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Sustainable Elite Youth Sports: A Systematic Scoping Review of the Social Dimensions

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ABSTRACT

Sports have been identified as an important contributor to social sustainability, and the benefits for health, well-being, and social learning in young people are well evidenced. Youth elite sports, however, have been criticized as being unsustainable. Following calls for a more socially sustainable development of youth elite sports, research on the topic has increased. However, studies vary in disciplinary origin, concepts, content, and methodology. The aim of this systematic scoping review is to identify and synthesize the current disciplinary research knowledge. Five disciplinary databases were searched. Based on six eligibility criteria and a double-blind review process, a total of 99 articles were selected. Findings were first charted in tables and then examined using descriptive statistics and thematic analysis. Key findings are that there is a lack of conceptual clarity regarding social sustainability, and that the field of study is multidisciplinary with distinct thematic research areas (athlete development, athlete health and well-being, athlete development environment). Most research focuses on athlete-related micro aspects and less on organizational and societal dimensions. Inequity issues were found regarding social diversity, including an overrepresentation of soccer and men's sports. Furthermore, mostly quantitative methodologies are used. A theoretically based and empirically tested understanding of social sustainability is needed as well as research addressing aspects of holistic youth development. Attention should be paid to contextual and macro-level influences. Knowledge about preventive programs and practices that advance social sustainability in youth elite sports is necessary. Organizational conditions and funding programs should be created to increase trans- or multidisciplinary research.

1 | Introduction

Since the 1989 publication of the United Nations (UN) report "Our Common Future" (World Commission on Environment and Development [WCED] 1987), sustainable development has attracted a considerable amount of global interest (Allen et al. 2021). While it took some time, sports were eventually identified as an enabler of sustainable development (UN 2015). In particular, sports have been found to contribute positively to the UN's Sustainable Development Goals (SDGs) that have a social dimension, including democracy, health, inclusion, integration, and sustainable societies (Abd Rashid et al. 2021; Lindsey and Chapman 2017; Lindsey and Darby 2019; UN 2015; Wals and Jickling 2002).

Existing research relating sustainability with sports has, however, mostly focused on ecological dimensions. For example, scholars have investigated the ecological footprint of major sporting events with respect to the generation of CO_2 emissions and waste (Gammelsæter and Loland 2022; Müller et al. 2021; Tang et al. 2024; Wilby et al. 2023). Research has also been conducted into how declining environmental conditions (e.g., air quality, climate change) are affecting athletic performance and athletes' health (Cury et al. 2023; Orr et al. 2022; Rundell 2012). In this article, we do not seek to extend the ecological and environmental dimensions associated with sports. Instead, our focus is on the *social* dimension of sustainability in sports, specifically in elite sports involving youth athletes from age 12 to 19, which is the predominant age span when systematic performance development occurs in elite sports systems globally and when talented youth specialize in most sports (De Bosscher et al. 2023). In this specific context, we understand social sustainability to include the fostering of youth athletes' health and well-being and continued holistic athletic and psychosocial development, and the promotion of sporting environments that are equitable, empowering, and caring (Barker et al. 2014; Loland 2006; Schubring and Thiel 2014).

Research on youth sports has emerged from diverse disciplines across the social, humanistic, and natural sciences, covering a comprehensive range of topics (Green and Smith 2016). This body of knowledge provides substantial evidence of the benefits sports and physical activity have on young people, notably on their health, well-being, social learning, and positive youth development (Biddle and Asare 2011; Bruner et al. 2023; Lohmann et al. 2024; Newman et al. 2023; Swann et al. 2018). The link to these social sustainability dimensions is, however, less obvious for athletes in elite youth sports. A key reason is the differences in logics that underlie participation- and performance-oriented elite youth sport. In participation-oriented youth sports, enjoyment, mastery, and a sense of community, as well as social inclusion and the development of a healthy lifestyle are central to the logic; in elite youth sports, such as in elite sports academies/schools and sport-specific regional/national talent development programs, strategically and systematically developing sports performance is central. While the outcomes of participation-oriented youth sports (i.e., socially sustainable dimensions) are relevant and may act as a modifying framework for the primary goal of performance development, research has evidenced that they are frequently perceived to disrupt the pursuit of performance development and thus are deprioritized or rationalized away (e.g., Bergeron et al. 2015; Bermon et al. 2021; Donnelly 2023; Kirstensen et al., 2022). Elite youth sports have thus been criticized for being unsustainable. Scholars from the social and medical sciences argue that elite youth sports have developed into a replica of senior elite sports, as early specialization, extensive training regimes, increased professionalization and commercialization, as well as short-term and performance-focused support structures have become widespread (Bergeron et al. 2015; Claringbould et al. 2015; Karlsson et al. 2022; Waldron et al. 2020). Research from various disciplines demonstrates that youth athletes are not only susceptible to a range of physical issues (e.g., injury, growth problems) but also to mental issues (e.g., anxiety, burnout, depression, eating disorders) and lifestyle-related health issues (e.g., overtraining, difficulties combining education and athletic careers) (Jacobsson et al. 2018, 2023; Kristensen et al. 2022; Moesch et al. 2018; Rice et al. 2016; Schubring and Thiel 2014; Waldron et al. 2020; Walton et al. 2024). In addition, emerging studies indicate that youth athletes have been and can be subject to various forms of violence and abuse in sports (Barker-Ruchti and Varea 2023; Bermon et al. 2021; Pinheiro et al. 2014). Hence, elite youth sports have been found to be socially unsustainable as they put young peoples' health and well-being at risk, undermine their long-term performance and personal development, and violate a child's right to play and leisure (Barker et al. 2014; Donnelly 2023; Hausken-Sutter et al. 2021; Lundberg Zachrisson et al. 2021; Moseid et al. 2018). Furthermore, these drawbacks also threaten the social and economic sustainability of sports organizations as they can lead to athletes dropping out (Barker et al. 2014; Wendling et al. 2018) and place the educational mandate and ethical standards of coaches and sporting bodies into question (Dohlsten et al. 2021; Lang 2022).

Following recent scandals of abuse involving child and youth athletes (e.g., Tofte et al. 2020; "USA Gymnastics sex abuse scandal," 2025; Rudin Cantieni, 2021), policymakers, the media and other stakeholders have called for more socially sustainable elite youth sports. Consequently, new policies have been and are being established, frameworks and recommendations are being developed, and sporting bodies are being put under pressure to develop more sustainable practices (Bergeron et al. 2015; Côté and Hancock 2016; Gojanovic and Tercier 2020; Grahn 2014; Lang and Purdy 2023; Strachan et al. 2011; Tercier et al. 2020; Wyttenbach et al. 2024). In line with international developments toward socially sustainable elite youth sports, research has also increased during the past decade (see Figure 1). However, the body of literature comes from a wide range of sports-related disciplines and varies widely in terms of concepts and definitions, as well as content and methodology. The lack of systematization in the current state of knowledge is further complicated by multivocal definitions and a general vagueness surrounding the concept of sustainability (Lindsey 2008; Purvis et al. 2019; Sartori et al. 2014). This is problematic for the development of the research field and complicates usability for coaches and sporting bodies who are the primary stakeholders in the transformation process being called for. Thus, a common base of knowledge and terminology is urgently needed to guide both researchers and practitioners working with and for the sustainable development of elite youth sports.

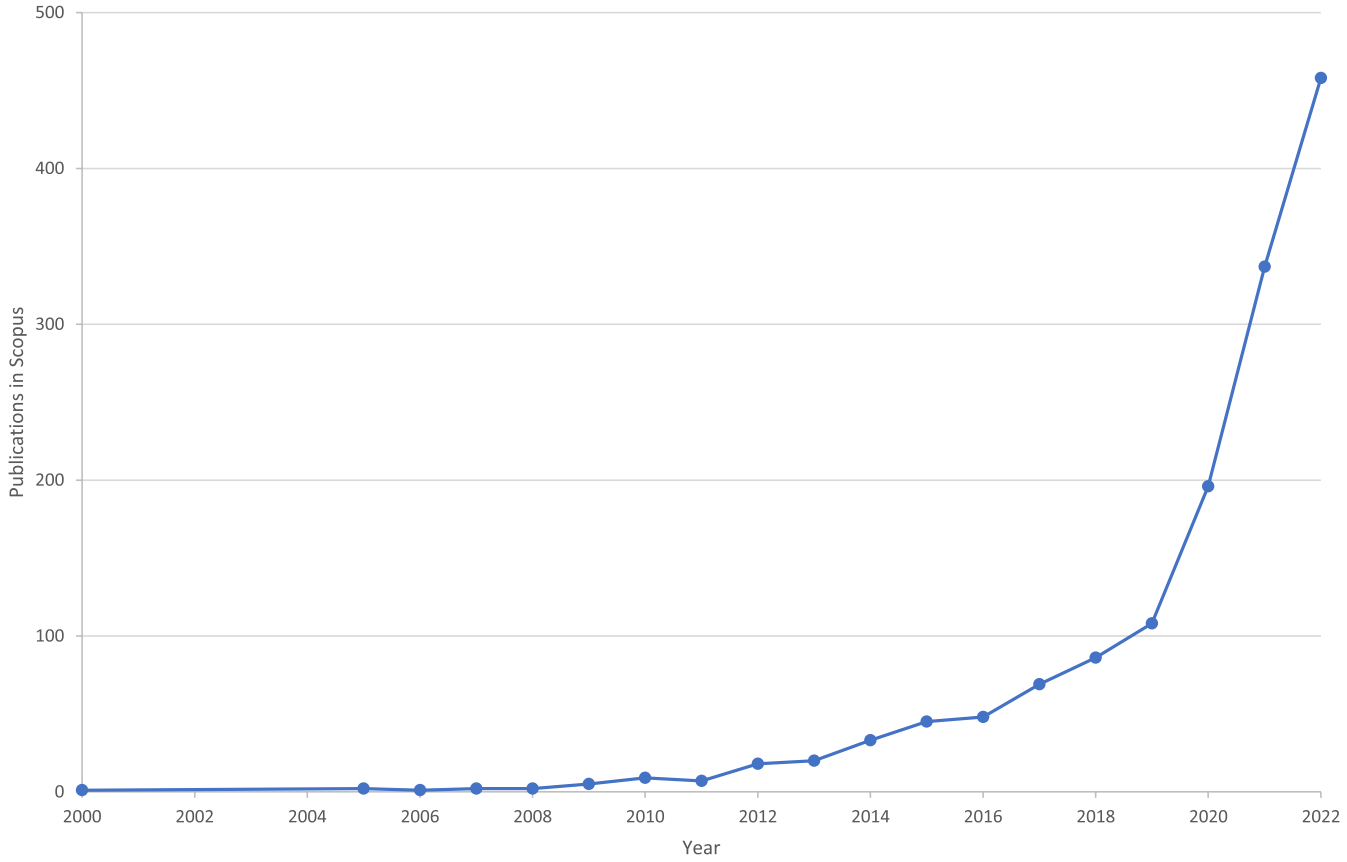

FIGURE 1 | Scopus-created timeline of publications per year based on preliminary search terms.

The aim of this scoping review is therefore to identify and synthesize the current disciplinary research knowledge in the field, with a specific focus on the social dimensions of sustainability relevant to elite youth sports. We begin by clarifying the key concepts that inform this review before specifying our three research questions and outlining the systematic scoping methodology. We then present our findings, and close by discussing and reflecting on their implications for research and practice.

2 | Conceptual Background: Sustainability and Sustainable Development

Given the aim of this review, a clarification is warranted of the key concepts of *sustainability* and *sustainable development* as well as their relationship. Based on the Latin root word 'to sustain', Spindler (2013, 11) describes sustainability as "a derivation of the noun 'sustenance' meaning 'what one retains'." Due to increased usage in global policy work (Feil and Schreiber 2017; Purvis et al. 2019; UN 2015), and in different areas of knowledge (Ruggerio 2021), the concept of sustainability has obtained multiple definitions, contributing to a degree of "fuzziness" and vagueness in terms of its meaning (Lindsey 2008; Purvis et al. 2019; Sartori et al. 2014; Spindler 2013; Wals and Jickling 2002).

When focusing, as we do in this article, on the social dimension of sustainability or 'social sustainability', the conceptual landscape becomes even more uncertain. Although social sustainability is garnering increased attention in research (see e.g., Abd Rashid et al. 2021; de Fine Licht and Folland 2019; Mensah 2019; Szathmári and Kocsis 2022), scholars lament the fact that the social dimension of sustainability has lived a life in the shadows of economic and ecological sustainability, since social sustainability is equally and perhaps even more complex to measure and to operationalize (Boström and Micheletti 2016; Wolsko et al. 2016). In response, Hellberg (2023) recently suggested literature-based indicators of social sustainability, namely a relation to "quality of life and health, equity, inclusion, access, social cohesion and participatory processes" (461).

In research on elite sports, conceptual work on sustainability in general remains marginal. Exceptions include Müller et al. (2021), who define sustainability in the context of hosting the Olympic Games as "minimizing resource use while guaranteeing minimum thresholds of social and economic well-being" (341). Applying to elite sports the idea of educating people about sustainable thinking (Wals and Jickling 2002), Barker et al. (2014, 5) argue that sustainability has little value as a goal but can serve as an "organizing concept" and can offer "an approach" and "a language system" with which to talk about elite sports while taking people and the planet into account. Looking at athletic performance ideals, Loland (2001, 2006) argues that exact quantification in terms of athletic records is unsustainable as it requires unlimited growth in limited systems, with problematic implications for the health and well-being of future generations of athletes.

Further complicating the described lack of terminological consensus (Purvis et al. 2019; Sartori et al. 2014), the terms *sustainability* and *sustainable development* are often used interchangeably (Olawumi and Chan 2018; Purvis et al. 2019; Sartori et al. 2014). To clarify, Escher (2020) suggests that sustainable development refers to the process, while sustainability refers to "the overall outcome of the sustainable development where the economic, environmental and social factors are balanced in equal harmony" (2803). Although there remain stark differences of opinion about the meaning of sustainable development in the literature, there is agreement that it is a multidimensional concept underpinned by an ethic of care for self, others, and the future (Nicholson and Kurucz 2019). Understanding sustainable development in this way echoes what Kioupi and Voulvoulis (2019) have termed a "holistic perspective" of sustainability, which is seen as "a dynamic state" that constantly needs to be defined and reached as part of a collective effort (4).

In his seminal article *Conceptualising sustainability in sports development*, Lindsey (2008) suggests differentiating further between four levels of sustainability on which sports development policy and practice can have/can target long-term outcomes. While Lindsey exemplifies his framework for the development of participation sports, we consider the four levels to also be valid for elite youth sports. These are firstly, *individual sustainability*, which refers to "long-term changes in individuals' attitudes, aptitudes and/or behavior through involvement" (Lindsey 2008, 282), such as youth athletes' sustained participation and performance development. Secondly, *community sustainability*, which refers to "maintenance of changes in the community" (Lindsey 2008, 282) involved in a specific sports program, such as skill- and network-building in a talent development environment. Thirdly, *organizational sustainability*, encompassing "the maintenance or expansion of sports programs by the organization responsible for their delivery" (Lindsey 2008, 283), such as sustained funding of dual career support programs for athletes of elite youth sports. Fourthly, *institutional sustainability*, which refers to changes in the wider political, economic, environmental, and social conditions in which sports programs are situated, such as increased pressure on sports organizations to establish safeguarding policies in elite youth sports.

Building on the outlined base of knowledge, we adopt a multilevel holistic perspective and define social sustainability in the context of elite youth sports as both "an evolving product and as an engaging process" (Wals and van der Leij 2007, 18) underpinned by an ethic of care and a desire to safeguard the well-being of youth athletes and the sport organizations—now and in the future. Based on this understanding, we have operationalized this review's aim in the following three research questions:

1. How is the social dimension of sustainability conceptualized in the current disciplinary research on elite youth sports?
2. Which key thematic areas, approaches, and levels of social sustainability can be identified in the current disciplinary research on elite youth sports?
3. How is the social dimension of sustainability studied with regard to the types of sports, gender, dis/ability, and methodology?

3 | Materials and Methods

To map the extent, range, and nature of the current, disciplinary research knowledge on social sustainability and elite youth sports, we identified the methodology of a systematic scoping review as being best suited to answering our research questions (Peters et al. 2015). Scoping reviews are a knowledge synthesis of research evidence on topics that have not yet been extensively reviewed or that are of a complex and heterogeneous nature (Arksey and O'Malley 2005; Tricco et al. 2016).

The scientific literature covered in this review represents different sports-related disciplines, including medicine, biomechanics, educational sciences, psychology, and sociology. The research traditions and methodologies of these disciplines differ. To provide an overview of the research performed by these diverse disciplines on the social dimension of sustainability, we conducted a scoping review which allowed us to identify and synthesize the available scientific literature written in English on the key characteristics and factors related to social sustainability in the context of elite youth sports (Arksey and O'Malley 2005; Mak and Thomas 2022). Our choice is further grounded in the fact that systematic scoping reviews offer a good way of identifying and analyzing research gaps (Tricco et al. 2016). To ensure methodological robustness, we established an internal protocol for the review and used as guidance the Preferred Reporting Items for Systematic Reviews and Meta-Analysis extension for scoping reviews (PRISMA-ScR) (Tricco et al. 2018; see Table S1).

3.1 | Search Strategy

Three different search strategies were employed to extract a broad range of literature from different disciplines on social sustainability and elite youth sports. First, we conducted a systematic search in the following five databases: SportDISCUS (multidisciplinary sport-specific), PubMed (medicine), ERIC (educational science), PsycInfo (psychology), and ASSIA (social science and health). Databases were selected to capture both discipline-related and sport science-related bodies of knowledge.

To establish the search string, we used a circular process of testing and refining search terms based on feedback from two university librarians with expertise in literature searches. In addition, the preliminary terms were audited by a group of researchers with expertise in multiple disciplines, including educational science, exercise science, physiotherapy, sports coaching, sports medicine, sports philosophy, sports politics, and sustainability science. These experts gave critical input on earlier versions of the search string and on inclusion and exclusion criteria.

The iterative feedback loops led to the inclusion of suitable Medical Subject Headings (MeSH terms) to structure the

search string in four thematic key term blocks (sustainability, youth, sport, competitive). In addition, by including "ecology," "holistic," and "long-term" as alternative terms, we were able to adjust for the fact that the term "sustainability" is increasingly being used as a buzz word. Based on comprehensive testing of synonyms and the trialing of various search strings, we established the following final search string to search the different databases: (sustainabilit* OR sustainable OR sustained OR ecology OR holistic OR long-term) AND (young OR youngster or youngsters OR teenage or teenager or teenaged or teenagers OR youth OR youths) AND (athletic* OR athlete* OR sport* OR player*) AND (elite OR top-level OR competitive* OR professional*).

To maximize the retrieval of relevant sources, a second strategy was added to this systematic search of databases by obtaining literature recommendations from the multidisciplinary expert group mentioned above. As part of the third search strategy, we conducted cited reference searching ("snowballing") on articles identified through the previous two strategies.

The literature review covered the years between 2012 and 2023 (up until May). The year 2012 was selected as a starting point. The decision for this cut-off point was based on a preliminary key word search: (("sustainable development") OR (sustainability)) AND sport AND (elite OR performance) AND youth AND athlete in the SCOPUS database where we found a systematic increase in publications relating to sustainability and elite youth sports in 2012 (see Figure 1).

3.2 | Inclusion and Exclusion Criteria

Our inclusion criteria were as follows: (a) articles written in English given this is the main academic language; (b) peer-reviewed empirical publications; (c) "youth" operationalized as athletes aged between 12 and 19 years which is the predominant age span for systematic talent development and specialization in most sports; (d) content of the articles explicitly providing empirical or conceptual findings on sustainability; (e) focus on the social dimensions of sustainability (e.g., health, athlete development, coaching, gender issues); and (f) articles published between 2012 and 2023-05-21.

In contrast, the following criteria excluded articles from our study: (a) non-English language publications; (b) peer-reviewed publications before 2012; (c) publications such as reviews, book chapters, reports/books, consensus papers, conference papers, and abstracts; (d) focus on athletes younger than 12 or older than 19 years; (e) focus on recreational sports and school-related physical activity, and not on elite youth sports; and (f) focus mainly on environmental and economic sustainability or on clinical methods or prevalence studies (e.g., injury, doping, etc.).

The systematic search of the five databases resulted in 1378 hits. All hits were exported into Endnote (Version 20) where an automated duplicate search was run. This resulted in 1157 remaining articles. These were all exported into the software Rayyan (Ouzzani et al. 2016) for further analysis of the abstracts. Five of the authors (A.S., A.C., H.B., K.J., S.G.) independently reviewed the abstracts in Rayyan to make sure that each abstract underwent a consistent double-blind review. When deciding on whether to in- or exclude articles, each reviewer applied the following, prior agreed criteria-based questions in hierarchical order: (1) Is the study context elite or performance sports?, (2) Are findings on youth athletes (aged between 12- and 19-years) reported on?, and (3) Do the findings relate to one or several dimensions of social sustainability?

Upon completion of the blinded review, the five reviewers met repeatedly to compare the results and to discuss each conflicting decision in order to agree on a final decision for or against inclusion. In cases, where our criteria-based questions could not be answered by the information in the abstract, the full-text was screened for further information. Studies that reported findings from a broader age span of athletes, and where it was not possible to identify which findings were specific to the age group in focus for the review, were also excluded. Further, studies that reported only on the prevalence of health issues for example, that were purely theoretical or that did not contain findings related to social sustainability, were also excluded. Once all 1157 articles had undergone this comprehensive double-blind screening, additionally identified duplicates ($n = 2$) were removed.

Figure 2 provides an overview of the search process and the number of included and excluded articles. A total of 99 articles met the criteria for full-text reviewing (for overview see Supporting Information 2).

3.3 | Analysis

A close reading and analysis of the 99 full-text articles included in the study was conducted by six of the authors (A.S., A.C., H.B., K.J., Su.L., S.G.) who came from different disciplinary backgrounds. These authors worked collaboratively, first, in deciding on the analytical process and second, in the stepwise identification and organization of the key findings. Regular process reports were issued to the extended author group, which allowed for a triangulation of researcher perspectives and critical auditing of the analytical findings (Patton 1999). The analytical process is outlined below.

3.3.1 | Thematic Analysis

Braun et al.'s (2016) thematic analytical approach served as a reference point for our entire analysis as it enables flexibility across ontological and epistemological positions and is a robust method for scholars working in teams across various disciplines (Braun et al. 2016). Moreover, thematic analysis is a way to search for themes or patterns in the data and to describe and interpret their meaning. In an initial step, the literature included in the study was inductively sorted into seven thematic groups based on title and abstract: (a) athlete health and well-being, (b) athletic performance development, (c) career development, (d) ecological and holistic development, (e) relative age effect, (f) sports injuries, and (g) talent development.

Next, these thematic groups were divided among the six authors responsible for the thematic analysis based on their disciplinary expertise. Three tables were established relating to the three

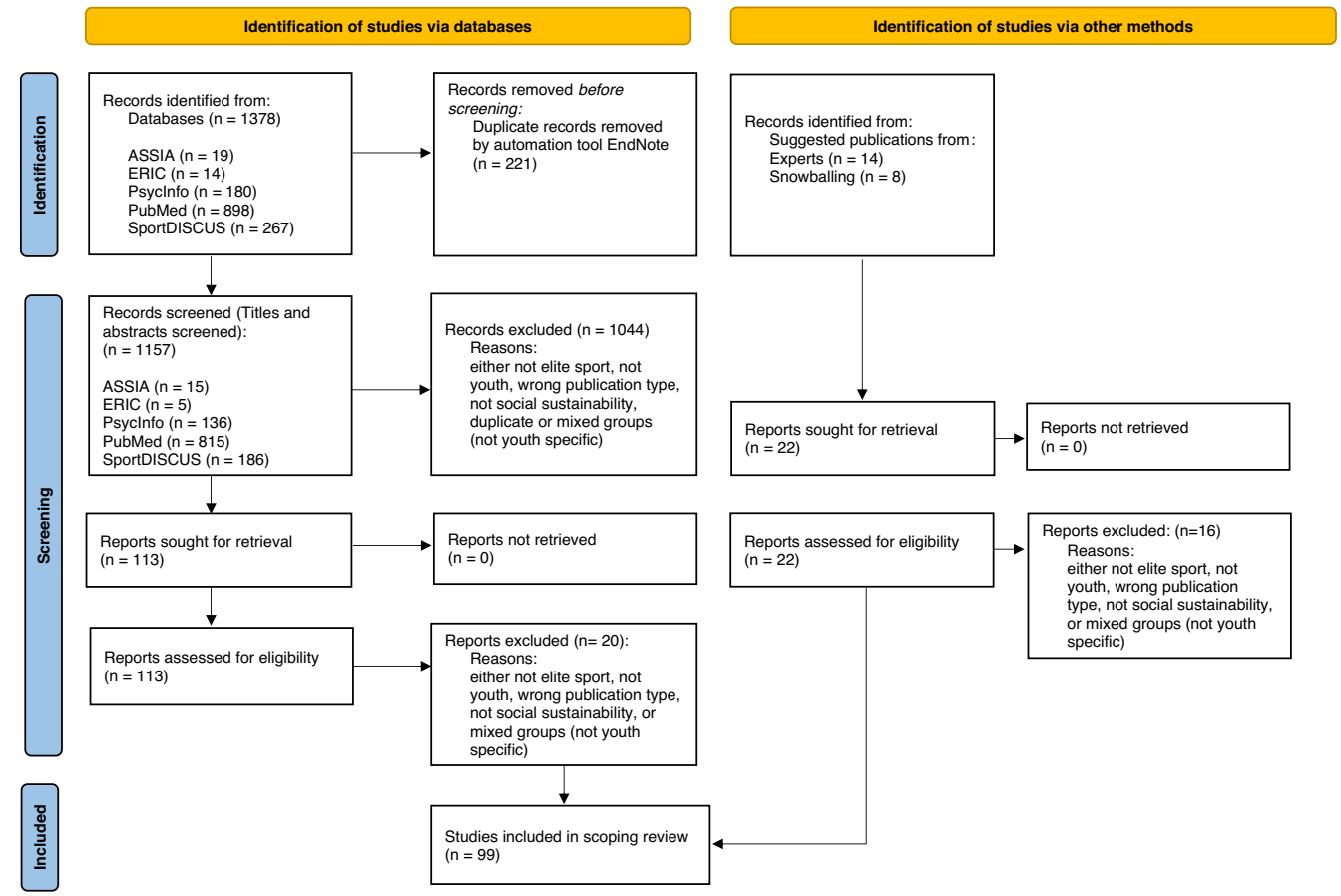

FIGURE 2 | PRISMA flow diagram for Scoping Reviews (ScR) for the literature search, screening, and inclusion process (based on Tricco et al. 2018).

research questions in order to extract descriptive and thematic information from each of the articles during the in-depth analytical reading (Braun et al. 2016). Building on our previously presented understanding of sustainability being a multilevel process (Lindsey 2008), we also fleshed out the following levels in the tables: athlete-related (AR), community around the athlete (CAA), organization of sports (OS), and society sports is situated in (SSS). Each table was audited and tested in the team, prior to usage. These tables assured consistency across the authors working on the analysis of the 99 articles. Data were first charted individually and then audited by a group of three to four co-authors who in a meeting went through each data entry to confirm the data. Based on the described analysis of the body of literature, together with the ongoing discussions in the author team, we identified central themes in the conceptualization of social sustainability (RQ1), main thematic research areas, approaches and levels (RQ2), as well as information regarding the types of sports, gender, dis/ability, and methodology (RQ3) used in current, disciplinary research on elite youth sports (see Supporting Information 3).

3.3.2 | Descriptive Analysis

In addition to the described thematic analysis, all data extracted from the articles were analyzed using descriptive statistics to provide a numerical representation and an overview of key variables (e.g., conceptualization, thematic areas, approaches, levels, and diversity dimensions) in the current academic studies on social sustainability in elite youth sports. The results were displayed as absolute or percentage values either in text, pie charts, bar charts, or tables. The statistical analysis was conducted using Microsoft Excel version 16.29.1 (Microsoft Corporation, Redmond, WA, USA). In the next section, we present the three research questions along with our findings.

4 | Results

RQ1. How Is the Social Dimension of Sustainability Conceptualized in the Current, Disciplinary Research on Elite Youth Sports?

Only two (Güllich 2019; Schubring and Thiel 2014) of the 99 articles provided an explanation of their understanding of the term social sustainability/sustainable development. Güllich (2019) placed social sustainability in relation to the career development of athletes. In a comparison of retrospective questionnaire data on the sport participation histories of world-class and national-class female soccer players, Güllich (2019, 1354) indicated that: "The hypothesis of 'sustainability' suggested that variable sport participation is associated with reduced opportunity costs,

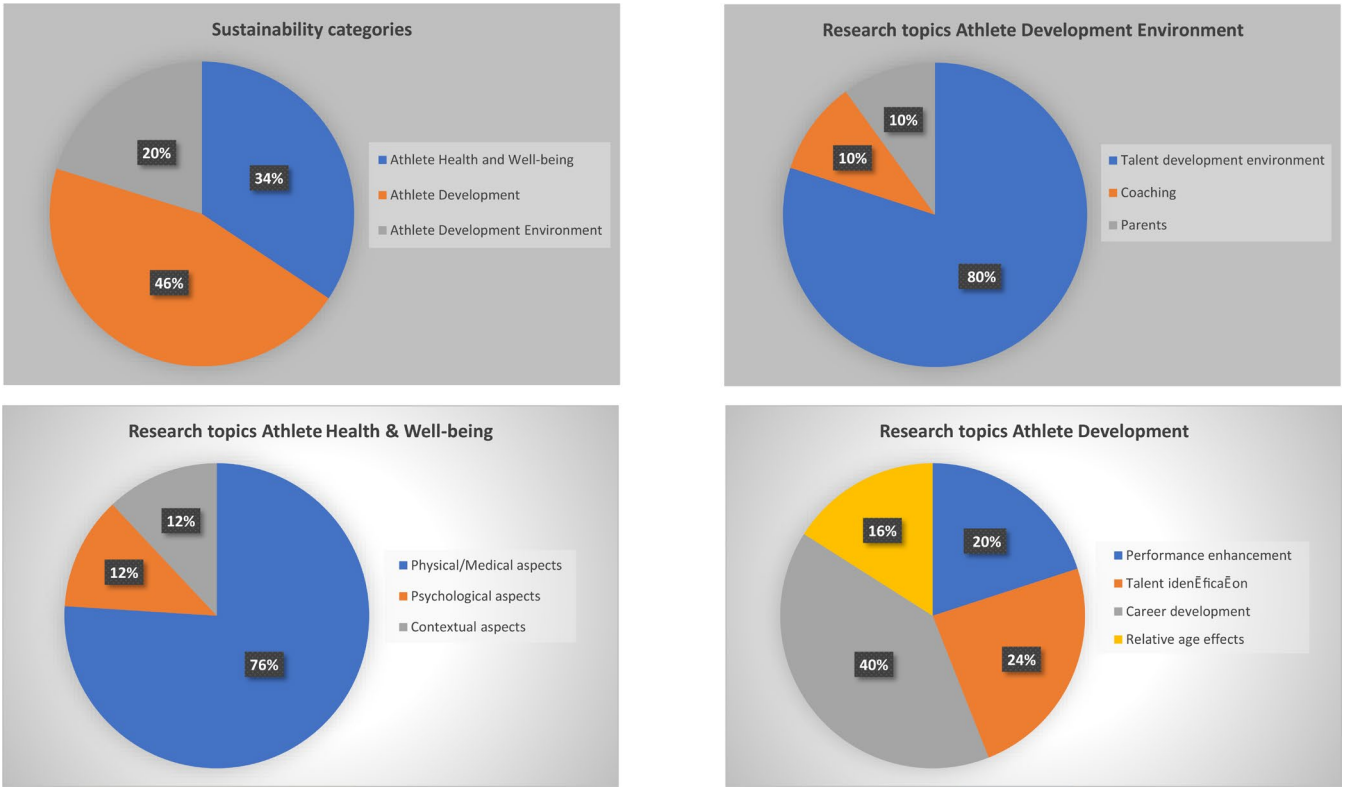

FIGURE 3 | Research themes and sub-topics in the current literature on social sustainability in elite youth sports.

mitigated susceptibility to overuse injury, and prolonged engagement." While not an explicit definition, social sustainability is often used in this article with the aim of qualifying a form of career longevity and reduced health risks in athletes.

In a cross-sectional qualitative study, Schubring and Thiel (2014) interviewed young athletes about their experience of growth and maturation and conceptualized "growth problems" as an "unsustainability problem". They suggested "that sustainable development in elite youth sports implies the care of adolescent talents' health and well-being, and the creation of conditions that allow them to safely develop and stay in the sport for as long as they desire—without physical damage later in life." (Schubring and Thiel 2014, 79). Their understanding of sustainable development relates to practices of care and conditions that allow for athlete health and well-being, longevity of development and participation, but also athlete agency.

In most of the reviewed literature, the term "sustainability" appeared only in the introduction and/or in the conclusion. In these sections, the term was either used to problematize a lack of social sustainability or to highlight a need to better sustain performance, health, or career development. None of the identified articles explicitly referred to social sustainability or social dimensions of sustainability, nor did they refer to the UN's SDGs in general or to specific SDGs.[1] In most of the studies, social sustainability was not the prime focus, but was investigated indirectly. In other words, the reference to sustainability functioned as a descriptive or predictive factor and/or variable that might either support (positive approach) or hinder (negative approach) sustainable development of elite youth sports.

RQ2. Which Key Thematic Areas, Approaches, and Levels of Social Sustainability Can Be Identified in the Current, Disciplinary Research on Elite Youth Sports?

Three larger thematic areas were identified in the literature (see Figure 3 and Supporting Information 3): athlete development (AD, 46%), athlete health and well-being (AHW, 34%); and athlete development environments (ADE, 20%). In each of the thematic areas, articles could be grouped into sub-topics. Articles in the AD group examined the topics of career development (40%), talent identification (24%), performance enhancement (20%), and relative age effects (16%). In the articles focusing on AHW, physical/medical aspects (76%) were identified as the main research focus, along with psychological (12%) and contextual aspects (12%). Finally, in the group of ADE articles, the topic of talent development environment dominated in a number of articles (80%), while coaching (10%) and parents (10%) appeared as new, yet minor, areas of interest (see Figure 3 thematic areas and sub-topics).

Twenty-nine percent of all of the articles included in the study focused on approaches that contributed to socially sustainable development such as career development, performance enhancement, or athlete health. Another 32% provided findings on both risks and facilitating factors for sustainable development. A final 39% reported only particular reasons for social unsustainability, such as risk of injury. While this distribution of approaches for socially sustainable development in elite sports appears well-balanced at first glance, a closer look at the three different groups of articles revealed significant differences. For example, in the AHW group of articles,

TABLE 1 | Overall evaluation of research on social sustainability in elite youth sports.

	Gender (%)				Approach (%)			Levels (%)				Methods (%)		
Group	**m**	**f**	**b**	**ns**	**P**	**N**	**B**	**AR**	**CAA**	**OS**	**SSS**	**Quant**	**Qual**	**Mixed**
All ($n=99$)	45	8	38	9	29	39	32	46	26	24	4	65	32	3
ADE ($n=20$)	60	0	35	5	35	15	50	30	30	38	2	20	80	0
AHW ($n=34$)	35	15	44	6	21	62	17	57	14	26	3	85	9	6
AD ($n=45$)	44	7	36	13	33	31	36	48	30	17	5	68	29	3

Abbreviations: ADE = Athlete Development Environment category articles; AHW = Athlete Health and Well-being category articles; All = All articles; AR = athlete-related; B = both (positive and negative) approaches; b = both sexes; CAA = community around athlete; f = female only; m = male only; Mixed = mixed methods; N = negative approach; ns = not specified; OS = Organization of sport; P = positive approach; Qual = qualitative methods; Quant = quantitative methods; SSS = society sport is situated in.

a more pathogenic approach prevailed with a focus on the aspects that hindered socially sustainable development and/or contributed to pain and injury. Otherwise, in the cluster of articles about ADE, barriers played a more marginal role and enhancement of socially sustainable development was important (see Table 1).

When considering how scholars researched the various aspects of socially sustainable development in the context of elite youth sports, we found that a micro-focus on the athlete (athlete-related, AR), such as their injury experiences, health status, ability to cope with stress, or age, dominated the AHW and AD groups. In contrast, in the research studies grouped under the theme of ADE, research was more evenly distributed across ecological levels. Articles focused on the organization of sports (OS), investigating, for example, sport-specific talent identification and development models, or organizational support and funding for athletes dominated in this group. These themes were closely followed by research that equally addressed the community around the athlete (CAA), such as coaching styles and practices, parental support, or team cultures and research around the athlete (AR). Hardly any of the identified articles investigated the social and cultural characteristics of the societies in which elite youth athletes and groups were situated (SSS), including, for instance, gender norms or a distinct sport and performance culture (see Table 1).

RQ3. How Is the Social Dimension of Sustainability Studied With Regard to the Types of Sports, Gender, Dis/Ability, and Methodology?

We found great variety across the literature in the different sporting contexts studied (see Supporting Information 3). Overall, 50 different sports were studied in the 99 articles (see Supporting Information 4). Soccer was the sport most commonly researched (19%). Individual sports, such as track and field and swimming, were also represented. Disability was also represented in one article on youth athlete development in parasport (Storli et al. 2022). We found differences in the variety of sports studied in the three subgroups: literature in the ADE and AHW groups contained the largest variety of sports ($n=41$ and $n=39$) and studies in the AD group contained the lowest ($n=21$). There was variation in the main sports studied within the categories, with soccer receiving the most attention in all categories (see Figure 4) while about 23% of the sports (e.g., cricket, diving and ski jumping) were studied just once (for overview see Supporting Information S3).

Of further interest was the question of how women's and men's sports are represented in current research and the extent of gender equality in the studies. We found a clear gender difference, with 45% of the articles only studying male athletes, compared to 8% that only studied female athletes; 38% of the articles studied both male and female athletes. Gender was not specified in 9% of the studies. This gender difference was also consistently found within the thematic subgroups (see Table 1).

Regarding research methodology, about two thirds of the studies (65%) used quantitative methods, and most of the remaining studies (32%) employed a qualitative method. Only two studies were found that used mixed methods. Researchers tended to stay within a disciplinary paradigm with respect to their choice of methodology (either positivist for the natural sciences and post-positivist/constructivist for the social sciences).

Furthermore, there was a lack of integration between the social and natural sciences and little interdisciplinary work, despite long-standing advocacy for integrated research approaches to issues such as athlete health and well-being and talent development (Hausken-Sutter et al. 2021). This interpretation is further emphasized when looking at the group of AHW articles, where almost all studies used a biomedical and quantitative approach. In contrast, in the ADE group, more than two-thirds of the studies had a social science perspective and were conducted using qualitative methods (see Table 1).

5 | Discussion

In line with our intention to identify and synthesize the current disciplinary research on social sustainability in elite

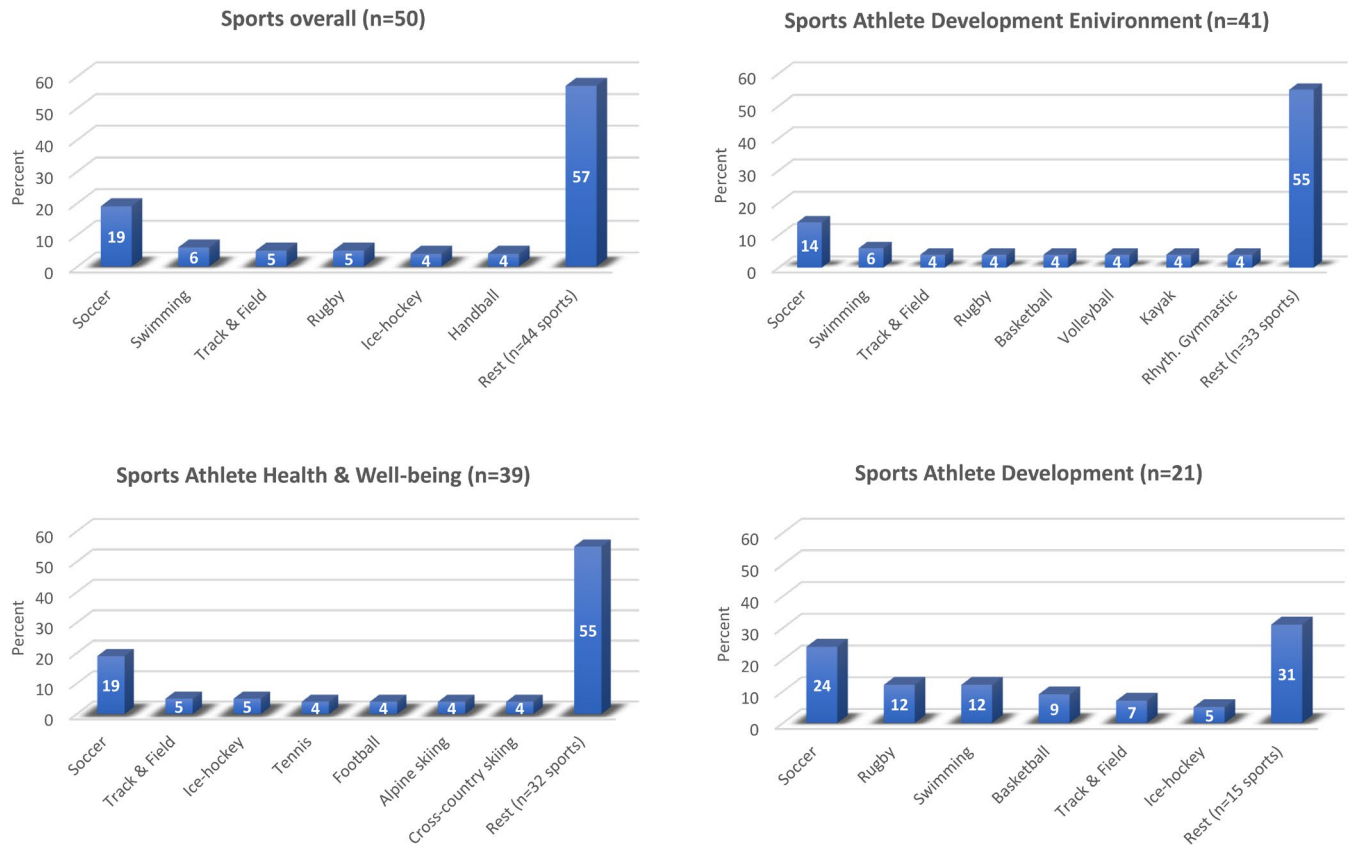

FIGURE 4 | Sports investigated in the reviewed literature on social sustainability in elite youth sports.

youth sports, we will discuss key findings for each of the three research questions, as well as their implications for research and practice.

5.1 | Conceptualizing Social Sustainability

In terms of the conceptualization of the social dimensions of sustainability in research on elite youth sports, we found an absence of definitions and conceptual clarity in the extracted papers. Furthermore, social sustainability was rarely part of the studies' primary focus and was only investigated indirectly. Scholars researching elite youth sports thus tended to use sustainability, sustainable development, and related terms as "buzz words" to argue for the relevance and/or implications of their research. Critical engagement with the social sustainability concepts is largely absent in the literature.

In addition, there is no explicit connection to the wider social and academic discussion about socially sustainable development. In only two of the 99 articles (see Supporting Information 2) could we find explicit definitions and connections to the ongoing conceptual work on the meaning of (social) sustainability. Interlinkages with theoretical work and policy surrounding sustainable development and the SDGs are missing.

This finding can potentially be explained by the fact that our search strategy excluded purely conceptual/theoretical papers, articles on senior elite sports, sports for all, and physical education in order to focus on empirical research on elite youth sports. However, it also demonstrates that the conceptual work that has been done in and outside of sports science (e.g., Barker et al. 2014; Lindsey 2008; Loland 2006; Wals and Jickling 2002) has not yet been systematically picked up in the research on elite youth sports. It also supports the idea that sustainability research is still an emerging field in sports science, including youth sports and physical education (Fröberg and Lundvall 2021).

We found that some of the studies used the terms *holistic* and *ecological* instead of *sustainable* to frame long-term athlete development processes or athlete-centered talent development environments (Henriksen et al. 2022; Larsen et al. 2014; Mitchell et al. 2021). This terminological parallelism may reflect the fact that sustainability science has not emerged within sports science and instead has been adopted from wider societal and academic developments (Barker-Ruchti and Purdy 2023; Lohmann et al. 2024; Loland 2006). Establishing a conceptual relationship between the different terms will be important to allow for better dialogue between these two lines of research.

The findings regarding research question one underscore the lamentable fuzziness of sustainability in general (Lindsey 2008; Purvis et al. 2019; Sartori et al. 2014), and the lack of attention paid to clarifying the meaning of social sustainability more specifically (Boström and Micheletti 2016; Wolsko et al. 2016). A lack of conceptual clarity is a frequent problem in different fields of research and in sustainability science in general (Klaperski-van der Wal 2022; Reeves et al. 2011; Salas-Zapata and Ortiz-Muñoz 2019). The resulting ambiguity has several challenging implications: it hampers the development of a robust base of

knowledge about the conditions for and effects of social sustainability in elite youth sports. Such knowledge is, however, essential for effective policy- and decision-making as well as for a transformation of work among sports organizations, coaches, and other stakeholders. It complicates the further development of the research field and of methodologies suited to advancing the knowledge and practice of sustainable development in elite youth sports.

Furthermore, there is a risk that sports science research on social sustainability disconnects from the wider field of sustainability research and policy. Such development is unfavorable from both a scientific and practical perspective. It makes it more difficult to demonstrate how and under which conditions (elite youth) sports can play a role as a potential contributor to a more sustainable development of society (UN 2015) and in which areas strategic support (e.g., funding, expertise, collaboration) is needed to bring about change. Against this backdrop, we see an urgent need for the development of a theoretically based and empirically tested understanding of social sustainability in elite youth sports.

5.2 | Social Sustainability Areas, Topics, and Approaches

We found an extremely broad field of studies reflective of the multidisciplinary nature of social sustainability (see Supporting Information 3). The studies were placed into three larger groups through iterative loops of thematic analysis. The largest group, making up close to half of the articles, was studies on athlete development (AD), followed by research on athlete health and well-being (AHW), and athlete development environments (ADE). Each topic was found to contain three to four different sub-topics (see Figure 3).

Studies pooled into the athlete development group were found to come from both the social and natural sciences. These studies represented a balanced mix with regard to their approaches to social sustainability (see Table 1). Some of the studies only identified aspects supportive of sustainable development; others focused only on barriers/risk factors, and a third of the studies included findings on both support and risk factors. Studies examining *career development* were the most substantial in number, followed by a relatively equal distribution of studies on the topics of *talent identification*, *performance enhancement*, and *relative age effect*.

Together, these studies covered several aspects of the life cycle of youth athlete development in elite sports, including entry into sports (talent identification, relative age effect), training (performance enhancement), and development over time (career development). Differences in the prominence of the four sub-topics in this group were less stark compared to the other two groups (see Figure 3). These differences might be method-related. While career development research can be conducted using smaller samples of athletes and have a retrospective design (De Bosscher and De Rycke 2017; Schubring et al. 2022), research on talent identification and relative age effect usually requires a substantial number of participants and should preferably be conducted prospectively to yield meaningful results (Abt et al. 2020; Berger et al. 2012).

The dominance of studies on team sports in these two sub-topics (talent identification and relative age effect) may consequently be connected to methodological requirements as well as to the fact that financially well-off team sports like soccer or ice hockey—notably men's sides—have professionalized talent identification and development. In the four sub-topics of youth athlete development research, there was a strikingly narrow focus on sports- and performance-related aspects of youth athlete development. Aspects relevant to the holistic development of youth athletes were marginally represented in the reviewed literature. Exceptions were found in the research on career development, which addressed aspects such as dual careers in education and sports, social relations, and youth culture. The finding that research on the holistic development of young athletes is scarce, confirms the long-standing focus on performance enhancement in research on elite sports (Molan et al. 2018). Alarmingly, this trend continues to persist in the current research on youth athletes with a focus on social sustainability.

In the athlete health and well-being group, studies primarily derive from biomedical research and, unlike the other two groups, their approach to social sustainability is clearly more pathological. Here, the focus is on factors that risk jeopardizing the health and well-being of youth athletes (see Table S2). The majority of these studies fell within the sub-topic of *physical/medical aspects*. Risk-of-injury studies clearly dominated over other health issues like relative energy deficiency in sports, concussion, or preventive training protocols. Studies investigating *psychological aspects* (e.g., anxiety, well-being) and *contextual aspects* (e.g., environmental demands) make up a marginal but equally sized proportion of the articles focusing on athlete health and well-being (Figure 3).

The clear dominance of risk-of-injury studies can have several explanations: First, elite youth athletes find themselves in a distinct "risk zone" for physical overload, pain, and injury given the concurrency of increased training and competition on the one hand, and growth and maturation processes on the other (Bergeron et al. 2015; Schubring and Thiel 2014). Second, in elite sports research, health is still often reduced to a physical state (the absence of injury and illness) rather than being conceived as a multidimensional process (Hausken-Sutter et al. 2021; Thorpe et al. 2021). The mental health needs of youth who participate in elite sports have so far received less attention than those of professional adult athletes (Vella et al. 2021; Walton et al. 2024). Third, the funding of biomedical research is, in the authors' experience, often better resourced, established, and legitimized within elite sports than social science research on health and well-being. Few of the studies in this group examined preventive training protocols and educational programs, despite long-standing calls for the need for this kind of knowledge in elite youth sports (Frisch et al. 2009). Reasons for this discrepancy may lie in the complex methodological demands of intervention studies trialing such programs (Emery et al. 2015), as well as the short-term logic of research funding (Hedstrom and Gould 2004).

In the group of studies looking at the athlete development environment, research on *talent development environments* largely dominated. Studies specifically investigating the role of *coaches* and *parents* of elite youth athletes each made up a marginal but

equally sized proportion of the studies that were included in this review. We interpret this topic distribution to be the result of a strong and growing interest—notably in the social sciences of sport—in understanding the make-up and workings of successful talent development environments as a whole, rather than in focusing individually on different actors (e.g., coaches, clinicians, sports psychologists).

Furthermore, we anticipate that, with the growth of academies and investment in professionalized talent development environments for youth athletes (Bergeron et al. 2015; Waldron et al. 2020), increased research attention is being paid to these environments. The small number of articles identified in this review on the role of coaches is, however, surprising—given they are key actors in elite youth sports. However, as our search string did not contain the term *coach**, it is logical that the number of hits in this regard was limited. Additionally, studies on parenting youth athletes are a recent phenomenon, which may explain the small number found in this review. In line with the distribution of topics, we need to stress that social science research prevailed in this thematic group and that a considerable number of studies adopted a purely positive approach to social sustainability or investigated both supporting factors and barriers.

In summary, we stress the following two aspects with respect to research question two:

First, in terms of Lindsey's (2008) levels of sustainability, studies focusing on youth athlete-related, micro-level aspects of social sustainability clearly dominated in the reviewed articles. This focus is particularly prominent in the literature on youth athlete health and well-being and athlete development. Less attention was paid to contextual and macro-level influences such as the community around the athletes, sports organizations, or societal conditions—except for the studies grouped under athlete development environment in the extracted literature. This individualistic perspective and the gap in knowledge that results from it are consequential: it hampers the design of multilevel strategies and hence the development of social sustainability in elite youth sports (see e.g., Jacobsson et al. 2018).

Second, the included articles focused more often on aspects that jeopardize social sustainability than on preventive measures or on aspects that promote it. Nevertheless, there is a substantial number of studies which have identified conditions for sustainable careers, athlete health, and performance development in elite youth sports (e.g., injury prevention training, athlete-centered coaching, provision of organizational and financial support). Such knowledge requires in-depth analysis to draw conclusions for practice and to harness insights for the design of transformative interventions.

5.3 | Diversity in Social Sustainability Research

The synthesized disciplinary research on social sustainability reveals a skewed representation and biases when it comes to the types of sports, gender, dis/ability, and methodology (see Supporting Information 3). The reviewed studies contained a wide variety of sports—including winter and summer, individual and team, Olympic and non-Olympic (see Supporting Information 4). However, the most frequently researched elite youth sports were those that were either large in number, resources, and media attention, or that had professionalized youth academies and training environments (soccer, track and field, ice-hockey, handball, rugby) or that allowed for early specialization (swimming, rhythmic gymnastics).

Soccer and team sports clearly dominated, notably in the athlete development research where less variety was found in the sports studied (see Supporting Information 4). The inequalities in the representation of sports confirm the findings of a recent systematic review of 699 sport medical studies (Paul et al. 2023).

Likewise, the sample of participants/sports in the reviewed studies demonstrated a skewed gender distribution (see Supporting Information 3). Less than 10% of the studies explicitly involved girls/girl sports only. A mixed gender representation was more frequent in the research on athlete health and well-being than in the other two areas. We interpret this finding to be an effect of (elite) sports being traditionally a male domain (Fraser and Kochanek 2023). Even if girls tend to be better represented in membership statistics today, inequalities remain in the distribution of resources, expertise, and access to facilities and equipment. Furthermore, in many sports (e.g., soccer, ice-hockey), men's sports are more professionalized and commercialized. These inequalities are likely to influence the availability of data and participants and thus also the number of studies on and knowledge gained about girls' (and women's) elite sports.

When comparing the identified gender inequalities (see Table 1) to the findings by Paul et al. (2023) on the representation of male versus female athletes in sports medicine research (71% male athletes only, about 9% female athletes only, and about 20% both male and female athletes), the inequalities we found were more moderate. This may relate to the multidisciplinary nature of our review, but is more likely due to our focus on elite youth sports. Gender inequalities in the research on elite athletes have been found to increase as the level of performance rises and may decrease or even be reversed for studies on youth sports (Paul et al. 2023). Overall, the gender distribution in the literature conflicts with SDG 5 to achieve gender equality, and the skewed knowledge base is likely to perpetuate this inequity.

In addition to a skewed representation of sports and gender, we also found that research into parasports and the inclusion of youth with an impairment was close to zero ($n = 1$). Ethnic minority youths were either absent or not identified in the studies. This underrepresentation clearly violates SDG10. The lack of research on parasports may relate to the fact that it is a young field of study, with few of its scholars having yet adopted a sustainability lens. Furthermore, para-athlete development practices, pathways, and systems are distinct and do not systematically focus on youth, since athletes do not join parasports until they are adults (Dehghansai et al. 2022). However, research on young athletes with an impairment has the potential to make a significant contribution to our understanding of the equity dimension of social sustainability.

In terms of methods, quantitative studies clearly dominate the literature, especially within the group of studies on athlete

health and well-being (see Supporting Information 3). The reverse is true for studies on athlete development environments. Qualitative study designs are the most common. It is striking that, despite repeated calls for more trans- or multidisciplinary research in elite sports (Burwitz et al. 1994; Schofield et al. 2020), we found the reviewed literature to be discipline specific. This can be useful for addressing discipline-specific questions, but "may not provide the necessary tools to fully understand and address complex scientific and societal problems" (Stokols et al. 2013, 5).

5.4 | Limitations

In addition to issues surrounding skewed representation, systematic searches in different databases can be limited in nature. Even though we searched five databases for this study, there may be additional articles in other databases that we did not identify. In addition, there may be articles published in languages other than English that could have been included. Still, we believe the search described in Figure 2 covers many different databases from different fields, which is a strength. Further, the sample of the 99 reviewed articles still covers a broad range of non-English speaking countries, which gives assurance that our findings are based on a diversity of geographical and/or sporting contexts (see Supporting Information 3). In this manuscript, we have defined social sustainability as "an evolving product and as an engaging process" (Wals and van der Leij 2007, 18) which in the context of elite youth sports includes the fostering of youth athletes' health and well-being and continued holistic athletic and psychosocial development, and the promotion of sporting environments that are equitable, empowering, and caring (Barker et al. 2014; Loland 2006; Schubring and Thiel 2014). Other contexts, however, may need different definitions of social sustainability (UN 2015; WCED 1987).

6 | Conclusion

The aim of this systematic scoping review was to identify and synthesize the current disciplinary research knowledge regarding the sustainable development of elite youth sports with a specific focus on social dimensions. Following the PRISMA guidelines, we searched a set of five different disciplinary databases using a comprehensive search string and, in a systematic double-blind process, screened the 1157 hits which we found for the time period 2012–2023. The 99 full texts included in this review were analyzed using three guiding research questions.

A key finding was a lack of conceptual clarity regarding social sustainability, a multidisciplinary field of study with distinct thematic areas of research which, however, mostly focus on athlete-related micro-level aspects and much less on the organizational and societal dimensions of social sustainability in elite youth sports. Lastly, the current knowledge base was diverse in terms of the sports studied, but clearly focused on young male athletes as well as able-bodied sports and athletes. Quantitative and traditional methodologies were mostly used. Based on the insights gained, we want to end by providing six conclusions with respect to the implications of our findings for researchers.

First, the development of a theoretically based and empirically tested understanding of social sustainability in elite youth sports is needed to meet a number of requirements to:

- Account for social sustainability being both a process and a goal involving athletes, sporting communities, organizations, and society,
- Be specific to the field of elite youth sports,
- Allow for further specification with regard to diverse local sporting contexts,
- Enable a democratic approach to the way that research accounts for the perspectives of key stakeholders, such as athletes, coaches, support staff, and sports organizations, and
- Be integrative regarding congeneric concepts in research on elite youth sports (e.g., athlete-centered, caring, ecological, holistic, etc.).

Second, to gain a more comprehensive understanding of the ways for elite youth sports to foster athletes' health and well-being and to become more equitable, empowering, and caring for young athletes it is important to balance quantitative with qualitative methods to enrich the understanding of subjective experiences and social contexts. In addition, longitudinal intervention studies are needed to make the necessary step from mostly descriptive and predictive knowledge (research) toward causal research to understand and design athlete development systems that are socially sustainable. For these types of studies to be possible, collaboration with, and understanding from sports organizations is key. Finally, we advocate for research that is cross-disciplinary, transdisciplinary, or multidisciplinary as these approaches, which integrate conceptual, theoretical, philosophical, and methodological perspectives, have the potential to provide an enhanced understanding of the phenomenon and identifying socially transformative solutions (Hausken-Sutter et al. 2023; Whitley et al. 2022).

Third, in order to overcome the narrow performance enhancement focus of the current base of knowledge, research is needed to address aspects of the holistic development of young elite athletes.

Fourth, more attention needs to be paid to contextual and macro-level influences, such as the role and responsibilities of the community around the athlete (e.g., coaches, parents, and peers), the organization of sports (e.g., clubs, federations, schools), the social conditions (e.g., policies, national legislation, educational systems, cultural norms), and the development of inner skills needed for sustainable development, such as caring for others, collaboration, and enabling change (Jordan 2021).

Fifth, in order to ensure that stakeholders have the knowledge and tools available to lead the transformation processes for social sustainability (in partnership), research-based knowledge is needed regarding the implementation of preventive measures, through programs and promising practices, that contribute to social sustainability in elite youth sports.

Sixth, organizational conditions and funding programs should be created to increase trans- or multidisciplinary research that

integrates methods and disciplinary perspectives, as well as include young female athletes, young athletes with an impairment and/or from marginalized backgrounds, as well as less resourced and mediated sports.

Seventh, drawing on Lindsey's (2008) four-tiered conception of sustainability, we suggest thinking of social sustainability in elite youth sports as a multilevel process and product. This involves the establishment of short- and long-term social SDGs as well as the development of inner skills in different stakeholders to address the dilemma of balancing performance enhancement, success, equality and the athlete's health and well-being on an individual, community, organizational, and institutional level.

Finally, while our literature review has focused on the social dimensions of sustainability in elite youth sports, it should be emphasized that sustainable development encompasses the ecological (e.g., biodiversity), the economic (e.g., circularity), and the environmental (e.g., climate and energy) dimensions. We contend, however, that the ethic of care for self, others, and the future that underpins sustainable development necessitates the foregrounding of the social dimension. This foundation ensures that elite youth athletes can develop athletically while enjoying their participation, being healthy and well, and positively developing psychosocially in an equitable, empowering, and caring environment.

Endnotes

[1] We are aware that articles published prior to the release of the Agenda2030 in 2015, cannot be evaluated against this criterion.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.