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Staging Olympic sustainability? A critical analysis of the IOC's framing of sustainable practices on YouTube

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ABSTRACT

As a significant pillar of the leisure world, the sports industry makes substantial contributions to climate change through carbon emission and its influence on sustainable practices, rendering some sport mega-events environmentally destructive. In line with wider trends, researchers have increasingly examined sport mega-events, their governance and environmental impacts. In this context, this article contributes towards an understanding of how 'sustainability' is framed by the International Olympic Committee (IOC) through a digital sociological analysis of its YouTube channels. Drawing on Ulrich Beck's concept of 'staging', the article addresses two research questions focused on (1) how the issue of climate change is publicly staged by the IOC and (2) how social media provides another outlet for the IOC's sustainable practice discourses. By exploring these questions, the article develops an understanding of how policies staged to address global risks now formulate a key aspect of sport governing bodies' presence on social media.

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Introduction

This article examines how the International Olympic Committee (IOC) frames and assigns meanings to 'sustainability' on one of their key social media platforms. For Lenskyj (2014), sport mega-events like the Olympics occupy a unique position within leisure studies because these events typically encapsulate the power of elitism, commercialization and consumerism within leisure services. Hence, Lenskyj argues that scholars concerned with leisure can significantly advance our knowledge on these processes by enhancing the evidence base on sport mega-events. Undeniably, one sociologically important avenue of research here relates broadly to climate change, sustainability and ecology. In an epoch where the impacts of the global climate crisis are latent and global (see Beck 2010; 2016), constituting a 'major threat to human life and patterns of economic and social organization' (Urry 2009, 85) and therefore cannot be ignored, important

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questions relate to challenges, practices and responses of sport's governing bodies within this wider crisis (Konstantopoulos and Manoli 2023).

Indeed, we can witness how scholars increasingly pay attention to how some of the most powerful actors in sport, its governing bodies, have started to address or integrate discourses of sustainability into their practices and efforts (Miller 2018; Ross and Orr 2022). This includes the largest multi-sport event in the world, the Olympic Games, which has integrated sustainability into their 'Olympic Agenda 2020' (IOC 2021a) and especially their 'Olympic Agenda 2020 + 5' (IOC 2021b) which is tied to the UN Sustainable Development Goals (SDGs) (United Nations 2023), and the Olympic Charter (IOC 2021c). Yet, to this date, the Olympics continue to create adverse environmental impacts for its host communities and the world (Trendafilova et al. 2023). These are primarily related to current Olympic gigantism (Chapellet 2013; Kobierecka and Kobierecki 2019; Russo, Figueira, and Mataruna-dos-Santos 2023) with is close connection to international (air) travel, stadium and venue constructions and high electricity usage (Death 2011).

Against this background, this article will expand our knowledge on how the IOC – who possess the power to define standards, requirements and guidelines for its event host cities (cf. Boykoff 2016) – have increasingly embraced the concept of 'sustainability' not merely in their official discourses or public speeches, but on social media platforms as exemplified here by YouTube. On this platform, the IOC curates two official channels (*Olympics* and *IOC Media*) with a total of around 10 million subscribers between the two channels (see Lee Ludvigsen and Petersen-Wagne 2023). By cross-pollinating methodological guidelines from Beck's (2011) cosmopolitan sociology with those of digital sociology (cf. Lupton 2014), we draw from an analysis of YouTube videos, and we engage with the following two research questions:

1. How have the issues of climate change and sustainability been publicly framed by the IOC?
2. How might social media provide another digital outlet for the IOC's sustainability discourses?

In response to these questions, this article will produce an argument maintaining that the IOC's staging of ecological sustainability is contradictory and directed towards niche and mainstream audiences. However, in an epoch where, as Beck (2005) argues, nation-states, global businesses, international organizations and movements increasingly compete for the power to set agendas and define risks in the international system, such argument illuminates the IOC's dictating power across traditional boundaries, through its power to create narratives on a global risk.

The article's contribution is thus threefold. First, we add to the literature on the nexus between leisure, sport mega-events and sustainability. Second, we contribute to our understanding of how sport governing bodies adapt social media platforms to articulate their formal discourse on socio-political issues. Finally, we make a conceptual contribution by driving forwards Beck's 'staging' concept into a novel context – namely, sport. This article continues with a section unpacking our conceptual framework as informed by Beck's work on risk, ecological politics and his concept of 'staging'. Following this, we review the growing literature on sport ecology and sustainability before discussing our

methods. Finally, our results are unpacked and discussed in relation to the wider literature on sport governing bodies, risk, sustainability and social media.

Global risks, ecological politics, staging: a conceptual framework

It has become common to identify various *turns* within mainstream sociology. This includes so-called 'cultural', 'global' or 'mobility' turns (Giulianotti 2009; Urry 2009). Yet, in this respect, one might also detect a 'risk turn' in the social sciences from the 1990s onwards (Beck 1992; Giulianotti 2009). However, aside from a few important exceptions (Giulianotti 2009; Petersen-Wagner, 2017a; Lee Ludvigsen, 2022; Cleland 2019; Sandvik and Seippel 2023), it is reasonable to argue that the pioneering risk-oriented work of German social scientist Ulrich Beck (1992; 2005; 2016) is yet to be fully embraced by sociologists of leisure and sport. Indeed, this is somewhat surprising because Beck is widely considered to be one of the most 'innovative' and 'provocative' thinkers in the social sciences over the last 50 years (Mythen 2018) and advanced a host of concepts with transportability to diverse contexts including leisure and sport.

Beck wrote and commented on a myriad of contemporary socio-political issues including 'cosmopolitanism', 'globalization', 'individualization' and 'Europeanization'. Yet we remain principally concerned here with his notion of 'risk', work on ecological politics and what he calls 'staging'. All these ideas congregate within his seminal concept of the 'risk society' which emerged in the late 1980s and early 1990s (Beck 1992). At the core, Beck was concerned with the transformation of risks and hazards between what he considered pre-industrial, industrial and modern societies. From the 1970s and onwards, Beck argued that the effects of modernity – including scientific and technological progress and the interconnection of countries and societies (e.g. globalization (Beck 1992, 1999)) – led to the emergence of a society preoccupied with responses to and management of 'risks' – namely, the *risk society* (Beck 1992). One primary characteristic of globalized risk societies where (traditional) national borders were eroded, was the emergence of 'manufactured' or 'man-made' risks that were brought about by civilization and 'which [could not] be socially delimited in either space or time' (Beck 1996, 1). In other words, the *unintended* consequences of modernization have created a new set of risks that are largely uncontrollable, unpredictable and have the potential to become existential risk (Mythen and Walklate 2008). Crucially, in this article's context, this includes *ecological risks* and *destruction* which Beck (2015; 2016) continuously returned to throughout his work as one archetypical example of a 'global risk' causing the coalescence between nature, society and politics and enabling a condition for a global metamorphosis (2016).

Yet, while Beck's reading of risk largely subscribed to realist proposition, he simultaneously adhered to the notion that risks could be socially constructed or amplified (Lee Ludvigsen, 2022). Significantly, this is where his idea of 'staging' becomes an interesting albeit under-utilized and relevant tool. Whilst the concept of staging appears in *Risk Society* (1992), Beck developed this further in his later work (e.g. Beck 2010) to explain 'how risks are pre-emptively brought to the attention of the public', but also how the media and other expert institutions, with the power to identify risks, increasingly attempted to 'publicly play out future risks through processes of pre-visualization' (Mythen 2018, 22).

As such, the anticipation of future risks lies central to the idea of staging. As Beck himself pointed to:

> I emphasize the *staging* in world risk society. That follows from the central theoretical preoccupation with "new global risks" defined, essentially, as those manmade, incalculable, uninsurable threats and catastrophes that are *anticipated*. They often remain invisible and their perceived existence depends, therefore, on how they become defined and contested in "knowledge" (Beck 2011, 1349).

Thus, given certain risks' relative invisibility for the general public, the staging process thus help *defining* risks before the public's eyes. It also showcases that, for example, an institution *is* actively addressing, or, at the very least, are aware of the relevant risk (even under conditions where panaceas are absent). However, staging – as borrowed from Beck's conceptual arsenal – is with some exceptions (Lee Ludvigsen, 2022), yet to be applied to the practices of institutions in sport or leisure. Therefore, we seek to advance his ideas by situating this study within the risk society framework wherein practices of staging occur, focusing then on how a governing body of sport, the IOC, has framed its sustainable practices in a globalized space, namely YouTube. Before this, however, we unpack the nexus between sport mega-events and sustainability.

Literature review: sport mega-events and sustainability

In *The Metamorphosis of the World* (2016), Beck argued that the word 'sustainability' had become so commonplace and normalized, that 'everything is now about greening' (45). Crucially, Beck's sharp remarks can be echoed in the contexts of sport and leisure. Indeed, as Konstantopoulos and Manoli (2023) highlight, the effects of the global climate crisis have meant that 'sustainability' has become another 'buzzword' that sport mega-events and relevant organizations have turned towards and adopted to their everyday vernaculars. Concurrently, it should be remembered that, in this context, 'sustainability is a notoriously slippery term' closely aligned with trendy visions of 'social corporate responsibility' (Boykoff and Mascarenhas 2016, 3). One key task for sociologists, therefore, is to critically interrogate 'sustainability' meanings in diverse social settings.

Since the 1990s, sport governing bodies and event organizers have increasingly dedicated a space to sustainability, environmental and ecological issues in their missions, policies and practices. Consequently, in more recent years, we observe that particularly the linkages between sport mega-events and environmental impacts have been examined by scholars across various fields (see Karamichas 2013; Mol 2010; Miller 2018; Ross and Orr 2022; Wilby et al. 2023). Whilst one of the reasons behind this relate to the wider global climate crisis, and its political significance, it is also important to point out here how sport mega-events are environmentally destructive due to stadium and infrastructure constructions, electricity usage and international travelling (Miller 2018). As such, a series of internal and external factors have boosted the sustainability turn in sport.

The pronounced focus on sustainability in sport – and particularly at the Olympics – may be traced back to the UN's 1992 'Earth Summit' in Brazil. This conference generated a greater focus on ecological issues in the IOC's Olympic Charter (Boykoff and Mascarenhas 2016). Two years later, the Lillehammer (Norway) 1994 Winter Olympics became a key moment within the Olympic sustainability movement, as the impacts upon the natural environment were increasingly given consideration (Trendafilova et al. 2023). These

trends, however, are not unique to the IOC, and can be identified across the practices of other governing bodies in sport, including *Fédération Internationale de Football Association* (Death 2011; Lee Ludvigsen, 2022) and Union of European Football Associations (Konstantopoulos and Manoli 2023). Therefore, sustainability becomes one *attractor* that constitutes and re-structures how institutions such as the IOC are run, and consequently how the mega-events it co-organizes with local organizing committees are produced in a form of ecological rationality that orders global networks and flows (Mol 2010).

Focusing specifically on the IOC here, Trendafilova et al.'s (2023) recent examination of Olympic sustainability provides insights into recent developments within the IOC's embracement of sustainability discourses (see also Russo, Figueira, and Mataruna-dos-Santos 2023). As Trendafilova et al. (2023) note, more recent key milestones here include the adoption of 'Agenda 2020' which strategically guided the Olympic movement's future and provided 'a set of 40 comprehensive recommendations whose principal goal is to protect the Olympic values and fortify the role of sport in society' (471). In the context of 'Agenda 2020', host cities and hosting rights bidders are increasingly encouraged and required to address the environmental issues and solutions, and to leave a sustainable 'legacy'. This, however, has meant that 'Olympic Games bidding proposals are increasingly similar as pro-environmental behaviors are institutionalized within the greater Olympic Movement' and increasingly, the IOC have been criticized for the continuous negative impacts of the Olympics on the environment (Trendafilova et al. 2023) and for the gaps that exist between sustainable rhetoric and pre – and post-event realities or so-called 'legacies' (Boykoff and Mascarenhas 2016).

However, while the IOC's policies, actions and formal discourses, in the context of sustainability and environmental issues, have been examined by researchers, one aspect that has received much less attention is how exactly the IOC's embrace of sustainability is publicly framed by the organization on its social media platforms, including YouTube. Since the early 2000s, technological progress, including the advent of social media platforms, has meant that sport's governing bodies and federations increasingly have adopted new communication strategies in order to reach new audiences and articulate their public discourses through new formats (e.g. videos, photos, tweets). Whilst scholars have analysed the increased presence of sport mega-events in digital media contexts like Facebook, Instagram and Twitter and the various flows of communication (Tang and Cooper 2018; Hutchins and Sanderson 2017; Petersen-Wagner and Lee Ludvigsen, 2023a; Petersen-Wagner and Lee Ludvgisen, 2023b; Lee Ludvigsen and Petersen-Wagner, 2023; Lee Ludvgisen and Petersen-Wagner, 2022), the positioning of sustainability within this remains an under-explored aspect that this paper seeks to address. Sociologically, the public framing of sustainability on social media remains important because, as we argue elsewhere, YouTube has become a central part of the overarching 'Olympic production' and 'spectacle'. Indeed, a platform-specific 'show within the show' is constructed in YouTube during and in-between Olympic editions (Lee Ludvigsen and Petersen-Wagner, 2023). Thus, in this section, we have argued that within the context of an expanding field, an analysis of 'sustainability', as framed on the IOC's YouTube channel, may advance our knowledge on how climate change, sustainability and environmental issues are publicly defined, framed but also staged (cf. Beck 2011) by the IOC in a global (digital) risk context.

Methods and data

By subscribing to both the digital (Lupton 2014; Marres 2017) and cosmopolitan turns (Beck 2007; Petersen-Wagner, 2017a) in the social sciences and approaching social media platforms as important spaces (see also Petersen-Wagner, 2017b) for understanding current and global developments in society, this paper draws from data collected from YouTube to analyse how the IOC has staged its sustainable practices to a global audience. As argued by Petersen-Wagner and Lee Ludvigsen (2023a; 2023b) and Lee Ludvigsen and Petersen-Wagner (2022; 2023), YouTube can be considered as an alternative media channel for the most important medium to sport – namely TV – and therefore the practices of staging and self-presentation by global actors within this platform must be regarded as of sociological importance. As discussed by Lee Ludvigsen and Petersen-Wagner (2023), the IOC presents itself on YouTube through *two* distinct official channels that have a combined subscriber base of 10 million users, demonstrating how videos posted on those channels can serve as, and be approached by researchers as the official voice of the IOC. Moreover, as argued by Lee Ludvigsen and Petersen-Wagner (2022), even though YouTube uses geoblocking features to limit access to some videos and playlists to specific geographical locations, the official IOC channels serve as an example of a post-national media order that requires methodological cosmopolitanism for avoiding the pitfalls of a national outlook. Furthermore, the videos posted by the IOC are curated in a current *lingua franca* (see Petersen-Wagner and Lee Ludvigsen, 2023c; Baker 2018) that allows for the visibility of global risks to a cosmopolitan world audience.

In order to automatically collect data from the two channels, we have employed YouTube Data Tools (Rieder 2015) to connect to YouTube's Application Programming Interface version 3 (API v3) (see YouTube 2023a) and collect all videos' (13,131) information such as title, category, number of views, likes, comments, date posted, tags and duration in ISO8061 format (e.g. PT1H5M35S) from the two official channels (YouTube 2023b; 2023c). As a second stage, we manipulated the data on Excel for Mac (Excel 2022) and calculated the age of the post, sum of active engagement, the active to passive consumption ratio, and transformed the IS8061 time format into seconds. After those initial data manipulation, we identified videos on both channels with words in their title or description related to climate change and sustainability ('sustain'; 'sustainability'; 'climate'; 'environment') leaving us with 68 videos in total. Those initial 68 videos were narrowed down to 56 after further data cleaning. Ultimately, these 56 videos went through a frame analysis (see Entman 1993; Gamson 1989; Goffman 1986; Graber 1989) considering previous studies that dealt with media framing and climate change (see Boykoff 2008; 2011; Boykoff and Boykoff 2004; León et al. 2018). As presented by M. Boykoff (2008) in his media analysis on climate change, frames that were commonly found historically, across multiple print media outlets and more contemporarily on British tabloid newspapers, focused on science, culture and society, political-economics and ecology/meteorology stories. Moreover, as León et al. (2018) showed, in terms of effectiveness of information frames (e.g. positive and negative consequences) in influencing behaviours concerning climate change, the use of negative frames captures audiences' attention but might concurrently lead to inaction. For León et al. gain frames (positive) highlight the possible benefits of

adaptation or mitigation measures to climate change, while loss frames (negative) stress negative consequences to climate change. In some instances, both gain and loss frames are similarly stressed (León et al. 2018). Therefore, following a deductive approach, we categorized the 56 videos into the four general frames (science, culture and society, political economics and ecology/meteorology) and in terms of information frames (gain, loss, gain/loss, none), by following Boykoff (2008) and León et al.'s (2018) frameworks.

Whilst traditionally framing involves analysing how certain topics in media are defined as problems, and subsequently how causes to such problems are diagnosed, and ultimately how moral judgments and solutions are presented (c.f. Entman 1993), for Beck (2016 122, emphasis in the original) 'global risks (like global climate risks) are not the result of any specific catastrophe to others in any specific space and time. Rather, they need to be staged ('socially constructed') as anticipated catastrophes to humankind *for-us*'. Consequently, staging, in Beck's (2016) terms, involves both the politics of invisibility and visibility as some global risks such as climate change are characterized by a *natural invisibility* that requires forms of *publicness* to be socially constructed to us as an existential risk. Consequently, staging for Beck (2016) comes closer to Goffman's (1986) original understanding of framing in terms of how or under what circumstances we perceive certain things as real.

We have also used SPSS v.27 for Mac (IBM 2021) for descriptive, correlation (*Spearman's Rho*), and non-parametric test analyses (*Mann–Whitney U*). During the frame analysis stage, a decision was made to remove eight videos as the content did not relate to the research topic even though words related to the research were used in the video description or video title. Therefore, our frame analysis is composed of a total of 48 videos that cover topics related to environmental sustainability and climate change. Furthermore, as we previously indicated, the IOC, as a powerful global player can influence the global perceptions of risks by the way it stages through its communication channels. Thus, we approached our frame analysis through the notion of power and were especially concerned with how the IOC has the ability to dictate sustainability discourses within a 'meta-power game' (Beck 2005).

In addition, by following the key tenets of document research (Bowen 2009), we complemented the YouTube data with an analysis of publicly available documents that were accessed in a digital context through the IOC's official channels. These sizable documents were purposively sampled and included the IOC's (2021a) '*Olympic Agenda 2020 Closing Report*' and '*Olympic Agenda 2020 + 5–15 Recommendations*' (2021b) and the 108-page long 2021-version of the *Olympic Charter* (IOC 2021c). These documentary discourses too, feed into how sustainability and other global risks are defined and staged by the organization and the power dynamics that lie beneath these discourses. Importantly, following Bowen (2009), document analysis remains most efficient when deployed in tandem with other data sources. Specifically, policy-documents provide the researcher the possibility of identifying differences, and 'how an organisation or a program fared over time' (30). Here, we analysed the documentary discourses specifically to examine whether the IOC's organizational discourses aligned (or not) with those organizational discourses we located on YouTube. The analysed documents, hence, contextualize our YouTube-focused findings.

Results

While sustainability and the climate crisis are at the forefront of IOC's *official* agenda as seen in both *Agenda 2020* and *Agenda 2020 + 5* documents (IOC 2021a; 2021b) where they feature on items 4 and 5 for the former, and 2 and 10 for the latter, as well as mission 14 on the 2021-revised *Olympic Charter* (IOC 2021c), the situation on IOC's official YouTube channels is rather distinct. As mentioned in the methods section, the IOC currently has only 56 videos out of a total of 13,131 on its two channels' libraries that contain any mention to sustainability, climate or environment in its video description or video title. As seen in Table 1 below, the majority of those videos were curated for the niche channel (IOC Media) that is described as 'The International Olympic Committee's YouTube channel for subjects of interest to the members of the media' that counts with *only* 45,000 subscribers. Meanwhile, on the most known channel (Olympics) – counting almost 10 million subscribers and described as 'Welcome to the Olympics YouTube channel, where the Games never end!' – there were only 11 videos in its library.

As similarly noted by Lee Ludvigsen and Petersen-Wagner (2023), the IOC uses all technological affordances available on the platform by sharing shorter vertical videos (like 'shorts'), *normal* horizontal videos, and by live streaming entire events such as the different IOC sessions (available on IOC Media channel), which are used for both sustainability and no-sustainability related videos. On average, the videos on both channels are rather *long* in nature, especially if we subscribe to the assumption which is common within media circles holding that there is currently a *shorter* attention span within

Table 1. Descriptive analysis.

			Descriptive statistics				
Channel	Sustainability		*N*	Minimum	Maximum	Mean	Std. deviation
IOC Media	No	Length in Sec	1048	0	41,515	2424	5826
		viewCount	1048	0	222,556	3698	13,108
		likeCount	1048	0	3419	33	148
		commentCount	1048	0	254	4	15
		Age in Days	1048	25	4971	2394	1405
		Active/Passive	1047	.00000	.34559	.01115	.01692
		Valid N (listwise)	1047				
	Yes	Length in Sec	45	51	4995	680	1336
		viewCount	45	162	54,845	3798	8741
		likeCount	45	0	284	32	48
		commentCount	45	0	94	6	16
		Age in Days	45	67	4408	1376	1101
		Active/Passive	45	.00000	.09659	.01728	.01610
		Valid N (listwise)	45				
Olympics	No	Length in Sec	12,027	0	43,143	1668	3624
		viewCount	12,019	0	111,395,966	419,577	2,433,771
		likeCount	11,477	0	3,519,770	5114	53,916
		commentCount	12,027	0	46,907	181	1032
		Age in Days	12,027	0	4864	2139	1352
		Active/Passive	12,018	.00000	.57549	.01169	.01506
		Valid N (listwise)	11,473				
	Yes	Length in Sec	11	70	4091	606	1162
		viewCount	11	1139	281,369	40,339	81,350
		likeCount	11	3	581	169	176
		commentCount	11	0	52	13	16
		Age in Days	11	379	4841	3287	1428
		Active/Passive	11	.00065	.02816	.01040	.00952
		Valid N (listwise)	11				

audiences (see Newman 2010), that is compounded by the emergence and consolidation of platforms that affords *short* video production and consumption such as TikTok and Instagram. Ultimately, messages that exist within the YouTube spaces can be considered as *similar* to official communications that are transmitted through possibly *the* most important medium for sport – namely, television (see also Lee Ludvigsen and Petersen-Wagner, 2023; Petersen-Wagner and Lee Ludvigsen, 2023a; 2023b).

By taking television, newspapers and other social media platforms such as Instagram (Boykoff 2008; 2011; Carvalho and Burgess 2005; Liu, Lindquist, and Vedlitz 2011; McCombs and Valenzuela 2021; Towner and Muñoz 2020) as yardsticks for measuring how sustainability is present on the IOC's agenda, it could be argued that either by the frequency (number of videos in each channel) (see Table 1) or length (overall time in seconds) (see Table 2), sustainability is not the most salient of topics on either of the relevant YouTube channels. For instance, on the IOC Media, sustainable videos account for only 0.01% of total screen time, while for the largest and more subscribed-to Olympics channel that is a meagre 0.0003%. It could be argued that this lack of screen time means that the IOC is *staging* sustainability by omitting it from its videos. Furthermore, in terms of the salience, the almost non-availability of sustainability-related videos means that there is a very small proportion of views – 0.04% and 0.00008% respectively – potentially impacting on how audiences perceive climate crisis and environmental sustainability to be an important topic to think about.

However, while absolute numbers presented in both Tables 1 and 2 depict a more *negative* picture in terms of how sustainability is *staged* by the IOC and therefore put into its official agenda, Table 3 demonstrates that, on some important metrics, both non-sustainability and sustainability videos have similar performances. For instance, on both the IOC Media and Olympics channels, both types of videos have similar length in seconds indicating that the *bigger* issue in terms of agenda setting is related to frequency – the number of videos curated – rather than how much *airtime* they get when they are shown. Secondly, on the IOC Media sustainability and non-sustainability related videos get similar views, while on Olympics it gets similar number of comments and ratio of active (comments plus likes) to passive (views) forms of consumption. As previously discussed (Petersen-Wagner and Lee Ludvigsen, 2023a), we consider viewing as a passive form of consumption akin to what is found on television, while active forms of consumption are afforded by

Table 2. Frequencies.

				Statistics			
Channel	Sustainability			viewCount	likeCount	commentCount	Length in Sec
IOC Media	No	N	Valid	1048	1048	1048	1048
			Missing	0	0	0	0
		Sum		3,875,530	34,589	3824	2,540,126
	Yes	N	Valid	45	45	45	45
			Missing	0	0	0	0
		Sum		170,894	1440	283	30,581
Olympics	No	N	Valid	12,019	11,477	12,027	12,027
			Missing	8	550	0	0
		Sum		5,042,893,425	58,691,352	2,170,918	20,059,432
	Yes	N	Valid	11	11	11	11
			Missing	0	0	0	0
		Sum		443,733	1863	141	6662

Table 3. Non-parametric tests.

Hypothesis test summary					
Channel		Null hypothesis	Test	Sig.[a,b]	Decision
IOC Media	1	The distribution of Length in Sec is the same across categories of Sustainability.	Independent-Samples Mann-Whitney U Test	.106	Retain the null hypothesis.
	2	The distribution of viewCount is the same across categories of Sustainability.	Independent-Samples Mann-Whitney U Test	.230	Retain the null hypothesis.
	3	The distribution of likeCount is the same across categories of Sustainability.	Independent-Samples Mann-Whitney U Test	.004	Reject the null hypothesis.
	4	The distribution of commentCount is the same across categories of Sustainability.	Independent-Samples Mann-Whitney U Test	.034	Reject the null hypothesis.
	5	The distribution of Age in Days is the same across categories of Sustainability.	Independent-Samples Mann-Whitney U Test	<.001	Reject the null hypothesis.
	6	The distribution of Active/Passive is the same across categories of Sustainability.	Independent-Samples Mann-Whitney U Test	<.001	Reject the null hypothesis.
Olympics	1	The distribution of Length in Sec is the same across categories of Sustainability.	Independent-Samples Mann-Whitney U Test	.833	Retain the null hypothesis.
	2	The distribution of viewCount is the same across categories of Sustainability.	Independent-Samples Mann-Whitney U Test	.016	Reject the null hypothesis.
	3	The distribution of likeCount is the same across categories of Sustainability.	Independent-Samples Mann-Whitney U Test	.013	Reject the null hypothesis.
	4	The distribution of commentCount is the same across categories of Sustainability.	Independent-Samples Mann-Whitney U Test	.063	Retain the null hypothesis.
	5	The distribution of Age in Days is the same across categories of Sustainability.	Independent-Samples Mann-Whitney U Test	.006	Reject the null hypothesis.
	6	The distribution of Active/Passive is the same across categories of Sustainability.	Independent-Samples Mann-Whitney U Test	.764	Retain the null hypothesis.

[a]The significance level is .050.
[b]Asymptotic significance is displayed.

YouTube as a platform and can be captured via YouTube Data Tools (e.g. number of comments and number of likes) were counted as active. These findings indicate that while non-sustainability related videos are curated more often and therefore have more salience for setting a possible public agenda, when sustainability videos are curated by the IOC – either in their niche or mainstream channel – those videos get important traction either by having similar views, comments, or active/passive. This is important, as Petersen-Wagner and Lee Ludvigsen (2023a; 2023b) highlight that within this platform economy, algorithm gatekeepers are crucial in impacting how content is recommended to other users within the platform (see also YouTube 2022).

Worth noting from Tables 1 and 3 is that sustainability related videos are normally more recent in the IOC Media channel. Meanwhile, the opposite is identified on the Olympics channel. In a way, there is a trend of more sustainability related videos to be curated on IOC Media, whilst the opposite is happening on Olympics channel. Whilst, in terms of the IOC Media channel, this finding is congruent with environmental sustainability agenda-setting seen in other media (Boykoff 2008; 2011; Carvalho and Burgess 2005; Liu, Lindquist, and Vedlitz 2011; McCombs and Valenzuela 2021; Towner and Muñoz 2020), what we encountered in the IOC channel with higher subscription numbers goes *against* the position in which sustainability is put in official documents such as Agenda 2020, Agenda 2020 + 5, and the Olympic Charter (IOC 2021a; 2021b; 2021c), and more broadly with the establishment of the UN SDGs in 2015 (United Nations 2023). Therefore, it appears that the IOC *stages* sustainability in rather contradictory styles for both mainstream and niche audiences, where for the former it becomes a

Table 4. Frame analysis.

Channel	Video Title	Scientific	Ecologic-Meteorological	Political-Economic	Sociocultural	Gain	Loss	Gain/Loss	None
IOC Media	Why host the Olympic and Paralympic Games? – Brisbane 2032			x	x	x			
IOC Media	Advice for aspiring Olympic hosts | Australian Olympic Committee | Paralympics Australia			x	x	x			
IOC Media	Social and economic benefits of hosting the Olympic and Paralympic Games Brisbane 2032 | Queensland			x	x	x			
IOC Media	How athletes shaped the vision for Brisbane 2032 | Natalie Cook | Patrick Johnson		x	x	x	x			
IOC Media	Olympic Refuge Foundation celebrates two-year anniversary of Game Connect programme in Uganda								x
IOC Media	The IOC launches Climate Action Awards			x	x				x
IOC Media	Brisbane 2032: a new way to elect hosts for the Olympic and Paralympic Games | Brisbane City Council			x	x	x			
IOC Media	Olympic Day								x
IOC Media	How to be a sustainable champion: ideas and inspiration for protecting #onlyoneearth			x	x	x			
IOC Media	The New Ice Age: Beijing 2022 Winter Olympics debut climate-friendly C02 cooling system	x	x	x				x	
IOC Media	Olympism365 Strategy				x	x			
IOC Media	Dear Leaders Of The World			x				x	
IOC Media	IOC reveals details of its Olympic Forest project		x		x			x	
IOC Media	Tokyo 2020 – innovative solutions to drive sustainable change	x			x	x			
IOC Media	IOC President receives the new Mirai zero-emission hydrogen fuel cell vehicle from Toyota	x				x			

(*Continued*)

Table 4. Continued.

Channel	Video Title	Scientific	Ecologic-Meteorological	Political-Economic	Sociocultural	Gain	Loss	Gain/Loss	None
IOC Media	Vancouver 2010: setting the standard for sport, sustainability and social legacy			x	x	x			
IOC Media	2020 Carbon Action Award of the IOC and DOW	x	x	x	x			x	
IOC Media	World Cities Day 2020: The power of sport to build healthier, more sustainable urban communities			x	x	x			
IOC Media	The IOC and Procter & Gamble announce an extension to their Worldwide Olympic Partnership to 2028				x	x			
IOC Media	World Environment Day 2020: building a healthier planet through sport	x	x	x	x	x			
IOC Media	World Environment Day 2020: Sport and the environment a natural fit	x	x		x	x			
IOC Media	Plastic Game Plan for Sport	x	x	x	x			x	
IOC Media	Faster, higher, greener	x		x	x	x			
IOC Media	Sport and the climate crisis	x	x	x	x			x	
IOC Media	Olympic sustainability, walking the talk	x	x	x	x	x			
IOC Media	Animation sustainable EN			x	x	x			
IOC Media	134th IOC Session – Christiana Figueres keynote speech	x	x	x	x			x	
IOC Media	Olympic House becomes one of the most sustainable buildings in the world	x	x	x	x	x			
IOC Media	On World Environment Day, the Olympic Movement celebrates one year of action against plastic waste		x	x	x	x			
IOC Media	Athletes support the Sports for Climate Action Initiative				x				x
IOC Media	IOC Clean Seas Ambassador begins first-ever descent of Africa fourth largest river		x		x			x	
IOC Media	Olympism in Action Forum – Working Zone 7	x	x	x	x			x	
IOC Media	PyeongChang Energy Substation Sustainability Film			x				x	
IOC Media			x	x	x	x			

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IOC Media	Inside the Olympic Games 4 – Planning and Delivering a Legacy				x	x	x
IOC Media	UN Women Executive Director: A message to the sport world					x	x
IOC Media	IOC President Speech at the United Nations' Sustainable Development Goals Summit				x	x	x
IOC Media	(Part 4/4) The Olympic Games like you have never seen them before (Part 4/4)				x	x	x
IOC Media	The Olympic Games like you have never seen them before (Full version)				x	x	x
IOC Media	Talking about my YOG Generation					x	x
Olympics	"We have to fight"! | Nikola Karabatic on his mission for environmental awareness			x	x	x	x
Olympics	Building A Better World Through Sport – The Work Of The Olympics					x	x
Olympics	London 1908 - 1948 - 2012 | Olympic Legacy				x	x	x
Olympics	Vancouver 2010 | Olympic Legacy			x	x	x	x
Olympics	Lillehammer 1994 | Olympic Legacy			x	x	x	x
Olympics	Sport without Boundaries – short version			x	x	x	x
Olympics	Changing Places Programme – London 2012			x	x	x	x
Olympics	Vancouver 2010 – The Sustainability journey	x		x		x	x

non-topic and for the latter, it is emphasized and acknowledged. Nevertheless, while in terms of public agenda setting the IOC seems to *stage* climate sustainability in contradictory ways, what was encountered during the frame analysis was a remarkably congruent approach where *gain frames* appear in over 90% of the videos (see Table 4).

Within the *gain frames* that the IOC uses to *stage* climate and environmental sustainability, it commonly seeks to show how the Olympic Games, athletes and 'Olympism' – the philosophy behind the Games – could be catalysts for positive change in societies across the world. In a very small fraction (18% of the total videos), those *gain frames* appear alongside *loss frames* which – while acknowledging the negative impacts of climate change – shows the different IOC initiatives that exist to counteract those impacts. Unsurprisingly, the IOC does not post any videos that focus solely on *loss frames*, as YouTube as a platform acts as a promotional space for the IOC to *stage* how, as a global actor (Boykoff 2016), it leads and defines standards that are aligned with current sustainable practices. This promotional aspect was particularly evident in different videos in which the IOC and its current and past TOP (The Olympic Partners) partners (Dow Chemical, Toyota, Proctor & Gamble) appear alongside each other, in what can be characterized as an attempt to use the most valuable and recognisable global sport asset (the Olympic Games and the Olympic Rings) for greenwashing (cf. Miller 2018). Interestingly, it can be argued that the IOC when posting videos in which other global institutions such as the UN appear is somehow trying to *greenwash* its own environmental impacts through the hosting of mega-events.

In terms of the different frames, the IOC predominantly *stages* its environmentally sustainable practices in terms of socio-cultural aspects such as the role of sport as a catalyst for positive change. This idea of sport as a social good is aligned with what the IOC sees as Olympism 365 (IOC 2021d), where sport becomes an enabler for achieving 17 targets in 10 different UN SDGs, in particular SDG 11 Sustainable cities and communities (Target 11.7), SDG 12 Sustainable consumption and production patterns (Target 12.5) and SDG 13 Take urgent action to combat climate change (Target 13.2). This alignment with the UN, TOP Partners, local organizing committees, and other stakeholders was the second most visible frame that the IOC *staged* (political-economic). This frame also contained different videos in which the IOC demonstrated how its initiative promoted economic sustainability either by recycling, less use of raw materials for construction, and smart energy consumption, and specifically how Olympic Games venues regenerated areas and promoted a positive economic impact to host cities and regions. With a lesser prominence the IOC *framed* its sustainable practices through ecological-meteorological discourses, which were particularly present in how climate change would impact sports that takes place outdoors or rely on *nature, inter alia,* kayaking and winter sports like various skiing and snowboard events. Finally, in a few videos, the IOC used scientific narratives through the different technological innovations that are used to reduce climate impact in Olympic Games' venues, and particularly to showcase how its newly constructed Olympic House in Lausanne (Switzerland) is one of the most sustainable buildings in the world achieving a LEED (Leadership in Energy and Environmental Design) Platinum certification with the highest point of any LEED certified construction to date.

Thus, the results make it possible to argue that the IOC *stages* climate change and environmental sustainability by bringing attention to the positive, enabling factors that sport has in societies across the world to a very specific and niche audience who

engages with the videos that are posted on the less-subscribed-to the IOC Media channel. Further, in reference to the idea of 'staging', which captures how institutions 'play out' risks of the future through pre-visualization processes (see Beck 2011; Mythen 2018), the IOC does this pre-emptively, demonstrating how the organization is an institution that is attuned to the wider socio-cultural and institutional movements such as the UN SNGs, and therefore at the forefront of the fight against climate crisis. Ultimately, by framing these videos on positive attributes to a specific audience expected to be comprised by journalists and media organizations in general, the IOC seeks to generate an intermedia agenda setting effect (see Sweetser, Golan, and Wanta 2008; Towner and Muñoz 2020) by *staging* and *directly guiding* what is to be seen and reported on.

Discussion and conclusions

This article has engaged with two research questions relating to (1) how issues of climate change are publicly framed by the IOC, and (2) how social media provides a digital outlet for IOC's sustainability discourses. In a collective response to these questions, this paper argues that YouTube provides a digital, continually updated, but selective space on which the IOC's sustainable practices, programmes and projects are publicly communicated, yet concurrently, where the negative impacts of the Olympics upon the environment (Wilby et al. 2013) are not afforded the same attention.

Such argument carries a significance because it attaches another layer to the suggestion that, 'when it comes to the Olympics, a significant gap exists between sustainability rhetoric and reality' (Boykoff and Mascarenhas 2016, 8). As our article reveals, YouTube, with its global audiences, provides one important, transnational site through which this gap is constructed and maintained. The power to create sustainable discourses, thus, derives partly from the IOC's public, social media exercises. Theoretically, our response to the research questions may be made sense of by a turn towards political sociological perspectives on globalization, risks and public staging exercises.

In particular, returning to Beck's (1992, 2014, 2016) sociology, climate change represents a paradigmatic, manufactured risk across global society. One of the key questions Beck dealt with related to the processes through which *invisible* risks were made visible through *staging*. Whilst the existing literature has demonstrated that climate risks are made visible through IOC considered *official* agendas such as the Olympic Charter, Agenda 2020 and 2020 + 5, our findings extend this by demonstrating how the IOC addresses and frames climate change and sustainability digitally, through their YouTube channels. Therefore, it is crucial to acknowledge social media platforms, such as YouTube, as important channels in which official risk communications are also made available to a wider public, or to borrow from Beck, they are *staged*. Given that the staging process assists the identification and definition of risks by expert institutions, according to Beck, we may interpret the IOC as an institution that attaches itself to the wider agenda set by other organizations within a 'global field' where the role, authority and power of the nation-state is eroded and reconfigured (Beck 2005; Giulianotti and Robertson 2012). Furthermore, what our analysis has shown is that the IOC by predominantly focusing on gain frames stages climate change in what Beck (2016) conceptualized as 'progress publicness' and 'side-effects publicness' or 'risk publicness'. In terms of the former, the IOC by focusing on positive enabling factors that sport has in society ends

by promoting progress while downplaying the associated potential risks of Olympic gigantism; and for the latter it changes audiences' frame of reference and consequently realigns values of 'bads' into 'goods' in a way that environmental 'bads' (e.g. climate change) mutate into majorly socio-cultural (e.g. change in day-to-day behaviours in terms of public transport, use of energy, recycled goods and living an active lifestyle) and economical 'goods' (e.g. economic regeneration, energy efficiency, recycling).

While ecological sustainability can be considered a top priority for the IOC if we consider its *official* documents such as Agenda 2020, 2020 + 5, and Olympic Charter, and more specifically, when showcasing the newly constructed Olympic House in Lausanne when in the video it states that it 'walk the talk', the situation on the channels is rather opposite. The non-visible nature of its *staging* across the two channels, where sustainability-related videos accounted for only 48 out of 13,131 demonstrates how climate crisis is not powerfully identified and defined as a risk and threat by the IOC. This is further exemplified when the IOC frames its sustainability-related videos either through *gain frames* or *loss/gain frames* which ultimately do not raise the imminent importance of the crisis and the negative consequences to its Summer and Winter Olympic Games stemming out of it. By predominantly focusing on *gain frames,* the IOC rather dilute the crisis and portray it as something that is manageable and under control through the different socio-cultural initiatives that it promotes through sport. This non-self-reflective and critical appraisal of its role in climate change acts as the foundation for perceiving those videos as *only* promotional tools for a very specific niche audience that consumes it in the less-subscribed IOC Media channel. Nevertheless, while Beck (2016) saw media as exaggerating a 'tipping point catastrophism' frame that produced a nation-state centred socio-political inaction, what the IOC does, by focusing on *gain frames* and the socio-cultural role played by sport in climate action, provides a possible *cosmopolitan* solution to climate crisis – or what Beck (2016, 38) would call the 'declaration of interdependence'.

Therefore, this contradictory nature of IOC's *staging* on YouTube reflects a strategy in which climate change and sustainable practices are *made invisible* for the public eye on its most-subscribed channel – possibly hiding any of its negative impact due to Olympic Games' gigantism (the politics of invisibility) – but at the same time *making it somehow visible* on its less-subscribed channel that caters to a very niche audience. Hence, the IOC positions itself as a *power broker* who can define what are *existential and global* risks or *normal* risks (see Beck 2016). In that regard, when the IOC *visibly stages* climate change and ecological sustainability to this niche audience it does by framing itself as a key non-nation state actor which possesses authority to shape climate action. It does so by showing how aligned it is to possibly the most important forum in terms of global response to the climate crisis – the United Nations – and specifically how sport as an educational tool can act as enabler for different sustainable development goals. This apparent equal position to the UN is played out when the IOC *stages* its climate response by incorporating other key stakeholders such as its TOP programme, athletes, national and international federations, and local organizing committees.

In a similar way as Beck (2016) reflected on the role of experts and the nuclear model of risk definition, the IOC occupies a Janus-like position in which it is both *creator* and *assessor* of risk. Nevertheless, the *creational role* is commonly hidden from the public eye because of its non-reflective critical framing in both channels, while its *assessor role* is emphasized to the niche audience of IOC Media channel. Moreover, by taking Beck's

(2016) twofold communication of risks model it could be argued that the IOC, when it publicly stages climate crisis, does so by over-emphasizing the progress-publicness through its *gain frames* – the production and distribution of goods through the different IOC climate action initiatives –while hiding and downplaying the public side-effects and public risk. Furthermore, if we assume that over 99% of its video library on the most-subscribed Olympics channel are non-sustainability related, it can be argued that the added multiple spectacularization layers that are possible on this platform (see Lee Ludvigsen and Petersen-Wagner, 2023) further downplay side-effect and risk publicness by showing only the excitement that stems from athletic performances during Summer and Winter Olympic Games. While this sanitized façade staged by the IOC on its most-subscribed channel might prevent public awareness and therefore side-effects and risk publicness, it may also lead to the emergence of emancipatory catastrophism due to the IOC's hiding its contributions to the climate crisis, and the platform affordances (e.g. ability to comment on videos) that would allow for networks of hope to become visible (see Castells 2015).

To conclude then, in recent years the nexus between sport mega-events and environmental issues has, increasingly, been subject to academic and public debate given many mega-events' environmentally destructive nature. Though, despite the growth in academic literature (Karamichas 2013; Miller 2018; Ross and Orr 2022; Wilby et al. 2023), the way in which sustainability is defined and framed publicly on social media, and what this tells us about the power to define ecological risks has been left under-explored. Grounded in Ulrich Beck's risk theories, and particularly his concept of 'staging', this article subscribed to the key tenets of digital sociology in order to examine how social media (exemplified here by YouTube) provides another outlet for IOC's sustainability discourses. This article argues that the IOC's framing of sustainability and ecological issues on YouTube may be understood as one way in which a latent and 'invisible' risk become defined and visible through *mediated staging* by an international organization. As contended here, the IOC stages sustainability in rather contradictory ways for both niche and mainstream audiences. Here, for the former, it becomes a non-topic and, for the latter, sustainability is emphasized and acknowledged. Arguably, the IOC, by emphasizing and acknowledging sustainable practices and the climate crisis for its *niche audience* (including journalists and media organizations) expect that their messages would get amplified on other media channels through an inter-media agenda setting (Sweetser, Golan, and Wanta 2008; Towner and Muñoz 2020).

Overall, this article's original contribution is threefold: first, we add to the emerging sport ecology literature that we have already described above as constantly growing; second, within the context of digital leisure cultures, this article ties into wider projects examining the 'platformization' of sport mega-events and the digital layers that sport mega-events and their rhetoric, 'legacies' and politics increasingly have acquired (Tang and Cooper 2018; Hutchins and Sanderson 2017; Lee Ludvigsen and Petersen-Wagner, 2022; 2023); third, this article can be understood as an attempt to utilize Beck's (2011) concept of staging in a novel context. As a final note, we contend that future analyses of climate change responses and future risks at sport mega-events could be explored through the prism of other platforms, beyond YouTube. This includes sport authorities' Twitter, Facebook, TikTok and Instagram channels through which they

are likely to stage the organizational attempts to address climate conditions and environmental risks to a wider audience.

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