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Playing small, winning big: the contribution of sports to sustainable future climate solutions

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ABSTRACT

This article aims to support sports and sustainability practices and research by describing an investigation of climate-related issues and exploring the sports industry's capacity to promote climate action. The research involved the construction of a comprehensive sustainability framework for sports and identified components that may function as stages or indices of development in the Degrowth transition. The study describes how backcasting and the Delphi technique were used with a group of stakeholders, including sports and media managers, athletes, fans, academic experts, and federation executives, to explore the sustainability aspects that will influence the future of sports. The findings highlight the significance of balancing sports and technological development, including in the application of self-imposed limitations, while adopting a localized approach to reevaluating the role of sports in combating climate change. The findings underscore differing perspectives about the impact of technological changes and the role elite athletes should play in tackling such urgent challenges.

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Elite athlete; climate change; Degrowth; sport; strong sustainability; wellbeing

Introduction

Sports have a compelling influence and are a predominant facet of popular culture worldwide, engaging billions of participants and spectators (Miller et al. 2003). Sport ranks among the most competitive and dynamic subsystems of human activity that occur within the economic framework (Köves, Szathmári, and Herr 2021), having experienced rapid global expansion along with the economic system (Thibault 2009) and exerting both socio-economic and global impacts alongside local effects (Lawson 2005). For many years, people have lauded sport for its capacity to unify people, dismantle cultural boundaries, and inspire generations (Vail 2007). Sporting events create venues where individuals can unite to relish the excitement of competition, celebrate the rewards of victory, and endure the anguish of defeat (Coakley 2015). The exhilaration associated with athletic success suggests that there is considerable potential for using sports as a catalyst for social and environmental change

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(Casper, Pfahl, and McSherry 2012). Therefore, we explore the significant influence that sports may exert in promoting climate action and tackling climate-related challenges, particularly if sustainability is prioritized at major sporting events.

Due to the rise in greenhouse gas emissions from human activities, climate change has emerged as one of the most pressing challenges of the twenty-first century (Dingle, Dickson, and Stewart 2023). The rapid and significant alterations in our environment are resulting in changes to temperature, precipitation, and weather patterns, among other phenomena (Stott et al. 2016). Climate change is a well-established phenomenon that is becoming increasingly severe, with associated repercussions (IPCC 2022). The substantial growth of the human population in the last century is a fundamental driver of this. Another is the excessive technological exploitation of non-renewable resources, resulting in their exhaustion (Khan, Hou, and Le 2021).

The sports industry has started to recognize its contribution to environmental challenges (Loewen and Wicker 2021; McCullough, Orr, and Watanabe 2020; Wicker 2018; Wilby et al. 2023) through promoting innovative solutions that have a bidirectional relationship as global temperatures increase and extreme weather occurrences escalate (Orr and Inoue 2019). Those engaged in sports have a duty to mitigate their environmental impact and safeguard the natural environment that sport affects, irrespective of the magnitude of the latter, just as individuals participating in sport, recreation, and physical activity should minimize their ecological footprints (McCullough 2023). Sports event management has consistently transformed over the last fifty years in reaction to increasing concerns about environmental conditions and their impact on human activities, similar to other industrial sectors (Dingle and Mallen 2020; Ross and Orr 2022). The United Nations (UN) asserts that the various interconnected activities, such as the construction of sports infrastructure and personal sports practices, influence the environmental impact of sports (UN 2022).

Historically, sports have involved a disregard for nature (Thibault 2009) and fostered over-consumption *via* international competitions, sports tourism, and the connection between top sports and commercial media and sponsorship (Smith and Stewart 2010). This perspective is grounded in the conventional understanding of sportification, which entails the transformation, structuring, and governance of outdoor settings and natural landscapes to facilitate sports and recreational activities. This embodies the traditional conception of nature as an unlimited resource for fulfilling human desires (Carlsson 2019; Loland 2013) and as a potential revenue source. Organized sports depend on a diversity of resources, extensive infrastructure (Mallen et al. 2010), mass tourism, and substantial merchandising (Fourie and Santana-Gallego 2011). In parallel with the increasing climate-change-related impacts of organized elite sports entities worldwide (Orr et al. 2022), critiques of the sports industry's weak environmental performance (Eriksen 2021; Gammelsæter and Loland 2023), lack of related action, and negative effects on players' health and safety have strengthened (IPCC 2022).

Theoretical background

Degrowth: prioritizing human well-being over economic growth

In light of the escalating climate change crisis, societies are progressively prioritizing ecological considerations in economic discourse. Ecological economics and degrowth reinforce

a sustainability rhetoric, highlighting the constraints of natural systems (Hall 2012). While neoclassical economists maintain the need for the centrality of economic growth to achieve sustainable development, alternative research fields suggest new approaches to social and economic institutions for establishing a more equitable economy concerning environmental and social factors (Kallis, Kerschner, and Martinez-Alier 2012; Latouche 2009). The fundamental idea of elevating the natural environment and human well-being ahead of economic growth involves an emphasis on shifting to more equitable, localized, and sustainable lifestyles, creating an alternative path toward sustainability (Latouche 2009), where communities can improve the human experience, build resilience, and lessen environmental damage by reducing production and consumption (Martínez-Alier et al. 2010).

From an ecological economics perspective, degrowth means a fair and socially sustainable decrease in society's throughput (Videira et al. 2014). Accordingly, the following three main goals have been identified – as incorporated in the motto 'less stuff, more happiness' (Jackson 2009) – reducing the negative effects of human activity on the environment, redistributing income and wealth, and accelerating the transition from a materialistic to a socially cohesive and participatory society (Research & Degrowth 2010).

The concept of degrowth offers a valuable framework for reevaluating humanity's connection to the environment, production, and consumption and stimulates discourse about alternatives (Parker, Fournier, and Reedy 2021). It is crucial to explore the viability of alternative economic systems grounded in non-growth principles and to examine the prerequisites for a non-growth-oriented existence that challenges the prevailing economic paradigm (Szathmári and Kocsis 2022).

This also applies to the world of sports. The organization, practice, and consumption of sport must respond to climate change by incorporating aspects of sustainability. The sports industry is a particularly intriguing sector in relation to the transition, as sporting activities often involve a merger of the civil and public sectors associated with distinct social objectives (generating significant social benefits such as community development, social identity formation, and the protection of health; Westerbeek 2010; Szathmári 2017), yet represents a predominantly profit-driven business sector characterized by explicit financial aims (Waardenburg 2016).

Hall (2012) defines three sustainability paradigms that we may apply in the examination of the relationship between environmental sustainability and elite sports organizations. The three types of sustainability are i) steady-state or degrowth (originating from ecological economics), ii) balanced (associated with the triple bottom line), and iii) economic (stemming from neoclassical economics). Degrowth is rarely attempted (and is opposed to traditional sustainability concepts as it promotes sufficiency over efficiency and aims at reducing consumption through market and regulatory mechanisms when possible), while the economic and balanced sustainability approaches have not been successful. Additionally, to address the challenges posed by climate change, sports leadership should incorporate self-imposed limitations on elite sports, as sporting events are subject to specific regulations. This proposal refers to the specification of the voluntary limitations that athletes, teams, organizations, or governing authorities may impose to foster ethical principles, athlete well-being, ecological responsibility, and equity. These constraints seek to mitigate the tremendous demands and competitive dynamics of top sports, which frequently result in excesses and have adverse consequences (Backman and Svensson 2023; Svensson et al. 2023). Degrowth also seeks to promote compliance with the limits on the planet's resources

while challenging the generally held notion that never-ending economic expansion is desirable and attainable (Daly 2014). However, what remains unclear for the sports sector is how sufficiency may be understood and how it can play a role in the future.

In the context of the Degrowth framework, this article aims to clarify how sports can become a dedicated arena for addressing climate change and urgent environmental issues and the role of the sports industry in this, considering sports as a global and influential aspect of popular culture with socioeconomic and global implications. The study explicitly seeks to make three conceptual advances in the realm of sports and sustainability practice and research: It examines climate-related concerns and explores how the sports industry may facilitate climate action; it facilitates the implementation of the robust sustainability paradigm in sports; and it identifies elements that could serve as indicators of progress in the Degrowth transition. To accomplish these goals, it employs backcasting and the Delphi framework to identify the sustainability components that a group of stakeholders (specifically, athletes, sports managers, and sports academics) consider relevant in their deliberations on the future of sports.

Method and material

The quest for sustainability necessitates unorthodox thinking. Hence, creative approaches should guide the research strategy. Furthermore, to solve a complex problem like sustainability, moving beyond mainstream approaches requires the ability to let go of the dominant frame of mind because our perceptions of what is attainable, desirable, and achievable in the future significantly affect our current actions and decisions. Consequently, Rotmans et al. (2000) suggest developing visions using a participatory approach to incorporate as many diverse perspectives as possible. To meet these requirements, we adopted a qualitative approach that focused on stakeholders' and experts' visions of a sustainable future and included backcasting and Delphi as appropriate futuring techniques (Robinson 2003).

Participatory mixed-method approach

The Delphi questionnaire methodology relies on expert views and is conducted over a minimum of two rounds. Participants get information on the outcomes of prior rounds in the subsequent rounds, enabling them to adjust and enhance their perspectives based on the insights of others. Maintaining the anonymity of the Delphi panel that includes research experts is crucial to prevent personal bias or the influence of one dominant expert from affecting the impressions of other participants. The approach involves a facilitated conversation in which the rationale for more extreme viewpoints is articulated, feedback is regulated, and personal biases are limited. In the majority of instances, this results in consensus. The panel size is frequently limited (10–20), limiting the statistical significance awarded to outcomes. The real value of the process lies in the ideas it produces, even those that lack a clear consensus. The selection of experts for the survey is often done through the 'snowball' method, whereby one expert recommends others for inclusion. The objective is to assemble a diverse and extensive group of specialists (Gordon 1996).

In this mixed-method research, backcasting functioned as the foundational or first phase of the Delphi process and was used to formulate a vision, normative scenarios, and actionable

measures for establishing a sustainable vision (Köves, Szathmári, and Herr 2021). Thus, three interconnected phases made up the futuring research (see Figure 1).

Backcasting is a strategic planning approach that begins by establishing a desirable future. It subsequently establishes and analyzes policies and programs that may bridge that envisioned future to the present (Quist, Thissen, and Vergragt 2011). For participatory backcasting to be beneficial, stakeholders (in this specific case, supporters and elite athletes) must articulate their understanding of the issue and the preconditions, future objectives, and strategies for potentially achieving them. When Delphi is integrated with backcasting, these two methodologies can assist communities, organizations, and policymakers in addressing complex sustainability issues, identifying innovative solutions, and developing a strategy for advancing toward more sustainable practices (Wright, Cairns, and Bradfield 2013). The iterative nature of the Delphi technique allows backcasting scenarios to build and adapt to ongoing feedback. To achieve these goals, the Delphi method involves experts and stakeholders in cooperative, well-informed decision-making, while backcasting helps generate a visionary framework for goal setting.

Material

The effectiveness of participatory backcasting and the Delphi process depends on stakeholders communicating their understanding of the issue under analysis, their desires and goals for the future, and their paths to potentially achieving them.

In November 2019, for the backcasting, we selected a group of fifteen master's students interested in sports management or with experience with elite sports for a three-day workshop that used several backcasting methodologies. This ensured that comprehensive data was gathered to determine critical metrics of use in evaluating a sustainable vision of elite sport. Combining several participatory methodologies, participants developed a two-page

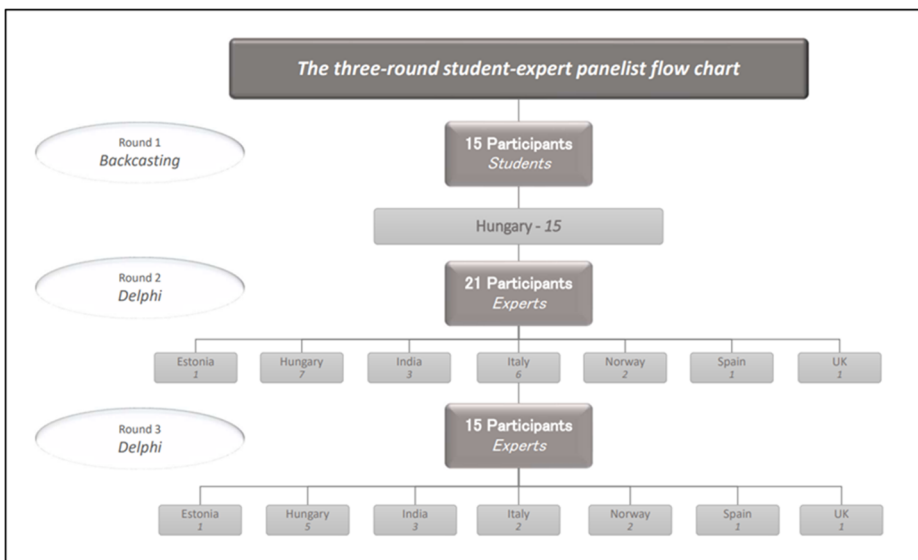


Figure 1. Stakeholders of the three-phase research methodology.

vision of sustainable elite sport, the basis for the Delphi expert study (see [Supplementary material](#) and Köves, Szathmári, and Herr 2021). An expert panel was selected for the Delphi steps in phases two and three of the research (as outlined in [Figure 2](#)).

Since the Delphi sample should incorporate the views of top experts in the field with as complementary backgrounds as possible, the survey utilized convenience sampling, a type of nonprobability sampling considered appropriate for this approach (Thompson 2013). The majority of members of the sample were well-known and respected industry experts with extensive professional networks; their participation in the sample was deemed significant because the goal was to identify as many different and well-reasoned viewpoints as feasible (Szathmári, Köves, and Gáspár 2024).

Four expert groups were taken into consideration: sports managers/federation members who usually organize international sporting events, sports media representatives, athletes, and academic scholars who frequently study issues related to the sports sector. We did not regard the type of sport as a critical factor, presuming that all sports experts had information pertinent to our study objectives. At the beginning of 2023, the Delphi study involved obtaining consent from 21 experts, including eight elite athletes from national sports federations, eight delegates from the sports management sector and media, five academic scholars, and representatives from Estonia, Hungary, India, Italy, Norway, Spain, and the UK. The indication that the sample size and representation were appropriate for the current investigation was meeting the criteria defined by Keeney, McKenna, and Hasson (2011). Despite in the spring of 2023 the invitation to contribute being extended to experts worldwide, answers were not received from all the targeted nations, which may restrict the research's global application. A further limitation pertains to the experts chosen to participate in the study. Their viewpoints may contrast with those of the individuals who opted not to continue to participate in later phases. Consequently, the findings may not comprehensively reflect those of all academic, sports media, and sports federation experts.

Characteristics of Delphi Panel Members (Round I)				
	Gender	Field	Work experience (Years)	Experience
A1	Male	Sports manager	30	Member of National Athletic Federation
A2	Female	Sports media representative	14	Sports Media expert, commentator, journalist
A3	Male	Sports manager	21	Media director
A4	Male	Sports media representative	12	Sports media expert, commentator, journalist
A5	Female	Sports media representative	20	Sports media expert, commentator, journalist
A6	Male	Sports media representative	10	Sports media expert, commentator, journalist
A7	Male	Sports manager	20	Media director
A8	Male	Academic expert	30	PhD
A9	Male	Elite athlete	20	National champion in rowing
A10	Male	Academic expert	12	PhD
A11	Male	Academic expert	16	PhD
A12	Male	Academic expert	34	PhD
A13	Male	Academic expert	10	PhD
A14	Female	Elite athlete	12	National champion in lawn tennis
A15	Female	Elite athlete	10	National champion in rowing
A16	Male	Elite athlete	11	Participated in multiple international water polo competitions
A17	Male	Elite athlete	10	National champion in ice hockey
A18	Male	Elite athlete	12	Represented country in rowing
A19	Female	Sports manager	30	Member of International Rowing Federation
A20	Female	Elite athlete	12	National champion in judo
A21	Male	Elite athlete	15	National champion in swimming

Figure 2. Attributes of Delphi panel participants (phase II, based on Szathmári 2024).

Strategies were employed to support the validity of the research, in conjunction with clarifying the researchers' assumptions (Maxwell 2013): (1) clarification of the research objective and the researchers' role in relation to the subject(s); (2) distribution of the theoretical framework, questions, and statements about sustainable visions to participants beforehand; and (3) an assurance of confidentiality in data management.

Participation in the research was voluntary as the human role is fundamental in this process, and the methodology emphasized inclusivity and the right to participate. Furthermore, owing to limited availability, the gender and age attributes of individuals included in the Delphi method did not conform to the requisite criteria (Robinson 2003), and the semi-structured nature of the study procedure may have led to a lack of diversity in interest representation. Consequently, there may have been constraints on the inclusion and variety of viewpoints in the research process that affected the efficacy of the decision-making outcomes (Szathmári, Köves, and Gáspár 2024).

The second and third phases involved requesting expert input on the sustainable vision. The iterative stage aimed to enable experts to refine the vision descriptions with fresh thoughts, feedback, and critiques. In contrast to a conventional Delphi study, this approach permits the descriptions to be modified between rounds. Although achieving consensus is a crucial component of data interpretation, the primary objective of the Delphi technique does not involve attempting to arrive at a consensus (Von Der Gracht and Darkow 2010).

The second phase was implemented in February 2023. During the second round of data collection, an overview of the main conclusions of the backcasting research was presented to the panel of experts. Furthermore, an open-ended survey was conducted (see [Supplementary material](#)). The panel of experts was requested to respond to questions and assertions about a sustainable vision for elite sports that would help mitigate climate change to enhance, corroborate, and broaden the problem definition. Following the compilation and evaluation of the first replies, a further poll, which included revised descriptions of the challenges, was distributed in the summer of 2023 to provide the Delphi panel with a thorough overview. The experts were instructed to answer each question correctly, and there was sufficient time for open-ended remarks (Szathmári, Köves, and Gáspár 2024).

Thematic content analysis was employed to evaluate the responses. Babbie (2020) defined content analysis as a type of descriptive research in which the investigator looks at a particular class of social artifacts, usually written documents. Content analysis aims to define or summarise content to identify key elements or highlight recurring themes. The first step was becoming familiar with the topic. Each response was examined several times, and preliminary ideas for themes were noted. The main themes associated with sports-related climate change dilemmas were finally extracted in the Autumn of 2023 following two rounds of Delphi meetings, and expert opinion was then used to categorize them. A specific identifier (A1–A21) was allocated to each responder to facilitate the tracing of remarks back to their source.

Results and discussion

This research was aimed at exploring whether sports can function as a unique platform for addressing climate change and pressing environmental challenges, with sports being viewed as a significant and influential component of global cultural identity with socioeconomic and international implications. The study investigates climate-related issues and assesses

the potential role of the sports industry in promoting climate action and identifying elements that might be used as Degrowth transition steps (see Figure 3). It also supports the integration of a comprehensive sustainability framework within sports and seeks to identify factors that could act as indicators in the Degrowth transition. Utilizing backcasting and the Delphi method, it aims to pinpoint sustainability elements relevant to stakeholders—including athletes, federation members, sports and media managers, and sports scholars—when contemplating the future of sports.

Balancing technological enhancement and decommodification

The majority of experts agreed that technological progress and access to technology are crucial in defining a sustainable vision and are likely to make the performance/continuity trade-off less of a dominant issue:

Technology is ambiguous; it all depends on how it is used. Innovative technologies can help to stimulate mass sport – the digital sharing of evidence-based exercise and training protocols, the stimulation of a sustainable sharing economy in sport, and the development of sustainable sports facilities (A12, academic).

The discussion of technology’s potential and risks has always been crucial to understanding humanity’s sustainability concerns (Kerschner et al. 2018).

Technology undoubtedly has the potential to make sports more enjoyable to play and consume/watch. However, the misuse of technology can potentially exacerbate sports’ negative environmental impact. Tech developments have tremendous potential to address some of sports’ environmental challenges and create more socially sustainable systems. However, I think technology alone cannot solve the sustainability challenge facing sports, and broader systemic changes are also needed to make a larger impact (A14, athlete).

For Muraca and Neuber (2018), technology is a way of being in the world and with other people because it embodies and shapes social relationships. Such tools are also meaning-bearers, power-reflectors, and frames for social practices and action. Illich (1973) asserts that a

Research stages					
			BACKCASTING	DELPHI 1	DELPHI 2
Main-, sub-categories, statements and consensus related to future visions	Technological enhancement and decommodification	Accessibility Commodification Mobility Virtual world	Technology serves as a resource, facilitating the realization of visions and enhancing the enjoyment of sports.	Advancements in information and communication technology can facilitate the development of more socially sustainable systems and partly mitigate the growing ecological pressures imposed on sports.	The impact of technology is nebulous; its application determines its outcome. Sustainability requires better embedding of human concerns into technological development.
	Athlete Well-being and Sportification	Consciousness Responsibility Sportification Well-being	Elite athletes should promote social and environmental responsibility through their inspiring and dedicated behaviour.	Determined and performance-driven careers may coexist, allowing athletes to exemplify balanced human beings who promote sustainable lifestyles for future generations.	Modifications of athletes' views and treatment are essential for improving the sustainability of professional sports and athletes. The focus should shift from impersonal results-centricity to prioritizing athletes' well-being.
	Relocalization	Event Organisation Multifunctionality Relocalization Sharing	Building strong communities by strengthening identity, leading by example, increasing local consumption and linking sport and education to the future of sport is a green alternative that is highly relevant in the world of sports.	(Re)localization can play a significant role in promoting sustainability in sports by leading to the more efficient use of resources and reducing waste.	Certain enabling factors are necessary to improve the involvement of local communities in sporting decisions. These include having publicly owned clubs, support from regional and national levels in terms of funding and knowledge sharing, and establishing dialogue with local athletes

Figure 3. Sustainable vision, main- and sub-categories associated with consensus.

harmonious society, characterized by minimal external control of tools, should be established to provide its members with maximal autonomy. Vetter (2018, 3) emphasized ‘the necessity of pursuing technologies that are not harmful to the environment’

I believe current technology neither ameliorates nor exacerbates the issue. [The issue of sustainability] pertains to our utilization of technology and the methods employed for resource consumption. (A8, academic).

In recent years, technology has played a pivotal role in training and competition (Tjønndal 2022) and driving sustainability initiatives within the sports industry, creating innovative solutions for reducing the environmental footprint (Mastromartino et al. 2020). Energy efficiency, data analytics, digital ticketing, and sustainable transportation solutions have all significantly improved due to technological advancements in stadium design and operation. Technology-driven initiatives have also assisted sports organizations in lowering their carbon footprint and encouraging fans to adopt more environmentally friendly behaviors (Zhang and Breedlove 2021). The evolution of the sports sector necessitates integrating technology and sustainability to secure a more ecologically and climate-conscious future (Millington et al. 2022). Simultaneously, experts have highlighted that concerns regarding the impact of technology on enhancing the enjoyment and sustainability of sports are emerging, even as technological development transforms the competitive environment and yields transformative impacts (Eriksen 2021). Experts also identified some of the preconditions needed to ensure balance as ‘sound and democratically based regulative frameworks’ (A12, academic), ‘a judicious[...] approach’ (A14, athlete), and ‘[putting] athletes’ power in their hands to do something about unwanted processes such as commodification’ (A1, manager). Another expert pointed out that:

Technological progress can only be truly delivered when we do not look only to technology for progress but to humans as well. If these two things are present in parallel, the risk of commodification is reduced (A2, media).

So, the intersection of human-centric sports, personal development, well-being, and their connection to sustainable sport and climate change is an emerging topic. The expert panel underscored the human element within sports, emphasizing the potential for personal development, physical well-being, and social cohesion. This human-focused approach emphasizes the notion of degrowth, prioritizing authentic well-being and health over material gain (O’Reilly et al. 2020).

Reconciling sportification with athletes’ well-being

Experts agree that ‘sport can positively influence individuals’ (A5, media) and assist in global sustainability initiatives. Experts contend that athletes ought to promote social and environmental responsibility through their ‘exemplary and motivated conduct’ (A19, manager). Conversely, there was also a focus on the individual sustainability (Szathmári 2021) of the athletic career, with emphasis on the necessity for athletes to be ‘career-aware, to acquire knowledge, and to evolve outside the realm of sports and competitive activities’ (A3, manager).

In elite sports, powerful biotechnologies, from doping to gene technology, can expose athletes to severe harm and commodify practices. There is an urgent need for public debate about ethics and sound decision-making regarding the use of technology in sports (A12, academic).

The application of technology to sports is just a ‘reflection of the process of the commodification of popular sports’ (A13, academic), and ‘anyone who opposes commercialization should select a sport as a career that does not regard humans as tools’ (A4, media). As indicated by one expert:

The good example that a professional athlete gives is that of a mindset based on constant self-improvement, made up of [incremental] steps towards a bigger, long-term goal. He should also make people understand that he is not a model of life [that one should] follow to feel good (A17, athlete).

As Degrowth pursues alternatives that cultivate human flourishing (Krueger, Schulz, and Gibbs 2018), if athletes are to set an example as individuals who live sustainably, more work needs to be done on the external factors that affect them, such as society’s understanding of them. To combat climate change in sports proactively, technology use must be actively pursued with an emphasis on voluntary simplification, slowing down, community-based coproduction, and sharing, as well as thoughtful resource minimization (Selwyn 2024). Many believe that new technology-enabled practices empower people, but McCullough (2023) emphasizes that a deeper understanding of this relationship is crucial before we can promote sports and athletes as sustainable. A good illustration of this standpoint was offered by an expert:

To achieve a more sustainable future for professional sports/athletes, some changes are needed in how athletes are perceived and treated. The focus should not be on faceless results-centricity but on turning it around and putting people at the center. This could include better health and safety regulations, fair pay, and working conditions, as well as a greater emphasis on a healthy work-life balance. However, it is important to treat them not as products but as people (A14, athlete).

The majority of experts articulated that athletes are now viewed more as products and instruments and are vulnerable because the whole system depends on their performance and success. Many of those involved in sports are forced to bend and transcend their moral bounds due to the system’s logic (Svensson et al. 2023). Experts perceive that ‘here we have a confrontation between elite sport and sustainability’ (A2, media). The understanding also needs to be mutual; professional athletes need to understand the social position that comes with their success and popularity and act responsibly to create awareness and boost morale, along with identifying the right compromises in terms of living a balanced life (Breitbart and Harris 2008).

To achieve this, not only society’s understanding but also social expectations need to be shifted: ‘Social expectations must change first, and the sports system should change as well by highlighting authentic people and rewarding this authenticity’ (A1, manager) because elite athletes live in systems and structures that do not encourage sustainability:

If a series of races creates an unsustainable schedule for financial profit (see Formula 1 2023, multi-national football European Championship, etc.), then the teams or competitors should have the option to decline to participate (A2, media).

One expert expressed a more skeptical view that the goal remains the same despite all potential reforms: ‘...to produce the best athletes in the world, which can only be done at the cost of sacrifice’ (A4, media). More importantly, with good leadership and strict,

regulative frameworks, elite athletes can live good sporting lives with sound human talent development, similar to what Gammelsæter and Loland (2023) have highlighted.

In pursuit of local governance

Experts explored methods for mitigating sports' ecological effect, with 'relocalization' (Ajulo, Von Meding, and Tang 2020) emerging as a focal point. The consensus of the expert panel, derived from the Delphi process, underscores the significance of localized sporting activities that minimize the necessity for lengthy travel, infrastructure, and resource-intensive mega-events (Szathmári 2024).

(Re)localization is certainly part of the solution, so this list is reasonable. If community ownership [can] distance itself from the profit motive, then it may be [a] more promising driver of positive change. (academic, A10).

The need for relocalization, defined here as increasing the resilience of networks of local communities, frequently emerges in discussions, fostering confidence that enhanced local affiliations among organizations and strengthened municipal authorities might facilitate a sustainability transition in sports. This entails establishing what Aoyama (2009) refers to as 'the future of sport': fostering robust communities through enhancing identity, exemplifying leadership, augmenting local consumption, and integrating sport with education. A more localized economy would help facilitate the resolution of resource issues by decreasing the distance between production and consumption (Dobson 2007).

Community engagement in the consumption of sports as a kind of entertainment is vital. Consumption as an actor, consumption as a spectator, and consumption as a mere supporter. The more specific and identifiable the consumption of sport, the more it evolves into a communal tradition and culture, becoming economically self-sustaining and involving a greater number of participants (A18, athlete).

Experts concurred about the significance of local community involvement, asserting that 'sport cannot operate without community' (A10, academic). 'Residents [locals] possess a more precise understanding of the demands of the surrounding community than any other group' (A6, media). Their participation would 'enhance the efficacy of sports financing and is essential for solidifying a vision and direction' (A21, athlete). Locals play a crucial role in enhancing sport's visibility and sustainability. An expert articulated this proficiently:

These processes cannot be imposed from above on local communities, but all the conditions must be created for [such processes] to develop organically. Disproportionate subsidy systems must be abolished (or at least reformed), and the key players (private clubs and local companies in any case) must be brought into the system, even by utilizing regulations (mandatory training programs, training opportunities, etc.) (A1, manager).

A good example of the governance of sport in local communities is the '50 + 1 rule' in football, particularly in Sweden and Germany. This rule reflects a model focused on community ownership, fan involvement, and ensuring that sports clubs prioritize the interests of supporters over profit-driven motives. The discourse about the organizational structure of professional football teams has escalated, resulting in a call for the German '50 + 1 rule' to be implemented on a wider basis in professional football (Gammelsæter 2023).

To enhance local community engagement in sporting choices, several facilitating variables are essential. These include the existence of publicly owned clubs, assistance from

regional and national entities with finance and knowledge dissemination, and better engagement with local athletes. Sports organizations will encounter difficulties sustaining access to sporting facilities as participation rates increase, necessitating governance that safeguards and preserves sports from climate change while considering adaptations for stakeholders (Kellison, Orr, and Watanabe 2023; McCullough 2023). This method has favorable implications for climate change mitigation, yet several experts expressed worries about the precise involvement of locals in financing decisions.

It would be essential to organize local and national sporting events that foster enthusiasm and commitment to sports in local communities. Good examples, successful events, and the atmosphere of large-scale community sporting events would encourage local communities to make the right decisions about sports and to recognize that sports are as important as good health and education in maintaining a quality standard of living (A3, manager).

Furthermore, this process cannot be enforced externally on local communities; rather, the necessary conditions must be established for its spontaneous development. Kallis, Kerschner, and Martinez-Alier (2012) assert that climate change cannot be effectively mitigated by aggregating disparate local low-carbon projects without international agreements. Furthermore, financial and knowledge support from society will provide long-term benefits and enhance social sustainability, while such inclusion may cultivate a more interconnected and responsive sports ecosystem.

Conclusion

Proactively addressing climate change is crucial for the preservation of human civilization in the long term. The research described here attempted to explore the capacity of sports as a distinct platform to address climate change by evaluating the sports industry's potential to foster climate action and identifying components that might serve as stages in a Degrowth transition. The study was also intended to increase understanding of what a specific group of experts in the sports sector views as a desirable and practical normative situation, along with defining the theoretical foundation concerning whether sports can contribute to a sustainable future climate solution. The majority of experts agreed that the Degrowth concepts of self-limitation, localization, and the balance between technological progress and a human-focused approach may aid in conceptualizing diverse sustainability pathways.

One pathway defined by experts highlights disparities in beliefs about technological advancement. Some experts were tech optimists, seeing technological innovations as the solution to climate change challenges, while other experts were concerned about technology's influence on sustainability. Experts agree that technological innovation is critical for transitioning to a more sustainable future; however, there are significant differences in how this may occur. Stakeholders who are sports academics are much more skeptical and divided about the latter. There is a need for deep conversations about the impact of technological innovation and its relevance to sports so that core values such as athletes' personal development, well-being, and social cohesion are not jeopardized.

Engaging in eco-conscious sports can promote physical and mental health and create a sense of personal responsibility toward the environment. In accordance with a sustainable vision of sports, sports should serve as a valuable platform for education, behavior change, and community engagement in the context of climate change mitigation. Research tools like Delphi and backcasting can assist any community—such as, in this case, the sports community—in

defining viable paths for the future. The results challenge the idea that a sporting event's financial worth should supersede its effects on the community and environment.

The incorporation of expert knowledge allowed for a more nuanced definition to be developed that emphasizes that technology is an ambiguous phenomenon; its application dictates its results and its relationship to visions of sustainability. Similarly, the futuring process suggests alterations in the roles that humans and athletes are encouraged to assume. The pragmatic attitude of top athletes is exemplified by the absence of discourse about their well-being (Szathmári 2021). The expert group reached an agreement that the attitudes and treatment of athletes must be enhanced for professional sports and athletes to have a more sustainable future, similar to what Szathmári and Kocsis (2022) proposed: the focus should shift from impersonal results-centricity to prioritizing human-centricity.

Limitations and further research

Despite seeking input from experts worldwide, we did not obtain replies from every continent, potentially constraining the global relevance of the findings. A further disadvantage is that the experts' perspectives may diverge from those of individuals who opted not to engage in subsequent rounds. Consequently, the findings may not comprehensively reflect the perspectives of athletes and experts in academia, sports management, and sports media. Our mixed-method approach is associated with several limits in addition to its great benefits (Szathmári, Köves, and Gáspár 2024).

Given the ongoing debate about the extent to which sports should adapt to meaningfully contribute to sustainability (e.g. Gammelsæter and Loland 2023; McCullough 2023) and mitigate climate change, more research should investigate the sports sector's impact on climate change. Discourse on the future trajectory of the sports business and its overarching strategy, including both proactive and reactive measures for addressing climate change, is also emerging. Analyzing stakeholder perspectives in the community and sports sectors regarding the various pathways to Degrowth should be a primary objective, specifically examining the repercussions of technological innovation and its impact on the core values related to sports. One weakness of our study is strongly related to the follow-up component. The participatory organization of the research design (Bayley and French 2008) was a viable alternative; however, this was constrained by the research's particular logic. There was greater potential for engagement, especially in validating findings, since expert and participatory follow-up can enrich the discourse without anticipating scientific publication (Beiderbeck et al. 2021). Furthermore, owing to availability limitations, the gender and age attributes of the individuals involved in the Delphi method failed to meet the requisite criteria (Robinson 2003), and the semi-structured nature of the study procedure may have led to a loss of some diversity and interest representation. Consequently, the inclusion and variety of viewpoints in the research process may be constrained, affecting the generalizability of the outcomes.

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