The Impacts of Sports Schools on Holistic Athlete Development: A Mixed Method Systematic Review

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Abstract

Background
To understand the multiple and wide-ranging impacts of intensified youth sport, the need for a holistic approach to athlete development has recently been advocated. Sports schools are an increasingly popular operationalisation of intensified youth sport, aiming to offer an optimal environment for holistic development by combining sport and education. Yet, no study has systematically explored the impacts associated with sports schools.
Objectives
The aims of this mixed method systematic review were to (1) determine the characteristics and features of sports schools; (2) identify the methods used to evaluate sports school impacts, and (3) evaluate the positive and negative impacts associated with the holistic athlete development of sports school programmes.
Methods
Adhering to PRISMA guidelines, eight electronic databases were searched until the final return in February 2021. Forty-six articles satisfied the inclusion criteria, were analysed thematically and synthesised using a narrative approach. The methodological quality of studies included was assessed using the Mixed-Methods Appraisal Tool.
Results
Findings indicated (1) sports school student-athletes receive considerably more support in academic and athletic services, more intensified training and competition schedules with higher level training partners but regularly miss school; (2) multiple methods have been used to evaluate student-athlete impacts, which makes comparison across studies and developing consensus on the impacts of sports schools difficult and, (3) there are a multitude of immediate, short- and long-term positive and negative impacts associated with academic/vocational, athletic/physical, psychosocial and psychological development of sports school student-athletes.
Conclusions
This study is the first to systematically review the research literature to understand the impacts associated with sports schools in terms of holistic athlete development. Practitioners should be aware that they can promote (positive) and negate (negative) health impacts through the design of an appropriate learning environment that simultaneously balances multiple training, psychological, academic and psychosocial factors that can be challenging for youth athletes. We recommend that practitioners aim to design and implement monitoring and evaluation tools that assess the holistic development of student-athletes within their sports schools to ensure they are promoting all-round and healthy youth athlete development.

Key Points:

- Sports school student-athletes receive more support in academic and athletic services than non-sports school athletes.
- There are a multitude of immediate, short- and long-term positive and negative impacts associated with being a sports school student-athlete that stakeholders should be aware of when designing, implementing, and evaluating sports school programmes.
- Practitioners should aim to design and implement monitoring and evaluation tools that assess the holistic development of student-athletes within their sports schools to ensure they are promoting healthy youth athlete development.

- The large range of data collection methods used to evaluate the impacts of sports school programmes makes comparison across studies difficult but offers multiple avenues for future research.

1. Introduction

The present-day outlook of Olympic and professional sport is now arguably more competitive than ever. One consequence is the increased intensity and professionalisation of youth sport programmes supporting athletes towards the Olympic and professional level [1-2]. This increased professionalisation of youth sport programmes introduces a number of characteristics, such as early specialisation [3], increased volume and intensity of training [4], prioritisation of sports over other aspects of life [5], and distinct cultures of eliteness [6] raising potential issues with the healthiness of intensified youth sports programmes. Recent position and consensus statements [1, 7] have warned about the risk of several negative impacts associated with intensified youth sport programmes, while Rongen et al. [8] emphasised that there are also potential positives and that ensuring healthiness may require a balancing act. Potential impacts include physical (e.g., enhanced physiological capacity vs. injury), psychological (e.g., increased confidence vs. burnout), psychosocial (e.g., time away from family vs. enhanced social skills, such as communication), and educational (e.g., academic high achievers vs. educational sacrifice) areas. Therefore, for the purpose of this paper, impact is not confined to outputs (performance), but incorporates the whole holistic development of youth athletes; encapsulating the athletic, psychological, psychosocial, and academic/vocational influence of youth-based sport. Given the popularity of youth sports programmes, the likelihood that most youth athletes do not ultimately succeed in their sport, and the multiple and wide-ranging positive and negative impacts associated with intensified youth sport programmes, understanding the holistic development impacts for youth athletes in these programmes is crucial [8-9] to ensure the promotion of healthy development.

In light of the multiple and wide-ranging potential impacts of intensified youth sport programmes, the need for a holistic approach to an athlete's development has recently been advocated [10-13]. In response to these calls, researchers have increasingly followed Wylleman's [14] Holistic Athletic Career model where for healthy, all-round development, youth sport programmes should embrace the multidimensional nature of youth athlete development. As conceptualised by the Holistic Athletic Career model [14], there are constant interactions between all levels of an athletes' development (e.g., academic, athletic, psychosocial, and psychological) throughout their sporting careers. This means that transitions occurring in one domain (e.g., athletic development) are concurrent and interact with transitions occurring in another domain of an athlete's life (e.g., academic studies). Therefore, although practitioners may instinctively focus on assessing and monitoring measures of physical performance, for the holistic development of youth athletes, it is imperative that considerations are also given to the psychosocial, psychological and academic/vocational domains [14]. By advocating a holistic approach, youth sport programmes are not only nurturing successful athletes but developing competencies and skills that allow them to meet challenges they face both in sport and other life domains. Therefore, to ensure this healthy all-round development and minimise the potential negative impacts of intensified youth sport programmes highlighted above, a dual career approach to an athlete's development has been encouraged. This proposes that youth athletes must successfully develop their athletic career alongside pursuing education and/or vocation, and other domains (e.g., social life; [10, 13-14]). Indeed, the combination of sport and education or vocational endeavours has been shown to have benefits such as improving coping with adversity, protecting against poor mental health or burnout, and maintaining perspective for athletes [15-18]. However, the way dual-career development environments (i.e., environments that support dual-career athletes; [19]) are shaped and the support provided is highly variable [17, 20-21].

One example of a dual-career development environment that aims to cater for the holistic development of youth athletes (e.g., healthy psychosocial development in addition to education and athletic development) is a sports school. A sports school is defined as a school, whether state-funded or private, which concentrates resources on developing sporting talent either within the curriculum and/or through extra-curricular activities [22-24]. Sports schools aim to safeguard the 'dual careers' of school-aged athletes through the structural coupling of sport and education. In most countries, sports schools were founded in the early 1990s, however, sports boarding schools have existed in the Soviet Unions since 1962 [25]. While in some countries sports schools are part of a national sport system and in other countries they are not, all schools cater for elite student-athletes in systematic ways [26]. Attendance at these sports schools is voluntary and specific to the individual, school and sport context. In some contexts, the schools are state funded, in others students can be fee paying or receive a scholarship. Sports schools provide a structural coupling of competitive sports and education, accomplished by organising more time for training alongside sufficient time devoted to education [22]. In these sports schools, timetables can be adjusted by school officials to enable early training, allow exemptions from lessons for training and competition, and provide compensatory lessons [22, 24, 27-28]. With the effective combination of competitive sports, education, and accommodation, sports schools could guarantee conditions that favour future top sporting performances while safeguarding opportunities for primary and secondary education [22] alongside allowing for more 'free time' through optimised time-schedules. Furthermore, many sports schools have specialist staff (e.g., physiotherapists, strength and conditioning coaches; [24]) that may further support the holistic and healthy development of youth athletes.

Despite sports schools offering an optimum environment where positives could be maximised and negatives minimised – to date, no study has attempted to systematically review the research literature to understand the impacts associated with sports schools in terms of holistic athlete development. Understanding the impacts associated with sports school involvement is important to inform the design, implementation, monitoring, and evaluation of sports school programmes. Furthermore, there are many ways in which sports school systems can be implemented. Consequently, we need to understand the characteristics and features of such sports schools and how this relates to holistic athlete development impacts. Finally, there are multiple data collection methods/instruments to assess impacts and it would be beneficial to gain an understanding of the commonly used methods to guide future research. Therefore, the aims of this systematic review were to (1) determine the characteristics and features of sports school programmes; (2) identify the methods used to evaluate sports school impacts, and (3) evaluate the common positive and negative impacts associated with the holistic athlete development of sports school programmes.

2. Methods

2.1 Design and Search Strategy

A systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocol (PRISMA-P) guidelines [29]. Adhering to PRISMA guidelines, a systematic search of eight electronic databases (The Cochrane Library, ERIC, PsycINFO, PsycArticles, PsycTESTS, SAGE Journals Online, Scopus and Academic Search Complete) was conducted to identify original research articles from the earliest available records up to and including February 2021 (when the formal search was

finalised). Boolean search phrases were used to include search terms relevant to student-athletes (population; “Student-athlete”, “School student”, “Adolescent”, “Youth”, “Young”, “Junior”, “Elite”, and “Talented”) and the educational systems/types of sports school intervention; (“Sport School”, “Elite School of Sport”, “Topsport Talent School”, and “Dual Career”). Relevant keywords for each search term were determined through pilot searching (screening titles/abstracts/keywords/full texts of previously known articles). Keywords were combined within terms using the 'OR' operator, and the final search phrase was constructed by combining the two search terms using the ‘AND’ operator. Additional records were taken from the bibliographies of eligible studies and previous reviews. Attempts were made to contact two authors of the selected articles to request any missing relevant information. One author replied to confirm that participants were from a sports school sample.

2.2 Study Selection

Duplicate records were identified and removed before the remaining records were screened against a predefined inclusion-exclusion criterion (Table 1). Studies were screened independently by two researchers (FT, FR). The screening of the journal articles was completed over 2 phases. Studies were initially excluded based on the content of the titles and abstracts, followed by a full-text review. In the event of disagreement in the reviewer's decision, reviewers met to come to an agreed decision on the paper.

*****Insert Table 1 near here*****

2.3 Search Returns

The final search phase was completed on 01/02/2021, which returned 2,488 studies following the removal of duplicates. After abstract screening against the inclusion/exclusion criteria, 2,319 papers were excluded, leaving a total of 169 studies. After each paper's full text was assessed against the inclusion/exclusion criteria, 123 papers were excluded due to not explicitly relating to primary or secondary age sports schools (n=63), data irrelevant or not aligned to study aims (n=28), full text was not available (n=11), lack of empirical data (n=10), published in non-English (n=2), university cohort (n=4) and, non-original peer-reviewed research articles (n=5). Therefore, a total of 46 papers met the inclusion criteria. The process of study identification, screening, and selection is presented in Figure 1.

*****Insert Figure 1 near here*****

2.4 Data Extraction

One author (FT) extracted the data using a specifically designed standardised Microsoft Excel spreadsheet. General information (i.e., author, year, country, and setting), study aim(s), study design, study population, data collection method and instrument, and the key findings presented in accordance with this systematic review’s aims were extracted.

2.5 Quality Assessment

All included studies were critically appraised by two researchers for the risk of bias. The methodological quality of studies included was assessed using the Mixed-Methods Appraisal Tool (MMAT) [30]. A third reviewer was consulted when disagreements occurred. The

MMAT can evaluate the primary studies' methodology of quantitative, qualitative, and mixed-method studies; therefore, it was deemed the most appropriate tool due to the variety of primary studies represented in the search return. The MMAT's validity and reliability have been documented previously as moderate to perfect regarding MMAT criteria and substantial concerning the overall quality score of appraised studies [31-32]. The tool poses two questions for screening purposes and five questions about the methodological quality that differ for qualitative and quantitative study designs. There are three possible answers to each question ("yes," "no," or "can't tell"). For the five questions about methodological quality, every "yes" is converted to a summed score for a total score ranging from 0 to 5 [30].

2.6 Data Synthesis

The final 46 papers were read multiple times by the first author to capture the focus of the investigation, the method, findings, and implications of each study [33]. Following this, a thematic analysis was completed to identify consistent themes within the data [34]. Inductive analysis was used to determine the characteristics and features of sports school programmes. Deductive analysis was used to evaluate sports school impacts [33, 35] based on the Holistic Athletic Career model [14]. Deductive analysis focused on the four main themes of Wylleman's [14] model: academic/vocational impacts, athletic/physical impacts, psychosocial impacts, and psychological impacts. Inductive analysis was then completed for the subthemes under each of the main four themes. Among career development research, the Holistic Athletic Career model [14] has been recognised as one of the most comprehensive frameworks [e.g. 36], describing an athlete's career across multiple developmental dimensions (i.e., athletic/physical, psychological, psychosocial and academic/ vocational). This model has been extensively used in research studies within sport to guide data collection about the athlete as a whole person [e.g. 37]. As such, this is why the current study used the Holistic Athletic Career model as a template for its thematic analysis. In this study, psychosocial impacts referred to impacts caused by the environment on the student-athlete's social aspects. Psychological impacts referred to impacts related to the mental and emotional state of the student-athletes. There was a mix of quantitative and qualitative data across the studies; therefore, to find a "middle ground" [32], a narrative approach to synthesis was adopted to integrate, interpret and communicate the relevant finding [38-39].

3. Results

3.1 Overview of Study Methodology

The 46 studies were conducted in Australia (n=1), Belgium (n=2), Bulgaria (n=1), China (n=1), Czech Republic (n=1), Denmark (n=4), Finland (n=12), Germany (n=6), Malaysia (n=1), Netherlands (n=1), New Zealand (n=2), Norway (n=8), Singapore (n=1), Slovenia (n=1), Spain (n=2), Sweden (n=8) and United Kingdom (n=1). Sample size can only be determined based on the information provided in 45 studies, resulting in a total population of 11,036 sports school student-athletes, made up of 3,034 females, 3,746 males and 4,256 participants whose sex was not declared. Overall, 11 studies evaluated the characteristics and features of sports schools and 44 evaluated impacts across the four holistic athlete development themes (i.e., academic/vocational, n=12; athletic/physical, n=27; psychosocial, n=9; psychological, n=21). Of the 44 studies that evaluated impacts across holistic athlete development, only 11 studies measured across two of the holistic impact themes, seven studies measured across three themes, and no study measured across all four themes. The research designs used across the 46 studies included six quantitative descriptive, 25 quantitative non-randomised, 11 qualitative, and four mixed-method studies. A large number

of data collection methods/instruments were used within the literature to evaluate the holistic athlete development impacts, including interviews (n=15), non-standardised/specified questionnaires (n=12), standardised questionnaires (n=19), data from documents/materials (n=6), field notes/observation (n=6), clinical analysis (n=1), physical and physiological assessments/analysis (n=3), cross-case analysis (n=1), researcher discussions (n=1) and visual representations (n=2). Table 2 presents the details of the 46 studies, including study design, study population and characteristics (i.e., sex, age, sport, type of school), the data collection method and instrument, and the key findings presented in accordance with the thematic analysis.

*****Insert Table 2 near here*****

3.2 Study Quality

The scores for the assessment of study quality according to MMAT [29] are presented in Table 3 with a description of the study quality criteria presented in Table 4. The study quality ranged from two to five out of the five items assessed with a mean score of 4.39 (SD = 0.95), with study quality for quantitative descriptive 4.00 (SD = 1.26), quantitative non randomised 4.36 (SD = 0.99), qualitative 4.73 (SD = 0.65) and mixed methods 4.25 (SD = 0.96) respectively. No study was excluded based on methodological quality.

*****Insert Table 3 near here*****
*****Insert Table 4 near here*****

3.3 Characteristics and Features of Sports Schools

Eleven studies [19, 24, 27-28, 37, 40-45] explored sports schools' characteristics and features, which are summarised in Table 2. Sports schools are situated in upper and lower general and vocational secondary education (International Standard Classification of Education level 2–5 [19]). Data highlighted that the majority of programmes supported athletes through development (i.e., athletes narrow their focus to 1 or 2 sports) and mastery (i.e., athlete becomes an expert in their sport) phases of their athletic development [19]. Sports schools can either be an education-led or vocation-led system (i.e., the athlete is based in an education/vocation environment which offers support for sport and performance), or a combined dual-career development environment (i.e., an organisation or institution that works in tandem with both sport and education/vocational providers to deliver an all-round support package to the individual undertaking the dual-career; [19]). However, the support provision between institutions in the same country are not standardised because each is able to decide what support they provide to each athlete for themselves. However, they can include similar features (e.g., sports facilities, academic support, sport science provision) [19]. The thematic analysis identified four themes: academic support services, athletic support services, intense routines, and training partners.

3.3.1 Academic Support Services

Academic support services within sports schools included extra tutoring to help after periods of absence [24, 42], adaptation of school and training schedules [24, 42], lighter load by one academic subject [27-28, 42], extra tuition hours for athlete's away at training camps or competitions [24, 42], an extra year of study [27-28, 42], academic structure (e.g., timetabled lessons or study periods; [27-28, 42]), and career advice [41]. In contrast, one study showed that only 25% of non-sports school student-athletes received additional study support [41].

3.3.2 Athletic Support Services

Athletic support services within sports schools included better training facilities [41], high-quality coaches (e.g., former elite athletes, head-hunted for international coaching roles; [24, 42]), sports training as part of the daily school programmes [42] and additional provision and access to services (e.g., nutritionists, nurses, physiotherapists, and other support personnel to deal with issues related to their athletic career; [24]). However, in one study, non-sports school athletes rated the services, the relationship with the coach, the coach's presence during competitions, and support services upon leaving school more positively than sports school student-athletes' [41].

3.3.3 Intense Routines

The majority of sports school student-athletes routines were significantly more intense than their previous routines and schedules [37, 40, 44] with higher demands in school (e.g., 20-25 hours work per week; [37, 44]), more time in practice (e.g., average ten times or 20 hours of intensive practice a week) and competitions [40, 44], perceived excessive training loads [43, 45], and strict training programmes of high intensity [37, 40, 43-44] highlighted.

3.3.5 Training partners

Findings indicated that many sports schools have quality training partners as indicated by sports school student-athletes "having someone to aspire to" [42], being surrounded by skilled people that you can learn from and seek new knowledge [24], and having role models for the younger student-athletes [27, 42].

3.4 Impacts

Forty-four studies (all except [19, 24]) evaluated the impacts associated with sports school programmes. The data collection methods and instruments used to evaluate impacts are presented below to gain a better understanding of the typical methods used to assess individual impacts. The data collection method/instrument and the key findings of these studies are also summarised in Table 2. Following the Holistic Athletic Career model [14], the thematic analysis resulted in four main themes: academic/vocational impacts, athletic/physical impacts, psychosocial impacts, and psychological impacts with sub-themes presented within each main theme.

3.4.1 Academic/Vocational

Twelve studies [22, 27, 36-37, 40-41, 43-44, 46-49] explored academic and vocational impacts—the thematic analysis resulted in four sub-themes: school experiences, school academic success, higher education success, and career success.

3.4.1.1 School Experiences

Seven studies explored the effect of sports schools on school experiences through interviews [36, 40], standardised questionnaires [22, 37, 48] and, non-standardised questionnaires [44, 49]. Missing school was a common issue experienced by numerous sports schools' students-athletes [22, 40, 44, 49]. Finnish alpine and cross-country athletes missed on average 88 and 22 of 190 days per academic year [44], respectively. Furthermore, missing significant days of study [49], missed examinations owing to competitions [22], and missed lessons due to competitions [22] were scenarios often reported by sports school student-athletes. Although alpine student-athletes perceived that sports school helped combine sport and school [44] and football student-athletes appreciated the school routine [40], Dutch student-athletes who had attended a sports school were no more satisfied with the combination of school and sport than athletes who had attended a mainstream school [49]. Additionally, higher demands in school than before was one of the least satisfied factors by Swedish Athletes [37] and most Finish

student-athletes considered school activities to be the inevitable part of youth, which consumed all their “free” time after sport [36].

3.4.1.2 School Academic Success

Six studies explored the effect of sports schools on school academic success through standardised questionnaires [22, 41, 44, 46, 49], interviews [41, 47], and classroom observations [40-41, 47]. In the majority of studies, sports schools did not impact upon the attainment of diplomas [41], grade point average [46], secondary school qualifications [22], high school graduation [22], and high academic achievement [47]. However, Dutch student-athletes who attended a sports school attained lower educational levels in their secondary school education than student-athletes who attended a mainstream secondary school [49] and 73% of the alpine skiers felt that sport participation negatively affected their success in school [44].

3.4.1.3 Future Higher Education Success

Five studies explored the impact of sports schools on future higher education success through non-specified-questionnaires [22, 41, 49], interviews [27, 40-41], field notes and observations [27]. Sports school student-athletes often developed competencies (such as attitudes, commitment, and time management) that could lead to a university athletic scholarship and future career [27]. The results on higher education continuation were mixed with De Bosscher et al., [41] revealing no significant difference between student-athletes within and outside sports school and continuation to higher education, yet in other studies, sports school student-athletes were less likely to start higher education [40, 49]. Equally Swedish sports school student-athletes that did continue to higher education had lower higher education attainment [49] compared with mainstream school students.

3.4.1.4 Career Success

Two studies explored the sports schools' effect on career success through a standardised questionnaire [22] and an interview [43]. German sports school student-athletes had greater likelihood of joining the Army or national police force than non-sports school pupils [22] and Czech Republic sports school student-athletes had only a limited experience with “ordinary” life outside competitive sport and therefore, reported only a minimal sense of agency about other possible professional careers and had difficulties in finding a new direction in life [43].

3.4.2 Athletic/Physical

Twenty-seven studies [22-23, 20, 27, 36, 40-42, 44-45, 48-64] explored athletic and physical impacts—the thematic analysis shaped four sub-themes: physical and physiological development, performance success, health and wellbeing, and drop-out.

3.4.2.1 Physical and Physiological Development

One study [64] using physical and physiological assessments/analysis explored the impact of sports school on physical and physiological development of two athlete groups (swimming and racket sports). Over the 2-year investigation, haemoglobin and vital capacity linearly increased reflecting a sports-specific response to training, but also the effect of testosterone production during the onset of puberty [64]. The resting heart rate (HR) remained on the same level and dynamic back strength increased over the two years until plateaued during the last half-year in the swimming group [64].

3.4.2.2 Performance Success

Six studies explored the impact of sports school on performance success through non-standardised questionnaires [41, 44, 49], standardised questionnaires [22], interviews [20, 41-42], participant observation [20, 42] and document analysis [20, 42]. The majority of sports schools have not led to marked differences or increases in the number of student-athletes performing at the world level indicated by no significant differences in the performance levels and highest level reached between student-athletes within sports schools and outside sports schools [41, 44]. Only 40% of the alpine skiers and 62% of the cross-country skiers were satisfied with their present athletic success [44]. However, one study found that sports school student-athletes demonstrated higher top places finishes [41] and more medal success [41] compared to mainstream school student-athletes. Yet, another study [22] found no significant differences between medals won by sports school and non-sports school student-athletes.

3.4.2.3 Health & Wellbeing

Twenty-one studies explored the impact of sports schools on health and well-being, through interviews [27, 36, 40, 55, 59], clinical analysis [53], laboratory tests [61], non-standardised questionnaires [23, 45, 50, 53, 58, 61-63], standardised questionnaires [26, 48, 51, 54, 56-58, 60], and male and female silhouettes [60].

Sports school student-athletes indicated a high incidence of injury [48, 58] and illness [58]. Clinical diagnosis of jumper's knee together with structural changes and neovascularisation in the tendon were found to be more common among Swedish elite junior volleyball players who had attended a sports school compared to controls [53]. Sports school drop-outs complained significantly more often about physical symptoms than non-dropouts [50] and sports school student-athletes felt physically ill-prepared for the intensity of sports school programmes [40] and pushed themselves so much that they got injured [45, 59]. In terms of illness incidences, sports school student-athletes reported an average of 3.6 health problems per person during a 26-week period [58], a higher proportion of self-reported physician-diagnosed asthma than controls [52], and a high incidence of iron deficiency and iron-deficiency anaemia [61].

On the other hand, sports school student-athletes often demonstrated stable levels of general health and well-being [23, 62], lower levels of depression, anxiety and excessive weight and shape concerns [63], spent more time in sport and less time in sedentary activities (screen-based behaviours) [23, 36] and smoked to a lesser extent than the reference group [61]. Furthermore, the results suggested that disordered eating is less of a problem among sports school student-athletes than in the community. Significantly more non-athletes reported being underweight [60], representing a disorder eating behaviour [60], "at-risk" for eating disorders [55] and reported dieting [56, 60] and use of pathogenic weight-control methods [56] compared to sports school student-athletes.

3.4.2.4 Drop-Out

Two studies explored sports schools' effect on drop-out through a standardised questionnaire [22] and demographic and sport-related data [50]. Both studies showed a high number of drop-outs from sports schools, with 629 pupils from 27 sports schools dropping out before attaining a school qualification [22], and 29.6% of sports school student-athletes terminating their sports careers prematurely but still pursuing their academic education [50].

3.4.3 Psychosocial

Nine studies [20, 27, 37, 42, 47, 59, 65-67] explored psychosocial impacts. The thematic analysis shaped four sub-themes: social skills, higher social status, family and friends, and life skills.

3.4.3.1 Social Skills
Two studies explored the effect of sports schools on social skills through a standardised questionnaire [47], interviews [42, 47], and observations [42]. Data revealed that social skills (skills we use every day to interact and communicate with others) was one of the main categories in the individual development of sports school student-athletes [42] and that sports school student-athletes tended to rate themselves significantly higher in the social domain than non-athletes [47].

3.4.3.2 Higher Social Status
Two studies explored sports schools' effect on social status, through interviews, field notes/observations, and document data [20, 27]. In the two studies, the coaches classified the majority of sports school student-athletes as successful in sports, work ethic and discipline, and as 'role models' [20, 27]. Classifying students as high achievers, elite, motivated, strong, competitive, and as 'the really good people' and distributing them into sports schools perpetuated an elitist discourse that positioned elite athletes as having status, popularity, and recognition [20, 27]. However, this also caused tension amongst those within the programmes who received little recognition [27].

3.4.3.3 Family and Friends
Four studies explored sports schools' impacts on family and friends, through interviews [42, 65-67], and documents, letters, and observation [65]. Time away from family and friends outside of sport seems to be a typical consequence for student-athletes in sports school. Results showed that many sports school student-athletes had less time for peers outside of sport [42, 66-67] and continually negotiated the terms of their membership of that group, for example, that they attended activities less frequently [67]. However, several sports school student-athletes spent a great deal of time together in class, training, competitions, living and leisure, and pursuing a common career goal that tended to result in friendships/relationships arising along the way [42, 65]. Competitions were highlighted as important social events, where athletes from different clubs and nations met, socialised, and made many friends [42].

3.4.3.4 Life Skills
Three studies explored sports schools' impact on life skills through in-depth interviews [37, 42, 59] and participant observation [42]. The results suggested that sports schools encouraged student-athletes to develop qualities and skills applicable not only in sport but also in other spheres of life, such as independence. Sports school student-athletes often organized their living (e.g., to calculate their budget), took care of themselves (e.g., washing, cleaning, cooking; [37]), developed skills to manage and organise time [59] and established social skills, autonomy, responsibility, and a strong work ethic, which are helpful to them both in sport and life. [42].

3.4.4 Psychological
Twenty-one studies [18, 22-23, 28, 37, 40, 42-43, 45-46, 49, 59, 63, 68-75] in total explored psychological impacts. The thematic analysis shaped five sub-themes: perceived pressure and anxiety, motivation, identity and orientation, self-optimisation and burnout.

3.4.4.1 Perceived Pressure and Anxiety

Seven studies evaluated the impact of sports schools on perceived pressure and anxiety measured through standardised questionnaires [22, 37, 63, 68], interviews [37, 40, 43], and a mixed-method survey [28]. Findings suggested that sports school student-athletes experienced a (perceived) inability to meet the athletic and performance requirements [22, 43], pressure to 'perform well' [37] and a constant pressure and expectation to achieve from others, such as parents and teachers [43]. Balancing sport and school were often seen as (organisationally) stressful for these young sports school student-athletes [28, 40]. However, female sports school student-athletes showed significantly fewer panic symptoms, post-traumatic stress, and specific phobia than female non-athletes [68]. Furthermore, a higher proportion of ordinary school students than sports school students reported low self-oriented perfectionism with high perfectionistic concerns associated with higher anxiety levels [63].

3.4.4.2 Motivation

Four studies evaluated the impact of sports schools on motivation through non-standardised questionnaires [37, 45, 49], and interviews [42]. The dual-motivated pattern (characterised by high value placed on both school and sport) was most typical among Finnish sports school student-athletes [46]. However, the percentage of student-athletes demonstrating this pattern decreased over time at the sports school, and the percentage showing a low academically motivated pattern increased [46]. Swedish student-athletes who had attended sports schools were significantly less motivated to do well at school than their counterparts at mainstream secondary schools [49] and 51% of Finish student-athletes' stated that they could not be bothered to invest the time and energy necessary to reach the elite performance level in their sport [45]. In contrast, Henriksen et al. [42] study highlighted a strong work ethic/motivation as one of the main categories in sports school student-athletes individual development.

3.4.4.3 Identity and Orientation

Two studies evaluated sports schools' impact on identity and orientation through a standardised questionnaire [72-73]. The most common profile (typical for 77% of student-athletes) was a dual identity, that is, student-athletes who reported strong identification with both athlete and student roles [73]. Furthermore, sports school student-athletes were more inclined towards task orientation [73].

3.4.4.4 Self-optimisation

One study using a standardised questionnaire [69] evaluated sports schools' impact on self-optimisation. Sports school student-athletes compared to students of a regular school showed higher values in self-optimisation and stayed at this higher level during the three-year study [69]. A comparison concerning the living situation shows a more positive development in self-optimisation for those athletes living on campus [69].

3.4.4.5 Burnout

Eight studies evaluated the impact of sports schools on burnout via interviews [43, 59], non-specified questionnaires [23] and standardised questionnaires [18, 70-71, 74-75]. At the beginning of the upper secondary sports school, most student-athletes experienced very low levels of burnout [18, 23]. However, these student-athletes may be prone to develop more severe burnout symptoms across the later school years, indicated by an increase in sport and school burnout scores of the sports school students over time [70, 75]. However, Sorkkila et al. [74] found that sport and school burnout dimensions remained relatively stable during the first year of upper secondary school.

4. Discussion

This mixed-methods systematic review is the first to (1) determine the characteristics and features of sports school programmes; (2) identify the methods used to evaluate sports school holistic athlete development impacts, and (3) evaluate the impacts associated with the holistic athlete development of sports school programmes. In total, 46 studies were identified that included 11 studies determining the characteristics and features of sports school programmes, and 44 studies that evaluated the impacts associated with holistic athlete development of sports school programmes. In summary, the systematic review identified the majority of research designs were quantitative non-randomised and were conducted within Northern European countries (e.g., Denmark, Norway, Sweden, Finland). Overall, the systematic review identified (1) sports school athletes receive considerably more support in academic and athletic services, more time in training and competitions with higher-level training partners and miss more days of school than athletes outside sports school programmes; (2) a large range of data collection methods and instruments were used within the literature to evaluate a wide variety of impacts; whilst insightful from an individual study perspective , this means that impacts are often only investigated within a single or small sample of studies, thus making generalisable conclusions regarding impact difficult; (3) there are a multitude of immediate, short- and long-term positive and negative impacts (see Figure 2) associated with being a sports school student-athlete that stakeholders (e.g., teachers, coaches, schools, parents, students) should be aware of when designing, implementing, and evaluating sports school programmes.

Insert Figure 2 near here

4.1 Literature Methodology

This study specifically aimed to understand study methodology and data-collection methods in order to enable an evaluation of the quality of the current literature, which is pivotal in establishing both the strength of the existing evidence as well as guiding future research. Overall, for all research designs the average quality assessment was above 4. This suggests that on average methodological quality was high with sufficient methodological detail provided (e.g., blinding, enrolment rates, drop-out rates, control for confounding variables) and strong philosophical or theoretical underpinnings. However, the standard deviations are quite large for such a small quality assessment range (i.e., 0-5), reflecting the variation in study quality across the studies. Addressing quality in mixed methods designs can be more difficult than in monomethod studies, due to the greater complexity of the former [76]. From the 46 studies included in the systematic review, 11 studies evaluated characteristics and features of sports schools and 44 evaluated impacts across holistic athlete development (i.e., academic/vocational, n=12, athletic/physical, n=27, psychosocial, n=9, and psychological, n=21). This demonstrates a reasonably balanced examination of holistic athlete development in the literature, although the academic/vocational and psychosocial domains are explored less frequently compared to the athletic/physical and psychological domains. In addition, most studies were uni- or bi-dimensional. For example, only 11 studies examined two holistic impact themes, only seven studies examined three themes and no studies examined across all four areas of holistic athlete development [14]. This often has to do with researchers working within specific research areas (i.e., physical vs. psychological). Therefore, future research needs a more interdisciplinary approach, which has been rare.

When analysing across the four main themes of holistic athlete development, multiple subthemes were identified, demonstrating further breadth of evaluation. Equally, when

considering the methods used to assess impacts, these were highly variable with most utilising interviews (n=15) and questionnaires (i.e., standardised, n=19; non-standardised/specific, n=12) alongside multiple other methods (e.g., observation, field notes, clinical analysis). It is a strength of this mixed-methods systematic review that it is able to combine multiple methodologies in understanding the impacts of sports schools. However, as the existing research is highly variable for the impact area and the method used, this makes comparisons across studies to develop consensus on the impacts of sports schools is difficult but does offer multiple avenues for future research. Furthermore, evaluation methods vary, as they may in scope, but most commonly a singular enterprise or context is the scope of an evaluation. In the current evidence base, there is a lack of research evaluating a single enterprise or context (programme evaluation projects) of a sports school. Finally, most research-designs use self-report measures which has limitations (e.g., response bias, honesty, introspective ability, misinterpretation of questions and sampling bias). Most experts in research suggest that self-report data should not be used alone, as it tends to be biased (e.g., 77). Research is best done when combining self-report data with other information (e.g., individual's behaviour or physiological data). Therefore, future sports school research should adopt a "multi-method" research design to provide a more global, and therefore more likely accurate, picture of the holistic impacts of sports school programmes.

4.2 Characteristics and Features of Sports Schools

In terms of the characteristics and features of sports schools, findings highlighted that many sports schools offered student-athletes considerable academic and athletic support (e.g., high quality coaches, physiotherapy, lighter load by one subject and adaptation of school and training schedules) [24, 28, 41-42]. Whilst non-sports schools may offer time off to practice and might adapt the school day, they usually are not able to offer the same range of support services as sports schools [78] due to available resources (e.g., finances). Furthermore, sports schools may also have an advantage over club-based development as they are better able to manage the competing calls of the student athletes' time/demands [24] due to resource economic efficiency (e.g., limited travel time, everything on site, extra support services, and a more flexible system). However, those outside sports schools who received extra services often rated such services better [41]. Therefore, although sports schools appear to provide considerably more support services than non-sports schools for their student-athletes, the services available may not be as high quality, which may be an area for development within sports school programmes.

Along with additional athletic and academic support services, sports school programmes often offer high quality training partners, role models [24, 27, 42], and more intense training and competition routines [37, 40, 43]. For the welfare and well-being of student-athletes at sports schools, training and competition workload should be appropriately monitored and assessed. Without careful planning and monitoring, student-athletes are at an increased risk of excessive training loads, insufficient rest and recovery [79-83], injury [84-87], and burnout [88-89]. While overtraining and non-functional overreaching are not exclusively a consequence of training overload, it is likely that sports schools that fail to provide sufficient recovery time for adaptation and natural growth, will increase the chances of negative health impacts in youth athletes [79].

Although many characteristics and features of sports schools are highlighted above, there are common themes that have been identified in talent identification and development systems (TIDS) that have not been reviewed in the current sports school literature. We are aware that

training within sports schools can be intense and competitive, however little is known about what the training at sports schools involves. For example, according to Ko et al.'s review [90], there are many trainable factors contributing to sport success (i.e., physiological variables, psychological attributes, physical performance, sport skills). Most training programmes, however, focus only on physical skills, although psychological variables have been identified as critical determinants of sporting development and for the maintenance of excellence [91]. Future research should explore in more detail the context of training within sports schools to assess whether they offer well-rounded, holistic development programmes. In addition, with the knowledge that training programmes at sports schools may be intense and competitive, little is known about the recovery strategies used within these sports school settings/contexts. Martindale and Mortimer's [92] review suggested that effective emotional/physical recovery needs to be emphasised in youth sport programmes in order to prevent injury and avoid other negative psychological consequences (e.g., stress and burnout). Various strategies with regard to training load, nutrition, cooling down, stretching, social support, and lifestyle education (e.g., time management and planning) can be included in a multidimensional training programme in order for the athletes to achieve the balance between life and training [92-93]. Therefore, as injury has been highlighted as a common issue within sports schools, future research could evaluate the training and recovery strategies/methods of sports school programmes to maximise holistic athlete development.

4.3 Impacts

Given the increased popularity of sports schools, the fact that only a few athletes ever obtain a professional status, and the multiple positive and negative impacts associated with intensified youth sport programmes, it was important to understand the impact of sports schools on holistic athlete development to inform their design, implementation, monitoring and evaluation. The combination of sport and academics is a key aspect of sports schools. However, current findings suggest contradictory impacts across sports school programmes across different countries and sports. Missing school was a common impact experienced by sports schools' student-athletes [22, 40, 44, 48]. However, although student-athletes missed schoolwork, four (out of six) studies [22, 41, 46-47] showed that attending a sports school did not impact upon school academic success. These findings are congruent with past research, which has indicated that elite athletes achieve in both sport and school [94-96]. Such findings within sports schools may reflect the importance that additional support offered by sports schools (e.g., extra tutoring, adaptation of school and training schedules, lighter load by one subject, extra year of study) may support and protect academic success. Therefore, whilst sports school athletes may miss periods of school work, strategies are in place to overcome such negative impacts.

Whilst the evidence supports the fact that sports school athletes were not negatively impacted in the short-term, there may be more longer-term negative implications. The findings on higher education continuation were mixed [40-41, 49], with some sports school student-athletes achieving lower higher education attainment [49] compared with mainstream school student-athletes. Therefore, although student-athletes tended to display a dual identity while at sports schools [72], the fact that more athletes outside sports schools attained higher education grades may indicate that sports school student-athletes choose to prioritise their sport over their studies to a greater extent once they leave the sports school and their sporting careers progresses. An overemphasis on sport may pose issues in terms of career opportunities for elite athletes once their athletic careers end. Therefore, although evidence suggests that sports schools provide adequate support for student-athletes to pursue both

education and sport [72], little is known about the consequences of combining elite sport and subsequent career success. Some studies have shown that top athletes obtain higher ranking jobs than non-athletes [97-98], however, further research is needed to establish whether specifically attending a sports school hinders student-athletes' future development outside their athletic careers [98].

Alongside academic development, the aim of a sports school is to develop athletic and sporting performance. Whilst one study demonstrated physiological and physical development across sports school training programmes [64], research suggested sports schools have not resulted in an increased number of student-athletes performing at the world level [41, 49] and findings on top place finishes and medal success results were mixed [22, 41, 49] raising concerns about the effectiveness and importance of specialist support and training within sports schools. In this respect, the fact sports schools have not led to marked differences in the number of student-athletes performing at the world level should not automatically lead to the conclusion that sports schools are not suitable to facilitate the combination of elite sport and education. There are multiple confounding factors influencing sporting success, such as genetic qualities of young talents and their close environment at the micro-level (e.g., parents and friends; [37, 99-100]), organisational and policy factors at the meso-level (e.g., sport clubs, international competitions and scientific research and innovation; [100-102]), and factors at the macro-level (e.g., media, sponsorship, politics, school system, geographic factors and performance culture; [37, 99-100]). Ultimately, sports schools can only ever be somewhat successful due to limited spaces at the top of the pyramid. However, if the majority of other impacts are positive and athletes (at the same rate as in other TIDS) make it to the top, they are probably successful. As such we may also need some comparative numbers (through future research) from non-sports school contexts to get a feel for what 'normal' performance success would be. It is also important to consider the bigger picture (holistic advantages) of sports school (not just focusing on sport performance). As a whole, attending a sports schools might be the only possibility for young student-athletes to combine school and elite sports. Therefore, even though sports schools may not guarantee better sporting performances and academic success, without sports schools, student-athletes may not be able to pursue their sporting ambitions at all, or they might have been even less successful in school/sport or might have become school/sport drop-outs. Overall, due to the sports school set up, there is hope for added value (i.e., instead of allowing youngsters to pursue elite sports away from school and not make it, and sacrifice their schooling, here they may at least safeguard their schooling and have a more pleasurable/balanced experience along the way).

It is impossible to eradicate all injuries from youth sport programmes; however, injury prevention schemes that develop appropriate training can significantly reduce the frequency and severity of injuries [103]. Consequently, seeing as many student-athletes were at a high risk of becoming injured after enrolment into sports schools, appropriate recovery and prevention strategies should be incorporated as part of sports school programmes. These could include; strength and conditioning (S&C) programmes focused upon strength, endurance, and proprioception/balance [104-106], collaboration and communication of stakeholders on managing youth athlete training schedules [107], monitoring of individual workload [107], modifying external training variables to achieve a desired internal response [107] programmes malleability and athlete education [107], extrinsic factors via the use of protective equipment (e.g., ankle bracing and taping, helmets, and mouth guards) [103, 108] and implementation of rules and regulations [85, 109].

Sports schools attempt to help athletes achieve athletic success at an early stage. As a result, training is intensified. An unintended consequence is an increased risk of early performance stagnation and thus higher number of drop-outs from sport and sports schools [22, 50]. Consistent with earlier studies [110-112], Baron and Alferman [50] demonstrated that physical complaints (e.g., injury, fatigue, illness), motivation, and volitional skills are important predictors of sports school dropout. Furthermore, the development of psychobehavioral skills (e.g., time management skills, effective communication, social awareness, and maturity) has been shown to support transition to new environments after deselection [113]. This study supports that sports schools contributed to the development of student-athletes' social skills [42, 47] and life skills (e.g., independence and time management; [37, 42, 59]), while being more inclined towards task orientation [73] which is associated with positive self-image, satisfaction and high performance in sports [114-115]. As such, it may be suggested that the best foundation for noticeable, permanent development within, through and after sports schools should focus on developing and supporting personal motivation, task-orientation, and volitational and psychobehavioral skills, while reducing physical complains for every individual at any stage of participation [113].

Being identified as talented can change the nature of peer relationships [3]. Although, many sports schools positioned student-athletes as having positive status, popularity, and recognition [20, 27], this also caused tension amongst some student-athletes within the programmes [27]. Furthermore, although sports schools may have provided many opportunities to retain and develop friendships within sport, time away from family and friends outside of sport was a typical consequence for student-athletes [42, 45, 66]. Researchers have highlighted the risk of social isolation, and feelings of alienation that result from spending substantial amounts of time away from family and inevitably having fewer opportunities to make and retain friendships outside sport (e.g., [116-117]). The reduced ability to form non-sport friends could result in a lack of psychosocial support when athletes terminate their athletic career and are potentially isolated from their friends within sport [118]. Furthermore, previous studies have demonstrated that a strong athletic identity was negatively associated with the quality of athletes' career transitions [119-120]. Therefore, given that all athletes eventually have to transition out of sport, it would be worth exploring if these negative impacts apply to sports school athletes that showed both a strong student and athletic identity [72].

Combining an athletic career with education is demanding for student-athletes [121] and junior athletes are susceptible to stress and burnout (e.g., [122-123]). At the beginning of sports schools, most student-athletes experienced very low levels of burnout [18, 23]. However, the results on the development of burnout across time at sports school were mixed. The finding suggests that among student-athletes at sports school, there are different subpopulations with different developmental trajectories, whereas among some student-athlete's symptoms of burnout may increase, among some others, the symptoms remain relatively stable. This highlights the importance of continuous screening (e.g., profile of mood test) and early detection of burnout in student-athletes at sports schools [18, 70, 75]. Furthermore, this also suggest the need for careful management of the performance environment as concerns have been raised that youth athletes are increasingly being exposed to inappropriate and unrealistic demands and expectations, resulting in psychological overload [80]. Indeed, some sports school athletes experienced athletic/performance pressures [22, 31, 37, 67] as well as pressure from others, such as parents and teachers [43]. Adopting a dominant performance focus can lead to high levels of perceived pressure, feelings of low self-esteem and confidence [124] in addition to a fear of failure associated

with the risk of being evaluated negatively and letting down significant others [125]. TIDS research has highlighted that parents, coaches and peers, have the potential to adopt a 'winning at all cost' mentality, or instil particular behaviours in response to failure and in search of better results, such as pressing athletes to 'push harder' [126-127]. Such pressure can contribute to an unhealthy training environment [126-127] and will likely require careful management to be avoided in sports schools.

Although being a student-athlete at a sports school may be associated with more pressure, training demands and expectations, current findings highlighted the important influence sport within sports schools may have upon student-athlete's mental health, health behaviours and their willingness to shift their time away from unhealthy behaviours related to general health and wellbeing. Sports school student-athletes spend a considerable time doing sport/physical activity. Consequently, it is unsurprising that numerous sports school student-athletes demonstrated more favourable levels of general health and well-being [23, 62], fewer mental health related symptoms [62] and more protection against unhealthy and risky behaviours [23, 47, 61]. This is in line with previous research that has shown positive health benefits [128-130] and lower rates of unhealthy and risky behaviours (e.g., less screen time, smoking, drug use) with increased physical activity and participation in sports [131-132].

Overall, there are many different characteristics and features of sports school programmes, which can be implemented in a variety of ways. As a result, impacts are likely to vary across every sports school context. The success of sports schools often depends on many situational factors, such as financing, goodwill of the person in a key position of an organisation, quality of coaching and teaching staff involved, and culture [37] effecting whether sports schools provide benefits and positively contribute to school-age athletes' holistic development [37]. It is not possible for this systematic review to establish a rigorous causal relationship between the characteristics and features of sports schools and the associated impacts. This means that more studies, understanding the characteristics and features of such sports schools and how this relates to impacts are warranted to account for the socio-cultural context and local conditions of programmes [37]. Furthermore, it was evident that involvement with sports school programmes is associated with a range of potential positive and negative impacts (summarised in figure 2), however more information on the motives and reasons why sports school student-athletes attend sports schools is warranted. Strategies should be put in place to try and mitigate the negative impacts associated with sports schools to ensure that we are encapsulating positive impacts, and practitioners are emphasising the holistic development of youth athletes to ensure system "worth" [8]. It has been suggested in TIDS research that positive impacts emerge from higher quality TIDS [8]. The same concept could be related to sports schools, where the issue does not lie with the overall concept of sports schools, but instead, impact reflects how well they are designed, implemented, and managed [8].

4.4 Limitations of Existing Research

Whilst the current systematic review highlighted the breadth of impacts associated with sports school programmes, a number of limitations exist within the current evidence base. Firstly, as stated above (section 4.1), most studies included in this review are uni- or bi-dimensional. Whilst studies examine individual components of holistic athlete development, no research evaluates all areas of holistic athlete development (i.e., educational/vocational, physical/athletic, psychosocial and psychological). Therefore, more multi-dimensional studies assessing the holistic development of student-athletes at sports schools is warranted. Furthermore, although the Holistic Athlete Career Model has been used extensively in

previous research studies to guide data collection about the athlete as a whole person [e.g. 37] and is a useful guiding theoretical framework for data analysis, it is not yet possible to unequivocally validate the Holistic Athletic Career framework as a model to describe development, due to the lack of empirical examination and testing.

Interestingly, the majority of studies (72%) have been conducted in northern European countries (i.e., Denmark, Norway, Sweden, Finland), especially those countries that have state sponsorship and specific policy approaches toward the dual-careers of student-athletes [133]. It is important to recognise cultural, social, and policy factors differing across countries and sport settings, which challenges the generalisability of the findings in this study. It is difficult to apply current research on sports schools' effectiveness to other countries as each country may have its own systems and approaches [26]. Sports schools may vary in their resources, organisational structure and aims/objectives, which are likely to affect whether sports schools provide benefits or contribute to school-age athletes' holistic development [37, 100]. This means that exploring the impact of sports schools across different countries is warranted to account for the socio-cultural context and local conditions of dual-career programmes. In addition, the data in this study cannot be generalisable across sports, it requires a sport-by-sport analysis. It is expected that sports schools require an individual approach, tailor-made for each athlete and each sport. Therefore, future research needs to take the specificity of athlete characteristics/variables (e.g., sex, type of sport, age, development stage within the school, training cycle) into account.
Finally, it is not possible to establish a rigorous causal relationship between attending a sports school and the impacts established in this study. The study designs within this systematic review are unable to evaluate whether impacts are a direct result of the sports school or any other confounding factors (e.g., genetic qualities, being an athlete, parents, friends, sports clubs, international competitions, media, sponsorship, politics, geographic factors, and performance culture, etc. [100]). Furthermore, there is a lack of control or comparative groups within the current sports school literature. It is important for us to explore and find out further in future research if sports schools through combining schoolwork with an intensified and competitive sport regime offer a return on investment that goes beyond what is to be expected at non-sports schools. Only three studies [22, 41, 49] compared student-athletes within a sports school directly with student-athletes outside a sports school. These three studies [22, 41, 49] all used a retrospective approach and design. This approach could lead to incomplete or inaccurate information due to selective memory loss (recall bias) or to participants' social desirability to describe the dual-career development in a more positive light. The studies also all used one single measurement, namely an online survey or interview. This opposes the nature of 'transition' as a process, which calls for using a longitudinal approach to investigate student-athletes' development or changes over time. Therefore, more studies comparing student-athletes within a sports school directly with student-athletes outside a sports school, as well as longitudinal studies that multidimensionally examine the impacts of sports school involvement in real-time and as they occur across the athletes' development, are warranted.

5. Conclusion

This systematic review prompts a debate and critical reflection about (1) the characteristics and features of sports school programmes; (2) the methods used to evaluate sports school impacts, and (3) the positive and negative impacts associated with holistic athlete development of sports school programmes. A range of characteristics and features of sports schools (e.g., athletic and academic support services) were identified, however further

research is needed to gain a more in-depth understanding of how these characteristics and features are operationalised across different contexts as well as how they relate to impacts. A large range of data collection methods and instruments were used within the literature to evaluate a wide variety of impacts; whilst insightful at study level, as a result, specific impacts are often only studied in a single or handful of studies with few studies truly holistic or multidimensional in nature. This makes comparison across studies and developing consensus on the impacts of sports schools difficult. Therefore, more multi-dimensional and longitudinal studies assessing the holistic development of student-athletes at sports schools in 'real time' are required. Furthermore, more information on the motives and reasons why sports school student-athletes attend sports schools is warranted. Nevertheless, from the current literature there are a multitude of immediate, short- and long-term positive and negative impacts associated with being a sports school student-athlete that stakeholders (e.g., teachers, coaches, schools, parents, students) should be aware of. The positive impacts included increased physical development, more stable levels of general health and well-being, positive behaviours, status/popularity, development of friendships within sport, life skills, higher values of self-optimisation and low levels of burnout at the beginning of sports school. The negative impacts included missing school, lower higher education attainment, limited experience with ordinary life outside of competitive sport, high number of injuries, illness and dropouts, loss of time away from family and friends outside of sport, performance pressure and pressure from others (e.g., parents and teachers). Practitioners should be aware that they can promote (positive) and negate (negative) health impacts through the design of an appropriate learning environment that simultaneously balances multiple training (e.g., load), psychological (e.g., identity), academic (e.g., exams) and psychosocial (e.g., sense of community) factors that can be challenging for youth athletes [1-2]. To aid careful management, practitioners should aim to design and implement monitoring and evaluation tools that assess the holistic development of student-athletes within their sports schools. Such monitoring tools could assess a range of factors including athlete wellbeing [83, 134], training load [135], physical development [136], injury prevalence [137] alongside psychosocial factors (e.g., athletic identity; [138]), education [2] and long-term health and performance development [8]. In summary, sports schools seem to be a potentially beneficial strategy for athletes to combine their pursuit for a sports career, alongside education, and other domains of life (e.g., social life). However, it is important to understand and mitigate against the negative impacts observed in such programmes to ensure healthy and holistic athlete development.

Declarations

Ethics
Approval was obtained from the ethics committee of Leeds Beckett University. The procedures used in this study comply with the ethical standards of the Declaration of Helsinki.

Consent for publication
Not applicable

Availability of data and materials
The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

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Authors' contributions
All the authors contributed to the manuscript, including the conception and design of the study, analysis and interpretation of the data, drafting and critically revising the manuscript, and approval for publication. All authors read and approved the final manuscript.

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