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# FACTORS INFLUENCING THE QUALITY OF LIFE, PARTICIPATION AND PERFORMANCE OF YOUTH FOOTBALLERS: A SCOPING REVIEW

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A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Science.

September 2022

# DECLARATION

I, Realeboga Mosikare, declare that this research report is my own, unaided work. It is being submitted for the Degree of Master of Science in Physiotherapy at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

Signed:

_____

On this 19th day of September 2022 in Johannesburg.

# DEDICATION

I dedicate this project to my family and friends. Without your many sacrifices, none of this would be possible. Your words of motivation and encouragement kept me focused and kept my spirits high. I cannot thank you enough.

# ACKNOWLEDGMENTS

Dr Siyabonga Kunene; thank you for your encouragement and support throughout the journey. Without your wisdom, I would have not made it this far. I am grateful for your patience and perseverance. Nothing can prepare an individual for the challenges they will encounter during the research process, but the way you approached every challenge taught me that a positive outlook guarantees a positive outcome. Despite your busy schedule and many responsibilities, you always found time to mentor me, which highlights your passion for research. You are an inspiration.

Ms. Nkazimulo Mnguni; thank you for your assistance. Your kindness is exemplary. Thank you for sharing your research experience with me. If time management was a person… You pushed me to be a better researcher and a better thinker. For this I admire you.

# NOMENCLATURE

**AGT:** Achievement Goal Theory

**BMI:** Body mass index

**DOMS:** Delayed onset of muscle soreness

**EPPP:** Elite Player Performance Plan

**FIFA:** Fédération Internationale de Football Association

**FMS:** Functional Movement Screen

**HRQoL:** Health-related quality of life

**ICC:** Intra-class Correlation Coefficient

**ICF:** International Classification of Functioning, Disability and Health

**JBI:** Johanna Briggs Institute

**KPIs:** Key Performance Indicators

**LHTL:** Live high-train low

**METS:** Resting metabolic rate

**NSL:** National Soccer League

**PCC:** Population, concept & context

**PED:** Performance Enhancing Drug

**PRISMA:** Preferred Reporting Items for Systematic Reviews and Meta-analyses

**PRISMA-ScR:** Preferred Reporting Items for Systematic Reviews and Meta-analyses – extension for Scoping Reviews

**QoL:** Quality of life

**RAE:** Relative Age Effect

**RPE:** Rate of perceived exertion

**RTP:** Return to play

**SEBT:** Star Excursion Balance Test

**SMART:** Safe Multidimension Algorithm for Return to Training

**STaRRT:** Strategic Assessment of Risk and Risk Tolerance

**TQR:** Total quality of recovery

**WHO:** World Health Organisation

# OPERATION DEFINITIONS

**"Adolescents"** refers to persons between 10 and 19 years of age.

**"Development"** refers to the football-related process of improving the skills and abilities of footballers in football.

**"Elite"** refers to the young people who are the best and most talented in their age group.

**"Football"** refers to the 11-a-side variation of the sport, also known as soccer.

**"Sub-elite"** refers to the young people who participate in any level of football below the elite level.

**"Young people"** or **"young sportspersons"** refers to persons between 10 and 24 years of age.

**"Youth"** refers to persons between 15 and 24 years of age.

# ABSTRACT

**Background:** Football is one of the most popular sports in the world, with most footballers being younger than 18 years of age. The unique physical, environmental, and personal characteristics of young people can affect their ability to participate and perform well in football, which in turn may influence their QoL. There are many contextual factors to consider when planning health-related intervention strategies to cater to youth footballers. Regarding QoL-, participation-, and performance factors, the research related to youth footballers is disseminated, making knowledge translation difficult. It is necessary to consolidate the research to ensure practitioners are aware of the range of factors influencing the QoL, participation, and performance of youth footballers.

**Aim:** To map the range of factors influencing the QoL, football participation, and football performance among youth footballers.

**Methods:** A scoping review was conducted in five stages: 1) clarifying and linking the purpose and research question; 2) assessing the feasibility of scoping process; 3) using an iterative team approach to selecting the studies; 4) extracting the data; and 5) incorporating a numerical summary and qualitative thematic analysis, reporting the results, and considering the implications of study findings to policy, practice, and research.

Database searches were conducted from August 2021 to October 2021. The thirteen databases that were searched through the EBSCO search engine were: Academic Search Ultimate, Africa-Wide Information, CINAHL Complete, Library, Information Science & Technology Abstracts, MasterFILE Premier, MEDLINE Complete, Mental Measurements Yearbook, Health Source: Nursing/Academic Edition, MEDLINE, Psychology and Behavioural Sciences Collection, SocINDEX with Full Text, and SPORTDiscus with Full Text. Two reviewers independently screened data, and one reviewer performed data abstraction. Articles that discussed or

described the factors influencing youth footballers were included in the study. All peer-reviewed qualitative and quantitative studies which have been published in English between 1998 and 2021 were included in this review. Descriptive synthesis was conducted.

**Results:** After screening 2691 citations and 310 full-texts, 164 articles were included. The types of evidence in this review included 119 cohort studies (72.56% of total), 18 narrative reviews (10.98%), 14 systematic reviews (8.54%), 4 descriptive epidemiology studies (2.44%), 2 meta-analysis studies (1.22%), 2 randomised controlled trials (1.22%), 2 consensus statements (1.22%), 1 cohort report (0.61%), 1 case report (0.61%), and 1 expert opinion article (0.61%). Sixty-seven articles (40.9%) discussed performance. 66 articles (40.2%) discussed QoL. 31 articles (18.9%) discussed participation. Furthermore, seventy-nine (48.17%) of the articles discussed factors related to male footballers, 13 (7.93%) discussed factors related to female footballers, and 72 (43.9%) were not gender specific.

The QoL-related factors that were identified were injury and injury prevention, health behaviour, psychological factors, and social factors. The participation-related factors that were identified were ambitions for career progression and dropout, relative age effect (RAE), talent, and level of competition. The performance-related factors that were identified were body composition, cognitive level, RAE, training, load, recovery, playing surface, birthplace effect, nutrition, and climate.

**Clinical implication and conclusions:** Through this review, we mapped the range of factors influencing the QoL, participation, and performance among youth footballers. Physiotherapists working with youth footballers must have knowledge of the factors influencing the footballers' sports engagement to implement effective health promotion programs. Further research is required to fill the gaps in the literature.

**Keywords:** Factors, Quality of life, Participation, Performance, Youth, Football

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# CHAPTER ONE – INTRODUCTION

## 1.1. General Introduction

Football is one of the most popular sports in the world, with most footballers being younger than 18 years of age (Fédération Internationale de Football Association [FIFA], 2018). The World Health Organisation (WHO) defines 'young people' as those between 10 and 24 years of age, and the 'youth' as those between 15 and 24 years of age (WHO, 2012). In contrast, FIFA accredits 'elite youth football' for young people between the ages of 13 and 21 (FIFA, 2018). Youth football is more popular among males than among females in all geographical zones (that is, continents). However, the growth of youth football in recent years is attributed to the rapid rise in the number of registered female footballers (FIFA, 2007).

Young people who participate in football during their adolescent years – that is, between 10 and 19 years of age (WHO, 2012) – gain the physical-, cognitive-, psychological-, and psychosocial stimulation which is critical for normal development (Noon et al., 2015; O'Connor et al., 2016; Monteiro et al., 2018; Fiorilli et al., 2019). As such, youth sports participation is encouraged. However, due to the normal physical changes that occur during adolescence, youth footballers are at elevated risk of sustaining injuries. Overuse injuries are a major concern, accounting for 47 to 54% of all youth sports injuries (Azubuike and Okojie, 2009; Bean et al., 2014; DiFiori et al., 2014; Merkel, 2013). Studies have found an injury prevalence as high as 88.2% among elite male youth footballers which negatively impacts individual and team success (Conley and Lategan, 2019). Serious injuries and chronic injuries govern career longevity (Turner et al, 2000; DiFiori et al., 2014; Houston et al., 2016) and disrupt the ideal talent identification and development processes (Williams, 2020). Furthermore, the burden of injury in youth football negatively influences the health-related quality of life (HRQoL) of youth footballers (Turner et al., 2000; Houston et al., 2016).

Apart from injury, other factors have been shown to have a detrimental effect on the HRQoL of sportspersons. These include performance-related stress (Azubuike and Okojie, 2009; Bean et al., 2014; DiFiori et al., 2014; Merkel, 2013) and acute and chronic fatigue from overtraining (Gentner, 2004; Feeley et al., 2016). Due to the physical nature of the sport, there is a tendency to focus on improving the physical condition of the sportsperson without addressing the contextual factors that influence their quality of life (QoL).

QoL is defined as "an individual's perception of their position in life in the context of the culture and value systems in which they live, concerning their goals, expectations, standards, and concerns" (WHO, 1995, p. 1). For a footballer, QoL is determined by football-related factors and non-football related factors (Bean et al., 2014; Castro-Sánchez et al., 2018; Feeley et al., 2016; Gucciardi, 2010; Karimi and Brazier, 2016). Football-related factors include physical attributes and fitness level (Lathlean et al., 2019), talent (Turner et al., 2000), and the coach-created footballing environment, known as the motivational climate (Castro-Sánchez et al., 2018). Non-football related factors include relationships with parents/guardians (Gentner, 2004), peer relationships (WHO, 2012), and the influence of a footballer's place of birth on the likelihood of them reaching elite levels, known as birthplace effect (Côté et al., 2006). The abovementioned factors have also been shown to influence the performance of youth footballers.

Performance is defined as "the action of fulfilling or executing an action or task" (Feeley et al., 2016, p. 1). Performance success is the most important outcome measure for elite youth footballers. Footballers join academy programs aiming to improve skills and to reach professional ranks. As such, youth footballers may specialise early to hasten career progression (Moseid et al., 2019). Early specialisation can lead to burnout, overuse and deformity due to the constant repetitive loads on the body from single-sport engagement (Moseid et al., 2019). Thus, to facilitate performance success, it is important for practitioners working with youth

footballers make evidence-based decisions about the youth footballing environment. This will ensure that the growth of the sport is sustained, and the well-being of the footballer is maintained.

The literature shows that QoL, participation, and performance are important concepts in youth football research. However, the relationship between the factors influencing the QoL, participation, and performance of youth footballers is yet to be established. To achieve this, the literature must be consolidated and summarised systematically.

## 1.2. Problem Statement

To promote player well-being, medical practitioners working with youth footballers structure interventions around three key areas: 1) maintaining and/or improving the footballers' QOL status; 2) facilitating the participation of the footballers in football or football-related activities, and 3) restoring and/or improving the performance level of the footballers.

The general problem is that literature on these areas is disseminated, making holistic evidence-based management difficult. According to Gentner (2004), the more talented a young sportsperson is, the more complicated life becomes, because of the added internal (self-imposed) and external (from society) pressure to succeed. Bean et al. (2014) reported that the inappropriate and/or inadequate management of elite youth sportspersons can be harmful to them, and can result in career termination, demotivation, or failure. To improve the awareness of sports medical practitioners on the factors influencing the QoL, participation and performance of youth footballers, it is necessary to consolidate the literature on these factors. To promote holistic evidence-based health management in youth football, it is necessary to report on the information gathered concisely.

The literature is disseminated because many factors influence QoL, participation, and performance. To understand the young footballer and to implement effective interventions, medical practitioners must have awareness of these factors.

The specific problem is that these areas have previously been researched in isolation from each other. As such, the relationship between the factors influencing QoL and the factors influencing the participation and/or the performance of youth footballers has not been established. A factor perceived to influence QoL can affect either participation or performance in sport (Turner et al., 2000; Malina, 2010; Dugdale et al., 2019). For example; a footballer under financial strain may be unable to focus during training or match play, which can result in demotion (due to poor performances) or deselection. This shows that these key areas are interrelated and must be reviewed as such. In discussing the complex interplay between factors affecting youth development through sport, Armour et al. (2013) argued that current health promotion interventions targeting youth sportspersons are insufficient and non-specific.

To date, there have been no attempts to review the factors influencing QoL, participation, and performance in youth football.

## 1.3. Justification of the research

The current youth football structure is geared towards skill mastery through early single-sport specialisation (Feeley et al., 2016). Grassroots programs register players from 5 years of age (FIFA, 2018). It is the role of medical practitioners working with youth footballers to promote the safe participation of children and young people in sport. Research of this nature will enable practitioners to do so, by improving our awareness of the complexities associated with youth footballers. Furthermore, the knowledge gained from this research will enable practitioners to advocate for the well-being of youth footballers (with key decision-makers in the youth football pyramid; including parents, coaches, and stakeholders).

It is necessary to conduct a review of the literature to consolidate the available information. No reviews have been published on this topic. Thus, this review will fill a gap in the existing literature. This review may also serve as a baseline for future research projects.

## 1.4. Review question

What were the factors influencing the QoL, participation in football, and football performance of youth footballers?

## 1.5. Review aim

This review aimed to map the range of factors influencing the QoL, football participation, and football performance among youth footballers.

## 1.6. Review objectives

The objectives of this study were to:

- Identify and collate data from existing qualitative and quantitative literature on the numerous factors influencing the QoL status, football participation, and football performance among male and female youth footballers.
- Designate and classify the available data into the following categories: 1) factors influencing QoL, 2) factors influencing football participation, and 3) factors influencing football performance among male and female youth footballers.
- Summarise the collected data (factors influencing QoL, football participation, and football performance among male and female youth footballers) descriptively and logically using qualitative content analysis.

# CHAPTER 2 – LITERATURE REVIEW

## 2.1. Introduction

According to Brandhorst (1982), a literature review is defined as an "information analysis and synthesis, focusing on findings and not simply bibliographic citations, summarising the substance of the literature and drawing conclusions from it". This literature review will analyse and summarise the common factors influencing the QoL, football participation, and football performance of youth footballers. Randolph (2009) outlined the structure of the introduction of a literature review. It includes: (1), the discussion of the purpose of the review, (2), the presentation of the taxonomy of the review, and (3), the discussion of the steps of conducting the review.

## 2.2. Purpose of the review

The purpose of a literature review is to "determine what is known on the topic, how well this knowledge is established and where future research might best be directed" (Western Sydney University, 2017, p. 1). Firstly, this literature review was conducted to provide the researcher with background knowledge on the chosen topic. Secondly, this review served as a pilot study for the main study, enabling the researcher to evaluate the feasibility of conducting a scoping review on the chosen topic. Lastly, this literature review enabled the researcher to gain methodological insights through the evaluation of the research methodology used by researchers in the studies included in this review.

## 2.3. Taxonomy

Cooper's Taxonomy of Literature Reviews (1988) was used to describe the characteristics of this review. Literature reviews can be classified according to six characteristics: (1), focus, (2), goals, (3), perspective, (4), coverage, (5), organisation, and (6), audience. Cooper's taxonomy was used for this literature review because it enabled the researcher to have multiple foci and

achieve multiple goals by conducting this review (Randolph, 2009). The six characteristics of this review are described below.

### 2.3.1. Focus

This is primarily a research outcomes-oriented review, and secondarily a research methodological review. According to Randolph (2009), an outcomes-oriented review enables the researcher to identify key research concepts – and to identify a lack of research – in the chosen field. Thus, the first- and the second purpose of this review was fulfilled through an outcomes-oriented focus. To gain methodological insights, the principles of a methodological review were applied in this review. This involved "investigating research methods to identify key variables, measures, and methods of analysis to inform outcomes-oriented research" (Randolph, 2009).

### 2.3.2. Goals

The primary goal of this review was to identify central concepts within QoL-, participation-, and participation research in relation to youth footballers. This aided the researcher in identifying the information relevant to the main study. The primary researcher was able to resolve conflicts that arose during the main study using the knowledge gained from conducting this literature review. The secondary goal of this review was to integrate and generalise information on the central concepts.

### 2.3.3. Perspective

Since the purpose of this review was to gain background knowledge, the researcher had no pre-existing biases. As this review was primarily outcomes-oriented, the researcher was neutral, and review findings have been presented as fact.

### 2.3.4. Coverage

Since the design of the main study is a scoping review – which was an exhaustive review –, the extent of this review was limited. A homogenous sample of convenience of QoL-, participation-, and performance studies in youth football research was used to compile this review. A text word search was conducted using the EBSCO search engine. The following databases were selected: Academic Search Ultimate, Africa-Wide Information, CINAHL Complete, Library, Information Science & Technology Abstracts, MasterFILE Premier, MEDLINE Complete, Mental Measurements Yearbook, Health Source: Nursing/Academic Edition, MEDLINE, Psychology and Behavioural Sciences Collection, SocINDEX with Full Text, and SPORTDiscus with Full Text. The search terms selected for the main study were used to search for the articles included in this literature review.

### 2.3.5. Organisation

This literature review has been organised according to the methodological format, which is; introduction, results, discussion, and conclusion.

### 2.3.6. Audience

This literature review has been prepared for the researcher's supervisor and the reviewers of the research.

## 2.4. Literature review search strategy

To identify studies relevant to this topic, the PCC eligibility criteria outlined for the main study were used. No limits were placed on source types, and no limits were placed on the date of publication. Only articles accessible through the University of Witwatersrand Library were included in this review.

The search strategy developed for the main study was modified to limit the number of results yielded from the searches, as a homogenous sample of convenience was desired for this

literature review. According to Jager et al. (2017), a homogenous sample of convenience can be used by researchers to obtain narrow and clear generalisability of a topic of interest in a limited sampling frame. In this review, the three sampling frames were the central themes of the review, namely; QoL, participation, and performance. The researcher was able to achieve the goals of the literature review through homogenous convenience sampling.

The search strategy for this review is outlined below:

Electronic literature searches using the EBSCO search engine were conducted on the 10th of August 2021. The text word search was divided into three sub-searches, which are detailed below:

QoL search:

"football" or "soccer" not "rugby" not "American football" AND "youth" or "young pe*" or "adolescent*" or "teen*" or "young adult*" AND "quality of life" or "health-related quality of life"

Participation search:

"football" or "soccer" not "rugby" not "American football" AND "youth" or "young pe*" or "adolescent*" or "teen*" or "young adult*" AND "participation" AND "elite"

Performance search:

"football" or "soccer" not "rugby" not "American football" AND "youth" or "young pe*" or "adolescent*" or "teen*" or "young adult*" AND "performance" AND "elite

## 2.5. Results

The results of the three sub-searches are detailed below:

QoL search:

205 results were retrieved from the "QoL" literature search. To obtain a sample of convenience, the first one hundred titles and corresponding associated abstract were screened for relevance using the eligibility criteria outlined for the main study. Thirteen articles were included in this review.

Participation search:

327 results were retrieved from the "participation" literature search. To obtain a sample of convenience, the first one hundred titles and corresponding abstracts were screened for relevance using the eligibility criteria outlined for the main study. Twenty-eight articles were included in this review.

Performance search:

581 results were retrieved from the "performance" literature search. To obtain a sample of convenience, the first one hundred titles and corresponding abstracts listed were screened for relevance using the eligibility criteria outlined for the main study. Thirty-five articles were included in this review.

The homogenous convenience sample of studies was analysed using conventional content analysis – an approach outlined by Hsieh and Shannon (2005). Conventional content analysis is "used with a study design whose aim is to describe a phenomenon" (Hsieh and Shannon, 2005). Since the purpose of this review was to gain background knowledge on the three central themes, conventional content analysis was appropriate for this review. To develop a framework for the factors identified, firstly, codes were developed from the data collected using the titles of the articles reviewed. For example, two codes were developed from the QoL search, namely; QoL and health related QoL (HRQoL). The key words used in the included studies were examined to identify common sub-themes. For example, the sub-themes related to HRQoL were physical functioning, mental functioning, emotional functioning, and social functioning.

Information related to the sub-themes was then summarised and described. The summary is presented below.

## 2.6. Discussion

### 2.6.1. QOL status of youth footballers

WHO defines QoL as "an individual's perception of their position in life in the context of the culture and value systems in which they live, in relation to their goals, expectations, standards, and concerns" (WHO, 1995, p. 1). Based on the thirteen articles identified, there seems to be a difference in QoL status among elite and sub-elite youth footballers. Sub-elite youth footballers, who participate in football because of the associated health benefits of physical activity (Janssen and LeBlanc, 2010; Merkel, 2013) and because they enjoy football (Scanlan and Lewthwaite, 1986; Larsen et al., 2021), have a higher QoL status compared to elite youth footballers (Gentner, 2004), who play in high-pressure (Møllerløkken et al., 2015) and highly competitive environments (Gucciardi, 2010; Erikstad et al., 2018). Furthermore, the relatively low QoL status among elite youth footballers may be due to high training loads in conjunction with limited free time, which may result in burnout, fatigue, and overuse injury (Keathley et al., 2013; Møllerløkken et al., 2015; Pfirrmann et al., 2016).

Although QoL research is common, there is no consensus on the definition of QoL (Gentner, 2004). To contextualise QoL for the youth footballer, QoL was discussed in this review using the WHO definition as the framework. Thus, QoL was discussed in the context of footballing culture and the value system of youth football, in relation to the goals, standards, expectations and concerns of youth footballers.

#### 2.6.1.1. Culture of youth football

According to Vaughan et al. (2021), football culture can be defined as the norms and practices adopted by members of the football community, which serve as a guideline for acceptable

behaviour among footballers. Although culture varies based on language, style of play, and regional traditions, global youth football culture has changed over time, as the established youth leagues and competitions have facilitated the transformation of the football environment from a school-based physical health promotion system to a professional club-based performance-oriented system (Curran and Hill, 2019; Vaughan et al., 2021). As such, there is greater emphasis on perfectionism and interpersonal competition, which can result in greater individualism and isolation among youth footballers (Curran and Hill, 2019). This can negatively influence the QoL of youth footballers. In contrast, it is part of football culture for players to interact with members of different sociocultural communities during competition, which results in shared learning experiences and unity in the youth football community. This can positively influence the QoL of youth footballers (Curran and Hill, 2019; Vaughan et al., 2021).

**Competitive behaviour**

The elevated level of competition in academy football appeals to youth footballers who aspire to pursue a professional playing career in football. Football academies provide players with the opportunity to play with other highly skilled individuals. The demands are high – with high training and playing loads – and there is pressure on every individual to perform. Players who do not reach the expected skill level run the risk of deselection. As a result, there is a tendency among youth footballers to under-report minor injuries, resulting in the high incidence and prevalence of overuse injuries among youth footballers (Arnason et al., 2004; Kucera et al., 2005; Keathley et al., 2013; DiFiori et al., 2014; Conley and Lategan, 2019). Furthermore, the highly competitive environment can result in non-functional overreaching and burnout (DiFiori et al., 2014; Noon et al., 2015). This can negatively influence the QoL of youth footballers.

**Enjoyment**

According to Scanlan and Lewthwaite (1986, p.8), sports enjoyment can be defined as "an individual's positive affective response to his or her competitive sports experience". Although football is a competitive sport, many young people play football because they enjoy it (Larsen et al., 2021). Sport enjoyment is multi-faceted and can be obtained through participating or spectating (Scanlan and Lewthwaite, 1986).

Enjoyment plays a crucial role in an individual's life satisfaction. Larsen et al. (2021) found that children who had never played football before participating in the '11 for Health in Denmark' study yielded a moderate-to-high overall enjoyment score. Thus, it was concluded that football can improve the QoL of children.

Furthermore, sports enjoyment is the main reason why young people continue to play football (Mossman and Cronin, 2019). To avoid high dropout rates, elite academies must balance the youths' desire for fun with the obligation to achieve performance success.

2.6.1.2. The value system of youth football

According to Vaughan et al. (2021), the value system of youth football is a sociocultural constraint, meaning that the culture of youth football is framed by what footballers value. The value system of youth football can be defined as the set of beliefs and attitudes shared by members of the football community (Vaughan et al., 2021). For example, in a high-performance environment, coaches, parents, and governing bodies intentionally instil values such as discipline and dedication to facilitate performance success (Vaughan et al., 2021). The QoL status of youth footballers can be influenced by their compliance to the set of beliefs that are instilled (Vaughan et al., 2021). For example, footballers who are disciplined may be rewarded with leadership roles within the team, resulting in increased popularity within the football community and positively influencing their QoL, while ill-disciplined footballers may

be punished with suspensions and/or fines, resulting in ostracization and/or dropout (Gentner, 2004; Vaughan et al., 2021).

**Winning**

Winning has a positive impact on an individual's confidence and self-image (Godfrey and Winter, 2017). In sport, winning is the main indicator of success. Football academies with a winning record attract more talented players and supporters. The financial rewards for winning stimulate a winning mentality in clubs and among players. In the UK, the winning mentality is instilled in youth footballers during the foundation phase (U9–U11), the youth development phase (U12–U16), and the professional development phase (U17–U21) of their football careers (Godfrey and Winter, 2017). Thus, winning forms a major part of the value system of football academies, and can positively influence QoL (Godfrey and Winter, 2017). In contrast, Kepčija (2016) argued that although the winning mentality forms an integral part of youth football development, talent development should remain the main priority at academy level, so that youth footballers are adequately prepared for a professional playing career in football.

**Skill proficiency**

Skill proficiency is the main aim of youth football. To facilitate the learning and retention of football skills, a high training load is required. In the UK, the English Premier League (EPL) rolled out the Elite Player Performance Plan (EPPP) for elite academies aimed at facilitating skill proficiency among youth footballers. Players who successfully transition from amateur to professional ranks through the EPPP may have a higher QoL status compared to those who dropout (Noon et al., 2015). However, failure and dropout are common among EPPP teams, because players are expected to complete between 8500 and 10 000 training hours in a 42-week season, training 5 days a week, twice daily, in the absence of confounding factors, such as illness or injury (Noon et al., 2015). The elevated training load may result in an increased injury

burden in youth football, which has been shown to negatively influence the QoL of youth footballers (Read et al., 2018b). Tears et al. (2018) reported a 47% increase in the incidence of injury in the 16 to 18-year-old age group 3 years after the introduction of EPPP, as compared to three years before EPPP. Time-loss injuries stunt the progression of youth footballers (Read et al., 2018b). Thus, it can be argued that the desire to achieve skill proficiency through single-sport specialisation can defeat the purpose for which specialisation is intended.

The focus on skill proficiency among youth sportspersons may also affect their academic performance. According to Souter et al. (2018), the stress of an elite sporting environment can place male athletes at risk of developing depression, with seriously injured athletes at a higher risk. Youths suffering from depression generally produce poorer academic results (Sorkkila et al., 2018). This can result in youths dropping out from either the sport or the school program (Sorkkila et al., 2018). It is important for practitioners and technicians working with young people to create a well-balanced sporting environment and promote normal functioning.

**Incentivised system**

The football academy system is a feeder for the professional football system. For example, the National Soccer League (NSL), the football governing body in South Africa, established an academy league in 2007 to improve talent identification and development in South Africa (NSL, 2020). The incentive for the youth footballers playing in the academy league is to be promoted to professional ranks.

Other incentives available for elite youth footballers include national team selection and representation. Young players who participate in international competitions are more likely to obtain professional contracts than those who do not (Sarmento et al., 2018). Participation in international competition is associated with increased popularity and celebrity status, which positively influences QoL (Sarmento et al., 2018).

2.6.1.3. Goals of youth footballers

The goals of youth footballers that were identified are: 1) to improve health status (Merkel, 2013), 2) to benefit financially (Gentner, 2004), and 3) to play professionally against those who are considered the best footballers (Møllerløkken et al., 2015).

**Playing football to improve general health**

Organised sport is an effective tool to meet the recommended requirements for physical activity in children and adolescents. According to Merkel (2013), "children and adolescents should participate in moderate-to-vigorous physical activity one or more hours per day and muscle and bone-strengthening activities 3 or more times per week". Physical activity promotes normal physical-, cognitive-, psychological-, and social development in children and adolescents (Merkel, 2013). Janssen and LeBlanc (2010) found that physical activity is crucial in the management of the major health concerns affecting children and youth, including obesity, low bone density, high blood cholesterol, and depression. Regarding football, Fernandes et al. (2014) showed a significant difference in the aerobic capacity of children who participated in twice-weekly 60-min football practice sessions, as compared to an inactive age-matched control group. As such, young people are encouraged to participate in youth football because of the associated health benefits. Thus, participation in youth football can positively influence the QoL status of the youth (Janssen and LeBlanc, 2010; Merkel 2013; Fernandes et al., 2014)

**Playing football to benefit financially**

The decision to specialise early is often driven by financial reasons (Moseid et al., 2019). Sportspersons may even drop out of school to heighten their chances of obtaining professional contracts by focussing on their sport of choice (Gentner, 2004). At the academy level, there are also financial rewards for talented individuals. Players who excel are given stipends, bursaries, and scholarships (Gentner, 2004). It can be suggested that players who receive financial

rewards for playing football improve their economic status, which enables footballers to address football-related and non-football related concerns. This can lead to less external stress or pressure, which has been shown to improve QoL (Louw and Louw, 2019). In contrast, players may also have elevated external pressure from receiving financial incentives, as the demand for success is heightened. Furthermore, parents and coaches may encourage certain career decisions because of the associated financial incentives (Gentner, 2004). The increased external stress can negatively influence the QoL of youth footballers (Louw and Louw, 2019).

**Playing football to reach professional ranks**

The goal of an elite youth footballer is to become a professional footballer. Although it is impossible to predict which footballers will reach professional ranks, the research suggests that certain characteristics are common among youth footballers who turn professional. Players that have developed self-regulating and self-motivation strategies are more prone to success and adaptation (Gucciardi, 2010; Erikstad et al., 2018). Self-motivated individuals are generally more self-assured, and turn professional at an early age (Gucciardi, 2010). Players who reach professional ranks have a higher QoL status as compared to those who do not, as obtaining a professional contract an outcome measure for success in youth football (Møllerløkken et al., 2015). Success is associated with a positive self-image, which is associated with a good QoL status (Louw and Louw, 2019).

In contrast, players who do not obtain professional contracts may suffer emotional stress due to the perception of failure (Louw and Louw, 2019). The high deselection rates in elite youth football show that not all youth footballers will obtain professional contracts (Møllerløkken et al., 2015). It can be suggested that deselection negatively influences QoL (Møllerløkken et al., 2015).

2.6.1.4. Expectations of youth footballers

The expectations of youth footballers that identified are: 1) to develop relationships, and 2) to gain football expertise.

**To develop relationships**

According to Armour et al. (2013), team sports are an effective tool for the social development of young sportspersons. Youths are more likely to fulfil team demands if they have the support of their teammates (Louw and Louw, 2019). Furthermore, Fleary et al. (2018) suggested that peers influence each other in health decision-making. Physical activity is strongly associated with positive health choices, as physically active young people are more likely to practice healthy eating habits, and they are more likely to avoid harmful substances such as drugs and alcohol (Merkel, 2013; Houston et al., 2016; Strazzeri and Toto, 2019). Thus, by encouraging the development of strong peer relationships among teammates, the QoL of youth footballers can be positively influenced, matching their expectations with their lived experience.

In contrast, competition among teammates is a contributing factor to the initiation of performance-enhancing drug (PED) use among sportspersons, particularly when they develop an unhealthy desire to win (Sowjanya and Girish, 2019). Often, however, PEDs are introduced to sportspersons by their coaches, parents, and teammates (Sowjanya and Girish, 2019). This suggests that unhealthy competition amongst peers and the fear of disappointing adult role models can negatively influence the QoL of youth footballers. When expectations do not match lived experiences, dropout may result (Møllerløkken et al., 2015).

Relationships that are valued by young sportspersons outside of the sporting environment are those with friends and those with partners (Gentner, 2004). According to Louw and Louw (2019), by late adolescence, the social interactions that youths engage in helping to frame their perspectives regarding life. Relationships can be a source of strain or relief, depending on the

status of those relationships. For sportspersons, the time demands of the sport may result in strained relationships, particularly when there is no support from friends and/or partners (Saward et al., 2019). In such instances, participation in sport may negatively affect QoL, which may result in poor performances. Awareness of the state of the relationships that youth footballers have is necessary to maintain a healthy sporting environment.

**To gain football expertise**

To facilitate performance success among youth footballers, coaches balance technical skills development with tactical development (Kepčija, 2016). Generally, the youth footballers that obtain professional contracts are those who develop both technical and tactical acuity (Johnston et al., 2018). It can be argued that players with limited playing time have stunted or delayed skill development, which can result in demotivation or disinterest. In such instances, QoL can be negatively affected by the unmet expectation of playing time (Kepčija, 2016).

2.6.1.5. Standards and concerns of youth footballers

The standards of youth footballers are influenced by the level that they play at. At amateur level, the environment is relatively more social, thus playing standards are relatively low. Amateur youth footballers tend to participate in other sports as well, thus spend relatively less time playing football (Moseid et al., 2019). At semi-professional level, the environment is relatively more constrained to encourage focus. Thus, semi-professional footballers are likely to specialise (Moseid et al., 2019), because the playing standards at semi-professional level are higher than at amateur level. Playing standards are highest at professional level. Elite youth footballers seek guidance from adults when making life decisions (Louw and Louw, 2019), such as choosing which team to play for. Professional footballers specialise early to promote skill mastery and to gain experience (Moseid et al., 2019).

The concerns of youth footballers are also determined by the level that they play at. Due to the social dynamic of amateur youth football, amateur footballers are more concerned about social acceptance and seek validation from peers (Louw and Louw, 2019). Semi-professional youth footballers are more concerned about career decisions, thus seek validation from parents and coaches (Moseid et al., 2019). Professional footballers are more concerned about performance success, thus seek validation from football governing bodies and teammates (Vaughan et al., 2021).

### 2.6.2. Health-related QoL of youth footballers

According to Karimi and Brazier (2016), HRQoL is a "multidimensional concept that includes domains related to physical-, mental-, emotional-, and social functioning". To review the research on the HRQoL of elite youth footballers, these terms in this definition will be used.

#### 2.6.2.1. Physical functioning

**Injuries in youth football**

Injury is a significant issue in youth football. An injury can be defined as any impairment of body structure and function that results in an athlete spending any length of time away from sports participation (Hägglund et al., 2005). According to Price et al. (2004), players lose up to 6% of development time in a season through injury. Studies have shown that 60-90% of all injuries in football are lower limb injuries (Faude et al., 2013; Sadigursky et al., 2017). Sprains, strains, and contusions are the most common types of injuries in youth football (Keathley et al., 2013; Møllerløkken et al., 2015; Pfirrmann et al., 2016). According to Pfirrmann et al. (2016), muscle sprains account for 16.7% to 37% of all injuries in male youth football, and ligament strains account for 15.6% to 18% of all injuries in female youth football. Furthermore, in reviewing injury incidences among elite youth football players, Pfirrmann et al. (2016) reported a total injury incidence ranging from 2.0 injuries to 19.4 injuries per 1000 hours of

exposure. Players are more likely to be injured during matches, with an injury rate ranging from 9.5 injuries to 48.7 injuries per 1000 hours of match exposure, as compared to an injury incidence of 3.7 injuries to 11.14 injuries per 1000 hours of exposure during training sessions (Pfirrmann et al., 2016). Injuries have a detrimental impact on the HRQoL of footballers. Thus, clubs implement injury prevention protocols to curb injury trends.

Playing level is associated with injury. The highest injury rates among youths occur in the middle-to-late adolescent age group (16-18 years) (Azubuike and Okojie, 2009). In many football academies, this age group is the transitional group between amateur and professional ranks, thus the high injury rate may be changed in training intensity that the players are subjected to. There is no association between age and injury type, age and injury mechanism, or age and injury severity (Dvorak et al., 2000). In South Africa, Conley and Lategan (2019) reported an injury prevalence of 88.2% in a cohort of 119 adolescent footballers. In this cohort of 15 to 19-year-olds, non-contact injuries were most common. Due to the low Functional Movement Screen (FMS) scores that were observed in the study, it was postulated that poor biomechanics were the primary cause of injury among the players, which suggests that injury prevention strategies that are implemented among South African footballers should address biomechanical impairments.

**Risk factors for injury in youth football**

Footballers are at risk of incurring a wide variety of injuries while playing. Risk factors can be classified as either intrinsic or extrinsic. Among youth footballers, the most common intrinsic risk factor for injury is previous injury (Arnason et al., 2004; Kucera et al., 2005; Keathley et al., 2013; DiFiori et al., 2014). This is due to both the inadequate and the inappropriate rehabilitation of the injury, which most often stems from the pressure placed on the player to return to play, and from the player's desire to return to play (Arnason et al., 2004). Among

adolescent males, there is also a reluctance to report the injury, as this may be viewed as a sign of weakness or a lack of commitment to the team, stemming from masculine socio-cultural norms (Louw and Louw, 2019). Medical practitioners working with football teams should work to limit the burden of injury in youth football by implementing tertiary injury prevention programs for players that have previously been injured.

Other intrinsic risk factors among youth footballers include strength deficits, decreased flexibility, low fitness levels, and poor biomechanics, all of which are common signs of an adolescent growth spurt (Feeley et al., 2016). Youth footballers undergoing rapid physical changes due to growth should have modified training programs to prevent injuries.

Extrinsic factors for injury include the style of play adopted by the team, which can influence the number of contact injuries seen in the sport. According to Dvorak et al. (2000), the reduction in foul play through coaching and the serious punishment of foul play is an avenue for injury prevention, seeing as a significant proportion of football injuries are caused by contact with another player.

Another extrinsic risk factor for injury is the playing surface. In rural South Africa, natural surfaces are often unkempt and uneven due to team and/or community budget constraints. Playing on such surfaces compromises the health and safety of footballers. A solution may be to advocate for the installation of artificial turf in rural communities. According to Ekstrand et al. (2006), there is no significant difference in injury risk when comparing play on natural and artificial turf. However, Fujitaka et al. (2017) found a significant increase in lower extremity injury incidence one year after male footballers switched from playing on the grass to playing on a synthetic surface. Thus, to promote the health of youth footballers, teams should be encouraged to train and compete on the same surface type. Furthermore, training should be tailored to enable players to meet the demands of the surface.

Overload is a major extrinsic risk factor for injury among youth footballers. According to Lathlean et al. (2019), there is a negative correlation between load and well-being among young sportspersons. Price et al. (2004) found a direct relationship between fatigue and injury. Overload is the primary cause of overuse injuries, which are the most common type of injuries among youth sportspersons (Friesen et al., 2018). Overuse injuries are more likely to occur during an adolescent growth spurt, as the rapidly adapting musculoskeletal tissue is relatively weaker than mature tissue, meaning adolescents are relatively more prone to injury from repetitive low-load activities (DiFiori et al., 2014; Friesen et al., 2018). Furthermore, footballers are at a higher risk of injury, fatigue, and illness during moments in the season when the training and competition load is increased (C. Jones et al., 2017).

In contrast, Noon et al. (2015) found no decline in physical performance during a season among youth footballers who followed EPPP guidelines. This suggests that overload can be curbed by periodisation. When training programs are designed to match the demands of the season, training is effective in preventing overload and fatigue.

2.6.2.2. Mental functioning

Elite youth football can cause performance-related stress (Keathley et al., 2013; Fiorilli et al., 2019). The mental toughness of players to cope with the demands of the competitive environment has been identified as a determinant of performance success (Gucciardi, 2010). As such, to equip footballers with coping strategies, mental-health interventions are warranted. Adult role models – parents, teachers, and coaches – play a crucial in facilitating stress management among youth footballers. Practitioners working with youth footballers must engage with adult role models to create a safe sporting environment for players.

#### 2.6.2.3. Emotional functioning

Emotional well-being is also a determinant of performance success in youth football. A key emotional developmental milestone during adolescence is the development of self-esteem and self-image (Fiorilli et al., 2019). Players with high self-esteem are commonly selected to assume leadership roles in their teams, and coaches depend on them to bridge the gap between the technical staff and the players. During adolescence, the mentality of many coaches is to encourage players to explore their skills and abilities, allowing them to be creative and innovative during play, as this is seen as a means of developing individual and team confidence.

#### 2.6.2.4. Social functioning

According to Gentner (2004), free time is a determinant of social functioning, and freedom to participate in leisure activities affects a young sportsperson's perception of well-being. Commonly, elite athletes sacrifice free time to engage in sports-related activities. Specialised footballers train in and out of season to prevent detraining (Møllerløkken et al., 2015; Mossman and Cronin, 2019). As such, the social functioning of elite youth footballers is based on the time spent with teammates. Furthermore, participation in elite sport brings with it much media attention. The support from fans improves elite youth footballers' social status in their communities (Fleary et al., 2018). This applies societal pressure for the footballers to lead responsible lifestyles (Louw and Louw, 2019). Addressing the social demands of young footballers can help to improve their focus and performance.

### 2.6.3. Participation in youth football

Participation can be defined as the act of joining with others in doing something (Baxter-Jones, and Maffulli, 2003). Football is one of the most popular sports in the world, with 265 million registered participants worldwide (FIFA, 2007). It is most popular among male youths, with 18.7 million youth (under 18) players worldwide (FIFA, 2007). Football is a global sport, as it is played in both urban and rural communities. It is the most popular sport in Africa, with forty-

six million registered footballers in Africa. Of those, 1.3 million are South African male youth footballers (FIFA, 2007).

2.6.3.1. Reasons for participation in football

The key reasons for youth participation in football are as follows:

**Parental influence**

Most parents encourage their children to participate in sub-elite football for the health benefits associated with regular physical activity (Felfe et al., 2016). Parents who enrol their children in academies have ambitions for their children to become professional footballers. Parents are the key decision-makers in the lives of their children and are the primary role models in their children's lives (Armour et al., 2013). The decision to participate in football, which is generally taken during childhood and adolescence (FIFA, 2007), is made by parents and/or guardians (Armour et al., 2013). As children grow older, they gradually become the primary decision makers in their lives (Louw and Louw, 2019). Thus, continued participation in football is determined by various factors, including the influence of adult role models, the player's footballing experiences, and the influence of peers (Keathley et al., 2013).

One limitation of the studies reviewed is that the role of other adult role models, such as extended family members, teachers, and mentors, was not discussed. Research examining the influence of adult role models on participation in football would be beneficial.

**Talent**

Talent identification is the process used by academies to source players earmarked for potential success in football. It is a detailed process, involving a multi-disciplinary team that includes coaches, team directors, scouts, and sports scientists. Players go through the talent identification pathway before being enrolled in academies. Most talented players are at the greatest risk of overtraining, burnout, and injury, because they participate in many

competitions, meaning they have limited rest (Jones et al., 2019). Nurturing youth talent requires close monitoring for overtraining, burnout, and injury (Moseid et al., 2019).

2.6.3.2. Drop out of football

Despite the high participation numbers in football, a review of the dropout rates in youth football by Møllerløkken et al. (2015) showed a combined average dropout of 23.9% among male youths in Europe and the USA. This negatively affects the growth of the sport. In Norway, the high dropout rate of youth footballers results in the disbandment of approximately 60% of youth football teams (Møllerløkken et al., 2015). Many young people drop out of sub-elite youth football because of failure to achieve elite status (Temple and Crane, 2016). Footballers who participate in football because of the associated health (Janssen and LeBlanc, 2010) and social benefits (Vaughan et al, 2021), and to have fun (Mossman and Cronin, 2019), generally do not drop out from football (Keathley et al., 2013).

High retention rates may be unrealistic in elite youth football because it is impossible for all youth footballers to pursue a professional career in football. Other reasons for the high dropout rate include serious injury or repeated injury, conflicting time demands (commitment to other sports or commitment to school), loss of interest due to lack of enjoyment, lack of opportunity to play, and relative age effect (Temple and Crane, 2016).

### 2.6.4. Performance of youth footballers

Performance is the most important indicator of success in football. As such, it is the most frequently researched area of a footballer's life. The performance of the young footballer has been described according to the following aspects: 1) physical; 2) personal; 3) interpersonal, and 4) environmental (Huertas et al., 2019).

2.6.4.1. Physical aspects of performance

**Training**

In youth football, training is structured to prevent injury and improve performance.

Injury Prevention

Preventive medicine in football comprises primary-, secondary-, and tertiary injury prevention. Primary injury prevention measures are those which are implemented prior to the onset of the injury. These focus on the early identification and management of biomechanical impairments which are risk factors for injury (Elmore and Wild, 1996), and include health screening and the subsequent specialised training – using evidence-based injury prevention protocols – prescribed for at-risk athletes and/or teams to minimise the risk of injury. There are various screening tools used by medical practitioners who collaborate with footballers.

Due to the commonality of lower extremity injuries in football, the screening tools most used are those which predict lower extremity injury (Dallinga et al., 2012). As such, the star excursion balance test (SEBT) is the most popular generic screening tool used in the USA and Europe (Gribble et al., 2012). In a systematic review of studies investigating the reliability of SEBT in healthy adults, median intra-class correlation coefficients (ICCs) for inter-rater reliability averaged 0.88 for all the directions of the tool and averaged 0.89 for intra-rater reliability for all the directions of the tool (Powden et al., 2019). To our knowledge, no studies have investigated the reliability and validity of the tool when it is used among youth footballers.

In England, the three generic screening tools most used are the FMS, self-administered questionnaires, and isokinetic muscle testing (McCall et al., 2015). In a systematic review with meta-analysis of the reliability, validity, and predictive value of FMS in collegiate athletes, the ICC for “intra-rater reliability was 0.81 and for interrater reliability was 0.81” (Bonazza et al., 2017). However, the researchers reported an inability to evaluate the validity of FMS, due to the lack of a standard quantitative value in all the studies included in the review (Bonazza et al., 2017). There is evidence of the use of FMS in the screening of male youth footballers in

South Africa. According to Conley and Lategan (2019), FMS had a low predictive value for injury, and there was no significant correlation between FMS score and previous injury when FMS was used in a cohort of South African male adolescent footballers with a high injury incidence.

Screening tools that are designed to identify anomalies specific to anatomical location and/or anatomical structure have also been shown to have a high predictive value for injury among footballers (Dallinga et al., 2012).

The results obtained from the screening guide enable practitioners to implement injury prevention programs that are relevant to the needs of the target group. Minimising the burden of injury in football through injury prevention interventions improves the HRQoL of footballers, reduces the financial burden of injury for football clubs, and allows for consistent player availability. For example, the FIFA 11+ injury prevention program was developed in 2006 with this in mind. It is a comprehensive 10-week warm-up program designed to reduce the incidence of non-contact injuries in youth football. Footballers perform exercises twice weekly under the supervision of a trained professional. The program consists of 15 structured exercises comprising core stabilisation, eccentric thigh muscle training, proprioceptive training, dynamic stabilization, and plyometric exercises, which are performed with proper postural alignment (Sadigursky et al., 2017). The FIFA 11+ program has been shown to reduce the incidence of non-contact injuries by 30% (Sadigursky et al., 2017).

These findings were supported by Al Attar and Alshehri (2019), who reported a 29% non-contact injury reduction following the implementation of FIFA 11+ among youth footballers. Furthermore, Owoeye et al. (2014) reported a 40% reduction in a non-contact injury in a cohort of Nigerian male youth footballers above the age of 14. Other than FIFA11+, many injury

prevention programs have been implemented successfully among youth footballers (Dallinga et al., 2012).

According to Plummer et al. (2019), primary injury prevention programs must be modified to meet the specific needs of the individual or team targeted. Adapting protocols ensures that the target group benefits from the intervention. Sport-specific prevention programs are more beneficial than non-specific programs, because they become an extension of normal training (Plummer et al., 2019).

Secondary injury prevention measures are those which are implemented to minimise the impact of biomechanical impairments which could lead to injury (Elmore and Wild, 1996). In football, secondary injury prevention is geared towards preventing the onset of overuse injuries. As such, periodisation – which is primarily a load management plan – is a form of secondary injury prevention, because the management of exposure hours prevents overtraining (Lorenz and Morrison, 2015). Various periodisation models exist, such as linear or classical periodisation, non-linear or undulating periodisation, and block periodisation, all of which have been shown to improve the conditioning of the athlete (Gavanda et al., 2019). Athlete fatigue and fitness levels are indicators of the success or failure of the model of periodisation used (Lorenz and Morrison, 2015).

Tertiary prevention measures are evidence-based measures implemented following player injury to rehabilitate footballers back to health (Elmore and Wild, 1996). Tertiary prevention measures ensure that footballers return to pre-injury fitness levels, and they are used to enable the athlete's safe and timeous return to sport by preventing the recurrence of injury once they have returned to play (Faude et al., 2013). Previous injury is the commonest risk factor for injury (Arnason et al., 2004; Kucera et al., 2005; Keathley et al., 2013; DiFiori et al., 2014;

McCall et al., 2015), thus, the decision to return to play (RTP) is one of the most critical decisions for the multi-disciplinary working with youth footballers to make.

The Strategic Assessment of Risk and Risk Tolerance (STaRRT) framework is a three-step multi-dimensional approach to making the correct decision for the player. Health status, sports factors, and contextual factors are all taken into consideration when deciding RTP (Shrier, 2015). Based on the STaRRT framework, Gomez-Piqueras et al. (2018) developed the Safe Multidimensional Algorithm for Return to Training (SMART) tool to objectively measure the readiness of an athlete to RTP. The SMART tool includes a combination of clinically reliable and valid assessment tools and outcome measures, which are used to determine the player's state of readiness (Gomez-Piqueras et al., 2018). The use of such tools protects the player and empowers the practitioner.

Improve performance

Training to improve performance is the main goal of training in youth football. Training is varied based on the desired outcome. The frequency of training, the intensity of training, the timing of training, and the type of training are usually altered based on the goals set for distinct parts of the season. An example of training alteration to achieve skill proficiency is the EPPP. As previously discussed, the evidence around the feasibility of intense training programs such as the EPPP is conflicting, with known benefits – that is, the achievement of high-performance levels (Noon et al., 2015) – and known risks – that is, the increased incidence of injury (Tears et al., 2018). Thus, practitioners should prioritise the health of the footballer when making decisions regarding training programs.

The length of training is usually altered in a normal training week either to prepare for a match (Miguel et al., 2021) or to recover from one (Gavanda et al., 2019). Training may also be altered to prepare for unusual or unfamiliar conditions. For example, changing the intensity of training

to prepare for competition at high altitudes is common (Bergeron et al., 2012; Gavanda et al., 2019). Furthermore, pre-season training sessions are relatively longer than in-season training sessions (Gavanda et al., 2019), while in-season training sessions are of a relatively higher intensity than pre- and post-season training (Miguel et al., 2021). When coaches target specific psychometric outcomes, then the type of training is altered. For example, agility training programs may be implemented if coaches aim to improve speed among players (Plummer et al., 2019).

2.6.4.2. Personal aspects of performance

**Individual performance – position-specific performance analysis**

Key performance indicators (KPIs) are used in the analysis of performance. Depending on the player's position, certain measures are used to assess a player's effectiveness and/or progress. For example, a midfielder can be assessed on the distance covered using Global Positioning System (GPS) tracking as an analysis of endurance, and a goalkeeper might be assessed on handling proficiency using video analysis. The use of KPIs in football has become commonplace and can influence coaching decisions to retain or release footballers from developmental structures (Herold et al., 2021). KPIs enable players to track their performances, and they can be used to set performance goals and targets. KPIs used in training can also be used to predict performance in matches and can influence team selection.

**Relative age effect**

According to Vincent and Glamser (2006), growth and maturation are considered the main confounders in talent identification during adolescence. Increases in speed, endurance, and power are observed around the time of age at peak height. Thus, the relative age effect (RAE) means that children born early in the year – and early maturers – are greatly advantaged in football selection (Vincent and Glamser, 2006). Slightly older participants are generally

physically and psychologically advanced (Vandendriessche et al., 2012). To negate the relative age effect, academies may alter selection criteria to assess players based on skill aspects, not only on age-related performance aspects (Kepčija, 2016).

**Experience (early specialisation)**

Early single-sport specialisation refers to the participation of young people in a single sport at a young age [starting from the age of 5 (Moseid et al., 2019)]. Early single-sport specialisation enables the player to gain skills and experience and progresses their football development (Feeley et al., 2016). It is thought that tactical acuity in football is gained through experience, thus early specialists are expected to have better game intelligence than their non-specialising counterparts (Moseid et al., 2019). At an early age, parents and coaches decide for the child.

Early specialisation may be a contributing factor to the injury profile of youth footballers. The repetitive low-load activities that children engage in, even at the foundation phase level, have been found to alter lower limb skeletal integrity (Gijon-Nogueron et al., 2017), which can result in deformity. It is the responsibility of the practitioners working with children to inform parents and coaches of the associated benefits and risks of early specialisation and promote the normal musculoskeletal development of youth footballers.

2.6.4.3. Interpersonal aspects of performance

**Team dynamics**

Team dynamics and team culture are important factors that influence team performance. (Castro-Sánchez et al., 2018). Youth footballers depend on adult role models to create a healthy motivational climate that will promote team cohesion (Gucciardi, 2010). Thus, the relationships that players have with their coaches and parents are a factor that influences their perception of the sport.

According to Bean et al. (2014), player relationships with adults are positive when the adults offer guidance and encouragement while maintaining the player's autonomy in goal setting and decision making. Adult role models need to facilitate independent learning, particularly during late adolescence (Fiorilli et al., 2019). Medical practitioners working with youth footballers should involve coaches, parents, and the team in the decisions regarding health interventions to foster team cohesion.

The availability of skilled staff affects individual and team performances. In elite academies, youth footballers become proficient in both the technical and tactical aspects of football through structured learning and coaching (Kepčija, 2016). Youth footballers are prepared for a professional playing career in football through the intervention of various professionals, such as coaches, sports scientists, performance analysts, and medical personnel. The input of all the members of the technical team optimises individual and team well-being (Raya-Castellano and Fradua, 2015).

**Style of play**

According to Kepčija (2016), the style of play that a team adopts is influenced by the coach's will to win. Youth coaches that prioritise winning are more likely to employ rigid tactics and select players that dominate others. In contrast, coaches that encourage skills development are more likely to take risks and enable players to develop holistically (Kepčija, 2016). The level of enjoyment is also influenced by the style of play (Temple and Crane, 2016). Possession-based play is more enjoyable for youths, whereas a more direct approach – long-ball play – is less enjoyable. A style of play that highlights the strengths of the playing personnel contributes to the performance of the team (Kepčija, 2016).

**Motivational climate**

The Achievement Goal Theory (AGT) is the most common theoretical framework used in sport motivational psychology (Monteiro et al., 2018). AGT describes the environmental motivations ("climates") sportspersons use to form individual goals. Two main motivational climates have been identified. Firstly, a task-involving climate refers to an environment where "team members are directed towards self-improvement, the coach or parent emphasises learning and personal progress, the effort is rewarded, mistakes are seen as part of learning, and choice is allowed." (Møllerløkken et al., 2017). Secondly, an ego-involving climate emphasises winning, provides positive reinforcement for success, and imposes punishment on mistakes and failure. The goal is to out-perform others, not to improve oneself (Monteiro et al., 2018). The personality of the coach working with the team is the key contributor to the motivational climate they create, and the player's personality determines how they respond to the motivational climate created by the coach (Castro-Sánchez et al., 2018). According to Castro-Sánchez et al. (2018), a task-involving climate has a more positive impact on the overall development of youth footballers, as they play an active role in creating a healthy environment.

2.6.4.4. Environmental aspects of performance

**Level of competition**

Players react to competition differently. For some, a high competition level is a motivator, and players raise their standard of performance to match or surpass competitors (Castro-Sánchez et al., 2018), while others have difficulty performing in a high-pressure environment (Keathley et al., 2013). It is the responsibility of the coaching staff to manage individual characteristics to progress team performances to the highest level possible.

**Turf**

The playing surface is an important educational medium for youth footballers. The quality of the surface determines the ability of the coaching staff to facilitate skill transference and

implement certain drills and techniques (Burillo et al., 2014). In recent times, there is a preference for artificial surfaces, because of the consistency of conditions during a year-long season. Artificial surfaces are relatively easier to maintain, both financially and in terms of the skills required to maintain the integrity of the surfaces (Burillo et al., 2014). A consistently good surface enables technical staff to consistently facilitate safe and efficient play.

## 2.7. Conclusion

Considering the information presented in this review, QoL, participation, and performance are multi-faceted and interrelated concepts. The QoL research that was reviewed was divided into QoL and health related QoL. These topics are commonly researched. However, the QoL studies reviewed were focussed mainly on issues related to the physical health of youth footballers. It is necessary for more QoL studies to be conducted to examine other aspects of health, to identify factors influencing the psychosocial, mental, and emotional well-being of youth footballers.

Regarding participation and performance, the research was mainly focussed on elite youth footballers. Research investigating the factors influencing participation and performance in a variety of sociocultural and socioeconomic settings would improve our understanding of youth footballers.

Through this review, the researcher gained awareness of the key factors influencing the QoL, participation, and performance of youth footballers. It is necessary for all practitioners working with youth footballers to tailor interventions to improve QoL, participation and performance.

# CHAPTER THREE – METHODOLOGY

Before this study was conducted, the researcher registered the title of this study on the Open Science Framework (OSF). The link to the research project on the OSF is: https://osf.io/cyr7a/?view_only=46ae6926d95a4573ab94c7edc56057fb

## 3.1. Type of study

This study was a scoping review. A scoping review is defined as "a type of research synthesis that aims to map the literature on a particular topic or research area and provide an opportunity to identify key concepts; gaps in the research; and types and sources of evidence to inform practice, policymaking, and research" (Daudt et al, 2013, p. 8).

To construct the methodological framework of this review, Arksey and O'Malley's framework for scoping reviews was used. According to Arksey and O'Malley (2005), a scoping review is conducted in six stages: 1) clarifying and linking the purpose and research question; 2) assessing the feasibility of scoping process; 3) using an iterative team approach to selecting the studies; 4) extracting the data; 5) incorporating a numerical summary and qualitative thematic analysis, reporting the results, and considering the implications of study findings to policy, practice, and research; and 6) incorporating consultation with stakeholders for knowledge translation. The first five stages have been completed.

In conducting this review, the researcher used the PRISMA group guidelines and the Joanna Briggs Institute (JBI) reviewer's manual for guidance (Moher et al., 2009; Peters et al., 2015). The PRISMA-ScR checklist, compiled and explained by Tricco et al (2018) (Appendix I) was used to guide the research process.

## 3.2. Defining the review question

The research question was defined by the researcher in consultation with three sports medicine experts, each with at least 10 years of experience in sports research. The research question was defined as follows: What are the factors influencing QoL, participation in football, and football performance among youth football players?

## 3.3. Identifying relevant studies

Studies that were relevant to this topic were identified using a systematic approach. The approach which was used was originally summarised by Peters et al. (2015) for systematic reviews and substantiated for scoping reviews by Tricco et al. (2018). The approach is as follows:

The process of drafting a search strategy includes: 1) defining the eligibility criteria, 2) defining information sources, 3) developing a search strategy, and 4) defining the study selection process. The researcher used PRISMA-ScR to draft the search strategy. The strategy was revised by the researcher following consultation with three sports medicine experts, each with at least 10 years of experience in sports research.

## 3.4. Eligibility criteria

The PCC (population, concept & context) eligibility criteria framework was used to define the search strategy for this scoping review. According to Peters et al. (2015), the PCC framework enables the researcher to accurately evaluate the inclusion and exclusion criteria for the study.

### 3.4.1. Population

This review included male and female youth footballers who were playing at both elite and sub-elite levels. As previously described, in the football context, the youth population group refers to players aged from 13 to 19 years. Despite our interest being in this population group, age filters were not applied during the review of the databases selected, as there is variation in

the definition of youth in football research. Thus, information related to young adults, aged 19 to 24 years (WHO, 2012) was included in this review. However, information related only to children, defined by WHO (2012) as persons under the age of ten, was excluded. Information related to adults – persons over the age of 24 (WHO, 2012) – was also excluded from this review.

### 3.4.2. Concept

This review included all studies that discussed the factors influencing QoL, football participation and football performance among male and female youth footballers. Football-related factors and non-football related factors were reviewed, which enabled the researchers to extract individual- and team-specific information relevant to the population group. To map the factors systematically, QoL, participation and performance were considered as central themes. Sub-themes were determined using the following definitions:

QoL: According to Gentner (2004), an athlete's QoL can be divided into six components, namely; general factors, physical factors, sports-specific factors, primary social factors, recovery/social factors, and additional factors. General factors include the athlete's financial satisfaction, spiritual and mental health, and overall life satisfaction. Physical factors are those which influence the athlete's satisfaction with their physical health and condition. Sport-specific factors are those which relate to an athlete's satisfaction with individual goals and team standards. Primary social factors address the athlete's satisfaction with their relationships with teammates, parents, and coaches. Recovery/social factors refer to the athlete's satisfaction with their free time, school performance, and social life. Additional factors are those unique to each athlete. These six components formed the framework of the information reviewed in this study. This framework was chosen empirically after the results were gathered.

Participation: The International Classification of Functioning, Disability, and Health (ICF) is "a framework for describing and organising information on functioning and disability" (WHO, 2007). The ICF framework is divided into five components of functioning, namely; the body functions and structures of people, the activities of people, the participation of people in all areas of life, the environmental factors which affect their experiences in life, and the personal factors which influence their experiences in life (WHO, 2007). These five components formed the framework the framework of the participation-related information reviewed in this study. This framework was chosen empirically after the results were gathered.

Performance: According to Borrell-Carrió et al. (2004) the biopsychosocial model is a framework that can be used to understand an individual's subjective experience as an essential contributor to health outcomes. The biopsychosocial model is divided into three components, namely; biological factors, psychological factors, and social factors. These three components formed the framework the framework of the performance-related information reviewed in this study. This framework was chosen empirically after the results were gathered.

### 3.4.3. Context

This study included all studies on factors influencing QoL, football participation, and football performance among elite and sub-elite male and female youth footballers from all geographical, cultural, and social backgrounds.

### 3.4.4. Types of evidence sourced

All peer-reviewed qualitative and quantitative studies which have been published in English over the past 23 years (1998 – 2021) were included in this review. Articles that have restricted access to the full-text publication were excluded from the review.

## 3.5. Search strategy

The database searches were performed using the systematic approach outlined by Levac et al (2010):

Step 1 included a MeSH terms search of the MEDLINE (PubMed) database and a text word search of the EBSCO database. Text words in both the titles and abstracts of each of the selected articles were analysed. The MESH terms and detailed search terms (text word search) are outlined in Table 1 below.

**Table 1:** Table showing the search terms used in this review

| Topic | | MeSH terms | Text words |
|---|---|---|---|
| **T1** | Football | Football"[Mesh] | Football OR Soccer NOT Rugby NOT American football |
| **T2** | Youth | "Youth Sports"[Mesh] OR "Adolescent"[Mesh] | Youth OR Young pe* OR Adolescent* OR Teen* OR Young adult* |
| **T3** | Elite | Athletes | Elite |
| **T4** | Quality of life | "Quality of Life"[Mesh]) | Quality of life OR Health-related quality of life |
| **T5** | Participation | None | Participation |
| **T6** | Performance | "Physical Functional Performance"[Mesh] OR Psychology, Sports"[Mesh] OR Quality Improvement"[Mesh] OR "Athletic Performance"[Mesh] | Performance |

Step 2 included a comprehensive text word search of the following databases: EBSCO (Academic Search Ultimate, Africa-Wide Information, CINAHL Complete, Library, Information Science & Technology Abstracts, MasterFILE Premier, MEDLINE Complete, Mental Measurements Yearbook, Health Source: Nursing/Academic Edition, MEDLINE,

Psychology and Behavioural Sciences Collection, SocINDEX with Full Text, and SPORTDiscus with Full Text).

Step 3 was a search for additional studies using the reference lists of the articles that had been identified in Step 1 and Step 2.

## 3.6. Source of evidence selection

The researcher developed a comprehensive literature search strategy. It was sent to the research supervisor and research assistant for review. The final search strategy incorporated feedback from the members of the research team. The researcher consulted an expert librarian regarding the process of conducting comprehensive literature searches on online databases.

A systematic approach of source selection for all the steps of the study selection process was followed. The selection of sources was based on the eligibility criteria which is specified in 2.4. above. The selection was conducted by two independent reviewers (both at the title/abstract- and full-text screening stages). Any disagreements between the two reviewers were solved by consensus or by a third reviewer. To pilot the process of source selection, the search strategy was used for the literature review of this study.

Database searches were initiated on the 5$^{th}$ of August 2021 and continued until the 17$^{th}$ of October 2021. The researchers conducted weekly meetings to discuss the results obtained from the database searches and to resolve disagreements.

## 3.7. Data extraction and data charting

A data charting form (Appendix II) was developed and used by the researcher to extract the data from the articles. Information was extracted based on the eligibility criteria checklist. Prior to data extraction, the researcher, research assistant, and research supervisor met to revise the eligibility criteria to exclude articles which had restricted access to full-text publication. Subsequently, all included studies were reviewed independently, with conflicts resolved by the

research supervisor. The references of the electronic articles were downloaded onto the Mendeley citation manager. All duplicates and articles that did not meet the inclusion criteria were removed. The full-text versions of the articles were then downloaded for further evaluation.

The following information was evaluated from the extracted articles (as outlined in the data charting form in Appendix II): the name(s) of the author(s), study title, publication year, study setting, study design, aims/purpose of the study, study population and sample method and size, study design, data collection methods, data analyses, the outcome of the study, conclusion, and the study limitations. The research supervisor performed verification of the extracted information. Summaries of the findings were tabulated and have been presented in the results section of this report (Chapter 4).

## 3.8. Analysis of the evidence

After extracting the results, the researcher descriptively mapped the results. According to Aromataris and Munn (2020), assessing certainty and synthesising the results is not a requirement for scoping reviews – it is a requirement for systematic reviews. As such, simple frequency counts of concepts, population, characteristics, or other data were done in this scoping review. The qualitative content analysis in this review was descriptive.

For the factors influencing QoL, Gentner's five components of QoL were used as the framework for descriptive analysis. As such, data were analysed using a directed approach with predetermined sub-themes. The key words used in the included studies were used to classify the studies based on the predetermined sub-themes. Information related to the sub-themes was then analysed and described.

For the factors influencing participation and performance, the conventional approach to content analysis was used. To develop a framework for the factors identified, firstly, codes were

developed from the data collected. The key words used in the included studies were examined to identify common sub-themes. Information related to the sub-themes was then summarised and described.

## 3.9. Presentation of the results

The results of this scoping review have been presented as a map of the extracted data in descriptive, tabular, and diagrammatic format in line with the objectives of the review. The PCC framework guided how the data was mapped.

## 3.10. Summarising and reporting the results

The summary focussed on highlighting all the factors reported to influence the QoL, football participation, and football performance of youth footballers.

## 3.11. Ethical considerations

A scoping review study does not require ethical clearance as there are no study participants involved.

## 3.12. Timeframe

Table 2 below is a breakdown of the timeline for this project

| Milestone | Time |
|---|---|
| **Protocol development** | September – November 2020 |
| **Protocol presentation (department)** | December 2020 |
| **Protocol submission (assessors)** | February 2021 |
| **Protocol resubmission** | April – June 2021 |
| **Study collection and analysis** | June 2021 |
| **Expert consultation** | July 2021 |
| **Write-up** | August-October 2021 |
| **Submit for examination** | December 2021/ January 2022 |
| **Write a paper** | February 2022 |
| **Submit a paper for publication** | March 2022 |

## 3.13. Budget

No funding was received for this study. Table 3 below outlines the budget for this study.

| Item | Number of units | Cost per unit | Total |
|---|---|---|---|
| **Course (scoping review methodology)** | 1 | R300 | R300 |
| **Editors (research report)** | R25 x 120 pages | R25 per page | R3000 |
| **Research assistant** | 10 | R130 per hour | R1300 |
| **Total cost** | | | R4600 |

# CHAPTER FOUR – RESULTS

Of the 2691 references that were identified through electronic and manual searching of the databases, 310 full-text articles were considered for the review. 164 articles were selected for this review using the defined eligibility criteria. The reasons for the exclusion of 146 articles are provided in Figure 1.

## 4.1. Study characteristics

The range of publication years for the included studies was 1998-2021. Of the 164 studies that were reviewed, 104 (63.41%) studies were conducted in Europe, 27 (16.46%) in North America, 16 (9.76%) in Oceania, 10 (6.1%) in Asia, 5 (3.05%) in Africa, and 2 (1.22%) in South America. Overall, 48.17% of the articles investigated variables among male footballers, 7.93% investigated variables among female footballers, 28.66% investigated variables among both male and female footballers, and 15.24% were not gender specific. Articles that did not specify gender were studies that did not involve human participants. These articles ranged from narrative reviews to expert opinion articles which described fundamental principles, theories, and concepts. Below (Table 4) is a summary of the distribution of studies based on the central themes and classification by gender.

**Table 4. Classification of themes by gender**

| Theme | Male | Female | Both | Unspecified | Total |
|---|---|---|---|---|---|
| **QoL** | 24 | 6 | 31 | 5 | 66 |
| **Participation** | 15 | 1 | 4 | 11 | 31 |
| **Performance** | 40 | 6 | 12 | 9 | 67 |
| **Total (%)** | 79 (48.17) | 13 (7.93) | 47 (28.66) | 25 (15.24) | 164 (100) |

### 4.1.1. Types of evidence

The types of evidence in this review included 119 cohort studies (72.56% of total), eighteen narrative reviews (10.98%), fourteen systematic reviews (8.54%), four descriptive

epidemiology studies (2.44%), two meta-analysis studies (1.22%), two randomised controlled trials (1.22%), two consensus statements (1.22%), one cohort report (0.61%), one case report (0.61%), and one expert opinion article (0.61%). The full list of the articles included in this review is provided in Appendix III.

### 4.1.2. Age ranges

According to WHO (2012), 'adolescence' refers to persons between the ages of 10 and 19, while 'youth' refers to persons between the ages of 15 and 24. Collectively, 'young people' refers to persons between 10 and 24 years old. The studies included in this review involved participants from 4 to 56. Eighty (80) studies examined 12–19-year-olds, nineteen studies examined 5-17-year-olds, seventeen studies examined 13-24-year-olds, fourteen studies examined 9-21-year-olds, eleven studies examined 16-37-year-olds, ten studies examined 19-25-year-olds, five studies examined 19-34-year-olds, four studies examined 13-56-year-olds, two studies examined 14-28-year-olds, and one study examined 4-34-year-olds and 12-34-year-olds, respectively. The studies which involved participants younger and/or older than 10 to 24 years of age were included in this review if part of the target age group for this review was investigated in those studies. For example, eleven studies investigating factors influencing 16-37-year-olds were included in this review because information related to late-adolescent footballers could be obtained.

Researchers that included either children or adults in their investigations sought to highlight the changes that footballers undergo with increasing age. Figure 2 below shows the distribution of data based on the age ranges identified.

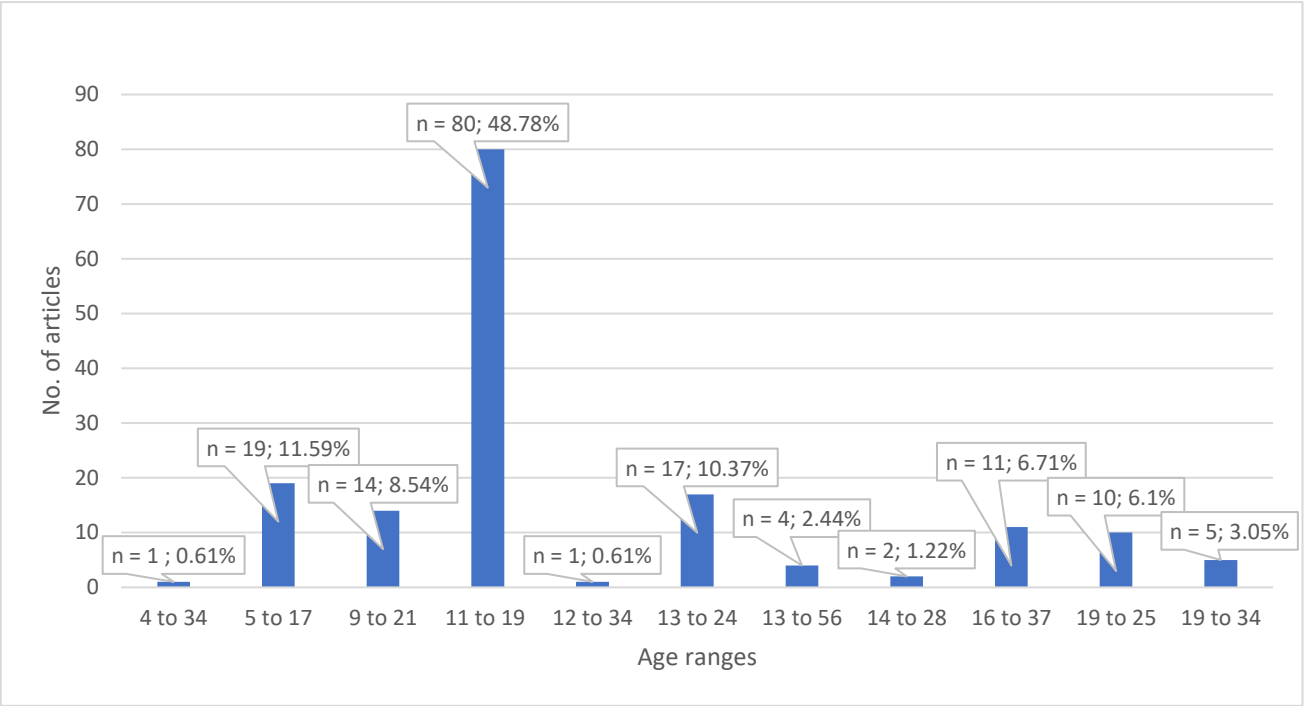


**Figure 2: Graph showing the distribution of articles based on the age ranges identified in the dataset**

## 4.2. Central themes

To fulfil the objectives of this review, QoL, participation, and performance were considered as the central themes. As is shown in Table 1, 66 (40.24%) studies described factors influencing QoL, 31 (18.9%) studies described factors influencing participation, and 67 (40.85%) articles described factors influencing performance.

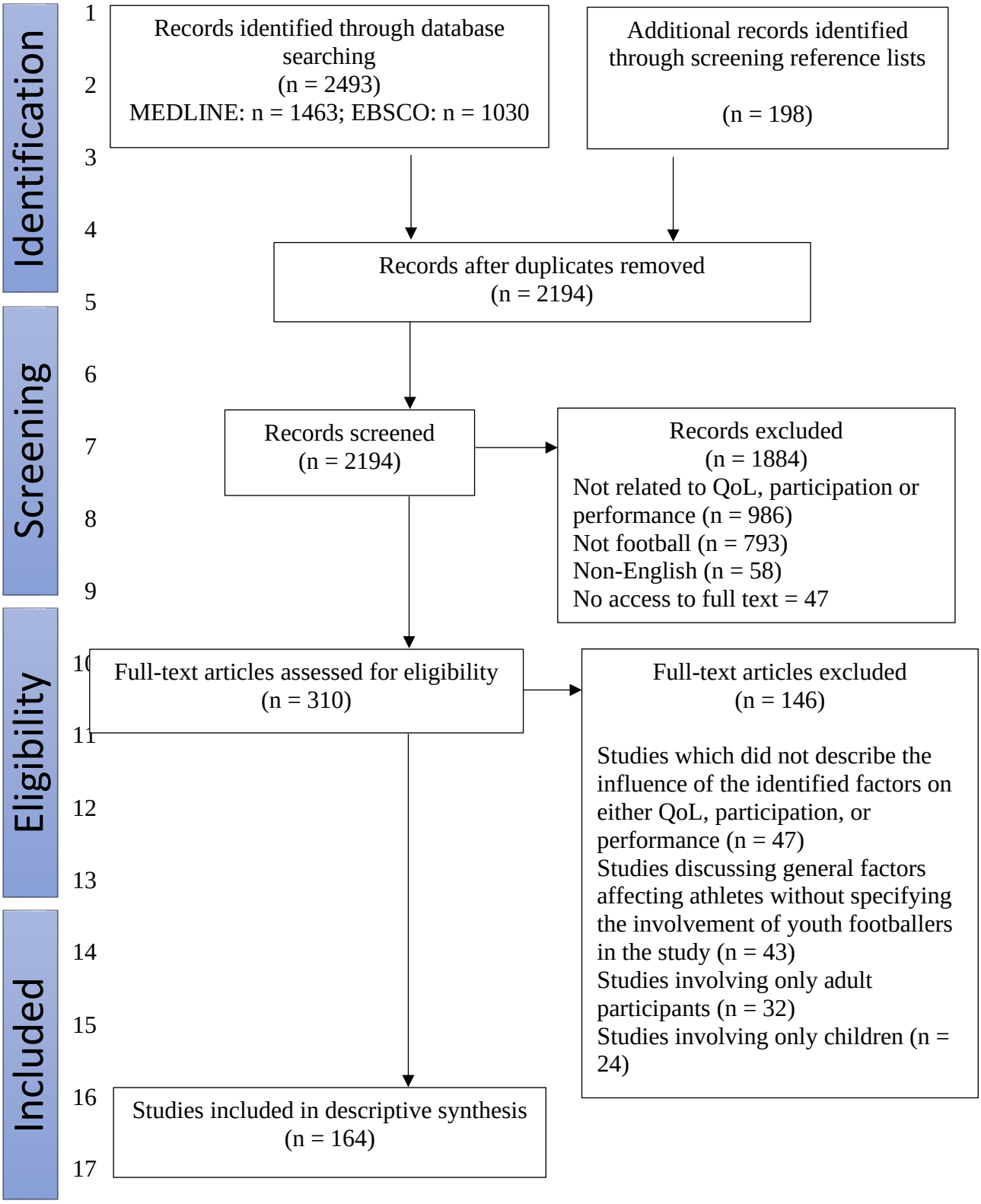


**Figure 1: Study flow diagram**

### 4.2.1. Factors influencing the QoL of youth footballers

The six QoL components identified by Gentner (2004) – namely; general factors, physical factors, sports-specific factors, primary social factors, recovery/social factors, and additional factors – were used to discuss the topics identified in this review. Sport-specific factors were combined with the influence of training on performance, thus, were not included in the review of the QoL-related factors. Table 5 shows the QoL topics identified from the dataset.

**Table 5. QoL: summary of topics identified from articles reviewed**

| Component | Sub-topic from dataset | No. of articles (n = 66) | (%) |
|---|---|---|---|
| **General factors** | Psychological factors | 7 | 10.6 |
| **Physical factors** | Injury | 25 | 37.88 |
| | Injury prevention | 9 | 13.64 |
| | Health behaviour | 8 | 12.12 |
| **Primary social factors** | Motivational climate | 12 | 18.18 |
| | Parental influence | 3 | 4.55 |
| **Social factors** | Social factors | 2 | 3.03 |
| **Additional factors** | None | N/A | N/A |

#### 4.2.1.1. General factors

All seven studies discussing general factors examined the influence of psychological factors on the QoL of the young athlete. Six studies were specific to youth footballers, and one study discussed factors influencing all young athletes.

Four studies discussed the psychological factors associated with injury in youth football. In a cohort of 82 sub-elite male youth footballers, Johnson and Ivarsson (2011) found that negative life event stress, somatic trait anxiety, negative coping, mistrust, and stress sensitivity were the leading psychological predictors of 23% of the injuries. These findings were supported by Junge et al. (2000) and Rice et al. (2016), who showed that previously injured players had significantly higher competitive anxiety, suggesting a lack of confidence and fear of reinjury following return to play. Furthermore, Junge et al. (2000) found that injury was not correlated with player personality, but re-injury was associated with mental ill-health.

Two studies discussed the psychological aspects related to performance success. Gledhill et al. (2017) identified 12 psychological characteristics associated with talent development, namely: "discipline, self-control, self-awareness, adaptive perfectionism, self-acceptance, task/mastery orientation, commitment, determination, intrinsic motivation, self-regulation, resilience, grit, non-verbal intelligence, fear of failure, psychological well-being, reflective skills, enjoyment, perceived competence, anticipatory skills, decision-making skills, delaying gratification and coping strategies." (Gledhill et al., 2017). Noon et al. (2015) found that individual performance satisfaction significantly decreased as the season progressed and subjective fatigue ratings increased in a cohort of fourteen mid-adolescent male footballers. This suggests that load influences player mentality, which has a detrimental impact on health by increasing the risk of injury or illness.

One study found a direct relationship between a winning mentality and mental toughness among youth footballers (Coulter et al., 2010). Mental toughness was correlated to positive outcomes of player "self-belief, physical toughness, work ethic, and resilience" (Coulter et al., 2010). Thus, it was suggested that a winning mentality be instilled in aspiring footballers.

4.2.1.2. Physical factors

Of the forty-two studies discussing physical factors, twenty-five focussed on injury, nine focussed on injury prevention, and eight focused on health behaviour.

*4.2.1.2.a. Injury*

Of the twenty-five studies in the dataset, seventeen examined injuries among male youth footballers, two examined injuries among female youth footballers, and six examined injuries among both male and female footballers.

**Youth footballers**

Five of the six articles in the dataset discussed the injury characteristics of youth footballers. One article discussed the injury characteristics of children and adolescents. This article was included because the age range of the participants overlapped with the target age range for this review, and the characteristics identified in this article were unique to the other five articles included in this review.

Swain et al. (2018) reported an association between musculoskeletal conditions and an active growth spurt among youth footballers. Footballers were at the highest risk of musculoskeletal injury during the mid-adolescence stage. This finding was unique to footballers, as there was no association, or the association was unclear in other youth sports such as gymnastics, ballet, and handball (Swain et al., 2018). Due to the biological changes which occur during a growth spurt, athletes were found to be at increased risk of overuse or stress injuries during mid-adolescence (DiFiori et al., 2014). Overuse injuries accounted for between 45.9% to 54% of injuries among youth sportspersons (DiFiori et al., 2014). According to Emery et al. (2005), the overall injury rate during the regular season was 5.59 injuries per 1000 player hours.

According to Tears et al. (2018), footballers who specialised during early adolescence had a decreased injury burden, whereas those who specialised during middle adolescence had an increased injury burden following specialisation. Drew et al. (2017) found that time-loss injuries post-specialisation severely hampered the sportsperson's ability to achieve key performance indicators, leading to failure and drop-out. Thus, Read et al. (2016) suggested an adjustment of training prescription particularly during mid-adolescence to minimise the risk of injury and promote normal growth and physical development.

**Injuries affecting male youth footballers**

All seventeen studies reported that lower extremity injuries were the most common among youth footballers, ranging from 74-87% in prevalence. The injury rate among male youth

footballers ranged from 2.0 to 19.4 injuries per 1000 hours of exposure (Kakavelakis et al., 2003; Faude et al., 2013; Watson and Mjaanes, 2019). All 17 studies reported that previous injury and inadequate rehabilitation were the most common risk factors for injury. Brito et al. (2011) reported that there was no significant difference in injury incidence during the preseason as compared to in-season injury incidence. However, training exposure was controlled through periodisation in the study. Under normal conditions, there was an increased incidence of lower extremity muscle injuries during pre-season than during the football season.

About 58-73% of all injuries were categorised as moderate to severe (Kucera et al., 2005; Timpka et al., 2008; Schmikli et al., 2011; Rommers et al., 2020; Wik et al., 2021). Injury incidence increased with age, with injury severity at its peak during mid-adolescence (Le Gall et al., 2007; Read et al., 2018b; Jones et al., 2019; Materne et al., 2021; Wik et al., 2021). The relatively higher training time and match exposure among early adolescent footballers resulted in an increased incidence of overuse injuries in early adolescence (Chomiak et al., 2000; Dvorak et al., 2000; Junge, Chomiak, et al., 2000; Rommers et al., 2020). All sixteen studies reported that muscle injuries were more common in late adolescence.

Contact injuries accounted for 31-54% of all injuries, and 45-69% of all injuries were non-contact (Deehan et al., 2007; Le Gall et al., 2007; Timpka et al., 2008; Schmikli et al., 2011; Read et al., 2016). According to Jones et al. (2019), early and normal maturers most commonly experience knee and groin tendinopathies, while late maturers most commonly experience osteochondral disorders.

According to Jacobs and van den Berg (2012), the prevalence of injuries among male footballers was position-specific. Midfielders were the most injured during training and in matches, followed by defenders, forwards, and goalkeepers.

**Injuries affecting female youth footballers**

The two studies in the dataset showed differences between the injury characteristics of male and female youth footballers. According to Faude et al. (2006), injury incidence was higher among defenders, followed by forwards, goalkeepers, and midfielders. Furthermore, defenders experienced the most severe injuries. O'Kane et al. (2017) showed that the injury rate among females was lower than among males, having found an injury rate of 1.9 injuries per one thousand exposure hours.

*4.2.1.2.b. Injury prevention*

According to Houston et al. (2016), HRQoL is an important outcome following athlete illness or injury, as it enables the health practitioner to monitor an athlete's response to injury prevention measures. Three of the eight injury prevention studies reported HRQoL outcomes. One study was a theory-based expert opinion.

All but one of the eight injury prevention studies indicated a reduction in overall injury rate following a 6–12-week intervention. Steffen et al. (2008) reported no significant difference in injury rate between intervention and control groups following an 8-month intervention. It was postulated that the poor result was caused by low compliance over the prolonged intervention period.

The three studies investigating the exercised-based injury prevention warm-up programs indicated an overall injury prevention effect of 25-44% (Emery and Meeuwisse, 2010; van Beijsterveldt et al., 2013; Bizzini and Dvorak, 2015). Thorborg et al. (2017) showed a 37% injury prevention effect using a neuromuscular warm-up program involving dynamic stretching, eccentric exercises, and balance exercise, which was implemented among indoor footballers. Heidt et al. (2000) found a 19.4% overall injury reduction through preseason conditioning among sub-elite female footballers.

Gabbett (2016) suggested that the key to injury prevention is appropriateness. Prevention programs that do not adequately equip the athlete for the internal and external loads they are subject to during training and matches have a minimal effect on long-term athlete well-being. Read et al. (2018a) reported that elite English academies had variable adherence to injury prevention programs, with health practitioners differing in opinion on which exercise type is most beneficial for injury prevention. In contrast, McNoe and Chalmers (2011) reported that only 20% of 883 sub-elite footballers participated in preseason screening and training.

*4.2.1.2.c. Health behaviour*

Only two of the eight studies in the dataset were specific to youth footballers, suggesting that the influence of health risk behaviours on the QOL of youth footballers is understudied. One study examined the health benefits associated with physical activity among youths, two studies examined general health risk behaviours among young athletes, and four studies examined doping in youth sport.

**Physical activity**

To maximise the health benefits associated with physical activity, Janssen and LeBlanc (2010) recommended that children and youth 5-17 years of age should be active for between 60min to several hours per day at a moderate (4 METS or 4 x resting metabolic rate) to vigorous (7 METS) intensity. This forms the base of the school-based health promotion programs implemented among youths. Training type should also be varied to include strength and aerobic training. Thus, football alone is insufficient to improve the HRQoL of youths. For academy footballers, vigorous daily exercise puts them at risk of injury (Noon et al., 2015).

**Health risk behaviour**

In terms of health risk behaviour, there was an inverse relationship between both cigarette smoking and alcohol consumption and sport participation among youths (Baumert et al., 1998;

Lisha and Sussman, 2010), but there was an association between stress-related alcohol consumption and elite sport participation (Lisha and Sussman, 2010). No significant difference was found between athletes and non-athletes regarding sexual risk behaviour (Baumert et al., 1998).

**Doping**

Regarding doping, the research suggests that youth athletes are under-informed about doping and performance-enhancing drugs (PEDs). According to Nolte et al. (2014), 14% of 346 youth athletes in Gauteng (South Africa) would consider using a prohibited PED if they knew they would not get caught. This suggests that when the desire to succeed supersedes the need to preserve well-being, athletes are willing to compromise their health. Furthermore, 57.9% of the cohort had little-to-no knowledge of PEDs and anti-doping rules and regulations (Nolte et al., 2014). In Cameroon, 54% of 1116 amateur African footballers had poor knowledge of PEDs (Ama et al., 2003). In Spain, 66.4% of 1757 elite athletes wanted more knowledge about doping (Morente-Sánchez and Zabala, 2013). In Italy, 58.8% of 423 youth footballers had poor knowledge of the side effects of PEDs (Giraldi et al., 2015). According to Morente-Sánchez et al. (2019), there was no significant difference in the knowledge of PEDs among elite and sub-elite footballers. This suggests that peers and adults can influence youth athletes to use banned substances. The lack of knowledge of PEDs also suggests that youth athletes do not consider health awareness as important. This must be considered a key area of intervention for health practitioners who seek to improve the QoL of youth athletes.

4.2.1.3. Primary social factors

Eight of the fifteen studies discussing primary social factors discussed factors specific to youth footballers. Seven studies discussed general factors influencing young athletes.

*4.2.1.3.a. Motivational climate*

Twelve studies discussed the motivational climate in youth sport. Motivational climate in sport can be defined as "the environment that the coach creates by designing sessions which provide instructions and feedback that will help to motivate the athletes in training or competition" (Weiss et al., 2009, p. 1).

Five studies identified the coach as the main facilitator of the motivational climate of a football team (Weiss et al., 2009; Hampson and Jowett, 2014; Haugaasen et al., 2014; Curran et al., 2015). Curran et al. (2015) reported that a "coach-created mastery climate positively corresponded with confidence, dedication, enthusiasm and vigour" among footballers. Fransen et al. (2015) found a fluctuation in in-game team performance, with a positive association between team confidence during half-time and second-half team performance, suggesting the positive influence of the coach on team performance. Furthermore, Weiss et al. (2009) identified the influence of a coach-created climate on an individual's social relationships with others.

Four studies discussed the influence of a perfectionist orientation on the welfare of a young athlete. Garinger et al. (2018) found a direct correlation between non-healthy perfectionism and burnout among 351 youth athletes. Non-healthy perfectionism was coach- and/or parent-driven and was the primary cause of emotional stress among elite athletes, which could lead to drop-out (Stoeber and Becker, 2008; Jayanthi et al., 2013). Larkin et al. (2016) found that players with perfectionist orientations spent more of their free time on football-related activities. To promote healthy perfectionism, which has been shown to enhance skills (Curran et al., 2015), Haugaasen et al. (2014) showed that the incorporation of non-football-related activities in the elite youth footballer's program was beneficial.

Two studies discussed the influence of peers on the motivational climate in youth soccer. Peer acceptance and teammate companionship positively influenced outcomes of player wellness, suggesting that teams should facilitate positive teammate relations to maximise performance (Ommundsen et al., 2005; M. Moran and Weiss, 2006).

Rossing et al. (2016) showed the influence of the environment on the motivational climate. In a cohort of 212 footballers in Denmark, it was found that more elite players originated from urban communities than from rural communities, suggesting that specialisation and perfectionism are urban phenomena in sport.

*4.2.1.3.b. Parental influence*

53% of the 64 youth footballers involved in the Baxter-Jones and Maffulli (2003) study specialised early because of parental encouragement. Sapieja et al. (2011) reported that both healthy and non-healthy perfectionists had significantly higher perceptions of parental authoritativeness. This suggests that performance success among adolescents is largely moulded by the parent(s) ambitions for the child. Murray et al. (2021) reported that mental toughness among athletes was developed in early adolescence through parental leadership, highlighting the role of the parent in preparing the athlete for the competitive environment.

4.2.1.4. Social factors

Of the two studies discussing social factors in the dataset, one study examined the influence of social relationships on the development of youth athletes, and the other study examined the influence of academic performance on the well-being of young footballers.

Social indicators of well-being are important among youth footballers. During early adolescence, youths seek affiliation from peers to counter social instability (WHO, 2012). As such, most youths participate in sport (including soccer) to develop peer relationships and to have fun (Côté, 1999). During this stage, social experiences in sport are facilitated by parents

and guided by coaches. Generally, the parents determine the extent of the child's commitment to the sport (Côté, 1999).

During mid-adolescence, athletes tend to specialise (Côté, 1999). The athlete's behaviour is determined by the peer group they are in because they desire social belongingness (WHO, 2012). As such, youths with strong social affiliations among peers are likely to continue with the sport, while those whose social expectations are not met are likely to drop out (Côté, 1999). During this stage, athletes affirm their self-image through social encouragement and support.

In the normal talent development pathway, athletes with the potential to become professionals are identified during the mid-adolescence stage (Johnston et al., 2018). As such, the level of commitment to a sport is determined by an individual's sport-specific skills (Côté, 1999). However, parents encourage both school and sport achievement in this stage. Ureña-Lopera et al. (2020) showed that demotivation or amotivation among youth footballers can be caused by poor academic performances. Thus, facilitating holistic success can positively influence social well-being among youth footballers.

During late adolescence, youths favour individual relationships over group interactions (WHO, 2012). Parents invest in their child's abilities by encouraging the development of relationships with adult role models. Older players with similar ambitions and/or older siblings become prominent (Côté, 1999). During this stage, elite athletes transition from amateur levels to professional levels. Parents and coaches guide professional decisions (Côté, 1999). The increased time demand of the sport means social relationships outside of the sporting environment may become strained (Côté, 1999).

Table 6 below is a summary of the QoL studies included in this review.

**Table 6. QoL: summary of studies included in the review**

| No. | Authors | Country | Study design | Study focus | Domain assessed |
|---|---|---|---|---|---|
| **1.** | (Ama et al., 2003) | Cameroon | Cohort study | Youth footballers | Prevalence of doping in football |
| **2.** | (Baumert et al., 1998) | USA | Cohort study | Youth sport (including football) | Health risk behaviours of adolescent athletes |
| **3.** | (Baxter-Jones and Maffulli, 2003) | UK | Cohort study | Youth sport (including football) | Influence of parent-child relationship on success |
| **4.** | (Bizzini and Dvorak, 2015) | Switzerland | Narrative review | Youth footballers | Effectiveness of FIFA 11+ injury prevention program |
| **5.** | (Brito et al., 2011) | Portugal | Prospective cohort study | Male youth footballers | Pre-season injuries |
| **6.** | (Chomiak et al., 2000) | Czech Republic | Descriptive epidemiology study | Youth footballers | Factors influencing injury severity |
| **7.** | (Côté, 1999) | Canada | Expert opinion | Youth sport (including football) | Influence of the family on athlete development |
| **8.** | (Coulter et al., 2010) | Australia | Cohort study | Football (including young adults) | Mental toughness in football |
| **9.** | (Curran et al., 2015) | UK | Cohort study | Male youth footballers | Impact of a coach-created motivational climate on footballers |
| **10.** | (Deehan et al., 2007) | UK | Cohort study | Male youth footballers | Musculoskeletal injuries at academy level |
| **11.** | (DiFiori et al., 2014) | USA | Expert opinion (consensus statement) | Youth sport (including football) | Overuse injuries and burnout in youth sport |
| **12.** | (Drew et al., 2017) | Australia | Systematic review | Sportspeople (including youth footballers) | Influence of injury on performance |
| **13.** | (Dvorak et al., 2000) | Czech Republic | Prospective cohort study | Footballers (including youths) | Risk factor analysis for injuries in football |

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|---|---|---|---|---|---|
| **14.** | (Emery and Meeuwisse, 2010) | Canada | Cluster-randomised controlled trial | Youth footballers | Effect of neuromuscular training on injury prevention |
| **15.** | (Emery et al., 2005) | Canada | Descriptive epidemiology study | Youth footballers | Risk factors for injury in youth football |
| **16.** | (Faude et al., 2006) | Germany | Descriptive epidemiology study | Female footballers (including youth) | Risk factors for injury among elite footballers |
| **17.** | (Faude et al., 2013) | Switzerland | Narrative review | Youth football | Injury epidemiology and prevention strategies |
| **18.** | (Fransen et al., 2015) | Belgium | Cohort study | Male youth footballers | Influence of team confidence on performance |
| **19.** | (Gabbett, 2016) | Australia | Narrative review | Athletes (including youth footballers) | Approach to training methods to prevent injury |
| **20.** | (Le Gall et al., 2007) | France | Cohort study | Male youth footballers | Influence of biological maturity on injury |
| **21.** | (Garinger et al., 2018) | USA | Cross-sectional study | Youth sport (including football) | Effect of perceived stress and burnout on perfectionism |
| **22.** | (Giraldi et al., 2015) | Italy | Cohort study | Youth footballers | Footballers' beliefs about doping |
| **23.** | (Gledhill et al., 2017) | UK | Systematic review | Youth football | Psychosocial factors associated with talent development |
| **24.** | (Hampson and Jowett, 2014) | UK | Cohort study | Youth football | Importance of the coach-athlete relationship on success |
| **25.** | (Haugaasen et al., 2014) | Norway | Cohort study | Youth football | Influence of non-football activities on the QoL of the footballer |
| **26.** | (Heidt et al., 2000) | USA | Cohort study | Youth female footballers | Injury prevention strategies |
| **27.** | (Jacobs and van den Berg, 2012) | South Africa | Prospective cohort study | Male youth footballers | Factors influencing injury incidence |

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|---|---|---|---|---|---|
| **28.** | (Janssen and LeBlanc, 2010) | Canada | Systematic review | Youth sport (including football) | Effect of physical activity on health |
| **29.** | (Jayanthi et al., 2013) | USA | Review | Youth sport (including football) | Recommendations for early sport specialisation |
| **30.** | (Johnson and Ivarsson, 2011) | Sweden | Cohort study | Youth football | Psychological predictors of injury |
| **31.** | (Jones et al., 2019) | UK | Systematic review | Male youth footballers | Injury incidence, prevalence, and severity at elite academy level |
| **32.** | (Junge, 2000) | Switzerland | Literature review | Sport (including football) | Influence of psychological factors on injury |
| **33.** | (Junge et al., 2000) | Switzerland | Cohort study | Youth football | Psychological characteristics of youth footballers |
| **34.** | (Kakavelakis et al., 2003) | Greece | Cohort study | Male youth footballers | Injury characteristics in youth football |
| **35.** | (Kucera et al., 2005) | USA | Prospective cohort study | Youth footballers | Influence of injury history on injury incidence |
| **36.** | (Larkin et al., 2016) | Australia | Cohort study | Male youth footballers | Perfectionism in elite youth footballers |
| **37.** | (Lisha and Sussman, 2010) | USA | Narrative review | Youth athletes (including footballers) | Health risk behaviours of adolescent athletes |
| **38.** | (Materne et al., 2021) | Qatar | Prospective cohort study | Male youth footballers | Injury incidence at elite academy level |
| **39.** | (McNoe and Chalmers, 2011) | New Zealand | Prospective cohort study | Youth footballers | Injury prevention behaviours of footballers |
| **40.** | (M. Moran and Weiss, 2006) | USA | Cohort study | Youth footballers | Influence of peer leadership in youth football |
| **41.** | (Morente-Sánchez and Zabala, 2013) | Spain | Narrative review | Youth athletes (including footballers) | Athletes' knowledge of doping |
| **42.** | (Morente-Sánchez et al., 2019) | Spain | Cohort study | Footballers (including youths) | Changes in knowledge of doping with increasing age |

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|---|---|---|---|---|---|
| **43.** | (Murray et al., 2021) | Canada | Cohort study | Male youth football | Influence of parenting style on mental toughness |
| **44.** | (Nolte et al., 2014) | South Africa | Cohort study | Youth athletes (including footballers) | Athletes' beliefs about doping |
| **45.** | (Noon et al., 2015) | UK | Cohort study | Male youth football | Perceptions of well-being among footballers |
| **46.** | (O'Kane et al., 2017) | USA | Case-control study | Female youth footballers | Risk factors for lower extremity overuse injuries |
| **47.** | (Ommundsen et al., 2005) | Norway | Cohort study | Youth football | Influence of peer relationships on motivational climate in youth football |
| **48.** | (Read et al., 2016) | UK | Consensus statement | Youth footballers | Injury risks of early specialisation in football |
| **49.** | (Read et al., 2018a) | Qatar | Longitudinal cohort study | Male youth footballers | Current injury prevention practices |
| **50.** | (Read et al., 2018b) | Qatar | Cohort study | Male youth footballers | Injuries at elite academy level |
| **51.** | (Rice et al., 2016) | Australia | Systematic narrative review | Sport (including youth football) | Mental health of elite athletes |
| **52.** | (Rommers et al., 2020) | Belgium | Longitudinal cohort study | Male youth footballers | Influence of body size and growth matter on injury incidence |
| **53.** | (Rossing et al., 2016) | Denmark | Cohort study | Youth sport (including football) | The role of the community in athlete development |
| **54.** | (Sapieja et al., 2011) | Canada | Cohort study | Male youth football | Influence of parenting style on perfectionism |
| **55.** | (Schmikli et al., 2011) | Netherlands | Prospective cohort study | Male footballers (including youths) | Injury rates and characteristics in male football |
| **56.** | (Steffen et al., 2008) | Norway | Cluster-randomised controlled trial | Female youth footballers | Effectiveness of an exercise-based injury prevention program |

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|---|---|---|---|---|---|
| **57.** | (Stoeber and Becker, 2008) | UK | Cohort study | Female youth footballers | Motivational climate in female football |
| **58.** | (Swain et al., 2018) | Australia | Systematic review | Adolescents | Relationship between growth and musculoskeletal conditions |
| **59.** | (Tears et al., 2018) | UK | Prospective cohort study | Male youth footballers | Influence of the elite player performance plan on injury characteristics |
| **60.** | (Thorborg et al., 2017) | Denmark | Systematic review and meta-analysis | Football (including youths) | Effectiveness of FIFA 11+ programme in injury prevention |
| **61.** | (Timpka et al., 2008) | Sweden | Descriptive epidemiology study | Male youth footballers | Long term effects of time-loss injuries |
| **62.** | (Ureña-Lopera et al., 2020) | Spain | Cohort study | Youth footballers | Influence of academic performance on football motivation |
| **63.** | (van Beijsterveldt et al., 2013) | Netherlands | Systematic review | Footballers (including youths) | Effectiveness of exercise-based injury prevention programs |
| **64.** | (Watson and Mjaanes, 2019) | USA | Narrative review | Youth football | Injury characteristics in youth football |
| **65.** | (Weiss et al., 2009) | USA | Cohort study | Female youth footballers | Motivational climate in female football |
| **66.** | (Wik et al., 2021) | Qatar | Prospective cohort study | Male youth footballers | Effect of age on injury patterns |

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### 4.2.2. Factors influencing the participation of youth footballers

The five components of the ICF framework – namely; body structure and function, activities, participation, environmental factors, and personal factors – were used to discuss the topics identified in this review. The participation component was not reflected in the results because it is one of the central themes for this review. Table 7 below shows the topics identified from the dataset.

**Table 7. Participation: summary of topics identified from studies reviewed**

| Component | Topic | No. of articles (n = 31) | (%) |
|---|---|---|---|
| **Body structure and function** | Talent | 15 | 48.39 |
| | Relative age effect | 6 | 19.35 |
| **Environmental factors** | Competition level | 4 | 12.9 |
| **Personal factors** | Reasons for drop out | 3 | 9.68 |
| | Ambitions of career progression | 3 | 9.68 |
| **Activities** | None identified | N/A | N/A |

#### 4.2.2.1. Body structure and function

*Talent*

One of the most important factors influencing participation in youth football is the footballer's talent or skill. Talented footballers are more likely to be selected for elite team participation, while less talented footballers are more likely to be deselected or drop out (Keathley et al., 2013). Ten of the fifteen studies supported a comprehensive approach to talent identification and development. To enhance the chance of future success, elite teams utilise physical-, physiological-, sociological-, and psychological predictors of talent in youth soccer (Mills et al., 2012; Unnithan et al., 2012; Johnston et al., 2018; Ford et al., 2020). Multidisciplinary talent identification was found to be useful to elite teams, with no differences noted between males and females (Reilly et al., 2000; Williams and Reilly, 2000; Vaeyens et al., 2008; Gonçalves et al., 2014; Coutinho et al., 2016; Sarmento et al., 2018).

Two studies showed the physical performance of youth footballers to be the cornerstone of talent identification. Performance in sprinting, agility, dribbling, ball control, and shooting was noted as the key predictors of youth talent (Leyhr et al., 2020). As such, Zibung and Conzelmann (2013) argued that motor performance can be enhanced through early specialisation.

One study discussed the different approaches to talent development in elite and sub-elite academies. Gangsø et al. (2021) showed that in Norway, talent development in the top-ranking academies is holistic, whereas talent development in low-ranking academies is focused on physical performance.

Two studies discussed the environmental influences of talent development in youth football. Factors such as birthplace effect, socioeconomic status, sporting policy, support structure, and training/development programs have been identified (Baker et al., 2003; Gesbert et al., 2021).

*Relative age effect*

Five studies discussed the influence of relative age effect (RAE) on male youth participation in elite teams, and one study reviewed RAE in both males and females.

Three studies reported a player-selection bias towards players born in the first quarter of the year among elite adolescent male and female football teams (Helsen et al., 2005; Cobley et al., 2008). RAE was more evident during late adolescence, with its influence relatively reduced during mid-adolescence (Peña-González et al., 2021). Deselected players are likely to drop out, which highlights the major influence of RAE on participation (Helsen et al., 2005; Cobley et al., 2008).

Two studies reported participation trends among early maturers. Early maturers accumulated more match minutes and had more in-game confidence (completed more dribbles and shots) as compared to normal- and late-maturers (Saward et al., 2019). Vänttinen et al. (2010) found

significant differences in reaction speed, perceptual and motor performance of early maturers as compared to normal- and late-maturers. This suggests that early maturers are most likely to progress to higher competition levels and are more likely to progress to professional ranks.

One study examined the influence of RAE on playing position. In a study by Towlson et al. (2017) including 465 elite youth footballers, goalkeepers and central defenders were advanced maturers during early adolescence, and central defenders were advanced maturers during mid-adolescence.

4.2.2.2. Environmental factors

*Competition level*

Two studies reported a reduction in adolescent depression, mental ill health, and social anxiety in conjunction with an increase in psychological well-being and self-esteem among youths that engaged in sport and physical activity (Daniels and Leaper, 2006; Eime et al., 2013). These results related to sub-elite sportspersons and suggest that youths should participate in sport for the associated psychological and social benefits.

Similar results have been reported among elite youth participants, emphasising the positive influence of competition on autonomy, competence, and self-concept in adolescence (Findlay and Bowker, 2009; Hodge et al., 2009). This supports the participation of talented individuals in competitive youth sport.

The results suggest that competition level does not negate the benefits of sport participation.

4.2.2.3. Personal factors

*Reasons for dropout*

Two studies found a greater dropout rate in youth players born late in the selection year and among late maturers (Helsen et al., 1998; Figueiredo et al., 2009). The RAE was the primary

reason for dropping out. Figueiredo et al. (2009) also found that fitness level, goal orientation, and skill level were secondary reasons for dropping out.

Rongen et al. (2020) found greater sport-related stress in fifty-eight academy footballers compared to aged-matched school pupils, and lower physical well-being and peer and social support among academy footballers. These can be considered as personal reasons for dropping out.

None of the studies in the dataset discussed the interpersonal reasons for dropping out.

*Ambitions for career progression*

Three studies in the dataset described the prospect of career progression as a factor influencing participation in youth football.

Malina (2010) argued that early specialisers (those who specialise in childhood or early adolescence) do not gain a significant advantage over those who specialise in middle to late adolescence. In support of this, Haugaasen et al. (2014) investigated the sporting history of 745 elite youth footballers and found no significant difference between professional and non-professional players in their history of multi-sport or single-sport engagement. As such, there is little evidence to support early specialisation, which suggests that the ambition to advance a child's career in sport is parent-driven and does not outweigh the health risks associated with early specialisation.

Dugdale et al. (2021) showed that only 10% of 537 academy footballers progressed to professional ranks, the majority of which (63.59%) specialised during middle adolescence. This suggests that there is a low probability of career progression in football, with most academy footballers expected to drop out at the time of the transition from amateur to professional football.

Table 8 below is a summary of the participation-related studies included in this review.

**Table 8. Participation: summary of articles included in the review**

| No. | Authors | Country | Study design | Study focus | Domain assessed |
|---|---|---|---|---|---|
| **1.** | (Baker et al., 2003) | Canada | Narrative review | Male youth football | The path to expertise in elite youth football |
| **2.** | (Cobley et al., 2009) | UK | Meta-analysis | Youth sport (including football) | Influence of age-grouping on athlete development and participation |
| **3.** | (P. Coutinho et al., 2016) | Portugal | Narrative review | Youth sport (including football) | Talent development and skill proficiency |
| **4.** | (Daniels and Leaper, 2006) | USA | Longitudinal cohort study | Adolescent athletes (including footballers) | Link between sport participation and self-esteem |
| **5.** | (Dugdale et al., 2021) | UK | Longitudinal cohort study | Football academy graduates | Impact of participation in academy football |
| **6.** | (Eime et al., 2013) | Australia | Systematic review | Youth sport (including football) | Psychological and social benefits of sport participation |
| **7.** | (Figueiredo et al., 2009) | Portugal | Cohort study | Male youth footballers | Reasons for continued participation and termination of participation |
| **8.** | (Findlay and Bowker, 2009) | Canada | Cohort study | Early adolescent athletes (including footballers) | Link between sport participation and self-concept |
| **9.** | (Ford et al., 2020) | UK | Cohort study | Male youth football | Global trends in talent identification pathways |
| **10.** | (Gangsø et al., 2021) | Norway | Longitudinal cohort study | Male youth football | The academy football environment |
| **11.** | (Gesbert et al., 2021) | Switzerland | Narrative review | Youth football | The role of the environment in the talent identification process |

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|---|---|---|---|---|---|
| **12.** | (Gonçalves et al., 2014) | Portugal | Cohort study | Male youth sport (including football) | Multi-level approach to sustaining elite participation in sport |
| **13.** | (Haugaasen et al., 2014) | Norway | Cohort study | Youth footballers | Effect of engagement in football-specific activities on development |
| **14.** | (Helsen et al., 1998) | Belgium | Cohort study | Male youth footballers | Influence of relative age effect on participation in football |
| **15.** | (Helsen et al., 2005) | UK | Cohort study | Youth footballers in Europe | Effect of relative age effect on participation |
| **16.** | (Hodge et al., 2009) | New Zealand | Cohort study | Elite athletes (including youth footballers) | Reasons for participation |
| **17.** | (Johnston et al., 2018) | Canada | Systematic review | Youth sport (including football) | Current practices of talent identification |
| **18.** | (Leyhr et al., 2020) | Germany | Longitudinal study | Female youth football | Factors influencing motor performance development |
| **19.** | (Malina, 2010) | USA | Cohort report | Youth sport | Effect of early sport specialisation |
| **20.** | (Mills et al., 2012) | UK | Cohort study | Male youth football | Factors influencing player development |
| **21.** | (Peña-González et al., 2021) | Spain | Cohort study | Male youth footballers | Impact of relative age effect on participation at different competition levels |
| **22.** | (Reilly et al., 2000) | UK | Cohort study | Male youth football | A multidisciplinary approach to talent identification |
| **23.** | (Rongen et al., 2020) | UK | Longitudinal cohort study | Academy football participants | Psychosocial outcomes of academy involvement |
| **24.** | (Sarmento et al., 2018) | Portugal | Systematic review | Male youth football | Current practices of talent development |
| **25.** | (Saward et al., 2019) | UK | Mixed longitudinal study | Male youth footballers | Effect of playing status on talent development |

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|---|---|---|---|---|---|
| **26.** | (Towlson et al., 2017) | UK | Cohort study | Male youth footballers | Impact of relative age effect on position allocation |
| **27.** | (Unnithan et al., 2012) | UK | Narrative review | Youth football | Process of talent identification in youth football |
| **28.** | (Vaeyens et al., 2008) | Belgium | Narrative review | Youth sport (including football) | Current practices of talent development |
| **29.** | (Vänttinen et al., 2010) | Finland | Cohort study | Male youth footballers | Impact of relative age effect on performance tests and participation |
| **30.** | (A. Williams and Reilly, 2000) | UK | Narrative review | Youth football | Talent identification and development in youth soccer |
| **31.** | (Zibung and Conzelmann, 2013) | Switzerland | Case report | Male youth footballer | The benefits of early specialisation |

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### 4.2.3. Factors influencing the performance of youth footballers

Performance is a key indicator of success in elite football. 109 (66.46%) of the studies in the dataset focused on elite footballers, 37 (22.56%) studies focused on sub-elite footballers, and 18 (10.98%) studies examined both elite and sub-elite footballers. According to Billaut et al. (2012), performance success at the youth level is defined as the improvement and retainment of skills. Although winning is encouraged at the elite youth level, youth coaches promote proficiency and prioritise career progression over winning. This is reflected in the dataset, as nineteen of the sixty-seven performance-related studies examined the influence of training on the skills developed by youth footballers.

The three components of the biopsychosocial model – namely; biological factors, psychological factors, and social factors – were used to discuss the topics identified in this review. Table 9 below shows the performance-related topics identified from the dataset.

**Table 9. Performance: summary of topics identified from studies in the review**

| Component | Topic | No. of articles (n= 67) | (%) |
|---|---|---|---|
| **Biological factors** | Relative age effect | 14 | 20.9 |
| | Physical attributes | 4 | 5.97 |
| | Cognition | 3 | 4.48 |
| | Gender-specific characteristics | 1 | 1.64 |
| **Social factors** | Training | 19 | 28.36 |
| | Recovery | 8 | 11.94 |
| | Nutrition | 8 | 11.94 |
| | Load | 4 | 5.97 |
| | Environmental conditions | 3 | 4.48 |
| | Playing surface | 3 | 4.48 |
| **Psychological factors** | None identified | N/A | N/A |

4.2.3.1. Biological factors

*Relative age effect*

All fourteen studies reported on the influence of RAE on physical performance among elite youth footballers. According to Augste and Lames (2011), there was a direct correlation between RAE and performance success.

The influence of RAE performance success was evident in the studies conducted at elite youth championships. Williams (2010) reported that over 10 years at the FIFA Under 17 Male World Cup, only 16% of the players were born in the last quarter of the year. González-Víllora et al. (2015) reported similar findings from the UEFA European U-17 Male Championships. In contrast, Romann and Fuchslocher (2013) found that RAE was less significant at the Female U17 FIFA Woman's World Cup. The same findings in females were reported by Vincent and Glamser (2006).

There was a direct correlation between the birthplace effect and RAE for both genders. Williams (2010) and Romann & Fuchslocher (2013) reported that the trend was uniform for all geographical zones except for Africa. The African region displayed a reverse RAE with most players born in the last quarter of the year.

Player age was also shown to be significant. Huertas et al. (2019) and Mendez-Villanueva et al. (2011) reported on the significance of RAE in early adolescence. Patel et al. (2020) reported on the significance of RAE in early to middle adolescence. The RAE showed the most significant influence on performance in middle and late adolescence (Vandendriessche et al., 2012; Buchheit and Mendez-Villanueva, 2014; Müller et al., 2017; D'Hondt et al., 2019; Sal de Rellán-Guerra et al., 2019; Jackson and Comber, 2020)

*Physical attributes*

Two of the four studies related to physical attributes in the dataset examined the influence of body composition on performance. Nikolaïdis (2012) showed an inverse relationship between body mass index (BMI) and physical fitness, with youth footballers showing a propensity to reduce physical activity during mid-adolescence. In contrast, Abarghoueinejad et al. (2021) showed that BMI declined significantly from early to mid-adolescence, which partly explained the higher levels of performance among 14-17-year-olds as compared to 10-13-year-olds.

One study discussed the influence of dexterity on performance. In a cohort of 31 youth footballers, Lyle et al. (2015) showed that dynamic bilateral limb control is essential for agility. Ambidextrous players showed greater double limb strength and power.

One study discussed the influence of gender on physical attributes. López-Valenciano et al. (2021) showed a difference between the injury profile of male and female athletes. Female football players showed four-fold higher joint and ligament incidence rates than their male counterparts (1.5 injuries per one thousand exposure hours in females as compared to 0.4 injuries per one thousand exposure hours in males), which was attributed to strength and flexibility differences between genders.

*Cognition*

Three studies investigated the influence of cognitive ability on performance. All three studies highlighted the importance of experiential learning on the improvement of tactical abilities. Cardoso et al. (2019) showed that experienced youth footballers (with a mean of 7 years' training experience) that had acquired tactical acuity over time displayed lower cognitive effort in football-related skill tests, enabling them to use cognitive effort on decision-making tasks. Glavaš, (2020) reported improved visuospatial abilities and situational awareness among experienced youth footballers, which was shown to improve overall football performance. van

Maarseveen et al. (2018) suggested that players developed perceptual-cognitive skills from functional training, having found no relationship between playing ability and performance on video-based tests.

*Gender-specific characteristics*

One study discussed the influence of the menstrual cycle (in females) on performance. In a cohort of nine elite female footballers, Julian et al. (2017) found a significant reduction in Yo-Yo Intermittent endurance test results during the mid-luteal phase of the menstrual cycle, suggesting that match running performance could decline when female footballers are menstruating.

4.2.3.2. Social factors

*Training*

Nineteen studies discussed the influence of training on performance.

Fitness is considered the main controllable determinant of match performance and success (Mujika et al., 2009). According to Le Gall et al. (2010), the fitness characteristics of youth footballers change drastically over time, with a substantial increase in the capacity to train and play at high intensity with increasing age. This finding is related to the physical, metabolic, and hormonal changes associated with growth and maturation (Hansen et al., 1999). Training has been shown to improve match running performance among male youth footballers (Vieira et al., 2019) and female youth footballers (Poehling et al., 2021).

Fourteen studies examined the acute training effects of different training modalities. The results are summarised in Table 10 below.

**Table 10. Summary of the acute training effects of different training modalities**

| Authors | Participants (ages in years) | Training type | Outcome |
|---|---|---|---|
| (Baron et al., 2019) | 20 elite youth footballers (Under-17) | Functional training | Improved acceleration, velocity; improved 5-10m and 10-30m sprint performance |
| (de Hoyo et al., 2015) | 36 youth footballers (U-17 to U-19) | Eccentric-overload training | Improved countermovement jump- and 20m sprint performance |
| (Formenti et al., 2021) | 79 youth footballers (Under-11) | Non-specific training program that emphasises fun | Improved general motor coordination and dynamic balance |
| (Iaia et al., 2015) | 13 elite male footballers (18.5 ± 1) | Two-speed endurance training | Speed endurance production (SEP): improved repeated sprint and high-intensity intermittent exercise performance<br>Speed endurance maintenance (SEM): maximised fatigue tolerance |
| (Mackała et al., 2019) | 16 sub-elite youth footballers (17.63 ± 0.48) | Respiratory muscle training | Improved expiratory muscle strength<br>No improvement on respiratory function parameters |
| (Mara et al., 2015) | 17 elite female footballers (Unspecified) | Block periodisation | Preseason gains in speed and endurance performance gradually declined in the season as training demands increased. |
| (Michailidis et al., 2019) | 31 male youth footballers (Under-12) | Plyometric training | Improved jumping ability, acceleration, and endurance performance |
| (J. Moran et al., 2019) | Systematic review | Small-Sided Games vs. Conventional Endurance Training | Small-sided games are as effective as conventional endurance training for increasing |

| | | | |
|---|---|---|---|
| | | | aerobic endurance performance in male youth soccer players |
| (Nawed et al., 2018) | 57 amateur male footballers (20.63 ± 2.11) | Functional training (FIFA11+) | Improved overall football performance |
| (Otero-Esquina et al., 2017) | 36 male footballers (U-17 to U-19) | Strength training | Improved sprint performance, countermovement jump performance |
| (Prieske et al., 2016) | 39 elite male footballers (17 ± 1) | Core training | Improved trunk muscle strength, sprint, and kicking performance |
| (Sander et al., 2013) | 134 elite youth footballers (Unspecified) | 2-year strength training program | Improved sprint performance |
| (Zadeh et al., 2019) | 45 male amateurs soccer players (Unspecified) | Mindfulness training programme | Improved overall performance |
| (Zago et al., 2016) | 20 sub-elite male footballers (Under-12) | Agility training | Improved Slalom Dribbling Test performance; improved 180° change-of-direction time |

*Recovery*

Of the eight articles in the dataset related to recovery, five studies discussed the prevalence of fatigue among elite youth athletes. Pallesen et al. (2017) found that kicking performance was the main outcome that was influenced by sleep deprivation among 19 youth footballers. Thompson et al. (2020) reported that acute mental fatigue is at its peak post-match. In contrast, D. Coutinho et al. (2018) reported that the onset of acute muscular fatigue occurs 14% more often than acute mental fatigue, and Pau et al. (2014) found that muscular fatigue detrimental effect on balance. According to Noon et al. (2015), fatigue levels peak as the season progresses, which suggests that recovery modalities should be used in increasing frequency as the season progresses.

Three studies discussed recovery modalities used in elite sport. In a review of these modalities, Barnett (2006) reported that massage, cryotherapy, active recovery, contrast temperature water therapy, hyperbaric oxygen therapy, compression garments, stretching, and electromyostimulation are useful in limiting exercise-induced DOMS. Research by Rowsell et al. (2011) showed that post-match cold-water immersion was more effective than thermoneutral immersion for reducing the perception of leg soreness and general fatigue. However, Barnett (2006) argued that the influence of recovery modalities between training sessions has not been shown yet.

Brink et al. (2010) reported that 18 elite youth footballers from the Netherlands trained for an average of 394.4 ± 134.9 minutes per week with a total quality of recovery (TQR) of 14.7 ± 1.3, which was considered good recovery quality. However, the recovery modalities used were not discussed. Furthermore, Brink et al. (2010) found that higher levels of perceived stress and lower levels of perceived recovery among elite athletes compared to their sub-elite peers, which highlights the importance of the use of recovery modalities in elite sport.

*Nutrition*

Of the eight articles in the dataset discussing the influence of nutrition on performance, four studies reported on nutritional knowledge among youth footballers. Manore et al. (2017) found that 46% of 535 middle to late adolescent footballers with poor-fair nutrition knowledge used dietary supplements, meaning they took dietary supplements without adequate knowledge of the associated benefits and risks. These findings were supported by Fernández-Álvarez et al. (2020) and Schuth et al. (2021), who reported that knowledge of sports nutrition was poor among adolescent groups. Gordon et al. (2015) found that 25% of 79 underprivileged South African male adolescent footballers were dehydrated during fourteen training sessions, indicating that the cohort was uneducated about the importance of hydration during play.

Two of the studies discussed trends in supplementation among youth footballers. Ostojic (2004) showed the positive acute effects of creatine supplementation among 20 youth footballers, with a significant improvement in sprint performance identified after a 7-day supplementation program, Mielgo-Ayuso et al. (2019) reviewed the effects of caffeine supplementation on performance, reporting positive effects on jump performance, repeated sprint ability, and running distance, with no adverse effects reported on muscle damage or RPE ratings.

Two of the studies discussed trends in dietary intake among youth footballers. Noormohammadpour et al. (2019) found that the majority of 3839 Iranian male footballers had a high-protein diet, with no influence on performance reported. In an investigation of the changes in nutritional trends over 20 years among elite male youth footballers in Europe, van Biervliet et al. (2011) reported that overall calorie intake has decreased, protein, fibre, and fat intake have decreased, while carbohydrate intake has increased. This shows the influence of the birthplace effect on diet.

*Load*

Four studies reported on the influence of load on performance.

Two studies commented on the training loads of athletes. Borresen and Lambert (2009) reviewed various theories of load management, all of which were designed to prevent threshold saturation and maximise performance. However, it was noted that markers that quantify a dose-response relationship between training and performance have not been identified yet. In an 8-week study of elite late-adolescent footballers, Gil-Rey et al. (2015) identified higher levels of training exhaustion and fatigue among players who had fewer match minutes, although more active players had more exposure to load, suggesting that the perception of the load is influenced the level of enjoyment.

Two studies commented on in-game loads among youth footballers. Bloomfield et al. (2007) found significant differences in in-game load among players of different positions. Defenders spent more time jogging and skipping than the other positions. Midfielders spent more time running and sprinting, while forwards spent the most time shuffling, walking, and jumping. These results were exclusive of training load, which was relatively the same for all in-field positions. Arruda et al. (2015) reported a difference in-game loads depending on competition level, game importance, and team motivation.

*Environmental conditions*

Two studies reported on the influence of altitude on performance.

Gore et al. (2008) theorised that in preparation for prolonged athletic competition at moderate-high altitude, athletes require 1-2 weeks of periodised training to acclimate and maximise performance. During the acclimation period, including longer recovery intervals between moderate-high intensity drills would be beneficial to the athlete. In contrast, Billaut et al. (2012) reported a 17% increase in anaerobic metabolism after 23 nights of 'live high-train low' (LHTL) altitude training, which improved sprint performance in team-sport athletes.

One study discussed the influence of the birthplace effect on performance. Côté et al. (2006) highlighted the contextual factors that determined the availability of opportunities and the potential of athletes to develop sporting expertise in their place of birth. In the Canadian study, rural communities produced the least elite athletes, while small cities provided early opportunities for athletes to advance themselves. Large cities had the largest number of participants and the greatest dropout rates. Côte (2006) argued that the birthplace effect was more impactful on talent development than RAE.

*Playing surface*

Three studies investigated the influence of the playing surface on performance.

No significant difference was found when comparing movement patterns on artificial versus natural turf for both male and female youth footballers (Andersson et al., 2008; Nédélec et al., 2013). However, according to Andersson et al. (2008), there was a significant difference in the style of play on the different surfaces, with fewer ball recoveries made by players on artificial turf. Furthermore, the results of the subjective evaluations in the study suggested that males found it easier to play on natural turf, while the female participants felt the turf did not influence performance. One study reported that there was no significant difference in injury incidence on natural versus artificial turf (Ekstrand et al., 2006).

Table 11 below is a summary of the performance-related studies included in this review.

1 Table 11. Performance: summary of studies included in the review

| No. | Author | Country | Study design | Study focus | Domain assessed |
|---|---|---|---|---|---|
| **1.** | (Abarghoueinejad et al., 2021) | Portugal | Mixed longitudinal study | Male youth footballers | Influence of body physique on performance |
| **2.** | (Andersson et al., 2008) | Sweden | Cohort study | Elite footballers (including youths) | Movement differences on natural and artificial turf |
| **3.** | (Arruda et al., 2015) | Brazil | Cohort study | Male youth footballers | The effect of match load on performance |
| **4.** | (Augste and Lames, 2011) | Germany | Cohort study | Male youth footballers | Relative age effect in elite youth football |
| **5.** | (Barnett, 2006) | Australia | Narrative review | Elite youth athletes (including footballers) | Effect of recovery modalities between sessions on performance |
| **6.** | (Baron et al., 2019) | Poland | Cohort study | Male youth footballers | Effect of functional training on performance |
| **7.** | (Billaut et al., 2012) | Australia | Narrative review | Youth team-sport athletes (including football) | Influence of altitude on performance |
| **8.** | (Bloomfield et al., 2007) | UK | Cohort study | Male youth footballers | Position-specific physical demands in football |
| **9.** | (Borresen and Lambert, 2009) | South Africa | Narrative review | Youth athletes (including footballers) | The effect of training load on performance |
| **10.** | (Brink, et al., 2010) | Netherlands | Cohort study | Elite male youth footballers | Effect of load and recovery on performance |
| **11.** | (Brink et al., 2012) | Netherlands | Prospective cohort study | Male youth footballers | Effect of recovery on overreached elite youth footballers |
| **12.** | (Buchheit and Mendez-Villanueva, 2014) | Qatar | Cohort study | Male youth footballers | Effect of maturity status on motor performance |

| | | | | | |
|---|---|---|---|---|---|
| **13.** | (Cardoso et al., 2019) | Brazil | Cohort study | Male youth footballers | Influence of cognitive ability on football performance |
| **14.** | (Côté et al., 2006) | Canada | Cohort study | Male youth athletes (including footballers) | Relationship between birthplace effect and sport performance |
| **15.** | (D. Coutinho et al., 2018) | Portugal | Cohort study | Elite youth footballers | Effects of fatigue on performance |
| **16.** | (de Hoyo et al., 2015) | Spain | Cohort study | Youth footballers | Effect of eccentric training on injury prevention and performance |
| **17.** | (Ekstrand et al., 2006) | Sweden | Prospective two-cohort study | Male elite footballers (including youths) | Injury risk on natural and artificial turf |
| **18.** | (Fernández-Álvarez et al., 2020) | Spain | Cohort study | Male youth footballers | Improving the nutritional status of youth footballers |
| **19.** | (Formenti et al., 2021) | Italy | Cohort study | Male youth footballers | Comparative effect of sports-specific versus non-specific training on performance |
| **20.** | (Gil-Rey et al., 2015) | Spain | Cohort study | Male youth footballers | Relationship between perceived load and performance |
| **21.** | (Glavaš, 2020) | Croatia | Cohort study | Male youth footballers | Relationship between basic cognitive abilities and performance |
| **22.** | (González-Víllora et al., 2015) | Spain | Cohort study | Male youth footballers | Relative age effect in elite youth football |
| **23.** | (Gordon et al., 2015) | South Africa | Cohort study | Male youth footballers | Hydration status of youth footballers |
| **24.** | (Gore et al., 2008) | Australia | Narrative review | Footballers (including youths) | Preparation for competition at high altitudes |
| **25.** | (Hansen et al., 1999) | Denmark | Cohort study | Male youth footballers | Effect of testosterone on performance |

| | | | | | |
|---|---|---|---|---|---|
| **26.** | (Huertas et al., 2019) | Spain | Cross-sectional study | Male youth footballers | Role of relative age effect on cognitive and physical ability |
| **27.** | (Iaia et al., 2015) | Italy | Cohort study | Male youth footballers | Effect of endurance training on performance |
| **28.** | (Jackson and Comber, 2020) | UK | Longitudinal and cross-sectional study | Male youth football | Influence of relative age effect on academy involvement |
| **29.** | (Julian et al., 2017) | Germany | Cohort study | Female youth footballers | Influence of menstrual cycle on physical performance |
| **30.** | (Le Gall et al., 2010) | France | Cohort study | Male youth footballers | Fitness characteristics of elite youth footballers |
| **31.** | (López-Valenciano et al., 2021) | Switzerland | Systematic review | Female youth footballers | Influence of body composition on injury profile |
| **32.** | (Lyle et al., 2015) | USA | Cohort study | Youth footballers | Influence of lower limb dexterity on performance |
| **33.** | (Mackała et al., 2019) | Poland | Cohort study | Male youth footballers | Effect of respiratory muscle training on performance |
| **34.** | (Manore et al., 2017) | USA | Cohort study | Youth footballers | Nutritional status of youth footballers |
| **35.** | (Mara et al., 2015) | Australia | Cohort study | Elite female footballers (including youths) | Effect of periodisation on performance |
| **36.** | (Mendez-Villanueva et al., 2011) | Qatar | Cohort study | Male youth footballers | Effect of age on performance |
| **37.** | (Michailidis et al., 2019) | Greece | Cohort study | Male youth footballers | Effect of plyometric training on performance |
| **38.** | (Mielgo-Ayuso et al., 2019) | Spain | Systematic review | Youth footballers | Influence of caffeine supplementation on performance |
| **39.** | (J. Moran et al., 2019) | Switzerland | Meta-analysis | Male youth footballers | Comparative effect of different training types on performance |
| **40.** | (Müller et al., 2017) | Austria | Cohort study | Elite sport (including football) | Maturity status influences elite performance of athletes |

| | | | | | |
|---|---|---|---|---|---|
| **41.** | (Mujika et al., 2009) | Spain | Cohort study | Youth footballers | Determinants of fitness among youth footballers |
| **42.** | (Nawed et al., 2018) | India | Cohort study | Male youth footballers | Effect of FIFA 11+ on functional performance |
| **43.** | (Nédélec et al., 2013) | France | Cohort study | Elite youth footballers | Performance on natural and artificial turf |
| **44.** | (Nikolaïdis, 2012) | Greece | Cohort study | Male youth footballers | Influence of BMI on performance |
| **45.** | (Noormohammadpour et al., 2019) | Iran | Cohort study | Male youth footballers | Relationship between body composition and performance |
| **46.** | (Ostojic, 2004) | Former Yugoslavia | Cohort study | Male youth footballers | Effect of creatinine supplementations among youth footballers |
| **47.** | (Otero-Esquina et al., 2017) | Spain | Cohort study | Male youth footballers | Effect of strength training on performance |
| **48.** | (Pallesen et al., 2017) | Norway | Cohort study | Male youth footballers | Effect of sleep deprivation on performance |
| **49.** | (Patel et al., 2020) | UK | Cohort study | Male youth footballers | Influence of birth quartile and anthropometry on player retention at academies |
| **50.** | (Pau et al., 2014) | Italy | Cohort study | Male youth footballers | Effects of fatigue on balance |
| **51.** | (Poehling et al., 2021) | Canada | Cohort study | Female footballers (including youths) | Development of physical performance |
| **52.** | (Prieske et al., 2016) | Germany | Cohort study | Male youth footballers | Effect of core strengthening on performance |
| **53.** | (Romann and Fuchslocher, 2013) | Switzerland | Cohort study | Elite female footballers | Influence of anthropometric measures on relative age effect |
| **54.** | (Rommers et al., 2020) | Belgium | Cohort study | Male youth footballers | Relative age effect and motor coordination |
| **55.** | (Rowsell et al., 2011) | Australia | Cohort study | Male youth footballers | Effect of post-match cold-water immersion on performance |

| | | | | | |
|---|---|---|---|---|---|
| **56.** | (Sal de Rellán-Guerra et al., 2019) | Spain | Cohort study | Elite footballers (including youths) | Changes in physical and technical performance with age |
| **57.** | (Sander et al., 2013) | Germany | Cohort study | Youth footballers | Effect of strength training on performance |
| **58.** | (Schuth et al., 2021) | Hungary | Prospective cohort study | Elite male youth footballers | Factors influencing creatine kinase response |
| **59.** | (Thompson et al., 2020) | UK | Cohort study | Male youth footballers | Examining the effect of mental fatigue on performance |
| **60.** | (van Biervliet et al., 2011) | Belgium | Cohort study | Male athletes (including footballers) | Change in nutritional status of youth footballers over time |
| **61.** | (van Maarseveen et al., 2018) | Netherlands | Cohort study | Female youth footballers | Relationship between perceptual-cognitive skills and performance |
| **62.** | (Vandendriessche et al., 2012) | Belgium | Cross-sectional study | Youth footballers | Influence of biological maturation on selection |
| **63.** | (Vieira et al., 2019) | Switzerland | Systematic review | Male youth footballers | Effect of age on match running performance |
| **64.** | (Vincent and Glamser, 2006) | USA | Cohort study | Youth footballers | Influence of relative age effect on Olympic selection |
| **65.** | (A. Williams, 2020) | USA | Cohort study | Male youth footballers | Relative age effect in elite youth football |
| **66.** | (Zago et al., 2016) | Italy | Cohort study | Male youth footballers | Effect of a technique and agility program on performance |
| **67.** | (Zadeh et al., 2019) | Iran | Cohort study | Male youth footballers | Effect of a mindfulness programme on performance |

## 4.3. Summary of results

Ninety-six (96) studies (58.54%) discussed intrinsic factors, and sixty-eight studies (41.46%) discussed extrinsic factors. Figure 3 below is a summary of the intrinsic and extrinsic factors influencing the QoL, participation, and performance of youth footballers.

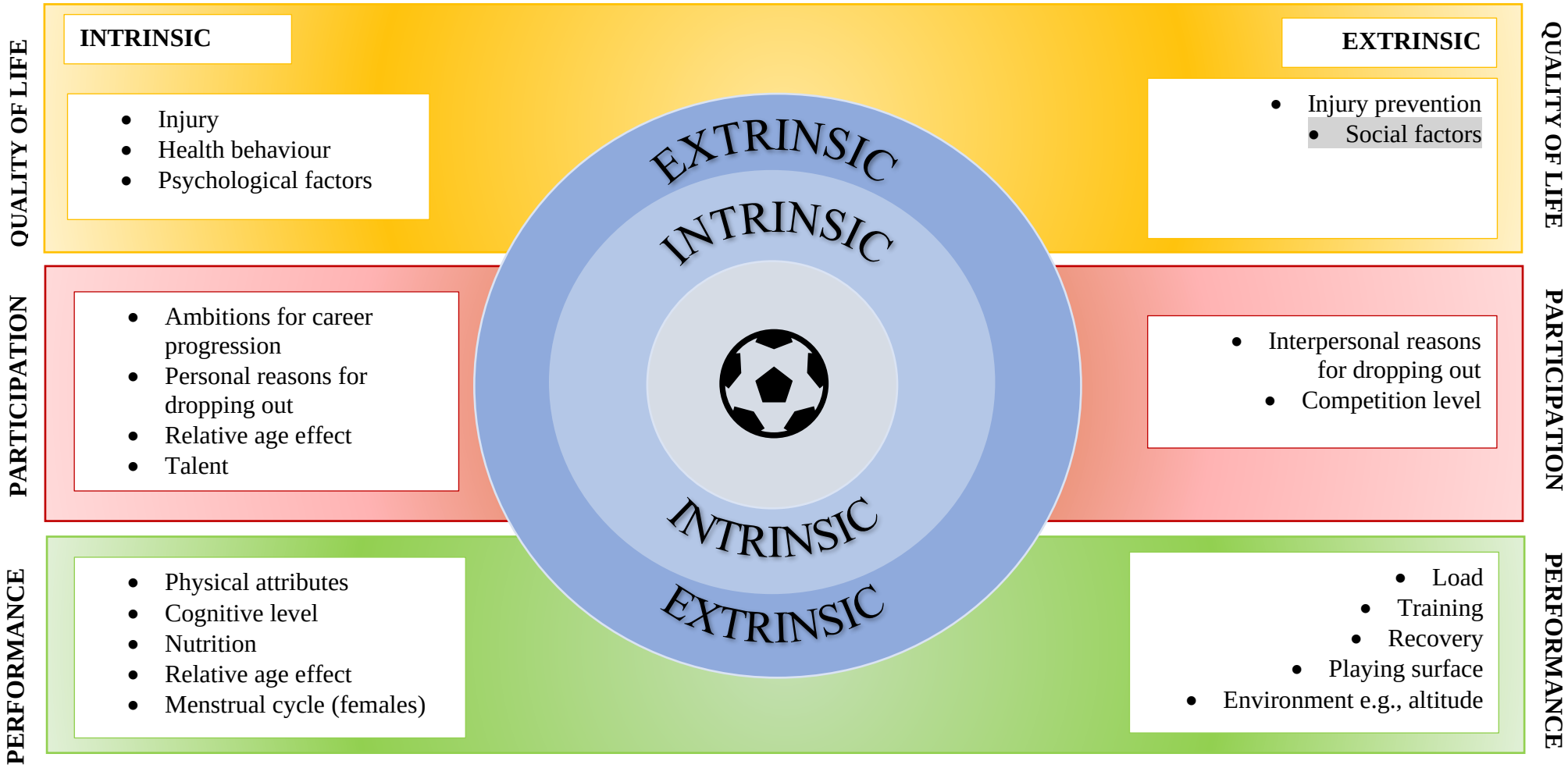


**Figure 3: Summary of factors influencing the QoL, participation, and performance of youth footballers**

# CHAPTER FIVE – DISCUSSION

## 5.1. Introduction

This scoping review aimed to map the range of factors influencing the QoL, football participation, and football performance of youth footballers. One hundred and sixty-four (164) articles met the inclusion criteria set for this review. The researcher fulfilled the aim of this review through the descriptive analysis of the dataset. Furthermore, the researcher gained an understanding of the complex nature of the youth football environment. In this chapter, the results of this review are discussed.

## 5.2. Descriptive Statistics

Initial inspection of the distribution of the data reveals an equal representation of QoL-related information (40.24%) and performance-related information (40.85%), with a low representation of participation-related information (18.9%). The participation-related factors identified in this review have a detrimental impact on the young footballer's decision to continue playing football at both elite and sub-elite levels. Ideally, the data should be more evenly distributed across the three key themes to reflect that they are equally important to the young footballer and to justify a comprehensive approach to the management of the youth footballer.

One hundred and four (104) studies were conducted in Europe, amounting to 63.41% of the dataset. This suggests that the interest in youth football is greatest in Europe. Unsurprisingly, Europe is the most successful region in terms of world football rankings, with thirteen of the top-20 ranked male national teams from Europe (FIFA, 2021a), and twelve of the top-20 female national teams from Europe (FIFA, 2021b). To reflect the global nature of football, more research should be conducted in the other geographical zones.

One hundred and nine (109) studies were conducted among elite youth footballers, meaning that 66.46% of the studies in the dataset are relevant to the minority of youth football participants. This shows that the focus of youth football research is on high performance. To identify factors that influence youth footballers at sub-elite levels and to continue to grow the sport, more research should be conducted among sub-elite youth footballers.

One hundred and nineteen (119) of the studies in the dataset were cohort studies, amounting to 72.56% of the data. The focus of youth football research on cohort studies justifies the need for more reviews to be conducted to consolidate the available information.

Eighty (80) studies in the dataset were specific to 11 to 19-year-olds. This is considered the most critical phase of youth football development (FIFA, 2018), thus the focus on this age group is justified. Furthermore, it is an important age range for normal human development (WHO, 2012). The juxtaposition of football skills development and normal adolescent development presents interesting findings. Studies have found both a direct and an inverse relationship between football participation and adolescent development. The evident influence of the relative age effect (RAE) on elite team selection (Johnston et al., 2018) suggests that training should be specialised to facilitate normal development because well-developed players have an advantage in the normal talent identification pathway. In contrast, early single-sport specialisation has been shown to increase the risk of deformity, which stunts normal adolescent development (Moseid et al., 2019). Medical practitioners working with youth footballers must be aware of the age-related changes that can have a detrimental impact on QoL, participation, and performance.

## 5.3. QOL

### 5.3.1. Injury and injury prevention

Injury and injury prevention studies represented 51.52% of the QoL dataset, which reflects the high burden of injury in youth football. There is an alarmingly high incidence and prevalence of injuries in youth football (Chomiak et al., 2000; Dvorak et al., 2000; Junge et al., 2000; Rommers et al., 2020). This suggests that current trends towards increasing training load are harmful to youth footballers. Health practitioners play a crucial role in curbing such trends to improve the QoL of youth footballers. The most important intervention is to use the research to advocate for an alteration of training and playing loads particularly among at-risk groups, which the evidence suggests is the mid-adolescent group (Johnston et al., 2018; Peña-González et al., 2021).

Our findings show that the injury characteristics change significantly with increasing age. For example, overuse injuries are more common in early adolescence, while muscle injuries are more common in late adolescence (Chomiak et al., 2000; Kakavelakis et al., 2003; Faude et al., 2013; S. Jones et al., 2019; Watson & Mjaanes, 2019). This shows that injury management and prevention strategies must be age- and level-specific to improve the QoL of youth footballers.

### 5.3.2. Health behaviour and nutrition

The most significant finding regarding health behaviour was the lack of knowledge among youth footballers regarding doping and substance abuse (Nolte et al., 2014; Ama et al., 2003; Giraldi et al., 2015). The same can be said about youth footballers' knowledge (or lack thereof) regarding sports nutrition (Gordon et al., 2015; Manore et al., 2017). These are areas that require immediate intervention. To promote the health of youth footballers, medical

practitioners working with youth footballers must educate and empower youth footballers to improve their health behaviours.

### 5.3.3. Psychological factors

The most significant finding regarding psychological factors was the psychological impact of injury on the success of return-to-play and return-to-performance measures implemented (Johnson and Ivarsson, 2011). Injury prevention strategies in youth football are focused on the injury. It is necessary to conduct screening and implement mental injury prevention programs among previously injured youth footballers to improve their mental health. With the high burden of injury in youth football, these findings highlight the crucial role of the sports psychologist in the multi-disciplinary management of the youth footballer.

### 5.3.4. Social factors

#### 5.3.4.1. Peer relationships

The results suggest an under-representation of social factors in the dataset, as only two of the sixty-six articles were related to social factors. The most interesting finding was the changing dynamic of social relationships with increasing age. As the footballer grows older, the need for peer acceptance decreases (WHO, 2012). This suggests that group interventions may be more applicable to younger footballers than to older footballers. Furthermore, specialised training might have a better effect among older footballers than among younger footballers.

#### 5.3.4.2. Motivational climate and parental influence

The results suggest that the motivational climate is coach- and/or parent-created, irrespective of age or playing level (Weiss et al., 2009; Hampson and Jowett, 2014). Furthermore, our findings show that the parents are the key decision-makers in every area of a young footballer's life (Baxter-Jones and Maffulli, 2003). Coaches and parents play a crucial role in promoting

the well-being of the youth footballer. To understand youth footballers better, the insights of the coaches and parents are necessary.

### 5.3.5. Gaps in the research

Although our findings show the influence of the birthplace effect on participation and performance (Williams, 2010; Romann and Fuchslocher, 2013), the influence of the birthplace effect on the QoL of youth footballers was not represented in the dataset. According to van Nieuwstadt et al. (2021), it is difficult to identify the influence of birthplace effect on QoL, because both urban and rural environments have been shown to both positively and negatively influence the QoL of athletes. For example, some players from rural communities might struggle to adjust to urban communities due to feelings of separation and isolation resulting in a lower perception of QoL, while others might succeed in urban environments because of greater access to training facilities, resulting in a higher perception of QoL (van Nieuwstadt et al., 2021). Furthermore, van Nieuwstadt et al. (2021) argued that factors influencing the QoL of youth footballers are often interrelated, with factors such as cultural diversity and median income in the community being closely associated to birthplace effect. More research investigating the influence of birthplace effect, socioeconomic status, and the proximity & availability of instructional resources on the QoL of youth footballers would be beneficial.

By identifying the unique goals, standards and concerns of youth footballers playing football in different geographical zones, researchers can improve the body of literature. By examining the relationship between RAE and QoL among youth footballers, researchers can promote for the implementation of interventions based on the needs identified among different groups.

## 5.4. Participation

### 5.4.1. Ambitions for career progression and drop-out

The findings suggest that there is a low probability of career progression in football, meaning that drop-out is expected among sub-elite youth footballers. Surprisingly, the research suggests that dropping out from elite football is considered a personal decision. Most of the key decisions in youth football – such as academy enrolment, training load, and team selection – are made by parents and coaches. Thus, dropping out from elite youth football should be considered a result of the footballer's experience of the coach- and parent-created environment. However, none of the articles in the dataset discussed the interpersonal reasons for dropping out. This is an area where future research will be beneficial.

### 5.4.2. RAE and talent

The most significant finding related to the RAE was the player-selection bias towards early maturers and players born in the first quarter of the year in elite football (Helsen et al., 2005; Cobley et al., 2008). The same findings were reported for talent identification (A. Williams and Reilly, 2000; Vaeyens et al., 2008; P. Coutinho et al., 2016; Johnston et al., 2018; Sarmento et al., 2018). Based on current talent identification trends, the research suggests that the main outcome of talent identification is the identification of biological maturity, and not talent or skill. This suggests that success (winning) is the main motivation of elite-level participation, despite Kepčija's (2016) argument that the most important motivation is the development of skills.

### 5.4.3. Competition level

The results of this review suggest that the level of competition was a motivating factor for continued participation in football for both elite and sub-elite footballing groups (Findlay and Bowker, 2009). It was found that players were more engaged, confident, and persistent in

highly competitive environments. (Daniels and Leaper, 2006), suggesting that competition level had a direct influence on football performance as well. Thus, footballers may continue playing football because of the positive affective response derived from competition. Furthermore, Daniels and Leaper (2006) reported that participation in elite competition positively influenced self-esteem among youth footballers through the impact that participation had on popularity and peer acceptance. This suggests that dropout can be limited by promoting healthy competition among youth footballers.

The competition among teammates is dependent on the motivational climate created by the key role players in the football environment. In a task-involving climate, interpersonal competition among team members is limited, and learning and self-improvement are emphasised. This motivational climate is generally implemented in sub-elite football (Møllerløkken et al., 2017; Monteiro et al, 2018). It has been suggested that a task-involving climate leads to enjoyment, which can result in sustained participation in football (Kepčija, 2016) In an ego-involving climate, interpersonal competition among team members is encouraged, and individual success is emphasised. This motivational climate is generally implemented in elite football (Møllerløkken et al., 2017; Monteiro et al, 2018). This suggests that the elevated interpersonal competition in elite football can result in player stress, and result in failure or dropout.

**5.4.4. Gaps in the research**

Firstly, there is conflicting evidence regarding early single-sport specialisation. Reviews of the risks and benefits associated with early single-sport specialisation would aid in improving our understanding of the best practice for youth footballers.

Secondly, the studies reviewed identified the influence of adult role models on key decisions. However, none of the studies examined the role of footballer agency on decisions to continue or cease participation in football. Young footballers, particularly teenagers have autonomy in

decision making, and research should be conducted to examine the influence of player autonomy on their participation in football.

Thirdly, factors such as the availability of finances, training facilities and equipment were not discussed in the dataset. At elite level, funding is provided by association clubs and leagues, however, at sub-elite level, footballers are generally self-funded, especially in rural communities. The lack of resources may influence the participation of the youth in football. Thus, these factors should be investigated further.

## 5.5. Performance

### 5.5.1. Nutrition

Although good nutritional habits have been shown to be important to maximise football performance output (Gordon et al., 2015), nutritional knowledge was found to be poor among both elite and sub-elite youth footballers (Gordon et al., 2015; Manore et al., 2017; Fernández-Álvarez et al., 2020; Schuth et al., 2021). This suggests that a lack of nutrition-based interventions among youth footballers.

Among elite youth footballers, nutritional supplementation was shown to have positive effects on acute performance outputs (Ostojic, 2004; Mielgo-Ayuso et al., 2019). However, it is concerning that nutritional supplementation is implemented in a population with poor nutritional knowledge. This highlights a focus on acute performance which could be to the detriment of long-term performance. Noon et al. (2015) found that chronic fatigue was prevalent among youth footballers towards the end of the football season, which resulted in poor performance.

### 5.5.2. Physical attributes

The most significant finding was the influence of gender-specific characteristics on the injury profile of male and female youth footballers. Lower extremity injuries were the most common

injuries in youth football (Lyle et al., 2013; López-Valenciano et al., 2021), however males were more likely to suffer muscle injuries and contact injuries (Lyle et al., 2013), while females were more likely to sustain tendon and ligament injuries (López-Valenciano et al., 2021). To facilitate performance success, injury prevention measures should be specific to the risk factors that are identified in the target group.

#### 5.5.3. Cognitive level

The results showed the benefits of experience in gaining technical and tactical acuity among youth footballers. Thus, the influence of experience on technical football performance may justify early single-sport specialisation.

#### 5.5.4. RAE

The most significant finding was the difference in the influence of the RAE in males and in females, with the RAE more influential among males than among females (Williams, 2010; González-Víllora et al., 2015). This suggests that male football is more physical (meaning performance success is dependent on physical attributes) and female football is more technical (meaning performance is dependent on skill level).

#### 5.5.5. General factors

There was an under-representation of studies showing the influence of the environment on performance. The influence of altitude on performance was reported, however, the influence of other environmental aspects – such as heat or humidity – were not represented in the dataset. Environment aspects have a detrimental impact on performance. Thus, further research in this area would be beneficial.

There was also an under-representation of studies showing the influence of gender-specific characteristics on performance. There was only one study in the dataset that highlighted the influence of menstruation on the performance of female footballers. Gender-specific studies

are important in this context, because of the influence of puberty on physical characteristics. As such, further research in this area would be beneficial.

### 5.5.6. Training, load, and recovery

The effectiveness of various training methods has been shown, which suggests that a variation of training methods may be most beneficial for the holistic development of youth footballers. It is the responsibility of the multi-disciplinary team that works with youth footballers to modify training based on; 1) the goals that have been set for the team, 2) the impairments that have been identified in the team, and 3) the stage of development of the youth footballers.

Regarding load, the results show that considerations have been made for the age of the footballers. Training duration is decreased with increasing age, and training intensity is increased with increasing age (Borresen and Lambert, 2009). The current load management trends reflect the injury patterns of the different sub-groups, with overuse injuries more common in early adolescence, and muscle injuries more common in late adolescence (Chomiak et al., 2000; Kakavelakis et al., 2003; Faude et al., 2013; Jones et al., 2019; Watson and Mjaanes, 2019). Medical practitioners working with youth footballers must be aware of training thresholds to facilitate the safe participation of the youth in football.

Regarding recovery, the effectiveness of various recovery modalities has been shown, which suggests recovery interventions should be based on feasibility, efficiency, and the availability of resources. As such, active recovery is the most efficient recovery modality to use in team sport. Medical practitioners working with youth footballers should implement active recovery modalities to improve performance.

### 5.5.7. Playing surface

Information related to the playing surface was under-represented in the dataset. Although no significant difference was found between performances on natural versus on artificial turf

(Andersson et al., 2008; Nédélec et al., 2013), none of the studies investigated the influence of the playing surface in rural communities (of low socio-economic status) on performance. Based on observation, young footballers in rural South Africa play football on uneven and unkept surfaces. Studies investigating the performance standards on such surfaces would improve our knowledge in the area.

### 5.5.8. Gaps in the research

During the screening of the databases, it was found that performance-related studies were the most common relative to the other central themes. More reviews are necessary to consolidate the performance-related information available.

There were no studies discussing the influence of psychological factors on performance. Studies examining the influence of psychological well-being on performance would be beneficial.

## 5.6. General discussion

In general, the most significant finding was the under-representation of studies specific to females, with only thirteen of the 164 articles in the dataset exclusively discussing factors related to female youth footballers. Although this is because football is more popular among males than among females, the results from the studies conducted on males cannot be related to females, because of the gender differences in injury characteristics (Lyle et al, 2013; López-Valenciano et al., 2021), style of play (Williams, 2010; González-Víllora et al., 2015), and physiology (Julian et al., 2017). More studies should be conducted with female participants.

This study has shown the similarities and differences between elite and sub-elite youth footballers. The main similarity is the high probability of dropout at both levels. The main difference is in the value systems of teams at various levels. Elite youth football is more

performance-oriented than sub-elite youth football, while sub-elite youth football is based on enjoyment and health promotion.

Our findings suggest that early single-sport specialisation is a feature influencing QoL, participation and performance among youth footballers. Although there is no consensus regarding the timing of specialisation, medical practitioners must be aware of its features to minimise the risks associated with specialisation.

Our findings suggest a direct relationship between the QoL-, participation- and performance-related factors. Three examples are listed below:

- Young footballers participate in football to improve their health status (Janssen and LeBlanc, 2010). Furthermore, the dropout rate increases with increasing age, which coincides with a decline in the health status of physically inactive youth with increasing age (Figueiredo et al., 2009; Janssen and LeBlanc, 2010). This suggests a direct relationship between participation and QoL.
- A winning mentality forms part of the value system of elite academy programs. Winning has been shown to have a positive impact on an individual's confidence and self-image (Godfrey and Winter, 2017). This suggests a direct relationship between performance success and QoL.
- The high representation of early maturers at the elite level coincides with the elevated level of performance of early maturers at the elite level (Helsen et al., 2005; Cobley et al., 2008; Saward et al., 2019). This suggests a direct relationship between participation and performance.

Our findings suggest that practitioners working with youth footballers must understand the relationships between these themes to implement effective management strategies. For example, a footballer who is considering dropping out may be demotivated because of burnout.

The effect of football participation for that player is life-dissatisfaction, but the cause might be overtraining. Thus, it may be beneficial to manage the player's load, which might motivate the player to continue playing football.

## 5.7. Limitations

It can be argued that the scope of this review is broad, thus the central themes were not reviewed in sufficient detail. However, this review aimed to identify the gaps in the current body of literature to justify future research. Furthermore, our research has shown the interrelated nature of the themes, which justifies conducting a review with a broad scope. During the screening, forty-seven articles were excluded from this review because of restricted access to the full text. Due to a lack of funding, we were unable to obtain those articles. Thus, the review could have been more comprehensive.

# CHAPTER SIX – CONCLUSION

Through this review, the researchers were able to map the range of factors influencing the QoL, participation, performance of youth footballers. A review of these topics was necessary because these topics are commonly researched but scarcely reviewed.

Many factors were identified. Regarding QoL, injury and injury prevention, health behaviour, psychological factors, and social factors were the factors reviewed in this study. Regarding participation, ambitions for career progression and dropout, relative age effect (RAE), talent, and level of competition were the factors reviewed in this study. Regarding performance, physical attributes, cognitive level, RAE, training, load, recovery, playing surface, birthplace effect, nutrition, and climate were reviewed in this study. Generally, some factors, such as injury, are more commonly researched than others, such as social factors, which highlights that the focus of youth football research is on the physical well-being of the footballer.

There were a few gaps identified through this review. Regarding QoL, more research investigating the influence of birthplace effect, socioeconomic status, and the proximity & availability of instructional resources on the QoL of youth footballers would be beneficial. Regarding participation, the role of footballer agency in key participation-related decisions must be researched. Regarding performance, more reviews of the data are necessary because of the commonality of performance-related research in youth football.

Through this review, the researchers were able to show how QoL-, participation-, and performance factors are interrelated. The complex relationship between the factors reflects the complex and ever-changing life of the growing footballer. There are differences evident in the demands of young footballers of different ages. Within this context, practitioners working with youth footballers must implement programs specific to the footballers' functional level to promote safe play.

With interest growing in female football, further research is warranted for practitioners to gain knowledge in this area. Further research is warranted for males and females alike to strengthen our current understanding of the factors influencing the QoL, participation, and performance of youth footballers.

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# Appendix I – PRISMA ScR Checklist

**Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist**

| SECTION | ITEM | PRISMA-ScR CHECKLIST ITEM | REPORTED ON PAGE # |
|---|---|---|---|
| **TITLE** | | | |
| Title | 1 | Identify the report as a scoping review. | Cover Page |
| **ABSTRACT** | | | |
| Structured summary | 2 | Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives. | vi-vii |
| **INTRODUCTION** | | | |
| Rationale | 3 | Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach. | 1-4 |
| Objectives | 4 | Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives. | 5 |
| **METHODS** | | | |
| Protocol and registration | 5 | Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number. | 32 |
| Eligibility criteria | 6 | Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale. | 33-34 |
| Information sources* | 7 | Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed. | 36 |
| Search | 8 | Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated. | 34-35 |
| Selection of sources of evidence† | 9 | State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review. | 36 |
| Data charting process‡ | 10 | Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators. | 36-37 |
| Data items | 11 | List and define all variables for which data were sought and any assumptions and simplifications made. | 34 |
| Critical appraisal of individual sources of evidence§ | 12 | If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate). | N/A |
| Synthesis of results | 13 | Describe the methods of handling and summarizing the data that were charted. | 37 |

| SECTION | ITEM | PRISMA-ScR CHECKLIST ITEM | REPORTED ON PAGE # |
|---|---|---|---|
| **RESULTS** | | | |
| Selection of sources of evidence | 14 | Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram. | 39 |
| Characteristics of sources of evidence | 15 | For each source of evidence, present characteristics for which data were charted and provide the citations. | 39 |
| Critical appraisal within sources of evidence | 16 | If done, present data on critical appraisal of included sources of evidence (see item 12). | N/A |
| Results of individual sources of evidence | 17 | For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives. | 40-78 |
| Synthesis of results | 18 | Summarize and/or present the charting results as they relate to the review questions and objectives. | 79 |
| **DISCUSSION** | | | |
| Summary of evidence | 19 | Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups. | 80-89 |
| Limitations | 20 | Discuss the limitations of the scoping review process. | 89 |
| Conclusions | 21 | Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps. | 90 |
| **FUNDING** | | | |
| Funding | 22 | Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review. | 90 |

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.
* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.
† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).
‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.
§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

*From:* Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.

# Appendix II – Data Charting Form

Example of data charting

| Data items | No. 136 |
|---|---|
| Name of the author | Kathryn Johnston |
| Title of study | Talent Identification in Sport: A Systematic Review |
| Publication | Springer International Publishing |
| Aim of study | To synthesize longitudinal and retrospective studies examining differences between performance variables in highly skilled and less-skilled athletes in elite-level sport. |
| Study setting | N/A |
| Study population & sample size | 1696 citations identified |
| Sampling method & size | 20 articles met the inclusion criteria |
| Study design | Systematic review |
| Data collection methods | In line with PRISMA guidelines |
| Data analysis | Descriptive analysis |
| Conclusion | Findings from this review highlight how little is known about talent identification (TID) in elite sport and emphasize the need for greater diversity in TID research |
| Most relevant findings | Holistic approach to TID |
| Limitations | The exclusion of articles that were listed in the ‘grey area’ (birthplace effect, deliberate practice, genetic predispositions, handedness, long-term athlete development, relative age effect). |
| Comment | Useful – provides background for influence of talent on performance. |

# Appendix III – Full list of articles included in review

1. A Longitudinal Investigation of Sport Participation, Peer Acceptance, and Self-esteem among Adolescent Girls and Boys
2. A multidisciplinary approach to talent identification in soccer
3. A Multilevel Approach to the Path to Expertise in Three Different Competitive Settings
4. A nutrition education intervention in adolescents who play soccer: The IDEHA-F project
5. A survey of talent identification and development processes in the youth academies of professional soccer clubs from around the world
6. A systematic review of the psychological and social benefits of participation in sport for children and adolescents: informing development of a conceptual model of health through sport
7. Adolescent musculoskeletal injuries in a football academy
8. Age and maturity related differences in motor coordination among male elite youth soccer players
9. Age-related differences in acceleration, maximum running speed, and repeated-sprint performance in young soccer players
10. Age-related physical and technical match performance changes in elite soccer players
11. An audit of injuries in six English professional soccer academies
12. An investigation of identified factors and their influence on the number of injuries sustained by elite male African youth soccer players
13. Annual Age-Grouping and Athlete Development: A Meta-Analytical Review of Relative Age Effects in Sport
14. Anthropometric and fitness characteristics of international, professional, and amateur male graduate soccer players from an elite youth academy
15. Athlete Engagement in Elite Sport: An Exploratory Investigation of Antecedents and Consequences
16. Attitudes, beliefs, and knowledge related to doping in different categories of football players
17. Avoidance of Soccer Injuries with Preseason Conditioning
18. Basic Cognitive Abilities Relevant to Male Adolescents' Soccer Performance
19. Biological maturation, morphology, fitness, and motor coordination as part of a selection strategy in the search for international youth soccer players (age 15–16 years)
20. Biological maturity and injury in elite youth football
21. Body Composition and Dietary Pattern of Iranian Male Soccer Players, a Large National Study
22. Body Physique, Body Composition, Physical Performance, Technical and Tactical Skills, Psychological Development, and Club Characteristics of Young Male Portuguese Soccer Players: The INEX Study
23. Boys' soccer league injuries: a community-based study of time-loss from sports participation and long-term sequelae
24. Caffeine Supplementation and Physical Performance, Muscle Damage and Perception of Fatigue in Soccer Players: A Systematic Review

25. Changes in perceived stress and recovery in overreached young elite soccer players
26. Characteristics of youth soccer players who drop out, persist, or move up
27. Coaching behaviours, motivational climate, and psychosocial outcomes among female adolescent athletes.
28. Creatine supplementation in young soccer players
29. Development of muscle strength in relation to training level and testosterone in young male soccer players
30. Doping in sport: Attitudes, beliefs, and knowledge of competitive high-school athletes in Gauteng Province
31. Early Sport Specialization: Roots, Effectiveness, Risks
32. Effect of 12-Week Functional Training Intervention on the Speed of Young Footballers
33. Effect of a mindfulness programme training to prevent the sport injury and improve the performance of semi-professional soccer players
34. Effect of post-match cold-water immersion on subsequent match running performance in junior soccer players during tournament play
35. Effect of specific exercise-based football injury prevention programmes on the overall injury rate in football: a systematic review and meta-analysis of the FIFA 11 and 11+ programmes
36. Effects of a 10-Week In-Season Eccentric-Overload Training Program on Muscle-Injury Prevention and Performance in Junior Elite Soccer Players
37. Effects of a combined technique and agility program on youth soccer players' skills
38. Effects of a Very Congested Match Schedule on Body-Load Impacts, Accelerations, and Running Measures in Youth Soccer Players
39. Effects of age and soccer expertise on general tests of perceptual and motor performance among adolescent soccer players
40. Effects of age, maturity and body dimensions on match running performance in highly trained under-fifteen soccer players
41. Effects of coach leadership and coach–athlete relationship on collective efficacy
42. Effects of Non-Sport-Specific Versus Sport-Specific Training on Physical Performance and Perceptual Response in Young Football Players
43. Effects of Plyometric and Directional Training on Physical Fitness Parameters in Youth Soccer Players
44. Effects of Small-Sided Games vs. Conventional Endurance Training on Endurance Performance in Male Youth Soccer Players: A Meta-Analytical Comparison
45. Efficacy of FIFA 11+ training program on functional performance in amateur male soccer players
46. Elite football on artificial turf versus natural grass: Movement patterns, technical standards, and player impressions
47. Enhancing Team-Sport Athlete Performance Is Altitude Training Relevant
48. Evaluation of Risk Factors for Injury in Adolescent Soccer Implementation and Validation of an Injury Surveillance System
49. Exploring the effects of mental and muscular fatigue in soccer players' performance
50. Factors Influencing Creatine Kinase Response in Youth National Team Soccer Players
51. Family Influences on talent development in sport

52. Fatigue-Induced Balance Impairment in Young Soccer Players
53. FIFA 11+: an effective programme to prevent football injuries in various player groups worldwide—a narrative review
54. Fitness determinants of success in men's and women's football
55. Football and doping: study of African amateur footballers
56. Football Injuries in Children and Adolescent Players: Are There Clues for Prevention?
57. From childhood to senior professional football A multi-level approach to elite youth football players' engagement in football-specific activities.
58. From childhood to senior professional football: elite youth players' engagement in non-football activities
59. Gender differences in the relative age effect among US Olympic development program youth soccer players
60. Health Risk Behaviours of Adolescent Participants in Organized Sports
61. Hill on a mountaintop: A longitudinal and cross-sectional analysis of the relative age effect in competitive youth football
62. How Effective are Exercise-Based Injury Prevention Programmes for Soccer Players? A Systematic Review
63. Hydration status and fluid intake of urban, underprivileged South African male adolescent soccer players during training
64. Identifying factors perceived to influence the development of elite youth football academy players
65. Influence of a 2-year strength training programme on power performance in elite youth soccer players
66. Influence of Academic Performance, Level of Play, Sports Success, and Position of Play on the Motivation of the Young Football Player
67. Influences of player nationality, playing position, and height on relative age effects at women's under-17 FIFA World Cup
68. Injuries impair the chance of successful performance by sportspeople: a systematic review
69. Injuries in Youth Soccer During the Preseason
70. Injury history as a risk factor for incident injury in youth soccer
71. Injury incidence and burden in a youth elite football academy: a four-season prospective study of 551 players aged from under 9 to under 19 years
72. Injury Incidence, Prevalence and Severity in High-Level Male Youth Football: A Systematic Review
73. Injury patterns differ with age in male youth football: a four-season prospective study of 1111 time-loss injuries in an elite national academy
74. Injury prevention behaviour in community-level soccer players
75. Injury prevention in male youth soccer: Current practices and perceptions of practitioners working at elite English academies
76. Injury prevention target groups in soccer: Injury characteristics and incidence rates in male junior and senior players
77. Injury Profile in Women's Football: A Systematic Review and Meta-Analysis
78. Is strength-training frequency a key factor to develop performance adaptations in young elite soccer players?

79. Is team confidence the key to success? The reciprocal relation between collective efficacy, team outcome confidence, and perceptions of team performance during soccer games
80. Knowledge, attitudes and behaviours on doping and supplements in young football players in Italy

List of titles of articles included in this review

81. Lower extremity dexterity is associated with agility in adolescent soccer athletes
82. Match Running Performance in Young Soccer Players: A Systematic Review
83. Maturity status influences the relative age effect in national top level youth alpine ski racing and soccer
84. Monitoring load, recovery, and performance in young elite soccer players
85. Neuromuscular and athletic performance following core strength training in elite youth soccer: Role of instability
86. Nurturing sport expertise: factors influencing the development of elite athlete
87. Nutritional intake evolution in adolescent sporting boys over the last two decades
88. Overuse injuries and burnout in youth sports: a position statement from the American Medical Society for Sports Medicine
89. Parental influence on sport participation in elite young athletes
90. Peer Leadership in Sport: Links with Friendship, Peer Acceptance, Psychological Characteristics, and Athletic Ability
91. Peer relationships in adolescent competitive soccer: Associations to perceived motivational climate, achievement goals and perfectionism
92. Perceptions of well-being and physical performance in English elite youth footballers across a season
93. Perceptual-cognitive skill and the in-situ performance of soccer players
94. Perfectionism and Perceptions of Parenting Styles in Male Youth Soccer
95. Perfectionism and sport-specific engagement in elite youth soccer players
96. Perfectionism, achievement motives, and attribution of success and failure in female soccer players
97. Periodization and Physical Performance in Elite Female Soccer Players
98. Physical demands of different positions in FA Premier League soccer
99. Physical fitness is inversely related with body mass index and body fat percentage in soccer players aged 16-18 years
100. Physical performance and subjective ratings after a soccer-specific exercise simulation: Comparison of natural grass versus artificial turf
101. Physical performance development in a female national team soccer program
102. Preparation for football competition at moderate to high altitude
103. Preventing injuries in female youth football – a cluster-randomized controlled trial
104. Progression from youth to professional soccer: A longitudinal study of successful and unsuccessful academy graduates
105. Psychological and Sport-Specific Characteristics of Football Players
106. Psychological predictors of sport injuries among junior soccer players
107. Psychosocial factors associated with talent development in football: A systematic review

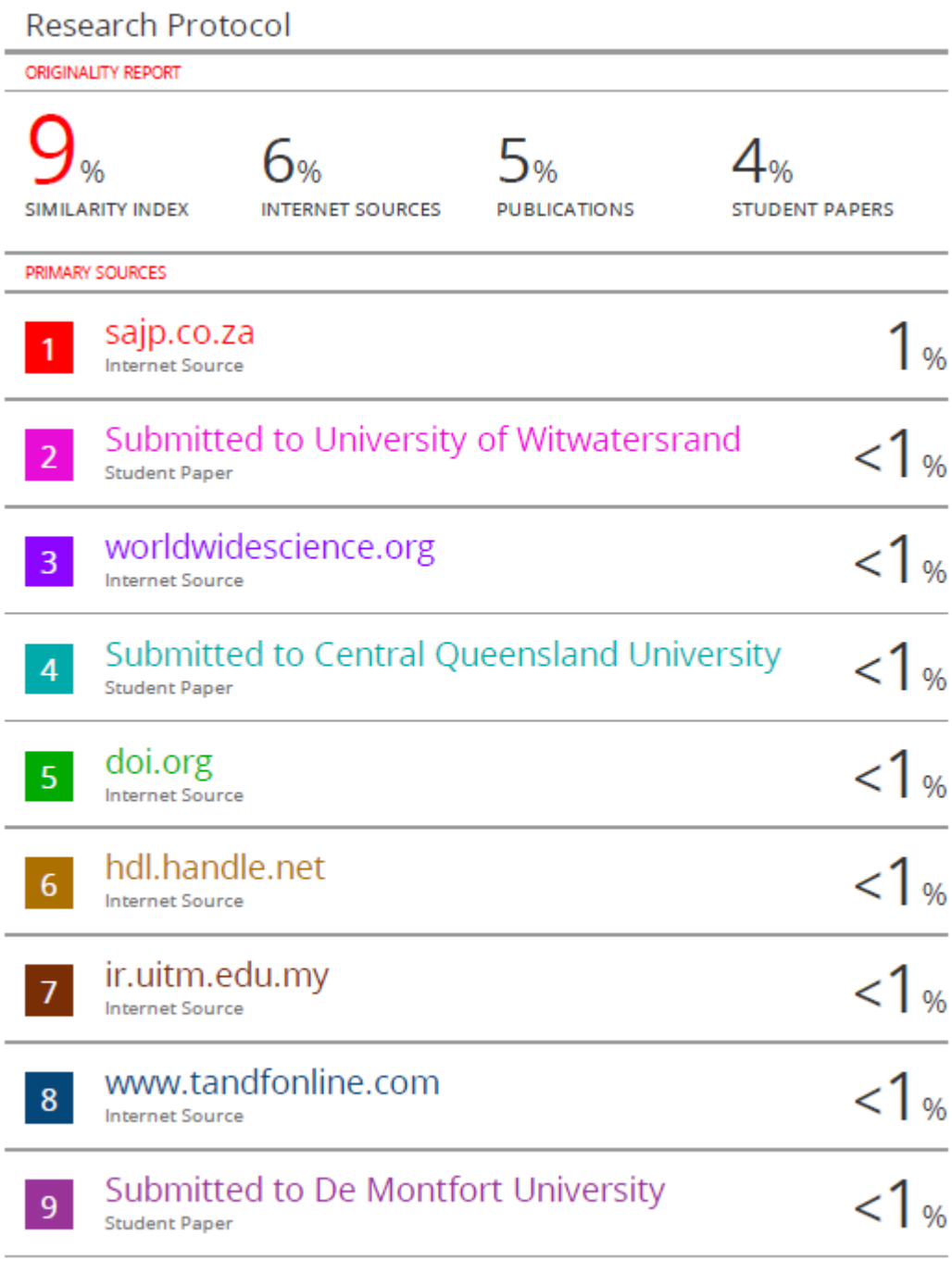
108. Psychosocial outcomes associated with soccer academy involvement: Longitudinal comparisons against aged-matched school pupils
109. Quantification of the perceived training load and its relationship with changes in physical fitness performance in junior soccer players
110. Relationship between growth, maturation, and musculoskeletal conditions in adolescents: a systematic review
111. Relationship of high school and college sports participation with alcohol, tobacco, and illicit drug use: A review
112. Relationships Between the Coach-Created Motivational Climate and Athlete Engagement in Youth Sport
113. Relative Age Effect in the Sport Environment. Role of Physical Fitness and Cognitive Function in Youth Soccer Players
114. Relative Age Effect in UEFA Championship Soccer Players
115. Relative age effect in youth soccer: analysis of the FIFA U17 World Cup competition
116. Relative Age, Maturation and Physical Biases on Position Allocation in Elite-Youth Soccer
117. Relative age-related differences between different competitive levels and field positions in young soccer players
118. Relative age-related differences between different competitive levels and field positions in young soccer players
119. Reviewing the role of the environment in the talent development of a professional soccer club
120. Risk Factor Analysis for Injuries in Football Players Possibilities for a Prevention Program
121. Risk factors for injuries in elite female soccer players
122. Risk Factors for Lower Extremity Overuse Injuries in Female Youth Soccer Players
123. Risk of acute and overuse injuries in youth elite soccer players: Body size and growth matter
124. Risk of injury in elite football played on artificial turf versus natural grass: a prospective two-cohort study
125. Severe Injuries in Football Players: Influencing Factors
126. Soccer injuries in childhood
127. Soccer Injuries in Children and Adolescents
128. Sport Nutrition Knowledge, Behaviours and Beliefs of High School Soccer Players
129. Sports Specialization in Young Athletes: Evidence-Based Recommendations
130. Systematic review of the health benefits of physical activity and fitness in school-aged children and youth
131. Talent Development Environments in Football: Comparing the Top-Five and Bottom-Five-Ranked Football Academies in Norway
132. Talent development in sport: A critical review of pathways to expert performance
133. Talent Identification and Development in Male Football: A Systematic Review

134. Talent identification and development in soccer
135. Talent Identification and Development Programmes in Sport Current Models and Future Directions
136. Talent Identification in Sport: A Systematic Review
137. Talent identification in youth soccer
138. The adolescent motor performance development of elite female soccer players: A study of prognostic relevance for future success in adulthood using multilevel modelling
139. The effect of perceived stress and specialization on the relationship between perfectionism and burnout in collegiate athletes
140. The effect of playing status, maturity status, and playing position on the development of match skills in elite youth football players aged 11–18 years: A mixed-longitudinal study
141. The Effect of Respiratory Muscle Training on the Pulmonary Function, Lung Ventilation, and Endurance Performance of Young Soccer Players
142. The Effect of Two Speed Endurance Training Regimes on Performance of Soccer Players
143. The effectiveness of a neuromuscular prevention strategy to reduce injuries in youth soccer: a cluster-randomised controlled trial
144. The effects of menstrual cycle phase on physical performance in female soccer players
145. The Effects of Sleep Deprivation on Soccer Skills
146. The elite player performance plan: the impact of a new national youth development strategy on injury characteristics in a premier league football academy
147. The influence of birth quartile, maturation, anthropometry, and physical performances on player retention: Observations from an elite football academy
148. The Influence of Psychological Factors on Sports Injuries Review of the Literature
149. The Influence of Relative Age on Success and Dropout in Male Soccer Players
150. The Link between Competitive Sport Participation and Self-concept in Early Adolescence: A Consideration of Gender and Sport Orientation
151. The Mental Health of Elite Athletes: A Narrative Systematic Review
152. The Quantification of Training Load, the Training Response, and the Effect on Performance
153. The relative age effect and success in German elite U-17 soccer teams
154. The relative age effect in youth soccer across Europe
155. The role of community in the development of elite handball and football players in Denmark
156. The role of specialisation in the promotion of young football talents: A person-oriented study
157. The scientific foundations and associated injury risks of early soccer specialisation
158. The training—injury prevention paradox: should athletes be training smarter and harder?
159. Transformational parenting and coaching on mental toughness and physical performance in adolescent soccer players: The moderating effect of athlete age

160. Understanding mental toughness in Australian soccer: Perceptions of players, parents, and coaches
161. Understanding the presence of mental fatigue in English academy soccer players
162. Using Recovery Modalities between Training Sessions in Elite Athletes Does It Help?
163. When “where” is more important than “when”: Birthplace and birthdate effects on the achievement of sporting expertise
164. Young Soccer Players with Higher Tactical Knowledge Display Lower Cognitive Effort

# Appendix IV – Turnitin Report

Digital receipt (full report sent as a separate file)



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predictors of talent in junior-elite football: 2000–2016", Soccer & Society, 2018
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