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English Academy Football Practitioners' Perceptions of Training Load, Maturation, and Injury Risk: A Club Case Study

Abstract

The management of training load in youth team sport athletes is important. There is, however, a lack of research on practitioners' perceptions and understandings of managing training load during this period and what this means in terms of maturational status and injury risk. This study aimed to investigate academy football practitioners' perceptions and understanding of training load, maturation, and injury risk in young male footballers. Coaches, sports scientists, medical staff and key stakeholders from a professional football club academy in England participated in focus groups investigating their understanding and perceptions of training load, maturation and injury risk. A qualitative descriptive methodology utilising framework analysis was used to capture and better understand participants' views. Findings revealed that practitioners consider managing training load during adolescence to be comprised of, and mediated by, three key elements: club philosophy, factors inside the club's control (periodisation strategy; staff member practice), and factors outside the club's control (life load; growth and maturation). This study is an important addition to the current literature on managing injuries through the growth spurt by investigating how different stakeholders perceive training load, maturation and potential strategies to mitigate risk.

Introduction

Youth academies are central to the long-term development of English soccer players¹ with success generally defined as the attainment of a professional contract and/or playing elite-level football². The long-term development of players involves the complex interaction of physical, psychological, environmental, and sociocultural factors³. Injuries can significantly impact player development, primarily through reduced training and match exposure, which may prevent individuals from transitioning from academies to first-team football⁴. The elite youth football setting presents some unique injury risk factors, including the adolescent growth spurt, a phase that has been associated with an increased injury risk in some studies⁵⁻¹¹. Common growth-related injuries include growth-plate fractures, apophysitis and apophyseal avulsion fractures¹². Furthermore, the inter-individual variation in maturation during adolescence is large, making it difficult for practitioners to accommodate for differences in growth and maturational status¹³. Despite this being a critical period for development and of high importance to football academies, there is a lack of research on how to most effectively manage training load through this period.

An adequate training dose is essential for the development of physical fitness and sporting skills (technical, tactical and psychological)¹⁴. An inadequate training load may under prepare the athlete for performance^{15, 16}, whereas, a greater training load with insufficient recovery may cause overtraining, overuse injury or burnout¹⁷. It should be noted, however, that the causal effects between training load and injuries are complex and poorly understood¹⁸⁻²⁰. For training load in youth athletes, the consensus statement for youth athletic development recommends three key considerations: 1) they should comprise of diversity and variability of athletic exposure, 2) they must avoid inappropriate training and competition that exceeds safe load thresholds, to mitigate the risk of overuse injuries and other health problems, and 3) they must provide sufficient and regular rest and recovery, to encourage positive adaptations and progressive athletic development²¹. These recommendations, although useful, are limited to

general observations and do not provide depth of insight into how this could be done practically in specific sports.

Factors contributing to the management of training load in youth team sport athletes has highlighted some key challenges and potential solutions²². As noted, periodising training load is paramount to providing a sufficient dose and allowing for recovery from the program. This can be difficult when multiple organisations (school, club, county, national) are planning training and competition in isolation^{23, 24}, therefore, one organisation would unlikely have all training load information. A second challenge is the large inter- and intra-individual variation in training load for youth team-sport athletes²⁵. Another key training load challenge in youth sports is balancing and maintaining both academic and sporting successes²². Finally, it is also challenging for practitioners to accommodate for differences in growth and maturational status; as chronological age groups may not account for differences in growth rate or maturational status.

To further our current understanding of injury risk reduction and the management of training load in adolescent athletes, it is important to consider injury prevention models and practices. There are several key considerations for developing and implementing injury reduction programs, including administrative support, an interdisciplinary implementation team, identifying logistical barriers and solutions, an evidence-based and context-appropriate injury reduction program, and educating staff and users^{26, 27}. The successful implementation of an injury risk reduction intervention should include key stakeholders and end-users' in the design process²⁷⁻³¹. Moreover, an evidence-based context-specific injury reduction training program in youth team sports should prioritise collaboration and integration between stakeholders³⁰. This idea further links with the "iterative sequence of prevention" approach, which involves an interdisciplinary collaboration between technical coaches, sports scientists and medical staff to have a meaningful impact on injury risk by accounting for medical, coaching and performance best practices^{32, 33}. As elite-level contexts are unique and continuously evolving, therefore, interventions must be adaptable to fit this dynamic and rapidly evolving environment³³.

In light of the preceding discussion, the overall aim of this study was to investigate English football academy practitioners' perceptions and understanding of training load, maturation, and injury risk. This study also aimed to uncover current practices within the club regarding training load during adolescence and formulate practical strategies to help reduce injury risk among male youth football players during the adolescent growth spurt.

Methodology and methods

Context

This study took place inside a Category 3 Academy English Football Academy during the 2019-20 season.

Subjects

Eleven staff were recruited using convenience sampling by the lead researcher based on being the key stakeholders (department heads) within the academy, as well as, the members of staff who work with the U13s to U16s age groups. They were recruited through email, one invited member of staff could not attend due to an alternative work commitment meaning eleven of the twelve staff invited attended the session. Two focus groups were conducted, one with 6 participants and the other had 5 participants. Each focus group included a mix of senior staff,

coaches, sports scientists and medical staff to provide a range of viewpoints from each discipline. There was no presence of non-participants. The groups were split to have the most senior staff spread between both groups so that the discussions and outcomes of both groups include key stakeholders.

Methodology

A qualitative descriptive approach was taken in this study. Qualitative description is a pragmatic approach to research, which focuses on descriptions of phenomena³⁴. As such, this approach allowed us to understand the academy staff and their view of the situation, problems and practical strategies through focus groups as the method of data collection. Allowing practitioners to share their perceptions on the subject, as well as, identifying barriers and facilitators of the specific context was key in this study, and focus groups were considered well-suited to this aim. Further, we utilized the framework approach for analysis because it can be used in deductive, inductive and combined types of qualitative research and can be adapted depending on the research question³⁵. This allowed findings from current literature and novel insights to be synthesized together within this study. The framework method is also not aligned with a particular epistemological, philosophical, or theoretical approach but rather a flexible tool that can be adapted for use with many qualitative approaches that aim to generate themes³⁵. In this way, this method is appropriate under a qualitative descriptive approach. Framework analysis provides clear steps to follow and produces highly structured outputs of summarised data which can be beneficial where not all members have previous experience in conducting qualitative research³⁵. The trustworthiness and credibility of the study were demonstrated using the Consolidated Criteria for Reporting Qualitative Research³⁶ (Appendix 1) and the four-dimension criteria to assess the rigour of qualitative research³⁷ (Appendix 2).

Ethics

Ethical approval was gained from the University of Bath, Department for Health ethical committee (REACH) (EP 17/18 239). Before data collection, participants were recruited by email, informed consent was obtained from all participants and the focus group was clearly explained to them through email and the participant information sheet. The focus groups were transcribed by the first author (D.M. Johnson) verbatim after the completion of both focus groups. Transcripts were checked for accuracy against the audio recordings and corrected for anomalies, and member checked by participants.

Data collection

Data collection for this study took place in the form of focus groups, and all data were collected by the first author of this manuscript who acted as the moderator (D.M. Johnson, MRes, PhD Candidate, Male). The moderator had received focus group training and completed a pilot focus group with a representative sample before data collection. DMJ has no personal experience in academy football as a player, but before data collection had worked in academy football for 3.5 years, 1.5 of which were in the specific academy within this study. As a result, relationships were pre-established between the moderator and participants. Participants were aware of the moderators' role and that the research and findings in this study could affect practice within the academy. Furthermore, the participants knew of the researcher's interest in the topic. Focus groups were used to allow interaction between participants so that they could come to a shared understanding of action points related to the topic.

Focus groups were conducted in a classroom inside the academy's office facilities over successive weeks.

Focus groups were recorded with a dictaphone placed in the middle of the table, there was a second dictaphone as a backup. The focus group started with each participant introducing themselves for the recording and giving an overview of their role at the club. The first author then provided post-it notes to each participant to note down their thoughts on training load in adolescent footballers. Participants were then instructed to share their ideas and group any similar ideas. The lead author did not contribute to the first task or offer opinions in the discussion but rather asked questions for more detail or clarity and aimed to involve each member in the discussion. The first author collected field notes during the focus group to support data analysis. The first focus group was a total duration of 01:34:14 and the second was a total duration of 00:57:54. Focus groups continued until data saturation when participants no longer had any further comments or information to add³⁸. There were no follow-up interviews or focus groups. Transcripts were emailed to all participants for comment or correction, as a form of member checking.

Data analysis

All data analysis was performed by the lead author (D.M. Johnson) who was embedded within the research context and had the greatest knowledge of the specific subject area, with a review, discussion, and input by the wider research group to ensure resonance and trustworthiness. The seven-step procedure for framework analysis was used 1, Transcription (see above), 2, Familiarisation with the interview, 3, Coding, 4, Developing a working analytical framework, 5, Applying the analytical framework, 6, Charting data into the framework matrix, 7, Interpreting the data³⁵. For familiarisation with the focus groups, the recording was listened to twice by the lead author and the transcripts were also read twice. Coding was performed by the lead author by adding notes to the transcription. After careful consideration, a set of codes, each with a brief definition were generated. This formed the initial analytical framework. The research group then met for a verification process where the themes and codes were discussed and amended. The analytical framework was then applied to each transcript. The transcript was systematically coded to the framework and meaningful text was highlighted with the corresponding code. After coding the transcripts using the analytical framework, data was summarised in a matrix. The matrix was created in Microsoft Excel (2018), using one row per focus group participant and one column per code. Themes were then generated by analysing the matrix and combining code which could be grouped into related topics. The lead author generated themes based on the research objectives and inductively generated novel concepts from the data. Themes, codes and results were then shared with select focus group participants for member checking.

Findings and Discussion

The findings of this research are presented in Table 1 and Figure 1. The three themes (club philosophy, elements internal to the club, and elements external to the club) will next be presented and discussed in turn.

Theme 1: Club Philosophy

A central issue around managing training during adolescence was the club philosophy. Club philosophy, in this study, is considered as '*perceptions of how the club and environment are unique and how this should contribute to any strategies implemented*'. The uniqueness of the

club was important to participants, with one noting *"This being quite a unique club"* (Coach 2). This was seen as a potential challenge when developing a periodisation strategy, as participants considered that their environment is unique and strategies might not transfer between this environment and others. Moreover, the club's attitudes towards player development and style of play were also said to impact the management of training load during adolescence *"I think club philosophy, 100% influences our training load"* (Sports Scientist 2).

Theme 2: Internal to the Club

The next layer to managing training during adolescence was the processes conducted inside the academy. This was split into two key categories, periodisation and practice, each of which had subthemes. Periodisation is a common idea in sport and is defined as the planned manipulation of training variables to maximize training adaptations and reduce the risk of overtraining³⁹. Participants of the focus group mentioned scheduling as part of periodisation, i.e., the long- and short-term planning of the frequency, intensity, duration and type of activity *"you need to pick and choose when you do your high days and your low days within the week"* (Sports Scientist 2). They also mentioned that periodisation is potentially linked to improvement in performance *"pushing boundaries of getting them fitter and faster and stronger at the same time"* (Coach 3). There was also a reference to the potential association between training load and injury *"It's just getting that balance right of again, trade-off for how much work we want to do to progress them while not stretching them too far that they're all going to get injured"* (Sports Scientist 2). This theme suggests that the participants of the focus group have identified the importance and also the complexity of managing training load for this population. Managing training load for youth athletes is a challenge which occurs across sports^{22, 40}. Moreover, Scantlebury, Till²² explored the factors contributing to managing the training load for youth team sport athletes further, highlighting some key challenges and potential solutions. Managing the schedule and training load is one particular challenge^{24, 25}, this challenge was identified in the present study including the periodisation of the training at the academy. The participants in this study identified interdisciplinary working as a potential solution to this problem; integration between staff members could allow for best practices from each discipline (physical, medical and coaching) when planning the schedule and training load. Both performance and injury are key considerations when planning training for adolescent athletes, and research has shown there are unique injury risk factors in youth football¹⁰. Caution should be taken when interpreting training load and injury as the causal effects between training load and injuries are complex and poorly understood¹⁸⁻²⁰. It is, however, important to balance injury and physical performance during this phase, as growth-related injuries can have lasting negative effects on strength and endurance function⁴¹. Moreover, adolescents who suffer from growth-related injury might need to continue a dose of plyometric training to facilitate the retention of power performance⁴². The psychological load was another theme mentioned by the participants. These were comments or acknowledgements of the psychological demand placed on players. The participants felt that psychological resilience should be accounted for when planning load *"Psych for sure, yes. Some need rest from football. Some need football every single day of their lives."* (Sports Scientist 2).

Practice was the next theme for inside the academy. In this context, it refers to how staff are expected to, or should work, within the academy. Interdisciplinary is the first sub-theme, which included references to staff working together towards a common aim or on a collaborative task, this can be represented best by the following quote, *"the integration of the staff is best practice because you want everyone from their specific disciplines giving their expertise."* (Sports Scientist 2). This study used an interdisciplinary approach, as the iterative sequence of

prevention model suggests the involvement and collaboration between technical coaches, sports scientists and medical staff to have a meaningful impact on injury risk³³. The shared understanding acquired during these focus groups aimed to account for medical, coaching and performance best practices³². Knowledge exchange is another theme under Practice. Knowledge exchange is the requirement of staff to impart knowledge or exchange information between each other or with players and parents, *"I think education is really important. It's just making sure that everyone knows why we're doing what we're doing because there's obviously a reason behind it. If there isn't a reason behind it, we need to be questioning it"* (Medical 1). Player buy-in was another consideration of good practice by the staff, they suggested that *"it's also something that has to be agreed by the player"* (Coach 1) and therefore it is important to communicate with the player and acknowledge their views along with those of the staff when making decisions. This idea is supported by injury risk reduction intervention literature, which suggests seeking the end-users' perspectives on the problem²⁹. In a similar study, gymnastic coaches also highlighted the need for further education to support adolescent gymnasts⁴⁰. Moreover, coach education has been previously used as an attempt to reduce the risk of injury in sport^{43, 44}. 'Agile' refers to the perception that the club environment is dynamic and continuously evolving, *"the training load needs to be adaptable"* (Medical 1). Again this fits with the iterative sequence of prevention approach, which suggests that the contexts in which injury reduction interventions are applied are unique and continuously evolving, especially at the elite level³³. This idea again matches the perceptions that the club environment is dynamic and continuously evolving in the sub-theme of the agile environment. The final aspect of practice refers to individualisation; this is the perception that the physical demand should be specific for each player *"training load needs to be individualised"* (Medical 1) and that this should be included in longitudinal planning *"each individual in the academy has their own journey"* (Sports Scientist 1). The staff also perceived that there are several factors that contributed to individualisation including psychological load, mentioned above, *"player specific in terms of how resilient they are psychologically"*.

Theme 3: External to the Club

The next main theme refers to phenomena occurring external to the club, including life load (physical activity, travel, nutrition, sleep), and growth and maturation. Life load and social determinants refer to the broader context of a player, their physical and psychological traits. This also includes their unique life and social context and anything done outside of the academy (e.g., physical activity, travel, sleep and nutrition). Managing or understanding a youth athlete's activity outside of the academy or elite environment is a challenge across sports^{24, 25}. Knowledge exchange between staff, parents, players and other external stakeholders (school, county and national) could be a potential solution. Both of these findings align with previous research that suggests collaboration and communication are potential solutions²². This challenge should also be considered as broader than just training load; life load might be a more appropriate term to characterise the variety of stressors (e.g., academic stress, travel, poor sleep, poor nutrition) or assistors (e.g., academic support, travel support or reductions, good sleep, good nutrition) involved. Key quotes to summarise this include *"Bear in mind they're at school all day"* (Coach 3) and *"distance, time and travel"* (Coach 2). School or academic stress is part of this consideration of life load²². To overcome this challenge, the academy must take a

player-centred approach in which they support their education and communicate effectively with all parties about periods of high sporting stress and high academic stress.

Growth and maturation were also identified as a theme. These processes of growing (increasing in size) and of maturing (progress towards adulthood) have both been defined in previous literature¹³. The staff referred to the potential effect of this on planning appropriate training loads “*while they’re going through their growth spurts, their individual needs are so different within one age group that it’s so difficult to plan a session*” (Medical 1) and “*ensure that they’re getting good quality work but at the same time they’re not overstressing and making that growth-related injury significantly worse*” (Sports Scientist 1). Research has previously identified risk factors that are associated with an increased likelihood of injury during adolescence. This includes maturity status^{5-7, 10}, rate of growth in stature^{8, 10} and lower limb growth rate^{10, 45}. This finding also fits with research in gymnastics, where coaches suggested modifying training during growth⁴⁰. Moreover, these gymnastics coaches suggested, or already under-took, modifications to training during the growth spurt including reducing training load and minimising high-impact loads⁴⁰. However, currently, there is limited evidence on practical solutions to address these risks⁴⁶. These risk factors have been identified by the practitioners in the present study and peer-reviewed studies as important in the prescription of appropriate training load during the adolescent growth. This does pose a new additional problem of determining what is an appropriate training load. There is a large inter- and intra-individual variation in training load for youth team-sport athletes²⁵, meaning that the individualised monitoring of athletes is paramount, as athletes may have dramatically different schedules and different responses to the same dose of training load.

Table 1: Analytic Framework of English Academy Football Practitioners' Perceptions and Understanding of Training Load, Maturation, and Injury Risk

THEME	DESCRIPTION	QUOTE
External to the Club	The Player	
	Life Load / Social Determinants	<p><i>References to the broader context of a player, their physical and psychological traits. This also includes their unique life and social context and anything done outside of the academy (e.g Physical activity, travel Sleep and Nutrition).</i></p> <p><i>"Bear in mind they're at school all day." (Coach 3)</i></p> <p><i>"distance, time and travel, I think the exertions for parents is huge" (Coach 2)</i></p>
	Growth and Maturation	<p><i>The process of growing (increasing in size) and maturing (progress towards adulthood) as an adolescent.</i></p> <p><i>"while they're going through their growth spurts, their individual needs are so different within one age group that it's so difficult to plan a session" (Medical 1)</i></p> <p><i>"I think it's about 12-13cm in a year that he's grown and he looks like Bambi on ice" (Coach 3)</i></p> <p><i>"I saw one player who was going through a growth spurt, I couldn't believe this boy was a football player the way he moved. Now, having watched him looking like he's just coming maybe to the end of it, end of that cycle, slowly but surely he's</i></p>

			<i>come out of it and he's now a striver amongst the group."</i> (Coach 2)
Internal to the Club	Periodization		
	Scheduling	<i>Long and Short term planning of the frequency, intensity, duration and type of activity.</i>	<i>"you need to pick and choose when you do your high days and your low days within the week" (Sports Scientist 1)</i> <i>"you need moderation within a session and within a week to manage the load properly." (Medical 1)</i> <i>"I think planning is a big part of that, isn't it, planning and periodisation is a big part" (Sports Scientist 2)</i>
	Performance enhancement	<i>Perceptions of training creating physical performance improvements.</i>	<i>"pushing boundaries of getting them fitter and faster and stronger at the same time" (Coach 3)</i> <i>"We need to make sure that we're not undercooking them and leaving them short for next year" (Sports Scientist 2)</i> <i>"physically well-balanced individuals are so important because you can see the deficiencies technically" (Senior Staff 2)</i>
	Injury Risk Reduction	<i>Perceptions of the potential association between training load and injury.</i>	<i>"It's just getting that balance right of again, trade-off for how much work we want to do to progress them while not stretching them too far that they're all going to get injured." (Sports Scientist 2)</i> <i>"basically just a balancing act" (Sports Scientist 1)</i>
	Psychological Load	<i>Perceptions of the psychological demand placed on players.</i>	<i>"player specific in terms of how resilient they are psychologically" (Medical 1)</i>

		<p><i>"Probably some of the psychology side of it" (Senior Staff 2)</i></p> <p><i>"There is also the desire side, isn't there, where someone wants to work hard." (Senior Staff 1)</i></p>
Practice		
Individualisation	<i>Thoughts regarding making the physical demand specific for each player</i>	<p><i>"training load needs to be individualised" (Medical 1)</i></p> <p><i>"each individual in the academy has their own journey" (Sports Scientist 1)</i></p>
Agile Environment	<i>Perceptions that the club environment is dynamic and continuously evolving</i>	<p><i>"the training load needs to be adaptable" (Medical 1)</i></p> <p><i>"It's just being adaptive ." (Medical 2)</i></p> <p><i>"It's tricky because it's [training load] so complex" (Senior Staff 2)</i></p>
Player Buy-In	<i>Perceptions of the need for a player to accept and support the decisions made by staff.</i>	<p><i>" I think it's also something that has to be agreed by the player" (Coach 1)</i></p> <p><i>"It's educating them to make sure that they do the right thing" (Coach 3)</i></p>
Knowledge Exchange	<i>Reference of a staff requirement to impart knowledge or exchanging of information between each other or with players and parents.</i>	<p><i>"I think education is really important. It's just making sure that everyone knows why we're doing what we're doing because there's obviously a reason behind it. If there isn't a reason behind it, we need to be questioning it." (Medical 1)</i></p> <p><i>"It's educating them to make sure that they do the right thing"(Coach 3)</i></p>

			<i>“The main thing for MDTs is communication so it’s having good relationships between all departments as well as good communication.” (Sports Scientist 1)</i>
	Interdisciplinarity	<i>References of staff working together towards a common aim or on a collaborative task.</i>	<i>“the integration of the staff is best practice because you want everyone from their specific disciplines giving their expertise.” (Sports Scientist 2)</i> <i>“Everyone in the MDT is on the same page and that everyone is working towards the same goals.” (Medical 1)</i>
Club Philosophy	Club Philosophy		
	Club Philosophy	<i>Perceptions of how the club and environment are unique and how this should contribute to any strategies implemented.</i>	<i>“This being quite a unique club” (Coach 2)</i> <i>“I think club philosophy, 100% influences our training load” (Sports Scientist 2)</i>

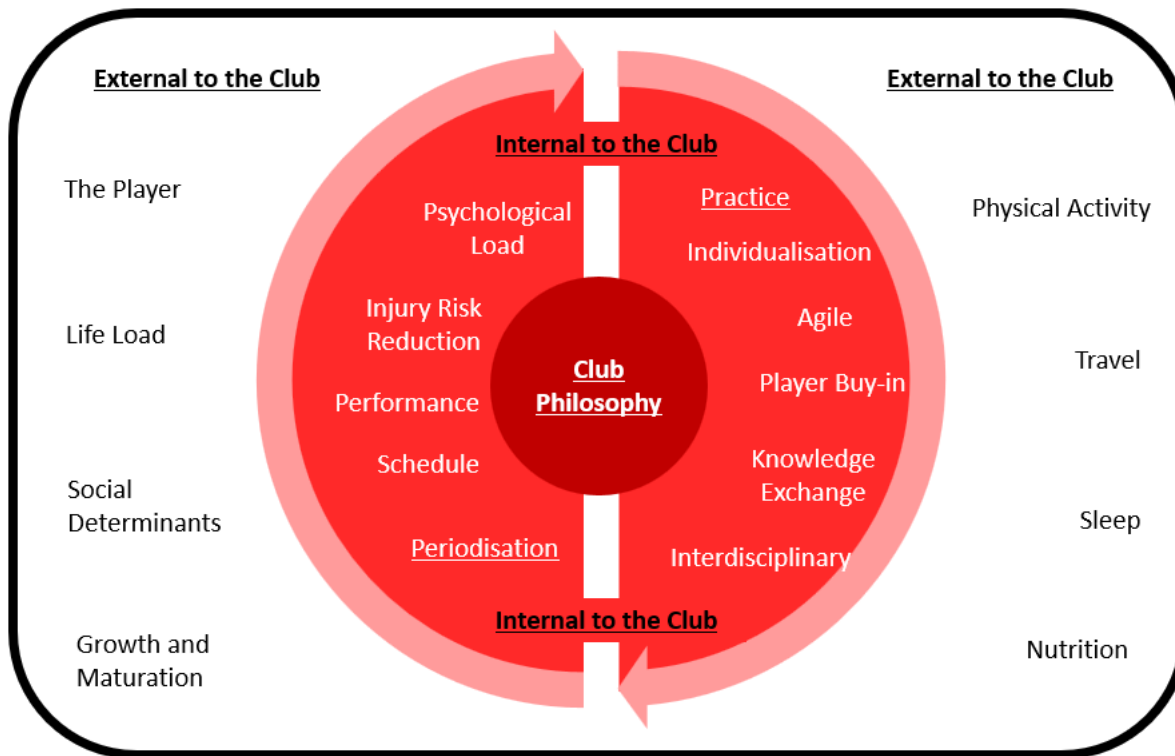


Figure 1: A graphic representation of English Academy Football Practitioners' Perceptions and Understanding of Training Load, Maturation, and Injury Risk (Themes are underlined)

Limitations

This study only represents the perceptions of staff from one football club. Moreover, the lead author's positionality could affect the interpretation of results, as they were embedded within the research environment and that research within this area is following his current understanding and desire to develop knowledge in the area of "training load and injury in academy football players". Resultantly this could affect the results produced by giving larger or smaller preferences to the themes generated based on their viewpoint. The relationship between the lead researcher/author and participants was pre-established as they were embedded within the research context. This could have potentially affected the results gained from the study as participants could have felt that what was said during the focus group might be perceived negatively or not accepted. There is also the possibility that if a participant's relationship with the lead researcher was negative they may not have perceived any value in sharing within the discussions. This study did use several strategies to overcome these potential issues, including a verification process with the research group, member checking with the participants, using the Consolidated Criteria for Reporting Qualitative Research³⁶ (Appendix 1) and the four-dimension criteria to assess the rigour of qualitative research³⁷. This study did not identify any diverse cases; this could be due to the homogeneity of the participants, as all study members had a similar socio-economic background, educational background, worked at the same football club and would have discussed this topic or similar as part of their work. This study provides an important addition to the research on managing injuries through the growth spurt. Despite its limitations, it adds an example of how a context-specific injury risk reduction strategy could be created. Currently, the literature lacks any possible solutions specific to academy football that account for the novel biological changes occurring during adolescence⁴⁷.

Conclusion

This study aimed to investigate academy practitioners' perceptions and understanding of training load, maturation, and injury risk. This study also aimed to uncover current practices within the club regarding training load during adolescence and formulate practical strategies to help reduce injury risk among youth soccer players during the growth spurt. When conducting injury risk reduction research it is important to consider how a study fits within the wider research and the process undertaken to achieve a successful outcome. This study fits in a wider research area, aiming to design strategies for reducing injuries during adolescence. This study represents an attempt to better '*identify*' both facilitators and barriers to injury reduction strategies in this context²⁷. Moreover, this study aimed to include all key partners in this design phase of the intervention to allow for an interdisciplinary approach towards injury reduction strategies. Moreover, gaining administrative support from key stakeholders, using an interdisciplinary implementation team, as well as, identifying logistical barriers and solutions are key in developing injury reduction strategies²⁶. The next steps should aim to design an evidence-based and context-appropriate reduction program, as well as, train those implementing the strategy²⁶. As well as generating knowledge, this study has contributed to a better shared understanding of the topic and provided ideas about applying knowledge in practice, which is important in injury reduction in youth team-sport athletes³⁰. Moreover, practitioners' perceptions about injury and injury reduction can influence program uptake³¹. Injury reduction strategies can be more successful by identifying perceived barriers and facilitators among stakeholders^{30, 31}. Furthermore, best practice in youth team sports would develop an evidence-based context-specific injury reduction training program and

implementation plan, through collaboration and integration between stakeholders ³⁰. Overall, our findings suggest that practitioners consider managing training load to be comprised of three elements. These elements include club philosophy, factors inside the club's control (periodisation strategy; staff member practice), and factors outside the club's control (life load; growth and maturation). Moreover, the information gained from this study aimed to have a meaningful real-world impact on practice to act as part of an intervention design process, by identifying factors contributing to the management of training load, maturation, and injury risk in adolescent footballers.

Appendix 1 - Consolidated Criteria for Reporting Qualitative Research ³⁶

Topic	Guide Questions/Description	Reported on Page no.
Domain 1: Research team and Reflexivity		
<i>Personal Characteristics</i>		
Interviewer/Facilitator	Which author/s conducted the focus group?	5
Credentials	What were the researcher's credentials?	5
Occupation	What was their occupation at the time of the study?	5
Gender	Was the researcher male or female?	5
Experience and training	What experience or training did the researcher have?	5
<i>Relationship with participants</i>		
Relationship Established	Was a relationship established prior to the start of the study?	5
Participant knowledge of the interviewer	What did the participants know about the researcher? E.g. personal goals, reasons for doing the research	5
Interviewer Characteristics	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	5
Domain 2: Study Design		
<i>Theoretical Framework</i>		
Methodological Orientation and Theory	What methodological orientation was stated to underpin the study?	4
<i>Participant Section</i>		
Sampling	How were participants selected? Purposive, convenience, consecutive, snowball	5
Method of Approach	How were participants approached?	5
Sample Size	How many participants were in the study?	5
Non-participation	How many people refused to participate or dropped out? And the reasons.	5
<i>Setting</i>		
Setting of Data collection	Where was the data collected?	5
Presence of Non-participants	Was anyone else present besides the participants and researchers?	5
Description of Sample	What are the important characteristics of the sample?	5
<i>Data collection</i>		
Interview guide	Were questions, prompts, guides provided by authors? Was it a pilot?	Appendix 3 18-19

Repeat interviews	Were repeated interviews carried out? If yes how many?	5
Audio/visual recording	Did the research use audio or visual recording to collect the data?	5
Notes	Were field notes made during and/or after the interview or focus group?	5
Duration	What was the duration of the interviews or focus group?	5
Data saturation	Was data saturation discussed?	5-6
Transcripts returned	Were transcripts returned to participants for comment and/or correction?	6

Domain 3: analysis and findings

Data Analysis

Number of data coders	How many data coders coded the data?	6
Description of the coding tree	Did authors provide a description of the coding tree?	7-8
Derivation of themes	Were themes identified in advance or derived from the data?	6
Software	What software, if applicable, was used to manage the data?	6
Participant checking	Did participants provide feedback on the findings?	6

Reporting

Quotations Presented	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? E.g. participant number	7-9
Data and findings consistent	Was there consistency between the data presented and the findings?	7-9
Clarity of Major themes	Were major themes clearly presented in the findings?	7-9
Clarity of Minor themes	Is there a description of diverse cases or discussion of minor themes?	12

Appendix 2 - four-dimension criteria to assess rigour of qualitative research ³⁷

Rigour Criteria	Purpose	Original Strategies	Strategies applied in our study to achieve rigour
Credibility	To establish confidence that the results (from the perspective of the participants) are true, credible and believable.	<ul style="list-style-type: none"> - Prolonged and varied engagement with each setting - Interviewing process and techniques - Establishing investigators' authority - Collection of referential adequacy materials - Peer debriefing 	Peer Debriefing Member Checking
Dependability	To ensure the findings of this qualitative inquiry are repeatable if the inquiry occurred within the same cohort of participants, coders and context.	<ul style="list-style-type: none"> - Rich description of the study methods - Establishing an audit trail - Stepwise replication of the data 	Criteria for Reporting Qualitative Research
Confirmability	To extend the confidence that the results would be confirmed or corroborated by other researchers.	<ul style="list-style-type: none"> - Reflexivity - Triangulation 	Reflexivity Member Checking
Transferability	To extend the degree to which the results can be generalized or transferred to other contexts or settings.	<ul style="list-style-type: none"> - Purposeful sampling to form a nominated sample - Data saturation 	Sampling Peer Debriefing Member Checking

Appendix 3 – Focus Group Guide

Section	Research Objective	Content / Questions
1. Welcome	Welcome the participants	<ul style="list-style-type: none"> • Welcome all participants • “This focus group is being carried out by the [Host Institution] as part of my PhD on training load in adolescent football players.” • I would like to thank you all for agreeing to take part today.
2. Aim if the Focus Group	Ensure that all participants have a basic understanding of the purpose of the focus group and are able to contribute.	<ul style="list-style-type: none"> • The aim of the focus group is to understand your thoughts on training load and injury in adolescent football players and to use critical discussion to further practices within the club.
3. Consent and recording	Check all have given in consent forms	<ul style="list-style-type: none"> • I’d like to reiterate that all information collected today will be confidential, and individuals will not be identifiable from these discussions. • An audio recorder is placed in the centre of the room and will record this focus group, there is also a second back-up recorder.
4. Introduction to the focus group	Remind participants of how the focus group will work and key ideas.	<ul style="list-style-type: none"> • Before we start, I’d like to encourage you all to be as honest and open. • Please also try to avoid speaking over each other and respect the opinions of others. • The aim of a focus group is to create discussion amongst each other, so you are encouraged to give your honest viewpoint and propose conflicting views, ideas, solutions and suggestions. • Just a reminder I won’t be participating in the focus group but facilitating by probing issues and asking questions • If you do not wish to answer a question or feel uncomfortable at any point, please let me know. You are entitled to withdraw at any time. • If you don’t understand a question, please ask and I will seek to clarify this with you. • Are there any questions before we start?

5. Ice Breaker	To get people talking and create a relaxed atmosphere	<ul style="list-style-type: none"> You all know each other fairly well to get things started I would like each of you to think of a career highlight. I will then get each of you to speak in turn, please say your name and job role for the recording then proceed to tell us about your career highlight.
6. Evaluate the current Injury prevention practice	Understand were possible improvements could come from.	<ul style="list-style-type: none"> To start with you have all been given some sticky notes, I would like you to write three things that come to mind with injuries and training load in academy football players. Has everyone finished? Now work together to see if you can group these themes – themes are clusters of notes which are closely related to each other. Working through the themes, what are the challenges we can see here? Probe further questions with notes
7. Planning for the upcoming season	Discuss the positives and negatives of this season.	<p>Positives</p> <ul style="list-style-type: none"> What do you do well? What do you think is good practice? <p>Negatives</p> <ul style="list-style-type: none"> What don't you think the academy does well? How could we improve practice and/or prevent more injuries?
8. Implementation of this new program	Discuss how to implement of new ideas	<ul style="list-style-type: none"> What are the keys to successful implementation? Integration (between departments) How should we frame changes to Players and Parents?
9. Summary	Summarise focus group Thank participants for their contributions	<p>Just to summarise the focus group:</p> <ul style="list-style-type: none"> We have discussed current practices within the academy Thank you for participating in this focus group. The information and discussion you've had today will help us drive injury prevention and future research in the area of training load at [The Football Club] If you have any further questions I would be more than happy to answer these or send me an email. Thanks again for your participation.

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