players often receive higher salaries,** suggesting that they often end up as the most talented players in their squad.
- It is notable in the nations which have strongly supported a Youth National Team 'Future' Squad featuring only late maturing players, that **more players end up reaching the U21 and A National squads from the Futures group than the 'regular' U16 National Team**, which is selected based on the coach's prediction of their potential at that time. The percentage of A squad players who featured at the youngest National Team levels across nations and cultures is low, showing that the selection bias exists almost no matter how the nation structures their youth programmes.

Research on Adversity in Youth Development

A study by Collins and MacNamara (2012) looked further at the topic of whether overcoming adversity is a *prerequisite* for elite sporting performance. They found:

- Talent systems tend to try and shield young athletes from difficulty, but this can limit resilience development and may disadvantage those athletes.
- Retrospective and prospective studies show athletes who reach elite status experienced **significantly more adversity** in youth compared to those who didn't.
- Psychological interventions like "resilience" training are useful—but often insufficient if not grounded in real, structured challenges.
- Athletes facing adversity learn coping strategies, problem-solving, and reflective skills—these are often pre-existing tendencies refined by the challenge.
- This aligns with stress-inoculation theory and post-traumatic growth, where manageable stressors facilitate stronger psychological foundations.

The authors recommended that talent development programmes allow players to move from operating in their comfort zone, to one which supports growth and development. This study provided the following practical recommendations:

1. Deliberate Challenge Integration

- Talent systems should intentionally include structured, manageable challenges—both sporting (e.g., competition losses, deselection) and non-sporting (e.g., academic exams, relocation).
- These are not harmful "trauma" but "purposeful and challenging" stressors designed to trigger the growth of coping skills.

2. Proactive Preparation ("Desirable Difficulties")

- Athletes should be mentally primed before challenge exposure, developing foundational psycho-behavioural skills:
  - Goal setting
  - Self-awareness
  - Motivation regulation
  - Stress tolerance
- This training serves as the icebreaker before the real test, easing adaptation and reflection.

3. Supportive Post-Challenge Debriefing

- After adversity, athletes should be guided through structured recovery and learning:
  - Reflective debrief sessions to shape meaning from adversity
  - Focus on extracting insights and strategies, not just coping mechanisms

4. Individualized Challenge-Development Balance

- Environments must be flexible—neither too safe nor overly challenging.
- Challenges should be scaled to the individual's current mental readiness, ensuring they:
  - Test and develop
  - Do not overwhelm
- This requires continuously adjusted support, not a one-size-fits-all challenge model.

5. Challenging Culture, Not Just Isolated Events

- Create a long-term culture of challenge and reflection, not just sporadic "adversity experiences."
- Consistency in challenge exposure and response builds deeper psychological characteristics over time.

Academies should redesign programmes to include:

  - Mental-skills workshops
  - Simulated adversity in training
  - Rotational squad placements to experience deselection
  - Structured coach-led reflection sessions
- Coaches should see adversity as a developmental tool, not a deterrent—adjusting challenge difficulty over time.
- Align pathways, coach education, and culture to balance challenge, support, and growth, not just prevent failure.

Importance of Individual Context Before Implementation:

Before building in any obstacles, it is important to consider other areas of a child's life that play a pivotal role and impact on resilience including; family life, education, peers and social circles, community etc. If we think of each of these areas as carrying different loads for different children, then it is important to understand from each individual child what their load looks like as well as metaphorically how much they can carry based on their own level of resilience.

A metaphor used in understanding stress is 'tipping the scales'. Each child will have a load that will tip the scales in a negative direction, positive experiences and support then rebalance the scales, and this is where football can be a force for good.

It is important that this process of equipping children with the necessary tools and strategies is first of all understood by all in terms of wider child development and the science that supports healthy brain development in children and adolescence. Secondly that any load is individually tailored to each young person's current situation.

Building in adversity as mentioned above should never be used as a justification for harmful and abusive coaching practices.

Case Study from Outside Football – Stephen Francis – *Excerpts from "The Goldmine Effect"*

MVP Track and Field club is undoubtedly one of the world's best athletics clubs, with a host of World Championship sprinters. The fascinating thing is that when Stephen Francis opened the club, he had no experience in Elite level athletics, no budget, and to make matters worse, had no access to the nation's best athletes. Instead, they would attend modern, proven athletics clubs or opt for Scholarships in the US. **This meant that Francis could only select from those who others had deemed not to be high potential.** Francis couldn't even afford to buy them running shoes, so they would often train in bare feet. In spite of all these challenges, **Francis identified and developed the likes of Asafa Powell, who went on to become (at that time) the fastest human being in history.** There are many other names on this list.

This is another clear case study which shows the failure of physical testing to determine potential. **Even in 100m sprinting, where the entire performance comes down a single metric of a single athlete – the amount of seconds on the clock – Francis shows that this was not a good indicator of who would become the fastest athletes in the world**.

The success of MVP is down simply to Francis' unique ability to see athletes in the opposite way than the others. **He ignored their performance, and looked for the hidden potential.**

Below are a collection of quotes form Powell, taken from "The Goldmine Effect":

"In my experience, it is very difficult to work with people who have been too proficient too early. For one thing, they are not very open to new input, and for another, they have problems maintaining and developing their motivation. They seem to feel entitled to win."

"I steer clear of those 'I can't miss' athletes as a matter of principle. Instead, I look for the most development potential. I love to work with people who are hungry for a second chance."

"It isn't difficult to identify talent like Usain Bolt. Anybody could see that he had huge potential when he was 16. The real challenge is to identify the potential in something currently ordinary that hasn't flourished yet."

"If you want results right away, which is what most people aim for, or you are under pressure, you will only see an athlete's performance. That is why people overlook the athletes with the greatest potential – because of lack of courage."

On Asafa Powell:

"He'd been to a poor high school with a bad coach and hadn't trained much at all. The training he had done consisted of him going over to GC Foster college in Kingston, looking at the way they trained and then going home to try and do the same thing. This told me that Asafa probably had considerable underexploited potential. One of the keys to understanding potential is to look not at how many seconds they run, but at their background. Is there something here than can still be improved?"

Modern Coaching & Club Leadership Roles

Academy & Club Strategic Leadership Roles

One observed trend around successful European nations was both the enrollment in bespoke continuous development programmes for those in senior leadership positions in clubs, and qualification pathways for those hoping to reach such positions in the future. This includes programmes for CEOs, Sporting Directors and Academy Directors.

The Scottish FA's requirement is that Academy Directors have a UEFA A, UEFA Elite Youth A or UEFA Pro License – high level coaching qualifications. However, it is also mandated in the Academy criteria that the Academy Director is not allowed to coach a team at the Academy.

This leads to the question – what is, then, the role of the Academy Director? If their specialty is in coaching, it would be illogical to prevent them working with players directly. If their specialty should be the strategic management and organisation of a long-term player development pathway, including managing and recruiting staff, dealing with budgets, developing KPIs and structured processes, and so on – then none of these topics are focused on within the coaching pathway.

Now consider the case study of Pedro Mil-Homens. After 10 years as Academy Director at Sporting Lisbon, during the period that it was one of the best in Europe, Pedro moved to Benfica, overseeing the development of one of the world's best academies. **Pedro has no experience coaching a football team, yet has organised two of the best academies in the world**. In fact, Pedro's PhD was in strength and power training, and before joining Sporting, was an Academic and Professor at Universities in Portugal. **Clearly, this shows that being a good football coach has no correlation with being a world-class academy director.**

Based on those who have worked with him, Pedro did however, have a strategic vision of how an academy should operate. He understood the importance of a regional grassroots development system and collecting the best players in a residential facility during adolescence. He also used his academic insight to individualise profiling of youth players, ensuring training loads matched their physiological development and not did not allow coaches to determine how much each player should train.

Under his leadership, Sporting's academy adopted regular biomechanical and neuromuscular assessments designed to monitor growth, fatigue, and risk—all practices rooted in his research.

This helped the academy prevent injuries, control load, and maximise development across adolescent age groups.

This report therefore recommends considering both bespoke ongoing engagement with current club leadership (including Academy Heads of Department & Phase) and tailored formal education pathways/licensing for those looking to progress to such roles in the future. Examples from other nations involve not only structured education provision, but also gatherings for people who are working in the respective roles simply to discuss scenarios they are facing, as well as sharing experiences. Informal education, such as WhatsApp groups run by the Association where articles and updates can be shared or questions can be asked to the group on an ongoing basis, is also a key part of modern learning.

It is also clearly worth considering why an elite coaching qualification is deemed necessary for a position which does not allow for any coaching involvement.

Trends in Elite Coach Development

Based on observation and insight to many of Europe's top Academies, the main pattern was as follows:

- **Clear player development structure** – philosophy, curriculum, age & stage development plan, etc – comes from the top of the club and/or academy.
- **Managed implementation** – The Head of Coaching role, alongside the Head of Phase positions, are responsible for ensuring the delivery of the strategic vision. Individual coaches are not allowed to deviate from the structure outlined by the club.
- **Age group coaches are trained in-house** – Because the club has a clear methodology of working, and full-time staff, most top academies preferred to bring in younger coaches and educate them on the way of working at the academy. Many top clubs found this preferable to recruiting experienced coaches who had worked at other academies and may be less willing to adapt to the demands of their methodology.
- **Coaches often start in Partner Club/affiliate programmes** – At many top academies, the partner club model not only develops players via the grassroots clubs in the area, but because the professional club provides the curriculum and way of working, it also helps to develop and identify young, aspiring coaches with the potential to move into the Academy.

An ECA Report into top European Academies noted similar trends. For example, it noted at FC Barcelona that *"Coaches are usually very young and do not necessarily have past experience at high levels",* or in Bayern Munich that *"coaches, particularly in the younger years, have usually been students in sport or have a background in teaching/pedagogy"*.

At FC Nordsjaelland, the Head Coaches of the U13 & U14 age groups (both full time) were 22 and 23 years old, both having come through the Grassroots Partner Club projects.

In Portugal, many examples now exist of coaches who began their career in the grassroots projects of the professional clubs, worked through the age groups at the academy and now work in the senior professional game at the very highest level. Very few examples exist of coaches developing in this way in Scotland.

At both Ajax and Dinamo Zagreb, the preference was for a Head Coach of each youth age group to have an academic approach to coaching – including detailed knowledge of periodisation, methodology, planning, and overall leadership of the development process. The Assistant Coach usually had a background in the professional game (i.e. a former player) who would organise individual and small-group trainings alongside supporting the Head Coach.

In the majority of cases, coaches of this profile who were observed at top academies had a **strong theoretical understanding of player development**. This means their knowledge and training extended far greater than their ability to plan, organise and execute a training session "on the grass". Coach Education in these nations is often significantly more academic in nature, with exams and pass/fail coursework on a range of topics, separate to the on-pitch delivery.

It was also observed that the criteria around coach licensing was more relaxed in other countries, allowing for clubs to bring in younger coaches and train them in their methodology. By insisting that all coaches already have "A" Licenses, Scotland has created a chicken and egg problem, with a number of clubs commenting that they were not able to take the coach with more potential because they needed to recruit someone who already had the qualification. It then means that many young coaches struggle to get the (expensive) qualification, because they cannot get a job in an Academy.

In Netherlands, for example, there is no license requirement at all for the Assistant Coach. This allows the clubs to employ and develop younger staff in their own methodology and way of working.

In contrast to all of the above, the following was observed in Scotland over the past year:

- A number of Academies have no clear structure, strategy or player development process from the top.
- While it is mandatory to employ a Head of Coaching, coaches at many Elite academies remarked that they have had no formal, in-house coach development programme.
    - In many cases, the Head of Coaching was focused on a separate full-time role, such as working with the 1st Team or coaching one of the older age group squads.
- The vast majority of Elite academy coaches were part-time, meaning they could not see coaching as a vocation and develop their expertise with the level of dedication they would prefer.
- It is mandatory to have two "A License" (or equivalent) level coaches at each age group. Many clubs complained about this, feeling it is restrictive and that it prevented them from developing coaches with higher potential. Clubs in regions which are less densely populated reported particular concerns with this criteria.
- Many club stakeholders have remarked that there is a "lack of young coaches" coming through in Scotland, however they have no active Grassroots Partner Club model through which to develop the next generation of coaches in the same way as their European counterparts.

Real Sociedad Case Study

- The methodology of the Real Sociedad Academy is mandated from the Sporting Director and no coach is allowed to deviate from the prescribed plan. *"We are not concerned at all if the coach loses games. But we do not accept them not following the prescribed methodology."*
    - Every detail of academy training is logged via a customised Power-Bi platform which allows the Sporting Director to track and follow every detail of the player's development.
- From winter every year, the club begins a 6-month monitoring of specific coaches with potential for the academy who are working in local clubs in the region. The aim is to know candidates in depth in case the moment comes (usually in summer) where they need to replace a member of staff.
- They want to see how the coach behaves when they don't know Sociedad is watching – checking training sessions, games etc discreetly.
- Sociedad don't believe in the "coach development" model where staff progress through the academy, instead they focus on "specialists" for each age group.
- The Academy operates a "Partner Club" model, working with 100 grassroots club in the region until U12, developing and recruiting the appropriate coaches for these clubs, and beginning the Academy programme at U13.
- Phase 1 of Academy is U13-U16, Phase 2 is aged 16+
- 80% of Phase 1 coaches have a formal teaching qualification, which gives them a pedagogical approach to their work, and also an understanding of the player's balance of sporting and academic life
- In Phase 2, Sociedad employ staff who have a previous connection with the club and understand clearly their identity and mode. For example, former Academy graduate Xabi Alonso returned as B Team Head Coach.

FC Nordsjaelland Case Study – The Head of Coaching Role

- The role is to develop the coaches & create cohesion throughout the pathway
- "Our style of play is the playmaker" - not the individual
    - The 1st team is obliged to play the same way as the academy
    - "This is by far our biggest strength in the market "– alignment throughout the club
    - "Our model is not to sell from the academy, it's to sell from the 1st team"
    - "This gives us a huge advantage over other clubs who can only develop generic players because they don't know what they are developing for"
- The style of play gives everything context– for example, what is bravery in *our* context? "For us it would be taking the ball close to pressure, and deliberately seeking pressure to create space somewhere else, for example"
- "Our coaches are more academic than the average club – there's quite a lot they have to understand, absorb and transfer on to the pitch – we currently have no former players working in the academy"
- "One of our coaching key pillars is to teach the players what to read in the game" – the style of play is based on "triggers" depending on the situation & reaction of the opponent

- Deliberate Practice
    - Before the session – objectives and purpose provided to the players, including video clips or pre-training meeting – "we expect players to do some preparation before they arrive, so they are aware of the purpose of the session – when we meet up, players go through the plan before we train"
    - During the session – refer to learning objectives of the session by giving *immediate and relevant feedback*
    - After the session – evaluate the learning objectives and outcomes linked to the purpose of the session immediately after

- Coaches receive a 6-week periodisation with how many times they are supposed to work on each objective over that period – "the actual session planning is up to them"
- Each phase of the game has a detailed breakdown of the situations and formations from the style of play, then principles, then technical skills
    - This breakdown is then reversed through the age groups
        - The youngest age groups focus on the technical skills for that phase of the game
        - At the 12-16 phase, players are focusing more on the principles of that phase of the game
        - And finally, players begin to focus on the specific formations and game scenarios – for example, building up against an opponent who is pressing in a specific way in a 4-4-2
    - The different age groups of the academy have a difference in methodology and training framework – in terms of how long is spent on each type of exercise

- The FCN ambition is to develop not only players, but employees that can work at the highest international youth level
    - "When I was employed here, I was also evaluated on a variety of things like how curious I was to seek new information. One of the questions was what good books have I read recently, for example."
- There are two very detailed coach feedback plans for a session – one about the coach themselves and their delivery, and the other about the session design according to the methodology
    - The Head of Coaching is responsible for focusing on the Head Coaches of U17 and U15, and Phase leaders focus on U13-U14 and Children's Phase respectively
- Evaluation of the training session – how long (timing and percentage) the session focused on each aspect is evaluated and discussed in line with the methodology – "the reality not the plan, sometimes a coach plans to focus more on something but then we see that in reality, it hasn't quite happened – we try to align those things"
- In order to ensure that the coaches understand the FCN style of play and game principle, they are required to do their own video analysis including tagging and cutting clips from training and games – the Academy analysts focus more on individual player clips and periodic KPI reports

Developing the Grassroots Coaching Network

While it has been discussed in this report that Academies around Europe work closely with a large number of grassroots clubs to provide a development curriculum and coach education, this does not mean that the Governing Body has no role to play.

It has also been discussed how in the best examples of smaller nations developing elite talent, (such as Iceland, Uruguay, Croatia), grassroots coaches are required to have a license to work with the youngest age groups ("*Especially them"*).

Another interesting approach was taken by the DBU, which initiated a "future coach programme". The Future Coach programme allows the professional clubs to identify young players who are players in the Grassroots Partner Club between the ages 14-20. The DBU will subsidise the 'C' License for these coaches, who are also trained by the professional club. In return, they must coach with the youngest age groups in their local club for that year.

Furthermore, they offer an online grassroots curriculum for those clubs who do not follow the methods of a professional academy. This splits the session into three simple and clear parts for the volunteer coach:

1. One ball - one player (ball mastery & 1v1 skills)
2. One ball - two/three players (passing & receiving)
3. Small sided games

It is worth considering how the Scottish FA can establish similar projects to improve the quality of grassroots coaching – such as working at that level becoming part of the criteria to receive the C License award, or utilising the many University and Colleges around the country offering

courses related to coaching to expand the network of grassroots coaches through “work experience” programmes.

It should also be noted that this impact will only be felt if such coaches work directly at the younger age groups of local clubs, at the age groups before the professional academies begin working with players (e.g. U6-U10).

The Importance of Parents & Guardians

Player Name	***Parental Circumstances***	**Direct Quote**
Cristiano Ronaldo	His mother sacrificed everything, including working multiple jobs, to support Cristiano's career.	"My mother always told me I had to be the best. There was no other option. She is the pillar of the family and what I have today is because of her."
Lionel Messi	His parents moved their life and his siblings across continents to Spain when he was 13 so Messi could join La Masia and get medicine he needed to combat his Growth Hormone Deficiency.	"Without my parents' support, I wouldn't have achieved anything."
Erling Haaland	His father Alfie, former professional player, managed his early career and made developmental choices like keeping him in Norway for longer to develop and choosing Dortmund as the best next step.	(By Alfie) "We wanted to build him step by step.. it's not about moving fast, it's about moving right."
Lamine Yamal	Even though Lamine lived close enough to travel daily to train with FC Barcelona, the father refused to sign unless he was allowed to stay in La Masia, understanding the holistic benefits (education, nutritional, learning to be humble, etc).	"They always took me to training, even when they were tired. My family keeps my grounded, my father always tells me to stay humble."
Thierry Henry	Henry has commented that his obsession to improve and succeed	"He was strict, yes, but I wouldn't have made it without that discipline. He was always there, always

	came from his father's parenting.	watching. And that mattered more than I realized back then."
Michael Owen	Credits his father, a former professional player, as being the reason for his motivation and career success.	"Being guided by a father like mine made it hard to fail. It was the single most important factor in my career success. I owe my dad everything, he gave up a lot to support my dream."
Robert Lewandowski	Lewandowski's parents shaped his development from the early years – his father was a professional player and judo champion and his mother a volleyball player.	"Having those parents helped a lot – it taught me at an early age that having talent isn't enough. You need habits, discipline and belief."
Harry Kane	Credits his parents for being the reason he overcame early rejections to have a successful career.	"My parents always believed, even when others didn't. My dad used to take me and my brother to the park with a football nearly every day after school. That's where the love began."
Andres Iniesta	Living 300 miles from Barcelona, Iniesta's parents have spoken about their heartache at allowing him to join La Masia to fulfil his potential.	(Iniesta's father) "It was the hardest decision of my life to allow him to move so far from us. But I knew he had a gift."
David Beckham	David Beckham's father is known as the key driver in his development as a young footballer.	"Every night after school, my dad would take me to the park or we'd be in the garden. It was always about practice."

The Scottish FA's Report on the Transition Phase (2024) involved speaking to 1st Team coaching staff about their experiences working with young players who had broken through to the 1st team. We asked them what factors were influential in those who succeeded compared to those who didn't.

Many times, we heard mention of the parents & guardians. It was clear that coaches who had a lot of experience in seeing career trajectories of many players believed that the parental

influence was crucial. However, it was often admitted by Directors of a number of academies that there were no real structured processes set out to develop the parent and guardian's understanding of elite youth football and the development pathway.

When speaking to parents and guardians themselves, the diversity of experience is clear. Some parents have a decent understanding of how the football world operates and are able to give the right advice to their children at different stages along the way. Other parents, however, admit that they know almost nothing about the world of football.

Since most stakeholders in Scottish football believed that parents and guardians with a good understanding of football was an advantage for the player, the question was raised as to how the game could help support and provide educational resources for those parents who do not have that experience.

When researching for this report, the parental influence came up time and time again in the trajectory of world-class athletes.

There are three main ways that parents have been observed to play a role when analysing the background of top-level players:

1. Phase 1 - The key figure in early-years engagement – does the parent encourage them to practice with the ball, or join a local football club, or play with them together in the garden, etc? When the child gets frustrated and discouraged, does this parent allow them to give up or teach them resilience strategies and to continue working towards mastery? Without this foundational support, there is no potential for the child to reach the highest level.
2. Phase 2 – The sacrifice – It was notable when asking young players enrolled in Scottish academies about their experience that they are fully aware of the sacrifices their parents make. Modern football development often involves driving the child to venues which are not local for training, games, and development opportunities. In many cases this involves parents having to get out of work early and/or sacrifice their own free time, including weekends, to support the dreams of their child. In other nations, sacrifice can range from parents with very limited income spending what they have to support their child's football development, or allowing them to leave home to join a residential academy as a teenager, for example.
3. Phase 3 – The decision maker – The other aspect of parental involvement is the way that they influence key decisions on a player's journey. Should they join this academy or that academy? Which one will give a better development experience? Should they do extra training when they get home or rest? What should they eat? What age do they need to have an agent and who is it that they can trust? Should they stay at a smaller club and play regularly or join a bigger club to develop further? There are countless examples of such decisions - and this is perhaps the area where a professional academy and/or an external party can help with structured resource.

Examples from Research

As far back as 1985, Benjamin Bloom completed a study on 120 individuals who were internationally recognised in their field – from elite sports to mathematics – to see what trends he could find.

Unsurprisingly, Bloom found that **parents were central to the development of these talents**.

Some of the themes Bloom discovered have been observed many times since in modern research and real-life examples. They are outlined below:

Early Exposure – As was discussed earlier in this report, this is a fundamental trend. Those who go on to accomplish great things in their field have been exposed to the domain from the earliest years, before ever formally joining the activity.

Developing Resilience – Mastery is a long process which includes difficulty, failure, and discipline. It was discussed in this report how the repetition required for a high-volume of 'self-practice' was often not considered 'fun'. Here the parent is again crucial to ensure that the child does not give up in difficult moments and continues to practice until the point that mastery is reached. In Bloom's study, the parents greatly valued virtues like self-discipline and strong worth ethic. Once a child overcomes these hurdles and sees their progress, this then triggers the reward centres in the brain, making children enjoy the subject more.

"They tried to instil these qualities in their children. Work before play, keep your promises, keep pursuing your goals, and so on. These qualities recurred in parents time and time again."

High Level of Investment in the Child's Activity – In this sense, investment does not necessarily mean financial. However, a key trend in high achievers was that the parents were significantly invested in their child's area of choice. Bloom found that many of these parents were willing to do almost anything to support their child's development. On some occasions, this included the family moving their home to be closer to elite coaches, or spending a significant proportion of their income and time to ensure the child was able to develop their interest.

Finding the Elite Coach – Parents of high achievers recognised that, at some age and stage, the child would need to find an expert coach to allow them to fulfil their potential. This involved what has been coined "coach shopping" – the parents did not simply take their child to the coach who was local or who had a charming personality. They looked for those with a proven track record in developing excellence, even if that meant relocating.

"No matter how gifted children may be, they do not develop their gifts without a parent or surrogate parent behind them, encouraging, stimulating, and pushing.

At first, I didn't agree with the way they pushed children into something at an early age. It felt like an arranged marriage. But then I realised – there's something really good about this. Kids are really gaining mastery. And when they see that they're becoming good, they develop motivation."

- Ellie Winner, Psychologist who studied the development of expertise

“People say that you shouldn’t push your children. But I feel the opposite. If you are not going to help your children to unfold their potential, then who is? I saw tremendous potential in my son and I didn’t want him to waste it.”

- **Enzo Calzaghe, father of former World Champion boxer Joe Calzaghe**

“Far be it from me to judge what is right and wrong, but one thing is certain: if other countries want to match the South Korean women, they need to take a good look at what is going on here. There is no doubt there are lessons to be learned from parents here.”

- **Robin Symes, Head of Golf Academy in Seoul, South Korea**

“Many reported very high levels of parental involvement in deciding their childhood schedule, but viewed this as essential to their success.”

- **2019 Study (Harwood et al.) on Olympic Athletes**

The Scottish Football Context

In many cases Scottish football has discouraged parents & guardians from actively pursuing their children’s development as a footballer at an early stage. The reason for this is clear. Ongoing examples of unwanted behaviour have created a reaction – the image of an aggressive parent who wants their child to be a successful footballer evokes memories of touchline behaviour at the side of a grassroots pitch, for example.

It is not in dispute that examples of such behaviours exist, and the Scottish FA strongly discourages this.

However, while specific behaviours should be challenged, it is vitally important that this message does not become misconstrued. Parents & guardians should not feel ‘shamed’ for actively encouraging their children to pursue their dream of becoming a footballer, or being invested in their development. As we can see, parental investment is a key trend in elite performance, particularly during the early years. **The Scottish FA, and Academies, should instead encourage parents & guardians to be highly invested in the development of their child throughout the footballing pathway, and support them in how best to do so.**

The solution to the problem of unwanted parental behaviour is not to tell parents to stop being an active participant, but instead, to support and educate them on how to be a more *informed* participant.

At some academies, a culture is created that feels like parents should almost exist separately to the development of the player. Coaches may be told not to communicate with parents outside organised parent meetings, for example.

The trend from this section is clear. The parent or guardian, and their behaviour, is one of the most important factors in the success of the child, whether in football, or in any other discipline.

Furthermore, the majority of the world's most successful athletes relied on substantial levels of dedication from their parents to help them achieve their goals.

Therefore, rather than attempting to remove the parental influence from our young footballers, it should be proactively encouraged as part of all marketing in children's football, along with a robust education platform to help parents navigate the complex world of youth football.

Platforms such as No1 Fan Group already provide a substantive resource and the Scottish FA should consider how to partner with such organisations alongside building customised resources for parents, and including key messages on this topic throughout the established Coach Education pathway.

Summer Football

The report has constantly referenced Iceland, Denmark and Norway as nations that we should look at to improve our player development models. None of the 3 have a larger population than us, all have geographic challenges, and none of them were ahead of Scotland in terms of player development in the not-so-recent past. All of them have made strategic decisions to change how they develop young players in the same way that we can.

One topic that was not mentioned so far in this report, however, **was that all three operate a summer football model** throughout all the years of the player development journey.

This trend mirrors the statement made by UEFA in the 2017 Grassroots Report, that: *"Football in summer months is more developmentally appropriate for young players in Northern climates".*

Furthermore, academic research such as the work of *Frontiers in Psychology* (2019) clearly showed that people were more likely to want to be physically active, take part in sport, and enjoy taking part, in summer than in winter.

For his dissertation, student Dougie Anderson interviewed 9 Youth coaches working in Scotland, some with more than a decade of experience. **There was unanimous agreement among those Youth Coaches that youth football should move to a summer model**. Some of the quotes from these coaches are below:

"We train and play better in the summer. It's not even close. The surfaces are better, the ball moves properly, and the kids enjoy it more."

"The quality of football would 100% improve – the pitches are better, the kids are more focused, and you can train and play consistently."

"In winter, you get weeks without playing. In summer, you can build rhythm – and kids get better quicker."

"Sometimes in winter we don't train for days because pitches are frozen or flooded. That doesn't happen in June."

"Kids learn more when they play more. And they play more in the summer – simple as that."

"You can see better passing, quicker feet, more confidence on the ball when kids are playing on decent grass and in the sun."

"In the summer, kids don't just train – they go out and play more. You see them in the parks, on the pitches, playing for fun. That's development too."

“You get more smiles in summer. That matters more than people think.”

“Kids are more likely to keep playing if they enjoy it. That means not freezing and soaking wet.”

“You can feel the difference – more energy, more laughter, more confidence in summer sessions.”

This report has discussed how, for the world’s best players, access to playing football 12 months of the year was a key trend. In winter, for example, Futsal could be much more heavily utilised within youth football to provide access to indoor, hard-court facilities.

However, the fact that football stops in the summer, when children are more likely to want to play outdoors, seems highly illogical.

Based on previous conversations on this topic (although dating back a number of years), various challenges existed to enable summer football to be introduced. This included being unable to gain certainties that facility access would be feasible across the country to cater for the scale of activity required. There was also split views amongst coaches and officials.

With regards to facilities, the festival or ‘camp’ format becomes one potential solution to this problem, particularly with younger children. As was discussed in detail early in this report, this is exactly how Japan operates until U13 due to a lack of facilities – teams will drive to one centralised facility, where they will play against several opponents and practice with the ball in between, from 8am until 5pm, on both Saturday and Sunday. Many clubs in Scotland also run camps in a similar fashion.

The recommendation from this report would be to ensure that all children have access to playing football during all weeks of the summer, without relying on ‘postcode lottery’, or having access to a one-week camp, but no access to play the following week, for example.

A move to summer youth football is a proven model in similar nations who excel in elite player development. It is therefore recommended that those involved in youth football in Scotland investigate this option further.

Height and Physicality of Elite Players

Player Name	***Listed Height***
Lionel Messi	1.70m/5ft 7in
Luka Modric	1.72m/5ft 7in
Xavi Hernandez	1.70m/5ft 7in
Andres Iniesta	1.71m/5ft7in
Marco Veratti	1.65m/ 5ft 5in
Bernado Silva	1.73m/5ft 8in
Phil Foden	1.71m/5ft 7in
Vitinha	1.72m/5ft 7in
Joao Neves	1.72m/5ft 7in
N'Golo Kante	1.68m/5ft 6in
Pedri	1.74m/5ft 8in
Florian Wirtz	1.76m/5ft 9in
Antoine Greizmann	1.76m/5ft 9in
Mo Salah	1.75m/5ft 9in

During the research for this project, it was mentioned a number of times by both youth and 1st team coaches in Scotland that players in their club were either "too small" or "too skinny" to play at a high level.

This is an interesting perspective considering the above table. The section on "Prediction of Talent" discusses the issues surrounding late maturation at length, and data shows that Scotland has a significant problem in this regard.

However, this is almost a separate topic. The maturation of a teenager is one thing – but the ability of a player to achieve a high-level career based on their physicality is another.

For a nation of 5 million people, it is even more pertinent, as biases shrink the talent pool even further via the Pygmalion Effect.

The Pygmalion Effect is a well-studied psychological phenomenon that shows the effect that expectations of a teacher or coach have a significant impact on the outcome. For example, if a

coach believes that small or slight players cannot play, they are less likely to spend time helping them develop, and more likely to do select them from the system. This means, over time, **these players will not develop – not because they are unable – but because of the bias of the coach**.

Clearly, the table above shows that **many of the world's best players are both small and slight.** Height and excessive upper body muscle mass is often spoken about as a positive by Scottish coaches. Of course, this does provide advantages in some situations. Defending a corner kick would be a clear example.

On the other hand, it also has some disadvantages. For example, smaller players have a clear biomechanical advantage in tight spaces. Taller people simply find it more difficult to change direction at high speed in small spaces while maintaining balance. What's more, **analysis shows that the players who excel in tight spaces attract the biggest transfer fees**.

There is a similar trade-off with muscle mass. More muscle consumes more oxygen, meaning it requires more energy, and given that football is predominantly an endurance sport rather than one that requires upper body strength, this comes at a cost. **This is why, for example Cristiano Ronaldo deliberately lost upper body mass** to lose 2kg of weight while at Real Madrid. **Consider the following statement by Jurgen Klopp about Joe Gomez**:

"When I came in I saw him for about 20 minutes playing in the under-21s. Then he got injured and when he came back again he was heavy... He had a lot of muscle and you only need muscles like that if you're only going to the beach or whatever.
We had to work on this and now he's back. He lost weight, he's really fit, he looks sharp."

The other notable factor in this public statement from Klopp is **that it is regarding a central defender**. It is not uncommon for coaches to feel that central defenders need to add signific upper body size. Consider the following thoughts of William Gallas, (84 Caps for France, including the World Cup Final – notably Gallas was also 5"11/1.81m) who was one of the best defenders in the world, in the most physical league in football.

"We can see that many modern academies are not producing too many top central defenders. And one of the biggest mistakes I see is when the youth coaches, with no understanding of what is required to play in that position at the highest level, send the defenders to get big in the gym. You are destroying the player!

I was never big in my entire career. Whenever I added extra kilos of muscle, I could feel a difference in how sharp I moved on the pitch. So, I knew exactly what weight to keep my body.

I used to go to the gym with my personal coach, every single day. But I deliberately did not train for size. Everything was low repetition, dynamic movements, to move explosively on the field.

Young defenders don't need bodybuilding. They need to be able to adjust their feet quickly, move sharply, change direction. That is the key.

Another thing – the most important quality for any defender is to read the game. You cannot coach defenders the way we see attacking players being coached in academies, where they are allowed to play from instinct. A young defender needs someone to sit with them for hours, looking at videos of game situations. What is going to happen next? Did you see it? Are you prepared? Is your body in the right position? Did you start to move before the attacker? Top level

defending is about always predicting the future and never reacting to a situation. This is exactly the type of work that many academies are not doing with their centre-backs."

Consider the following from Ryan Giggs:

"When I came up against a fullback like Micah Richards for example, big muscles, a lot of lactic acid build up. I knew he would close me down at speed early on, so I played the long game. I would make him constantly stop and start, come short to go long. I knew that in the second half, he would start to tire, and I would be able to keep making those runs for 90 minutes."

On the flip side, from an athletic perspective, the biggest advantage one can have is to be as strong as possible *without* having to add size.

"The key to building athletic strength is to build strength relative to size. More strength at the same bodyweight means more athletic capacity."

- **Strength and Conditioning expert Dr. Chris Beardsley**

"Strength training in football must be functional, not for size. There's no place for bodybuilding in football."

- **Martin Bucheit, Former Head of Performance, Paris St-Germain**

"Upper body mass is often a liability. Extra mass in the upper body can reduce acceleration, deceleration, and rotational speed."

- **Dr Mike Young, one of the world's leading high-performance experts**

Hypertrophy (muscle size) and strength are not the same thing. If this was the case, powerlifters would be bigger than bodybuilders, and bodybuilders would lift heavier than powerlifters. Below are some of the key components in strength:

- Neural Connection & Central Nervous System (Motor Unit Recruitment)
- Core Strength & Stability
- Biomechanics/Coordination – Movement Efficiency
- Genetics – Limb Ratios, Muscle Fiber Dominance, etc

The key factor about all of the above is that none of them are easily visible to the naked eye. That's why a coach or scout believes bigger is better – simply because it is up front, in their face and easy to see. After all, based on the way that humans evolved, **evolutionary psychology clearly shows** that taller, more muscular men are seen as more impressive and competent on average, **even when the task is clearly unrelated to their physicality**. For example, around 4-5% of the US population are 6 feet (1.83m) or taller. Yet **they make up 58% of Fortune 500% CEOs**. In fact, for every inch in height that they were taller, men earned an average of $789 more per year.

As with all biases, they exist whether we like it or not. Being conscious of the bias, however, can allow individuals to put strategies in place.

Returning to the topic on height as regards to elite football, consider the following:

- A CIES Football Observatory Study found **no correlation between a team's height and results**. The only correlation was between the average height and the preferred philosophy of the coach.

- The Barcelona team of the Guardiola era are widely considered as perhaps the greatest team in football history. **They had the shortest average height of any top-flight team in Europe**. The average height of the front 5 was 5"7.
- When arriving at Manchester City, Pep Guardiola reduced the average height of his squad. **City had the smallest average height in the world's most physical league** during the years that they dominated the championship.
- The smallest squad at Euro 2024 was Spain, **the winners of the tournament.**

Clearly, style of play is linked to this phenomenon. It has been observed how, in countries like Croatia, players are drilled from U8 to stay in spaces behind and between opponents, perceive their surroundings, and have either the skill to evade pressure or move the ball in one or two touches, before an opponent arrives. In summary, **they are taught that when you have the ball, the game should be a non-contact sport.** That means that if a smaller player loses the ball in a contact duel, the problem was either:

- The execution of the pass was not correct (decision, weight, angle, etc)
- The player was not correctly positioned in space
- The player did not perceive their surroundings well enough
- The player's body shape was not correct when receiving
- The player made the wrong decision (e.g. didn't turn in the correct direction or move the ball quickly)

Some coaches believe that being able to "win a duel" (i.e. fight for control of the ball with a defender when it is played to you) is a key skill. While this skill might certainly be a bonus, the problem is that **they simply deselect those who cannot do it at a younger age**.

It is clear how one approach requires more insightful coaching, but also clearly develops the technique and intelligence of the players to a higher level. The other approach, in fact, does not develop anything. It simply makes a judgement on a player. This also leads to another question on this topic – is the job of the youth coach to evaluate players as "not good enough" or "not big enough", or to teach them how to use their skills to their advantage in the game? If the latter, then this type of commentary, is clearly unhelpful.

As was discussed, the debate becomes even more heated when the topic turns to positions like a central defender.

There is in fact **only one defender who has ever won the Ballon D'or.** He (Fabio Cannavaro) was 5"9 (1.75m). This would be shocking enough if it weren't for the fact that the central defender considered to be the greatest of his generation *before* Cannavro was Franco Baresi, **who was the same height**. The same applies to fullbacks. Many people would argue that Dani Alves and Marcelo were the best right and left backs of their generation and were 5ft 7 (1.72m) and 5ft 8 (1.74m) respectively; before them, Cafu (5ft 9/1.76m) and Roberto Carlos (5ft 6/1.68m) were of similar profile.

As always, football is a game of compensation. There is no good or bad "type" of player. **It is only a question of how the player develops the strategies to play in a way that compensates.**

The job of the Youth Coach, therefore, should be to teach the player such strategies. Not to cast judgement based on their own bias.

Summary of Recommendations for Change

Age 0-5

- The Scottish FA should look beyond formal, organised activity and consider how to begin a project which targets parents and encourages every child to have access to multiple balls at home during infancy.
- Additionally, research by Tom Byer and two top US Universities has shown that such a programme has holistic benefits in tackling obesity, benefiting overall brain development, and enhancing academic achievement. In this way, the Scottish FA can partner with government and education providers to develop this project, with potential gains for all parties.
- Finally, the Scottish FA should consider whether 4v4 is the best games format for the initial organised stage of player development, given the evidence at hand. Comparatively, Belgium's move to 1v1 +GK is seen as one of the factors that led to the development of their 'golden generation'. The Scottish FA is developing a 'Player Journey' plan which should be coordinated with the findings of this report.

5-12:

- Grassroots & Children's Education should focus on falling in love with the ball, rather than focusing on a games only-approach.
- A project should be aimed at encouraging children to master the ball and spend hours practicing *outside* of organised football training programmes.
- Technical "skills clinics" around the country would enhance the development of players at this stage.
- An emphasis on year-round, daily access to football and/or futsal for those children who wish to practice.
- Approach government and multi-sport stakeholders regarding primary school education, with the aim of enhancing movement fundamentals via the PE curriculum or after school classes.
- Senior professional clubs & the Scottish FA should aim to work with grassroots clubs around the country to provide clear training curriculums and aid in selection of coaches.
- Support large grassroots clubs with a professional role focusing on the development of coaches and players up to and including U12.
- Allow professional academies flexibility of how to work in Children's phase – varying models are shown to be successful.
- Integrate futsal into the grassroots game particularly below U10 – for example, winter activity.
- Creating free-to-use "space to play" facilities via building football cages, campaigning government to unlock school facilities, and creating access to indoor facilities (school gym halls) in winter.
- A project which focuses on tackling the challenge of the Relative Age Effect – e.g. Rules on percentage of late quarter birthdays, Average Age quotas, Rotating 6-monthly Cut-Offs.

- Develop a Movement Skills Curriculum with video content, to be shared with grassroots clubs (for warm-ups) and Primary School teachers (for PE lessons).
- Consider how to widen and improve the quality of workforce for grassroots football, such as developing and deploying young coaches via C License Qualifications and College and University programmes related to sport, who partner with Parent volunteers and deliver the Scottish FA curriculum to children at Grassroots level.
- Removing the mandatory nationwide 'best v best' games programme for elite academies at this stage as part of the Scottish FA competition structure and consider how to reduce travel and maximise contact time with the ball as part of any games structure – e.g. regional games, festival formats, etc.
- Create a dual registration system which allows children to train and play both with professional clubs and grassroots clubs in order to attain the recommended 6-7 days per week of practice.

12-16:

- Reform Club Academy Scotland.
- Employ experts in youth development, who can work closely with our top academies on an ongoing basis.
- A broader strategic approach to the Youth National Team structure, focused on working with a wider group of players for longer, including late developers.
- Phase out Scottish FA Performance Schools, and reallocate resource to new Scottish FA Regional projects, including supporting academies directly and a wider-based approach to the Youth National pathway.
- Build an internal, cost-effective 'Futures' programme for late maturing players.
- Allow goalkeepers who are 'on time' in their physical maturation to able to play in younger age group, due to a bias in this position towards early matures only within matchday squads.
- Explore the possibility of a National 'Full Residential' Programme as has been established in comparable nations, with a focus on selecting those players who have not been selected for the nation's top academies (such as late maturing players) and providing opportunities to those from rural areas such as the Highlands and Islands.
- Consider regional elite development centres for children born in the Islands.
- Remove squad size restrictions to encourage top academies to cast a wider net, beyond those players who show as performing well through the youth phase.
- Include rule changes which allow for academy players to be dual registered with a grassroots partner club or move to another academy via a 'loan' system, to allow young players to develop at an appropriate level at each age and stage without needing to be 'released' if they show longer-term potential.
- Employ a more relaxed Licensed criteria to allow clubs to develop younger coaches in their own methodology.
- An emphasis on elite tier academies having a strategic plan and managed approach to player loading and growth & maturation across age groups.
- Minimum standards enforced which ensure the health & wellbeing of children within the academy environment as it relates to topics such as player loading and strength & conditioning.

General

- Explore the potential benefit of moving the calendar towards summer football.
- Allowing for league tables throughout the academy programme "youth" age groups, and the gradual introduction to tournaments with trophies at the latter stages of the "children's" age groups should be considered by the Scottish FA.
- The development of a Scottish FA Long Term Athletic Development approach and employing a full-time expert in Physical Development (Youth).
- Consider bespoke education programmes for Doctors & Physios on the football-specific domain.
- Align with Head of Coach Education to embed best practice from strategic reviews throughout the License structure and ongoing CPD.
- Bespoke education courses for Academy Directors, Head of Coaching, Head of Phase
- Develop educational resources and communication strategies for Parents & Guardians.
- Consider the creation of a new Scottish FA Elite Development Board, which feeds into the Professional Game Board and other avenues on an ongoing basis.

Special Thanks

- *Thanks to Flynn Gray for his research on 'best with best' academy models around Europe.*
- *Thanks to Steve Curnyn & Mark Leslie for their work on Growth & Maturation within Club Academy Scotland.*
- *Thanks to Dougie Anderson for his research on Summer Football.*