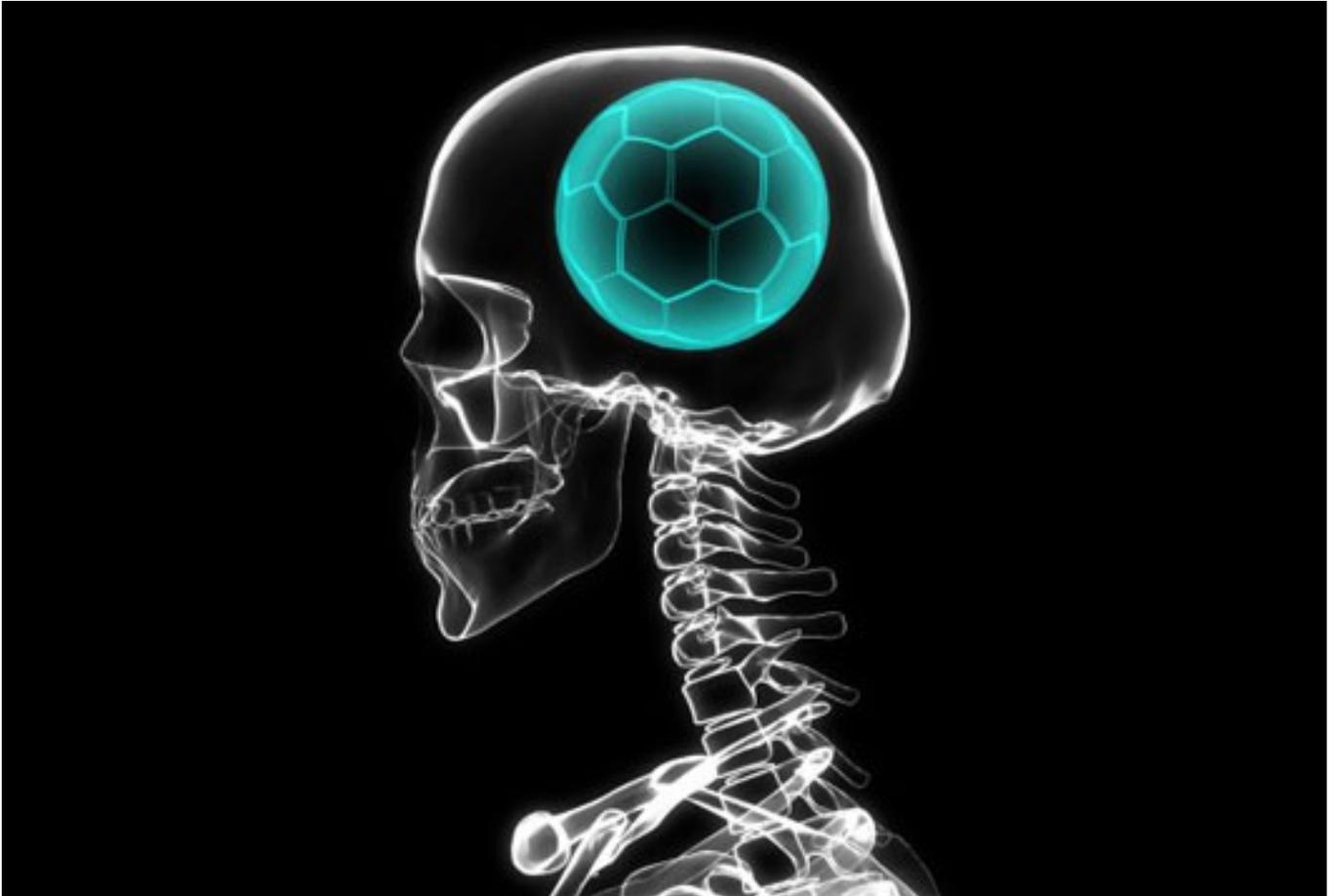


Changing the game for teenage footballers

In an online exclusive, football coach and visiting fellow at the University of Bristol Dr Perry Walters takes an evidence-based approach to understanding and improving young players.



Increasingly, neuroscience research is suggesting that the teenage period is a time of dynamic neural change with implications for the way teenagers think, feel and behave; new understandings that should be communicated with educators, including football coaches.

Teenagers tend to behave differently than their younger selves. They can be more reactive, more likely to lose control of their emotions and become frustrated or angry when they make a mistake. They can also be sensitive to evaluation by their peer group, particularly aware of their social status, more anti-authority but also passionate, excitable and eager to try new things. These were some of the observations of elite football coaches attending the recent Advanced FA Youth award at St George's Park, on which I was a tutor.

My background, starting as a footballer, then coach, teacher and latterly PhD researcher, has given me a unique lens with which to understand developing footballers. Whilst

studying for a Masters, then PhD at Bristol Graduate School of Education, my growing insight into the developing adolescent brain and mind helped me understand why adolescence might be characterised by periods of emotional intensity, impulsivity, risky decision-making and elevated social awareness – behaviours which have chimed with my own observations of teenage footballers. My aim in recent years has been to introduce this new understanding of the adolescent brain as an additional perspective with which to understand and help coach young players in football.

Emotional teens

Whilst delivering the FA's new Advanced Youth Award, a common theme emerged from coaches' observations on teenage footballers. Teenagers, they suggested, tended to find it difficult to manage their emotions, especially in pressurised contexts such as competitive matches; they were prone to lose control and become frustrated, 'sulky' or 'angry' when things didn't go to plan, such as losing the ball or conceding a goal. They seemed more influenced by evaluation from significant others such as coaches, parents and teammates than they were a few years before.

From a cognitive neuroscience perspective these observations of adolescent behaviour did not surprise me, in fact they aligned with some of the research I had seen about the adolescent brain. Research shows, for example, that in times of high emotional arousal (like playing competitive football matches) and especially in the company of peers, teenagers may find it uniquely difficult (as compared to children and adults) to control their emotions.

This behaviour has been linked to differing developmental trajectories for emotional and control networks in the brain. Limbic structures located deep in the brain and linked to processing emotions and rewards are shown to be robustly developed by mid-adolescence, whereas frontal networks associated with controlling emotions as well as promoting sound judgement show delayed development, not fully maturing until well into the third decade. So it might be that this developmental 'mismatch' or 'imbalance' between emotion and controlling networks mean that emotions hold more sway and manifest themselves as impulsive, reactive behaviour; an 'emotional overshoot'. Further, research suggests that the pathways needed to control or dampen down this emotional intensity may not yet be fully hooked up for adolescents (Giedd, 2015). So in essence there appears a 'double whammy' of a heightened emotional reaction, for the teenager, with a still developing ability to control it. These insights might help to explain why some teenagers 'lose control' during important moments of a game or training.

Research also suggests that the environment is especially salient for the teenager (Galvan, 2014). In neutral or 'cool' contexts such as the laboratory, adolescents' cognitive abilities function at adult levels: however, it is in aroused or 'hot' contexts, and in the presence of peers, where adolescents' judgement appears compromised linked to difficulties in controlling robust emotional reactivity.

What does this new information mean for coaching adolescent football players? Firstly, managing the emotional climate is important, scaffolding for teenagers what is still, for them, a 'work in progress'. As neuroscientists Jensen (2015) and Willis (2010) suggest, 'be the frontal cortex' for the players. They may not be able to consistently manage their

emotions but coaches can model how to interpret and react in given situations. For example, provide supportive environments, encourage re-appraising mistakes as opportunities for learning. This can be achieved by stressing mastery over performance goals so that 'errors are seen as the routes to mastery' (Dweck, 1999). Model strategies to manage emotional reactions that might be unhelpful including the use of 'positive self-talk', 'imagery' and 'on field' techniques to remain composed and focused. In this way, it is suggested, we can scaffold development of the adolescents own frontal-limbic connectivity.

Rewards shine brighter for the teenager?

An observation of coaches, and again something that fits with my own coaching experience, was that some players can appear to get over-excited when in pressurised, critical moments in the game, such as in front of goal. Their instincts seem to impact their judgement and, despite unfavourable odds, they find it difficult to resist the temptation of choosing risky options. As an Academy director observed '*... there will be a lot of them that know that they can't make the pass - they can see it - but they can't stop themselves trying.*' Again this observation resonates with neuroscience research around the increase in novelty-seeking during adolescence, linked to the stronger influence of the reward system at this stage of development, where it might be difficult to resist salient cues in the environment.

Dopamine, a neurotransmitter linked with seeking out rewards, is at its peak during adolescence and is implicated in teenagers motivated behaviours: driving teenagers to experience their environment, finding rewards in trying and experiencing new things. This might mean teenagers see more reward and less danger in situations, and dopamine has been implicated in risky decision-making (Ernst et al., 2006). As part of my PhD I explored whether some of these insights may be applicable in football contexts. Is there a developmental difference where mid-teens are more likely to make riskier decisions than children or adults on the field? Adapting methods used in the lab my studies showed that mid-adolescents (14 years) were statistically the most likely to favour risk over reward: that is make riskier decisions, compared to both children and adults. The emotional climate, such as the level of competition, exacerbated this difference.

From a football perspective this means that a coach shouldn't be surprised if teenage players are taking more risks: the reward (scoring a goal, playing a 'glory' ball) might shine brighter for the teenager. It is important for the coach to have an appreciation that a player isn't necessarily a poor decision-maker, but may be processing and responding differently at this stage of their development. The challenge might be to cultivate these natural drives toward novelty seeking and risk and create environments that enhance them; providing safe or 'experimental environments' (Claxton, 2005) where risks can be explored, while at the same time helping strengthen the players' own regulatory capacities.

Growth spurts of the mind

In my experience football tries to develop the player physically but tends to leave the psychological to chance. As a coach working at a professional academy I've noticed an attitude amongst coaches of fixed abilities, the 'natural' born player, the belief that talent is largely innate, and that you either have a 'football brain' or you don't. Yet adolescence

represents a period of dynamic brain reorganisation, and delayed maturation offers unique opportunities to strengthen capacities associated with the frontal cortex, including judgement and control. So in articles and workshops, I have emphasised that adolescence represents not only 'growth spurts of the body' (which coaches are broadly familiar) but also 'growth spurt of the mind', linked to dynamic neural change. An article I wrote for the FA coaches' journal, 'The Boot Room', aimed to communicate these messages to coaches. The article emphasises the unique ability of the teen brain to respond to experience and also, importantly, that frontal capacities are still improvable beyond the teenage years. This is important for British football, which has historically made decisions on releasing players relatively early at 16 years of age. There are good scientific arguments for keeping players as part of longer developmental programmes.

Talking to teenage footballers

In my experience and as others have identified in the research (e.g. Ford et al., 2010), young footballers need to be mentally tough, needing both a resilient attitude and sense of agency in their learning (Nesti & Sulley, 2015). Historically psychological understanding of the developing player has been neglected in football (Pain, 2005) with little understanding of how to improve these capacities. Perhaps football can learn from recent educational research. Interventions from schools' education suggest that one way to develop resilience and agency is to talk to teenagers about their developing brains; especially to foreground the concept of brain plasticity, that is, that their brains (and thus talents) are changeable and can be strengthened through practice (Blackwell et al, 2007; Yeager et al, 2013). This approach has been linked with improvements in motivation, engagement and performance.

Recently I adapted these psychological interventions for teenage footballers, situating examples within football contexts and emphasising the unique capacity of the adolescent brain to change in response to challenge, beyond the teenage years up until the early 20s. Workshops with 15-year-old players proved encouraging, appearing to cultivate an appreciation of the unique opportunities of this developmental period. Participants' comments such as '*The teenage brain is the best time for learning new things*' and '*The brain is not fixed; you can always improve*', appeared to foster a sense of resilience and agency. This pilot intervention offered some promise and, moving forward, it might be profitable for football to develop 'scaled up' psychological mind-sets interventions, recently trialled in schools' research (Yeager et al, 2013; Paunescu, 2015) to reach larger numbers of young footballers.

Growing football and the brain

We are at the initial stages of exploring how insights from cognitive neuroscience might find application for football. Football has traditionally not incorporated insights from academic research, particularly around psychology (Nesti, 2010); however, there appears a genuine appetite on the part of football coaches to understand more about the developing mind and brain and how this might become useful for football. In order to progress this knowledge, we might borrow from the nascent field of Mind, Brain and Education which advocates developing joint collaborative research, bringing together practitioners and researchers to 'co-construct' useful research questions and methods

(Fischer, 2007). This might involve joint research projects connecting football clubs, the Football Association and universities to explore and develop new understandings of the adolescent football player. Indeed, this is something I am undertaking through my involvement with the FA, Bristol University and football clubs in the South West, aiming to build new understandings of the teenage footballer's developing mind.

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