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ORIGINAL ARTICLE

The impact of new media on the reform of physical education teaching in faculty

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ABSTRACT

It is evident that mass media play a significant role in shaping and influencing physical education. Over the years, mass media platforms such as television, the internet, social media, and advertising have increasingly impacted the way individuals perceive and engage with physical activity. Firstly, mass media has the power to create awareness and promote the importance of physical education. Through various mediums, it can highlight the benefits of regular exercise, sports participation, and healthy lifestyle choices. By featuring athletes, fitness programs, and success stories, mass media inspires individuals to adopt an active and health-conscious approach to physical education. Secondly, mass media acts as a platform for disseminating knowledge and information related to physical education. It provides access to a wealth of resources, training tips, instructional videos, and expert advice, enabling individuals to enhance their understanding of different forms of physical activity. This wide availability of information encourages people to explore diverse disciplines, discover new activities, and make informed decisions about their physical education journey. This study was conducted qualitatively. A comprehensive literature review provides an overview of the existing studies on the topic, highlighting the gaps in knowledge and areas requiring further investigation. The research also examines the implications of new media on student motivation, participation, and skill acquisition within the context of physical education. It investigates how digital tools can facilitate active learning, foster collaboration among students, and encourage lifelong engagement in physical activities beyond the classroom setting.

Keywords: Technology, Innovation, New media, Physical education faculty, Educational reform.

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INTRODUCTION

Physical education in the new media era allows students to develop a variety of learning methods. The teaching concept promotes the sustainable development of physical education teaching and reflects the advantages of new media teaching.

THE IMPORTANT ROLE OF NEW MEDIA IN PHYSICAL EDUCATION TEACHING IN FACULTY AND UNIVERSITIES

Changed the physical education teaching environment in faculty and universities

The application of new media in physical education teaching in faculty and universities will help to improve the environment of physical education teaching, mainly the effective dissemination and expression of information, and enrich the channels for students to master physical education knowledge (Botagariyev et al., 2016). In actual physical education teaching, let students the ability to acquire knowledge get promoted. In the previous physical education teaching, students were not interested in learning physical knowledge, and in the process of learning and understanding physical knowledge Therefore, the application of new media to physical education teaching can enable students to master physical education knowledge in a timely manner, let students feel the fun of physical education knowledge learning in a diverse teaching environment, and promote students to form a positive Active learning attitude, in a good physical education environment, enhance students' enthusiasm for learning physical knowledge, enrich students' learning method (Pilar et al., 2019).

Promoting the rational use of teaching resources

In the reform of physical education teaching in faculty and universities, the utilization rate of teaching resources by teachers is not high, which leads to the unsatisfactory effect of physical education teaching. Some teachers have conflicts between their actual teaching innovations and their teaching methods (Pandey, 2006). In order to effectively improve students' physical education learning ability, teachers should reasonably use new media teaching resources to enrich the content of physical education teaching and promote teaching. The rational use of resources allows students to acquire knowledge in physical education. and capacity enhancement.

Establish the goal of physical education

For the goal of physical education teaching in faculty and universities today, teachers should combine the development of the times and the interest characteristics of students to enhance the diversification of classroom teaching models, let students form active learning interests, and strengthen students' learning of physical education in a good educational environment. Teachers should master the rational use of new media so that students can interact with teachers in the learning of physical education knowledge (Van Yip et al., 2004). Active and active interactive communication enhances students' concepts of sports and encourages them to develop the habit of physical exercise.

INFLUENCING FACTORS OF NEW MEDIA ON THE REFORM OF PHYSICAL EDUCATION TEACHING IN FACULTY AND UNIVERSITIES

Physical education teaching thinking

Teachers should clearly understand the role of new media in physical education teaching. In actual physical education teaching, they should avoid the influence of traditional teaching thinking, actively change teaching methods, improve the effect of physical education teaching, and let students form a correct view of sports.

Form a proactive learning attitude. In physical education teaching, teachers should focus on physical education that is in line with the development of students' thinking. allow students to recognize and understand the important role of physical education knowledge learning, and promote students' mastery and understanding of physical education knowledge (Edwards, 2006).

Physical quality of teachers

Teachers are the key figures in the teaching of physical education knowledge and the implementers of physical education teaching reform. Therefore, improving teachers' physical education quality will directly affect students' understanding and mastery of physical education knowledge. Teachers should gradually develop the awareness and ability to use new media and rationally use the teaching advantages of new media to improve the dissemination and development of physical education knowledge in faculty and universities and the quality of physical education (Edwards, 2006). Classroom teaching efficiency enables faculty physical education to form a new teaching goal, promotes the enrichment of physical education content so as to improve teachers' physical quality, and leads students to learn physical education efficiently.

Physical education model

In physical education teaching, the reason for the unsatisfactory teaching effect is mainly reflected in the fact that teachers only give a single explanation of physical education knowledge and students have mechanical learning methods (Yuldashev, 2021). Teachers' understanding of new media teaching concepts is not in place, and it is difficult to realize the innovation of physical education teaching concepts, which leads to in-depth explanations of physical education knowledge content and a lack of correct teaching objectives.

Utilization of teaching resources

Physical education resources mainly refer to hardware facilities and software facilities. Teachers should clearly understand the importance of the utilization of teaching resources, and in physical education teaching, it is necessary to clarify the integration of new media teaching resources and sports knowledge explanations, and conduct them in the form of new media (Patten & Newhart, 2017). The effective use of physical education resources can promote the reform of physical education teaching in faculty and universities.

STRATEGIES FOR THE USE OF NEW MEDIA IN THE REFORM OF PHYSICAL EDUCATION TEACHING IN FACULTY AND UNIVERSITIES

Innovation of teaching concepts and reform of teaching methods

When teachers use new media in the process of physical education teaching, they must realize the innovative development of physical education teaching concepts. In the era of new media, teachers should actively reflect students' main learning status and promote students' active learning through interesting explanations of physical education knowledge. Teachers can display teaching courseware to enhance students' understanding of theoretical knowledge (O'Toole & Essex, 2012). For example, when teachers explain basketball theoretical knowledge and basketball skills, they can make content-rich courseware and use new media to disseminate sports knowledge at the difficult points of students' learning. When teaching basketball skills, teachers can use new media technology to perform slow-motion processing of dribbling and passing action videos, allowing students to learn in depth through the intuitive and detailed courseware presentation (Zhang, 2017).

Reasonable use of teaching resources to meet the individual characteristics of student's new media teaching resources are very rich

Teachers should actively guide students to expand their learning of sports knowledge, encourage them to rationally use new media technology, learn and understand sports knowledge independently, and promote their reasonable use of sports information resources. Students learn sports knowledge and professional skills according to their own personalized learning needs (Ren, 2017). At the same time, when students learn and understand information resources, teachers should pay attention to the effect of students' use of resources, so as to avoid the influence of bad resources on students' independent learning (Boyle-Holmes et al., 2010). Therefore, teachers should improve students' physical knowledge resources in their daily study and life. Reasonable dissemination of information allows students to form timely and effective use of sports resources under the correct guidance of teachers, and enables students to form correct learning concepts, promote students' understanding of information resources, and promote students' all-round development. With the continuous expansion of today's new media platforms, students can learn knowledge through a variety of sports platforms (Ren, 2017). These sports platforms can allow students to fully exercise the right to choose according to their own interests and characteristics, and at the same time more meet the individual needs. to promote the innovation of students' physical education knowledge learning methods, to allow students to select and organize physical education knowledge on a variety of new media platforms, and then to promote the improvement of students' personalized learning ability, to satisfy students' learning psychology of rational use of physical education resources, and to let new students' Physical education under the development of media is more comprehensive. Improve the dissemination of physical education teaching knowledge in faculty and universities, promote the improvement of students' learning ability, let students form a change in the way of learning physical education knowledge in actual physical education learning, promote the reform of teachers' physical education teaching modes, and steadily improve students' physical education literacy (Baiza, 2013).

Reasonable application of new media to solve the difficulties in teaching

In the process of physical education classroom teaching in faculty and universities, there are many highly technical movements that also have a certain degree of abstraction, and faculty students have certain difficulties in the learning process (Ostman & Parker, 1987). In order to better explain the difficulties and key knowledge in physical education teaching, teachers need to scientifically use new media technology to solve this problem. For example, explaining the knowledge of the three-step layup to students During the content process, individual students are prone to muscle strain due to physical and technical problems. In order to effectively solve this problem, teachers need to use Flash software reasonably during teaching and carefully create three-step layup animation courseware for students (Stead et al., 2019). Through multimedia Present to students in class. During the playback of the video, the teacher can decompose the action in detail and explain it in words by controlling the playback speed, which will help students analyse the action process more seriously, improve their understanding ability, and carry out targeted training activities in an orderly manner after class. It is conducive to better completing the teaching tasks in physical education classrooms in faculty and universities (Chen, 2018).

CONCLUSIONS

Under the background of new media, for the reform of physical education teaching in faculty and universities, teachers should clarify the innovation of teaching concepts and teaching models in physical education teaching, improve students' understanding of physical education knowledge, and let students form a reasonable use of physical education information resources to promote the improvement of students' learning ability so that students can meet the needs of personalized learning on a variety of new media platforms. To

promote the rational use of resources in physical education teaching, let students experience the fun of physical education knowledge learning, enhance students' independent learning ability, improve the effect of physical education teaching, and promote the sustainable development of physical education teaching in faculty and universities. In conclusion, this research on the influence of new media on the reform of physical education teaching in faculties and universities highlights the transformative impact of technology in the educational landscape. The findings reveal that new media has revolutionized the way physical education is taught, creating opportunities for innovative and engaging instructional methods. Firstly, new media platforms such as interactive websites, mobile applications, and virtual reality simulations have enriched the learning experience by providing immersive and interactive content. These tools have facilitated more dynamic and personalized instruction, allowing students to actively participate in their own learning process. Secondly, the integration of new media in physical education has promoted inclusivity and accessibility. Overall, this research underscores the importance of embracing technological advancements in physical education teaching. By harnessing the potential of new media, faculties and universities can enhance student engagement, promote inclusive learning environments, and foster collaborative learning experiences. As technology continues to evolve, ongoing research and professional development will be essential in maximizing the benefits of new media in physical education and shaping future educational practices.

AUTHOR CONTRIBUTIONS

Sayed Anwershah Abed arranged the main and sub-topics of the research and wrote the results of the research. Jumakhan Bahaduri created a general idea for the research and wrote the resource section. Hizbullah Bahir conducted the literature review, the research method and design, and the research analysis.

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SUSTAINABILITY & SPORTS SCIENCE JOURNAL

ORIGINAL ARTICLE

Exploring residents' perceptions of the socioeconomic impact of sport tourism

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ABSTRACT

The main objective of this study is to investigate and assess critical factors related to the socioeconomic impact of sports tourism on territorial growth. The study highlights the significance of residents' perceptions regarding the economic and social consequences of hosting sporting events in gaining public support for such endeavours. This research relies on primary data collected from diverse regions throughout Italy via a specialized Google Module, with a particular focus on the intersection of sports and tourism. Notably, 84% of the sampled population expresses support for the idea that hosting sporting events can yield potential economic benefits for the hosting region. While these initial findings are preliminary, they strongly indicate that the population is inclined towards organizing sporting events in their own regions. This inclination creates opportunities to consider long-term investments in hosting sporting events, which can stimulate tourist influx and subsequent economic growth in the involved territories.
Keywords: Sport Management, Socioeconomic impact, Sports tourism, Territorial growth, Residents' perception, Economic impact, Social impact, Sporting events.

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INTRODUCTION

Sporting events have evolved beyond mere competitions to become powerful drivers of economic and social change, with tourism emerging as a key beneficiary of this symbiotic relationship. As regions increasingly recognize the potential for leveraging sports as a tool for development, the connection of sporting events and tourism has garnered substantial attention. This research seeks to explore the profound socioeconomic impact that hosting a sporting event can have on the tourism sector of a region, the research bases its studies on the host perceptions, asking the question on what the host think about the relationship between sport tourism and socio-economic growth of their territory. As proposed by Mao et al. (2016), successfully organizing a major sporting event necessitates a concerted effort from various stakeholders within the host communities, owing to its inherently complex nature. Notably, the inclusion of the host community's perspectives in the event planning process is indispensable for the sustainable execution of major sports competitions (Prayag et al., 2013).

Although sport tourism is not a recent phenomenon, it has garnered increased attention in recent years as a catalyst for socioeconomic development (Lee & Taylor, 2005). Despite this growing interest, the financial impacts of active sports events remain an area of limited study, as suggested by Gibson et al. (2018). Both public and private entities are increasingly intrigued by integrating the business aspect of sports into their promotional strategies, viewing it as a means to enhance economic growth, spanning from the cities to remote rural regions (Achilleos et al., 2021).

Communities often host sporting events with the intentions of providing entertainment, enhancing local pride, and stimulating economic growth. However, it's often the economic implications that take centre stage, serving as a primary justification for sporting events and a central focus when evaluating the feasibility of tourism development on a broader scale (Yuan, 2001). Nonetheless, not all regions are equally positioned to effectively host sporting events, games, or teams, due to the substantial public expenditures and a need for substantial flexibility, which may not necessarily translate into long-term economic benefits for the local populace, as articulated by Porter (1999).

Concurrently, research indicates that most communities gain limited economic advantages from owning professional sports teams, primarily witnessing a boost in local pride, especially when the construction of stadiums is financed through taxpayers' money (Calhoun & Gorman, 1994). Territorial growth encompasses economic development and social progress within a given region or nation. Sporting events have the potential to significantly impact territorial growth, extending beyond immediate economic gains. Investments in infrastructure, the promotion of tourism, and the development of sports facilities have enduring implications for the areas that host such events. Understanding the depth of the contribution of sporting events to territorial growth is essential for policymakers, event organizers, and local communities.

Italy, a country renowned for its rich sporting tradition and thriving tourism sector, serves as the focal point for this study. The diverse regions of Italy provide a unique context for understanding the impact of sports tourism on territorial growth. From the scenic landscapes of Tuscany to the bustling urban centres of Milan and Rome, Italy's varied economic landscapes and cultural diversity offer a rich tapestry for exploring the relationship between sports tourism and territorial development. Italy has a deep-rooted history of sports, with events like the Giro d'Italia in cycling, Serie A in football, and the Italian Open in tennis attracting a global audience. The cultural significance of sports in Italy is intertwined with its historical heritage, making it a compelling location to examine the interplay between sports tourism and territorial growth. Italy's diverse

geography and cities have hosted numerous international sporting events, which have left a lasting impact on local communities and economies.

Statement of the problem

While there is a growing body of literature on sports tourism and its impact on local economies, there exists a noticeable gap in our understanding of the specific socioeconomic implications of sports tourism for the territorial growth of Italy. The current literature lacks a detailed exploration of the economic, social, and cultural dimensions influenced by sports tourism in different regions of the country. This gap hinders our ability to formulate targeted strategies for harnessing the positive impacts of sports tourism while mitigating potential challenges.

Additionally, there is an insufficient focus on the perspectives of local residents regarding the socioeconomic influence of hosting sporting events. While previous studies acknowledge the importance of community engagement, there is a lack of in-depth exploration into residents' views on economic changes, job opportunities, and social and cultural transformations brought about by hosting sporting events. This gap limits our understanding of the holistic impact of sports tourism on the communities directly affected.

Furthermore, the existing literature falls short in providing comprehensive strategies and policies to enhance the positive effects of sports tourism on territorial growth. While some studies touch upon the general benefits and challenges, there is a dearth of practical recommendations based on empirical findings and best practices. This gap impedes the development of effective policies that could optimize the benefits of sports tourism while addressing any associated challenges, hindering the sustainable growth of regions hosting sporting events.

In light of these existing gaps, there is a critical need for research that systematically investigates the specific socioeconomic impacts, incorporates the perspectives of local residents, and formulates practical strategies and policies to enhance the positive effects of sports tourism on the territorial growth of Italy. Addressing these gaps will not only contribute to academic knowledge but also provide valuable insights for policymakers and stakeholders involved in the planning and management of sports tourism events in the country.

Research questions

- What specific socioeconomic impacts does sports tourism have on the territorial growth of Italy?
- How do local residents perceive the socioeconomic Influence of hosting sporting events?
- What strategies and policies can enhance the positive effects of sports tourism on territorial growth?

Research objectives

- To examine the specific socioeconomic impacts of sports tourism on the territorial growth of Italy.
- To explore local residents' perceptions of the socioeconomic influence of hosting sporting events.
- To propose strategies and policies to enhance the positive effects of sports tourism on territorial growth.

Literature review

Sports tourism has become a global phenomenon, with host regions increasingly recognizing its potential to stimulate territorial growth. Early studies in this field predominantly concentrated on the economic aspects of sports tourism, particularly revenue generation, job creation, and the economic benefits of hosting sports events. Numerous studies highlight the substantial economic benefits associated with hosting sporting events. Ritchie and Adair (2002) argue that sports tourism can significantly contribute to the economic growth

of regions through increased spending on accommodations, dining, transportation, and entertainment. For instance, Preuss (2007) notes the positive impact of the 2004 Athens Olympic Games on the Greek economy, emphasizing the potential for sports events to attract international visitors and boost local businesses. Ritchie et al.'s (2003) work in New Zealand studied the social impacts of hosting the 2000 America's Cup. This research illuminated the influence of such events on social capital, community development, and cultural enrichment. These findings emphasize that sports tourism is not solely an economic endeavour but also an avenue for social and cultural development within host regions.

While Higham (1999) claims that there are no gains to hosting big events, studies by Swindell and Rosentaub (1998) fail to demonstrate any substantial socioeconomic advantages for local areas fielding professional sports facilities and teams. Organizing small-scale sports events might benefit the local community in which they are organized as compared to a large-scale sports event since they don't need a massive infrastructure and input but instead functions within society's predetermined limits. If so, since the extra spending is not offset by capital spending, net financial advantages are simpler to manifest as "*accumulative expenditure in excess of what would be anticipated in the region if the event were not in place*".

A conceptual model is offered by Eiji and Higham (2020) that maximizes the advantages of sport tourism by recognizing the connections between event sports and ancillary tourist destinations. A destination's resources, attractions, and activities may see increased use as a result of effective sports find programs. The idea of a central place helps identify the kind of area that will gain from the growth of sport tourism. As per (Parra et al., 2017; Parra-Camacho et al., 2015), it is possible to consider any issue to have a social influence if it has the potential to change how well local residents are able to live their lives.

Several researches have attempted to comprehend and justify why locals support sporting events and how they view the benefits connected with them. The theory of social exchange has been employed as an effective structure theory in these investigations (Gursoy, 2014). Residents' perceptions of the benefits and drawbacks of hosting events vary. The likelihood of supporting the staging of the event is therefore higher if the benefits surpass the costs than it is if the opposite is true (Rua, 2020). This theory can explain how locals perceive the economic, sociocultural and environmental effects of the tourism phenomenon (Nguyen & Coca-Stefaniak, 2020), for instance, hosting a sporting event. The perceived consequences of a sporting event have been found to affect interest (Gursoy et al., 2017). However, one of the topics most focused on in this field of research is examining the process through which citizens' support is altered by perceptions of consequences (Kim and Kaplanidou, 2019). Analysing local community' impressions of the sport's effects is crucial to the sport's effectiveness because they are a crucial group stakeholder for the event's long and short-term viability (Prayag et al., 2013). A major sporting event's potential socioeconomic positive and negative effects on a community are two of the most crucial factors in determining whether residents support or oppose hosting the event, according to the majority of studies analysing the social perception of impacts of sporting events (Sánchez-Sáez et al., 2018). The association between the host community's perceptions of the effects and support for sporting events has been demonstrated by research (Gursoy et al., 2017). Similarly, recent studies have confirmed the mediating role of a number of factors, including life satisfaction (Kim and Kaplanidou, 2019), general attitudes toward the event (Prayag et al., 2013), sports participation (Kim and Kaplanidou, 2019), community engagement, and positive and negative emotions, in residents' perceptions of the effects and public support for the event's celebrations (Ouyang et al., 2017). One of the main aims of this study is to discover and examine important features of the social impact of sports tourism and territorial growth.

Scholarly discussions have underlined the critical role of local residents in the success and impact of sports tourism. Rómulo Jacobo González-García et al. (2022) have contributed significantly to this topic by highlighting the importance of community engagement in the context of sports events. Their work emphasized the need to consider the impact of these events on local communities, including the potential for community cohesion, cultural enrichment, and a sense of shared identity. Additionally, Sánchez-Fernández & Cardona (2016) argue that Community engagement and local residents' perceptions and expectations have increasingly become focal points of sports tourism research, acknowledging the significance of resident support for the success of sporting events.

While there exists a substantial body of international research on sports tourism, studies specific to Italy are relatively scarce. Italy, renowned for its rich sporting tradition, diverse geography, and thriving tourism sector, represents a compelling and unique context for exploring the interplay between sports tourism and territorial growth. Italy's historical significance in the world of sports, from football to cycling to tennis, makes it an intriguing case for understanding how sports tourism can contribute to its territorial development.

While there is a substantial body of research focused on understanding the motivations behind travel and sports engagement, the process of profiling sport tourists remains relatively underdeveloped in the literature. This deficiency, especially when approached from an organic methodological standpoint, is primarily attributed to the challenges associated with integrating various databases and analytical methods. For instance, Morfoulaki et al. (2023) proposed the creation of an interactive platform to facilitate the generation of value for each participant in a sporting event. This platform could also serve as a means for effective communication between sports event organizers and institutional tourism offices, thereby enhancing the profiling of sport tourists from both a synchronous and diachronic perspective.

METHODOLOGY

Study area: Italy

Italy, located in southern Europe, is a captivating study area for exploring the impact of sports tourism on territorial growth. Several key factors make Italy an ideal setting for this research. To begin with, Italy boasts an astonishing range of geographical features, from the stunning coastlines along the Mediterranean Sea to the towering peaks of the Alps and the rolling hills of Tuscany. This diverse landscape enables a wide array of sports and recreational activities, making it an attractive destination for sports tourism. Water sports, skiing, hiking, and cycling are just a few examples of the activities that tourists and locals alike engage in. Italy has an enduring and passionate sporting tradition that has left an indelible mark on the global sporting landscape. Football (known as soccer in some regions) is deeply ingrained in Italian culture, with Serie A, the top-tier football league, attracting fans from around the world. The country also has a strong presence in cycling, with prestigious events like the Giro d'Italia. Tennis, motorsports, and various other sports hold significant importance, contributing to Italy's status as a sporting hub.

Sports events often intertwine with Italy's rich cultural history. Iconic venues like the Colosseum in Rome, which once hosted ancient gladiator contests, are symbolic of this connection. Italy's passion for sports is evident in the fervent support for local teams and international competitions. This cultural significance extends to the fan experience, as sporting events offer unique opportunities for travellers to engage with Italian culture.

Italy's tourism sector plays a pivotal role in its economy. The country's rich historical heritage, iconic cities, world-class cuisine, and natural beauty make it a top global tourist destination. The merging of sports events with Italy's existing tourist infrastructure creates substantial potential for enhancing the tourism sector and its

associated economic benefits. Sporting events can serve as magnets, drawing visitors to experience Italy's cultural and culinary offerings.

Note. Retrieved from [Accessed February 25, 2024]: https://www.railpass.com/plan-your-trip/maps/italy

Figure 1. Map of Italy.

Understanding Italy as the study area is crucial for contextualizing the research findings. The cultural, historical, and geographical nuances of Italy contribute to its potential for harnessing the benefits of sports tourism. This research aims to delve into the multifaceted relationship between sports tourism and territorial development within the diverse regions of Italy, offering insights and recommendations that can contribute to sustainable growth and development. Italy, with its rich sporting heritage and diverse territories, offers a unique opportunity to explore the broader implications of sports tourism on a national scale.

Materials and method

A comprehensive approach was employed to collect data through a questionnaire disseminated via a dedicated Google Module, specifically tailored to the intersection of sports and tourism. The initial sample consisted of 510 participants from diverse regions across Italy, emphasizing the socioeconomic impact of sports tourism on a territory or region. The questionnaire, strategically designed to explore residents' perspectives on the intricate relationship between sports tourism and socioeconomic aspects, was administered and collected during the period spanning November 2021 to January 2022. This method ensured a thorough representation of diverse viewpoints, providing valuable insights into the multifaceted dynamics of sports tourism and its effects on the economic and social fabric of the surveyed regions in Italy.

Table 1. A summary of sociodemographic characteristics of the 510 participants in the study.

Gender		**Age bracket**		**Employment status**	
Female	45%	12-20	42%	Students	46.9%
Male	55%	21-30	7%	Working-students	3.7%
		31-40	12%	Full-time	40.4%
		41-50	23%	Unemployed	3.3%
		51-60	11%	Others	5.7%
		Over 60	5%		
Total	**100%**	**Total**	**100%**	**Total**	**100%**

The sociodemographic characteristics of the 510 participants in this study, who were surveyed using the Google module, are succinctly outlined in Table 1.

A questionnaire comprising of factors relating to social interests, negative and positive effects, the economic advantage of sporting events, and tourism in a region was used to gather the data. The three scale options used to evaluate data indicators includes; 1 = Yes; 2 = No; 3 = Maybe. There are numerous justifications for using this kind of sampling. First, there is no appropriate sampling frame that is distinct from the respondents that are now accessible. To avoid this bias in the collection of data, an effort was made to balance the composition of the clusters bestowing to age and sex. The questionnaires were self-administered using a google module. It was divided into three sections; Part 1: Social-personal data, containing 9 questions (for example sex, gender, etc.) Part 2: Candidate interest, containing 9 questions; (for example question number 10: Do you play sports throughout the year?) Part 3: Economic benefit of sporting events and tourism in a region, containing 16 questions (for example question number 19: Is there any potential economic benefit to your region from hosting the sporting event?).

Data analysis

Upon completion of the data collection phase, the dataset was exported from Google Forms and imported into JASP, a statistical software known for its user-friendly interface and robust analytical capabilities. Descriptive statistics, including mean scores, standard deviations, and frequency distributions, were calculated using JASP. These statistics provided a preliminary overview of the respondents' perspectives on the socioeconomic impact of sports tourism across the regions in Italy. JASP's built-in functions for correlation and regression analysis were employed to examine relationships between variables.

Hypotheses

- Null Hypothesis (H0): There is no significant association between hosting sporting events and economic benefit.
- Alternative Hypothesis (H1): There is a significant association between hosting sporting events and economic benefit.

Table 2. Contingency tables showing the percentage of the Potential economic benefit of hosting sports.

			Total
Yes	Count	428.000	428.000
	% of total	84%	84%
No	Count	15.000	15.000
	% of total	3.000%	3.000 %
Maybe	Count	66.000	66.000
	% of total	13.000 %	13.000 %

Table 3. Chi-Squared test results.

	Value	**df**	***p***
X^2	1.037	1	>.001
N	510		

Notably, the *p*-value is less than the significant level of .005, this study rejects the null hypothesis because there is a relationship between hosting a sporting event and the potential economic impact of a region.

RESULTS

The first part of the questionnaire reflects the social-personal data of the interviewees. This is important because it gives the author a clear idea of who is taking part in the interview and if the author is using the right population for the research study. The second section of the questionnaire addresses the candidate's interest in sporting activities. This section is important because it provides the author with a way of building a basis for the socio-economic impact of sport tourism in the region. Observing the results of the descriptive statistical data analysis, it is possible to detect that as many as 84% of the sample populace supports the hypothesis that there is a potential economic benefit to the region hosting a sporting event. The third part of the research allows the researcher to understand how a large number of respondents are aware that their home region can obtain socioeconomic benefits by hosting sports events; the results are summarized in Table 4.

Table 4. A summary of the results from the questionnaires.

Will holding a sporting event help the recreational infrastructure of your region and stimulate the construction of new sporting facilities?		Is there a potential economic benefit to their region from hosting a sporting event?		Do you practice sports or physical activity during your holidays?		Do you choose their holiday destination based on the possibility of carrying out physical and sporting activities		Do you play sports throughout the year?	
Yes	72%	**Yes**	84%	**Yes**	36%	**Yes**	10%	**Yes**	41%
No	4%	**No**	3%	**No**	39%	**No**	64%	**No**	29%
Maybe	24%	**Maybe**	13%	**Sometimes**	26%	**Sometimes**	26%	**Maybe**	30%
Total	100%	**Total**	100%	**Total**	100%	**Total**	100%	**Total**	100%

DISCUSSION

According to the data analysis, residents are generally in favour of holding sporting events on their own territory. The study's results demonstrate how local residents view the impact of sporting events on a region's or nation's economic development favourably. A large percentage of the populace agree that there is a potential economic benefit of hosting a sporting event in their region.

Socioeconomic impacts of sports tourism on the territorial growth of Italy

Sport-related tourism has received a lot of attention lately, both as a topic for academic research and as a steadily popular tourist option**.** According to the findings of the study, these sporting events serve as the cornerstone of resilience in terms of the social consequences of sport tourism. The results of this research agree with Higham (1999, p. 85) are supported by this research, including the benefits of organizing sporting events the following: *"local community more likely to share the favourable economic gains connected with sport," "greater levels of local access to athletic activities," and "facilities typically in existence."* In a study focused on the Italian context, sports tourism is defined as an increase of leisure sporting events (Coni - Censis, 2008). Sport tourism has developed into a key element for the expansion of the regional tourism sector (Coni - Censis, 2008). In order to promote stronger links and local and regional development, sports tourism can be used as a tool. Chris Gratton claims that in this sense, economic revival refers to a rise in local income and employment as a result of a sport-related economic production (Gratton et al., 2007). According to Ejarque (2003), there is a range of tourist value for events. The Olympic Sports Events, the FIFA World Cup of football, and sailing competitions are all part of the first level. Tennis, golf, and athletics

are all part of the second level. Skiing, swimming, and team sports like basketball or baseball are all part of the third level (Ejarque, 2003). For a modern traveller who enjoys event sport tourism—defined as traveling to witness a sporting event—doing physical activity has become essential in Italy. While smaller-scale athletic events may have greater positive effects on host towns, the majority of the existing event sport tourism literature concentrates on major or signature events based on the Italian context (Gibson et al., 2012). Any athletic event, no matter how big or small, generates a flow of tourists that can lead to cultural changes, the revival of regional customs, an improvement in quality of life, and the enhancement of a community's reputation. The event might be used to meet the needs of the people on a daily basis because of its distinctiveness and potential to bring tourists. At the research level, more multidisciplinary research is required, particularly research that builds on the knowledge bases currently present in the sports and tourism industries.

Questions about evaluating a few direct economic effects of sporting events were included in the research questionnaire. In accordance with the required answers, the respondents were asked to express their ideas by selecting one of the following values: 1 (Yes), 2 (No), or 3 (Perhaps). According to prior research that, on the one hand, affirm the significance of this type of sport tourism event in giving more social benefits, several of the questionnaire's fields focused on the perception of social components of sporting event and economic platforms on the tourism of a region (Taks, 2013), than on the other hand, recommend that sporting events have economic effects (Gibson et al., 2012). Residents' perceptions of the socioeconomic effects of sporting events and economic growth are moderated by a number of factors. Some of these factors are subjective, such as age, closeness to tourism destinations, or employment prospects in the tourism industry, while others are universal values, such as a sense of place and community as well as other sociocultural, political, and ecological beliefs. The results of this study show that there is an economic benefit to hosting a sporting event. 84% of respondents said there is economic benefit in hosting a sporting event compared to 3% who were on the contrary and 13% who did not have any idea whether hosting a sporting event has economic benefits. However, various characteristics of the location, such the season of the number of visitors, their life stage, and the type of tourism, are important. When it comes to holiday possibilities, location attachment, a strong connection to a particular location, inspires incredible dedication.

Residents' perception on the socioeconomic influence of hosting sporting events

Local residents are often the primary stakeholders in the hosting of sporting events, and their perceptions play a pivotal role in determining the overall success of such initiatives. Community engagement programs that actively involve residents in the planning and execution of events foster a sense of ownership. When residents feel that their voices are heard and their perspectives valued, it positively influences their perception of the socioeconomic impact of sporting events. Similarly, Kozhokulov et al. (2019) emphasize the pivotal role of securing residents' support for the tourism industry through a comprehensive understanding of their viewpoints. Their research indicates that engaged and informed residents are more likely to support the industry's growth and sustainability. Furthermore, involving residents in decision-making processes related to tourism planning fosters a sense of ownership and responsibility, contributing to a more harmonious coexistence between tourism and the local community.

Bazzanella's (2019) post-event analysis methodology is widely acknowledged as a valuable tool for evaluating stakeholder perceptions. The research focuses on exploring the perspectives of event stakeholders, particularly residents in tourist destinations, regarding sports events. Qualitative analysis reveals a general sense of contentment among residents and other stakeholders regarding the tourist destination.

Rómulo-Jacobo et al. (2022) introduce a novel perspective, highlighting the importance of assessing residents' perceptions for promoting social engagement and inclusivity in the context of sports tourism. Their findings underscore the value of analysing citizens' social perception and evaluating the impact of sports tourism on their support for tourism development in shaping policies for social cohesion and local development.

However, Peric (2018) identifies a significant gap in the approach to sports event tourism, emphasizing the need to shift focus from the events themselves to the tangible benefits that local communities can derive. The discussion underscores the importance of prioritizing the interests and advantages that residents gain from hosting sports events, emphasizing that the success of such events is closely linked to the level of support and perceived benefits from the local community's perspective.

In contrast to the prevalent positive views of residents on the impact of sports tourism, Cheung et al. (2016) present a dissenting perspective. They argue that while sports tourism may bring economic benefits, it often comes at the cost of local residents' quality of life. Increased tourist traffic, according to their research, can lead to overcrowding, environmental degradation, and a rise in the cost of living, negatively affecting the well-being of the host community. Cheng et al.'s research urges a cautious and balanced approach, emphasizing the need to carefully assess the trade-offs between economic gains and potential social and environmental drawbacks when promoting sports tourism for sustainable development.

Strategies and policies to enhance positive effects of sports tourism on territorial growth

Effective strategies for enhancing the positive effects of sports tourism on territorial growth begin with integrated planning and collaboration. In this approach, various stakeholders, including government bodies, tourism boards, local communities, and event organizers, work in tandem to develop comprehensive strategic plans. This collaborative effort ensures that all facets of sports tourism are considered, from infrastructure development to community engagement. A coordinated approach maximizes the impact of sporting events on territorial growth, leveraging the strengths of each stakeholder group.

Secondly, critical to the success of sports tourism is the investment in infrastructure. Allocating resources to develop and enhance sports facilities, transportation, accommodation, and entertainment venues is paramount. Upgraded infrastructure not only improves the overall experience for visitors but also contributes to the long-term growth and attractiveness of the region. Well-planned investments create a positive feedback loop, attracting more significant events and fostering sustained economic development.

Furthermore, the active involvement of local communities in the planning and execution of sports events is a key strategy for ensuring a positive impact on territorial growth. Establishing community engagement programs allows residents to participate and benefit directly from the events. Beyond economic benefits, this approach fosters a sense of community ownership and pride. In turn, a more engaged local population becomes a crucial element in the sustained success of sports tourism initiatives.

Commitment to sustainability in the organization of sports events is not only an ethical consideration but also a strategic one. Implementing sustainable practices, such as waste reduction, energy efficiency, and eco-friendly transportation, aligns with global trends and enhances the region's appeal as a responsible tourism destination. By minimizing environmental impact, regions can attract environmentally conscious visitors and position themselves as leaders in sustainable sports tourism. Additionally, strategic marketing and branding efforts play a pivotal role in maximizing the positive effects of sports tourism on territorial growth. Beyond promoting the sporting events, regions should highlight unique selling points, such as cultural attractions,

natural landscapes, and local experiences. Crafting a compelling and multifaceted image of the region attracts a broader audience and contributes to sustained growth by creating a memorable destination beyond the sporting arena.

CONCLUSION

In conclusion, this study establishes a clear correlation between sports tourism and the socioeconomic impact of a region, as perceived by its residents. The descriptive analysis results indicate a positive judgment from residents regarding the economic growth attributed to sports events within their region or country. The primary focus of this study was on residents, recognized as pivotal determinants and witnesses of the impact associated with hosting sports events. The implications of this research suggest the potential for longer-term investments in organizing sporting events, which can subsequently stimulate tourist movements and contribute to the sustained economic growth of the involved territory. Furthermore, this study contributes to the existing understanding of residents' attitudes toward the impact of sporting events on regional tourism and economic platforms.

The findings highlight that these sporting events play a crucial role as a cornerstone of resilience, mitigating the social and economic consequences associated with sport tourism. Leveraging sports tourism as a strategic tool can foster stronger connections and drive local and regional development. As a suggestion for future research, it would be beneficial to explore whether hosting sporting events in one's home territory has effects that are linked to other sports achievements, thus providing a more comprehensive understanding of the broader impact of sports on a community.

AUTHOR CONTRIBUTIONS

The publication reflects a collaborative endeavor marked by unique and complementary contributions from the authors, illustrating a well-coordinated team dynamic. Each author played a vital role in various facets of the research and development process.

Giovanni Raso was instrumental in shaping the research framework, leveraging his expertise in Sport Science and management to formulate key research questions and guide the study's trajectory. Moreover, Raso Giovanni spearheaded the design of the study methodology and supervised the field data collection, ensuring the robustness of the gathered data through hands-on involvement.

Dr. Cherubini assumed the lead role in crafting the manuscript, skillfully synthesizing contributions from all authors into a coherent narrative. His proficiency in research write-up guaranteed clarity and precision in communicating the research methods, results, and conclusions. Additionally, Dr. Domenico played a pivotal role in the review and editing process, incorporating feedback from all authors to refine the final manuscript.

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SUSTAINABILITY & SPORTS SCIENCE JOURNAL

ORIGINAL ARTICLE

Importance of mental health in the sports environment: Influence of outcome on anxiety in young female volleyball players in home and away conditions

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ABSTRACT

The objectives of this study are focused, firstly, on understanding the levels of cognitive anxiety, self-confidence, and pre- and post-match somatic anxiety. Secondly, to analyse the impact of the match outcome (win-loss) on the mentioned dimensions according to the Home-Away condition. The research involved 70 volleyball players (28 home and 42 away) belonging to cadet categories from different volleyball teams competing in the School Sports Program in the province of Araba, specifically in the city of Vitoria Gasteiz. Participants completed the Competitive State Anxiety Inventory in Sport (CSAI-2) (Martens et al., 1990), consisting of 27 items, adapted and validated in Spanish by Capdevila (1997), and subsequently reviewed and used by other researchers (Arruza et al., 2001; Telletxea, 2008). The results show that somatic anxiety significantly decreased between pre and post-match in the home condition, and there are significant differences between home players and away players in response to a victory outcome. The ability of coaches, monitors, and fitness trainers to understand and address athletes' anxiety states is crucial for optimizing their performance and overall well-being, as well as adherence to physical activity.
Keywords: Health, Mental health, Physical activity, Sports initiation, Volleyball, Anxiety.

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INTRODUCTION

The realm of affects, emotions, feelings, and moods plays a crucial role in the human experience. These aspects are fundamental for understanding human behaviour, interpersonal relationships, decision-making, and mental health (Martínez-Sánchez et al., 2002; André, 2010; Totterdell, 1999). Anxiety, as a construct related to the aforementioned aspects, is another phenomenon influencing human behaviour. It can be understood as a set of experientials, physiological, and expressive manifestations in response to a situation or stimulus that the individual perceives as potentially threatening, even if objectively it may not be dangerous (Cano Vindel, 1989).

The relationship between physical activity, sports, and mental health, including anxiety, has been an area of interest for researchers in various fields. Competitive state anxiety is defined as an immediate emotional situation characterized by feelings of apprehension and tension associated with the activation of the organism in competitive situations (Martens, 1977). Following the development of the Multidimensional Anxiety Theory (Martens et al., 1990), this variable began to be considered a multidimensional construct distinguishing cognitive and somatic aspects that influence sports performance differently. It is primarily used in the context of sports performance to understand and measure the anxiety experienced by athletes. This theory asserts that anxiety is not a single entity but has multiple dimensions that must be considered for a comprehensive understanding (Sierra et al., 2003).

In the sports context, research on anxiety has explored various directions, addressing how anxiety can affect both performance and the mental health of athletes. The relationship between anxiety (both state and trait) and sports injuries is complex and often inconclusive in all cases (Fernández et al., 2014, and Ríos et al., 2021). Although studies suggest an association between elevated anxiety levels and a higher risk of injuries (Olmedilla et al., 2009; García-Mas et al., 2014, and Catalá et al., 2020), research in this field has produced mixed results.

It is well-known that physical activity can play a significant role in stress and anxiety management (Sánchez-Bañuelos et al., 2000; Arribas et al., 2007; Marco et al., 2020), supported by a growing body of scientific evidence indicating that regular physical activity may be associated with lower anxiety levels (McAuley et al., 2002). Numerous studies have explored this relationship and found results suggesting that sports participation and exercise can have significant mental health benefits, including anxiety reduction (Castro et al., 2019; Chacón et al., 2016; Espejo et al., 2017; Olmedilla et al., 2011).

Furthermore, in the realm of sports performance, León-Prados et al. (2016) found that the relative contribution of anxiety and self-confidence in explaining group performance weakly and partially supported the established multidimensional anxiety theory. In other words, it predicts a negative linear relationship between cognitive state anxiety and performance and, with lesser strength, an inverted U-shaped relationship between somatic anxiety and performance. Regarding high sports performance, some researchers suggest that confidence levels modulate the effects of anxiety, thus avoiding significant performance fluctuations for athletes (Sánchez et al., 2017).

Due to the interaction between technical-tactical, psychological, affective, and social factors, volleyball, like other sports, provides a conducive scenario for studying psychological phenomena. The numerous factors interacting during practice and competition, such as resilience (Patsiaouras et al., 2021), decisional profile according to expertise level (García-Coll et al., 2009), self-esteem in relation to position (Stanovic et al., 2020), gender (Milavic et al., 2013; Machado et al., 2016; Da Silva et al., 2022), the Individual Zone of Optimal

Functioning (IZOF) (Nogueira et al., 2019), and the condition of playing as the home and/or away team (Menegolli et al., 2014). This anxiety-condition (home-away) relationship is the focus of our study. Therefore, our research is framed within the context of sports in formative ages, and its dual objective is to firstly understand the levels of cognitive anxiety, self-confidence, and somatic anxiety between home and away teams before the competition begins. Secondly, to analyse the impact of the match outcome (victory-defeat) on the mentioned dimensions for both home and away teams.

MATERIAL AND METHOD

The design of this study, following Ato et al. (2013), responds to an empirical investigation that has adopted an associative strategy for a comparative study, as it aims to analyse the relationship between variables by examining differences between groups created by different independent variables generated by the studied situation, such as the condition (home and away) and the match outcome (in this particular case, victory or defeat). It is both a retrospective and prospective ex post-facto study.

The research adheres to ethical principles (respect, justice, and beneficence) for the protection of human research subjects, as established by the Belmont Report (1979) and the Declaration of Helsinki (WMA, 2021).

Participants

The sample consisted of 70 female athletes belonging to the cadet category from different volleyball teams competing in the School Sports Program in the province of Araba, specifically in the city of Vitoria Gasteiz during the 2021-2022 season. The ages of the subjects ranged from 14 to 15 years (14.50 ± 0.50), with 28 under the "*home*" condition and 42 under the "*away*" condition. This is a sample of volleyball players in developmental categories selected for convenience (Otzen and Manterola, 2017).

Instruments

The Competitive State Anxiety Inventory in Sport (CSAI-2) was used (Martens et al., 1990), consisting of 27 items, adapted and validated in Spanish by Capdevila (1997) and subsequently reviewed and used by other researchers (Arruza et al., 2001; Telletxea, 2008) with satisfactory results. In this version, the scales that make up the test are Cognitive Anxiety, Self-Confidence, and Somatic Anxiety.

The measurement scale is Likert-type with a range from zero to four (0 to 4) distributed as follows: zero, 0 (Nothing); one, 1 (A little); two, 2 (Moderately); three, 3 (Quite); four, 4 (A lot).

The reliability of the scales calculated using Cronbach's Alpha coefficient, in this research yielded values of .84 for cognitive anxiety, .81 for somatic anxiety, and .85 for self-confidence, prior to the match. After the match, the values were .77 for cognitive anxiety, .77 for somatic anxiety, and .71 for self-confidence.

Procedure

To intervene and apply the test before and after matches to non-professional athletes (volleyball), permission was sought from club coordinators, team coaches, and the parents of the participants. A pre-session was conducted to explain the necessary information to participants regarding the objective and purpose of the research, as well as its anonymous, voluntary, and confidential nature, from data collection to statistical treatment. Doubts raised by players from different teams were also clarified during this session. The tests (data collection) were conducted thirty minutes before the start of the match and after its completion. The research design spanned from October 2021 to May 2022.

Statistical analysis

Firstly, it is noteworthy that all variables involved met the normality condition, except for the Post Somatic Anxiety variable (As = -0.5; Cur = 2.9), so we cannot assert the existence of multivariate normality. However, the assumption of homoscedasticity of variances, tested using the Levene's Test, yielded non-significant values. Given these data, Student's t-tests for related and independent samples were decided to be employed. Some researchers (Montilla and Kromrey, 2010) suggest that under these conditions, the t-Student test is robust. The Box's M test used to check the equality of covariance matrices yielded significant values, so the performance of multivariate analyses was dismissed. To measure the effect size (ES), Cohen's (1994) estimator was used. This estimator calculated the degree of population generality of an effect based on the observed difference between two sample means. A value of 0.2 is considered a poor ES, 0.5 a moderate ES, and starting from 0.7, it is considered a strong ES. Statistical analyses were conducted using the SPSS 29.0 statistical program.

RESULTS

Study 1. Pre-match anxiety in home and away conditions

Through the comparison of means for independent samples, the difference in various dimensions of anxiety between the home and away conditions was examined at the moment before the match (pre-competition) in the entire sample. None of the dimensions showed statistically significant differences between playing at home or away (CA (p = .922;) CONF (p =.445) and SA (p =.158)) -Table 1-.

Table 1. Pre-competition home-away comparison.

	PreL (n = 28)	PreV (n = 42)	Mean Diff	CI 95%	$t_{(df)}$	*p*	*d*
CA	54.60 ± 6.95	54.78 ± 4.48	-.1785	[-3.79,3.44]	$-0.98_{(68)}$	.922	
S	47.78 ± 8.02	46.30 ± 7.76	1.476	[-2.35,5.30]	$.768_{(68)}$	.445	
SA	52.07 ± 8.74	54.88 ± 6.84	-2.809	[-3.20,1.81]	$-1.432_{(68)}$	.158	

Note. Table of Own Elaboration. CA = Cognitive Anxiety, S = Self-confidence, SA = Somatic Anxiety, Pre = Previous, Post = Posterior, Mean Diff. = Mean Difference, CI = Confidence Interval, df = degrees of freedom, p = significance, d = Cohen's d.

Study 2. Pre and post-match anxiety when the outcome is a victory.

Through the comparison of means for related samples, the difference in various dimensions of anxiety between the pre-match (pre) and post-match (post) moments was examined when the result was a victory in the entire sample (home and away). Only somatic anxiety decreased after the match, although not significantly (t(35) = 1.925; p = .062) -Table 2-.

Table 2. Pre-Post comparison with victory outcome (home and away).

	Pre(n = 36)	Post(n = 36)	Mean Diff	CI 95%	$t_{(df)}$	*p*	*d*
CA	53.19 ± 6.99	53.13 ± 7.35	.0555	[-1.82,1.94]	$.060_{(35)}$	.953	
S	46.94 ± 7.88	46.91 ± 8.70	.5277	[-2.43,3.48]	$.362_{(35)}$	.719	
SA	54.97 ± 6.29	52.86 ± 7.91	2.111	[.-115,4.33]	$1.92_{(35)}$	.062	

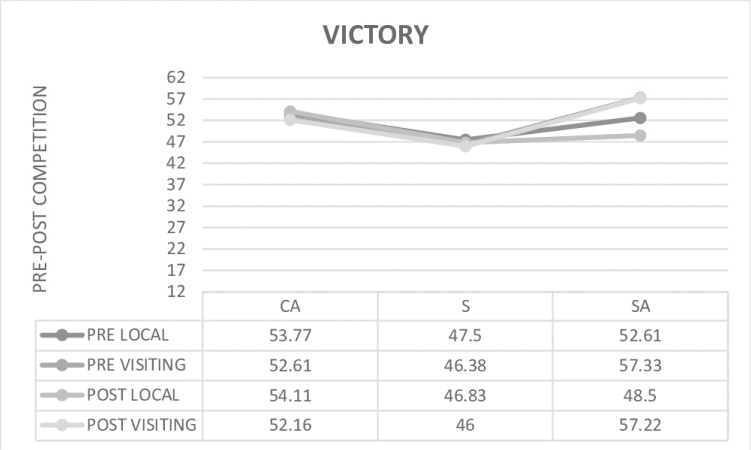
Note. Table of Own Elaboration. CA = Cognitive Anxiety, S = Self-confidence, SA = Somatic Anxiety, Pre = Previous, Post = Posterior, Mean Diff. = Mean Difference, CI = Confidence Interval, df = degrees of freedom, p = significance, d = Cohen's d.

In relation to the home condition (Figure 1), it is worth noting that only somatic anxiety significantly decreased between pre and post-match (t(17) = -.289; p = .048) and to a moderate extent (d = 0.4).

Regarding the away condition (Figure 1), no significant variation is observed in any dimension of anxiety.

Considering the pre-post competition comparison between the home and away conditions when the outcome is a victory, the results indicate that only the somatic anxiety dimension shows statistically significant differences both before (p = .025) and after competing (p = .001).

In pre-competition, it is much higher in away players (57.33 ± 3.28) than in home players (52.61 ± 7.67), while in post-competition, the result is reversed, being lower in the case of home players (48.50 ± 9.03) than in the condition of competing away (57.22 ± 2.62).



Note: Figure prepared by the authors.

Figure 1. Comparative graph of the average CSAI-2 scales, showing the differences Pre-Post Competition Victory in home and away condition.

Study 3. Pre and post-match anxiety when the outcome is a defeat.

Through the comparison of means for related samples, the difference in various dimensions of anxiety between the pre-match (pre) and post-match (post) moments was examined when the result was a defeat in the entire sample (home and away). Only self-confidence (t(32) = -.911; p = .343) and somatic anxiety (t(32) = .282; p = .780) decreased after the match, though not significantly -Table 3-.

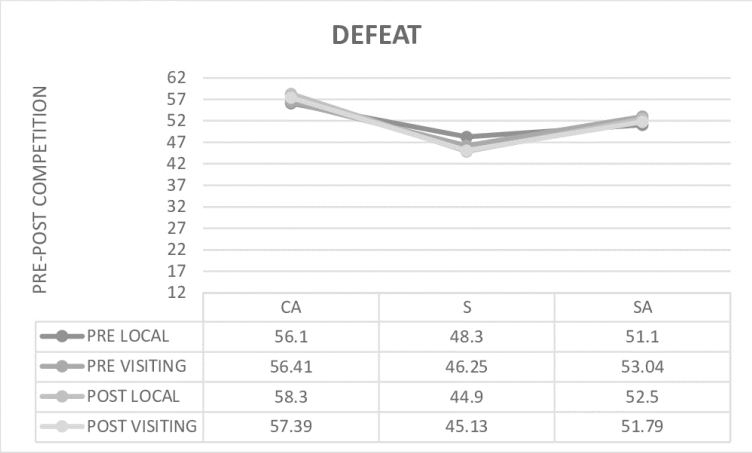
Table 3. Pre-Post comparison with defeat outcome (home and away).

	Pre$_{(n = 34)}$	**Post$_{(n = 34)}$**	**Mean Diff**	**CI 95%**	**t$_{(df)}$**	***p***	***d***
CA	56.42 ± 7.63	57.66 ± 8.38	-1.242	[-4.01, 1.53]	-.911$_{(32)}$	.369	
S	46.81 ± 8.05	45.06 ± 7.59	1.757	[-1.96, 5.47]	.963$_{(32)}$	.343	
SA	52.47± 8.91	52 ± 7.08	.4705	[-2.92, 3.86]	.282$_{(32)}$	.780	

Note. Table of Own Elaboration. CA = Cognitive Anxiety, S = Self-confidence, SA = Somatic Anxiety, Pre = Previous, Post = Posterior, Mean Diff. = Mean Difference, CI = Confidence Interval, df = degrees of freedom, p = significance, d = Cohen's d.

In the case of the home condition, it is noteworthy that only self-confidence decreased non-significantly between pre and post-match (t(9) = .922; p = .381). Meanwhile, cognitive anxiety (t(9) = -.665; p = .523) and somatic anxiety (t(9) = -.353; p = .732) increased but not significantly.

On the other hand, regarding the away condition, it is worth mentioning that none of the anxiety dimensions experienced a significant decrease, but it did not follow the same trend as the home condition. Among the dimensions that decreased, in addition to self-confidence, somatic anxiety is also included -Figure 2-.



	CA	S	SA
PRE LOCAL	56.1	48.3	51.1
PRE VISITING	56.41	46.25	53.04
POST LOCAL	58.3	44.9	52.5
POST VISITING	57.39	45.13	51.79

Note: Figure prepared by the authors.

Figure 2. Comparative graph of the CSAI-2 average scales, showing the differences Pre-Post Competition Home and Away Defeat.

DISCUSSION

The present study aimed to (1) first understand the type of anxiety profile exhibited by non-professional volleyball players just before competition and (2) examine the effect that match outcome variables have on the anxiety profile of both home and away players.

The anxiety profile of home players before competition is characterized by scores reflecting cognitive and somatic anxiety higher than self-confidence. Regarding the three anxiety dimensions analysed in this study—cognitive anxiety, self-confidence, and somatic anxiety—the results differ from those obtained in other research conducted in individual sports such as tennis (Rodríguez et al., 2017), amateur golfers (Pinto & Vázquez, 2013), as well as team sports like handball players (Baro et al., 2016; Ortín-Montero et al., 2013), footballers (Castillo-Rodríguez et al., 2022), and volleyball (Milavic et al., 2013; Patsiaouras et al., 2017; Do Amaral et al., 2016), where self-confidence scores were lower.

On the other hand, the anxiety profile of away players before competition in this research shows a similar profile to home players, with slightly higher scores. This differs from the results found by the mentioned researchers (Rodríguez et al., 2017; Morcillo, Baro et al., 2016, Ortín-Montero et al., 2013), who obtained an anxiety profile where self-confidence scores were higher than cognitive and somatic anxiety. It is also worth noting that no statistically significant differences were found between the self-confidence scores of home and away players.

Pre and post-match anxiety when the outcome is a victory

Regarding the total sample, it is worth noting that the scores of the three dimensions of the anxiety variable, both before and after the match, remain constant, and no statistically significant differences are detected.

However, when we analyse the home player sample separately, it is noteworthy that somatic anxiety significantly decreases between the pre-match and post-match moments despite winning. In contrast, cognitive anxiety decreases from pre to post, as expected.

As for away players, it should be mentioned that none of the anxiety dimensions experienced a significant decrease between pre and post when the outcome is a victory.

In relation to the home-away comparison, victory shows statistically significant differences both before and after competing in somatic anxiety. In pre-competition, the manifestation of anxiety through physical (somatic) symptoms such as muscle tension, nervousness, etc., is much higher in away players compared to home players, while the post-competition test results show a reversal of the results. In this case, home players reflect lower somatic anxiety, which could be translated as a sense of greater relaxation, joy, etc., for having achieved a positive result in front of their fans.

Pre and post-match anxiety when the outcome is a defeat

In the total sample, as mentioned throughout the study, the scores of the three dimensions of anxiety remain stable, and no statistically significant differences were found between pre and post. However, it can be highlighted that cognitive anxiety is slightly higher after competing (post). Cognitive anxiety has recently been empirically associated with personal responsibility and commitment (García-Mas et al., 2011). Therefore, this increase in cognitive anxiety levels may indicate a perception of responsibility and personal commitment by players after the negative result obtained. On the other hand, self-confidence decreases significantly after the match, but somatic anxiety shows similar scores before and after. This can also be interpreted as a reasonable result. After the match, the athlete experiences persistent physiological activation after a sporting event, even though the competitive tension phase has passed. This sustained activation can be part of the stress and excitement response that accompanies competition. In addition, the decrease in belief in one's own abilities after a recent defeat may contribute to feelings of discomfort or dissatisfaction (Prieto, 2016; Castro-Sánchez et al., 2019).

CONCLUSIONS

The two objectives pursued in this research were to understand the levels of cognitive anxiety, self-confidence, and somatic anxiety between home and away players before the competition and to analyse the impact of the match outcome (victory-defeat) on the mentioned dimensions for both home and away players.

After the analyses performed and the results obtained, it can be stated that, of the three dimensions analysed—cognitive anxiety, self-confidence, and somatic anxiety—it is the second dimension (self-confidence) that varies between pre-competition and post-competition, both in home and away players, decreasing significantly in both cases. Meanwhile, the other two dimensions, cognitive anxiety and somatic anxiety, do not show statistically significant differences between them.

This study has some limitations that should be considered. Firstly, anxiety in athletes was evaluated only once, and data were not collected throughout several matches. Periodic assessments could provide a completer and more dynamic picture of anxiety and other psychological variables related to performance. Secondly, the role of being a starter or substitute can have significant implications in terms of pressure, expectations, and anxiety levels in the sports context. Thirdly, and in the same line, monitoring the number of minutes played throughout the season is a significant variable that can influence a player's anxiety state. This metric can not only affect the player's perception of their contribution to the team but also have implications for their development, confidence, and emotional well-being.

Therefore, future research should address these limitations. Firstly, by controlling a greater number of variables (starter-substitute status, playing time, team ranking) to include them in explanatory models of

player anxiety states both before and after the match. Also, considering the circumstances surrounding a particular match can shape the player's anxiety state. Therefore, variables such as the importance the player assigns to the match, the team's position in the standings, or the significance of the match could be dimensions to consider in future studies on anxiety.

Moreover, future research could conduct cross-sectional studies between different theoretical constructs such as mastery climate and anxiety (Papaioannou & Kouli, 1999; Yoo, 2003).

On an applied level, the presented results, especially those related to playing time, anxiety, and other psychological variables, can be valuable for informing the design of intervention programs aimed at coaches (Soriano et al., 2014; Sousa et al., 2007). This study can be of great utility for coaches and fitness trainers in adapting their communication and support strategies. Crucial aspects in team management, player performance, as well as in promoting physical activity.

This work calls for the attention of monitors and coaches to integrate psychological variables into training programs, essential for the growing understanding of the importance of mental preparation in sports performance. Integrating the psychological dimension into training can have significant benefits for the well-being of athletes and their ability to face challenges.

AUTHOR CONTRIBUTIONS

The authors' contribution to the study has been:

a) The idea and conceptualisation of the study (Dr. Rubén Arroyo).
b) The collection of the data, together with the second author (Dr. Paula San Martin).
c) Methodological structuring, together with Dr. Mario Amatria.
d) The reading of the scientific literature and writing (introduction, interpretation of results, discussion and conclusions of the study) (Active participation by the three authors).

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No potential conflict of interest was reported by the authors.

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SUSTAINABILITY & SPORTS SCIENCE JOURNAL

ORIGINAL ARTICLE

Carbon emission in football games: Footprint impact of power five conference realignment

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ABSTRACT

Abstract: The environmental impact of carbon dioxide emissions arising from travel has emerged as a significant concern. Notably, the recent frequent realignments within the Power Five conferences have led to substantial fluctuations in the annual carbon footprint of football games played between member teams. In this comprehensive study, we collected and analysed conference data spanning the previous decade, as well as forthcoming schedules (wherever available), to evaluate shifts in this carbon emissions footprint. Our findings underscore the potential environmental ramifications of the impending realignment, commencing in 2024, revealing the possibility of an almost twofold increase in carbon emissions.

Keywords: Environment, Power Five, Carbon dioxide emissions, Footprint, Environmental consciousness, Climate change.

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INTRODUCTION

Social development has given rise to increased greenhouse gas emissions, contributing to climate change as evidenced by global warming. According to the Environmental Protection Agency's annual report for 2021[1], transportation accounted for the largest share of U.S. Greenhouse Gas Emissions by Economic Sector. This concern is also prevalent in the sports community, as regular games involve extensive domestic and international travel, resulting in a substantial carbon footprint (Trendafilova et al., 2014). (We note that increased travel across time zones may also impact individual health and student educational experience, but we focus on environmental impacts in this paper). It is also worth noting that major sporting events can potentially serve as a platform to raise public awareness about environmental sustainability (Casper et al., 2014). In this work, we examined the carbon footprint generated by the Power Five Football Conferences, spanning from 2010 to the most recent schedule announcements. We specifically focused on the Power Five College Football Conferences, which are part of the Football Bowl Subdivision (FBS) of the National Collegiate Athletic Association (NCAA) and comprise the top-performing teams in the United States. These conferences include the Atlantic Coast Conference (ACC), Big Ten Conference, Big 12 Conference, Pac-12 Conference, and Southeastern Conference (SEC). The alignment of schools in these conferences has evolved over time. Before 2000, schools were grouped into conferences primarily consistent with proximate geographical locations. However, as time has progressed, conferences have undergone frequent realignments. Notably, in 2024, there are plans for the realignment of numerous institutions, resulting in new cross-country trips for schools such as UCLA, USC, Cal-Berkeley, Oregon, Washington, and Stanford. Our data collection process involved gathering information on conference matches, including venue locations, home and away teams, the flight distances involved, as well as the approximate carbon costs. Our analysis indicates that the new alignments will produce nearly twice the amount of carbon dioxide emissions.

MATERIAL AND METHODS

In this section, we report our methods of collecting and processing data to obtain the footprint of games. Since the footprint depends on the distance between the away team and the game stadium, we first extracted the schedules (2010-2023) from College Football Data API[2], which was chosen for its comprehensive coverage of NCAA football games with a specific focus on the Power Five conferences. We obtained the future schedules from the conferences' official websites. The conference alignments in 2010 and 2024 are visualized in Figure 1. We calculated the estimated carbon emission for each game based on the following formula:

Carbon Emissions (kg CO_2) = Distance (nautical miles) × 1.852 × Emission Factor (kg CO_2 per km) × Number of Trips × Number of Travelling Passengers

This formula takes into account several factors. First, the "*Distance*" is initially converted from nautical miles to kilometers using the conversion factor of 1.852. This conversion aligns with standard practices in navigation, where 1 nautical mile is approximately equal to 1.852 kilometers[3]. The "*Emission Factor*" is a key component that varies based on the mode of transportation. For air travel, a typical emission factor for a

[1] *Retrieved from [Accessed March 13, 2024]: https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks*
[2] *Retrieved from [Accessed March 13, 2024]: https://collegefootballdata.com/exporter/games*
[3] *Retrieved from [Accessed March 13, 2024]: https://oceanservice.noaa.gov/facts/nautical-mile-knot.html?ref=driverlayer.com/web*

Boeing 737 is 115g of CO_2 per passenger per kilometer[4]. Conversely, for bus travel, an emission factor of 20.04g of CO_2 per kilometer is utilized[5]. In the context of NCAA football games and sustainability considerations related to conference realignments, the "*Number of Trips*" is fixed at 2. The number accounts for one trip to the game venue and one return trip to the university. This approach is crucial for providing an accurate assessment of the environmental impact associated with travel to and from sporting events.

In our analysis process, we made assumptions as follows:

- We only consider the intra-conference matches as we aim to explore the effects of alignments on carbon costs within Power Five;
- We calculated the carbon footprint based on the travel distance between the away team stadium and venue, standardizing the calculations for factors such as the airplane type and the number of individuals , including team members, staff, and associated personnel assumed to be a 65% full Boeing 737-400;
- We did not account for the carbon footprint from the team stadium to the airport, as its impact is negligible;
- We assume that teams travel by plane if the distance is longer than 200 miles. Otherwise, we assume that they travel by bus for the match. For the bus travel, we used road miles instead of nautical miles;
- We calculated the average carbon footprint of each match in different seasons for every conference.
- Only team travel is considered, fan travel to venues could be substantial but is difficult to estimate. Effectively, we assume fan travel patterns would remain similar and thus simply serve to provide a multiplicative effect to observed differences in carbon footprint.

For all teams in the Power Five conferences, we extracted season, venue, home, and away teams. Season indicates the year when the game was played. Venue refers to the location of the game, which is crucial for assessing travel-related sustainability factors. Home and away teams provide context for each game and support the distance calculation. Then, for each venue, we collected the geo-position data from Google Map and calculated the travel distance for the away team. We simulated the carbon costs of flights with the Python Library codecarbon.

We visualize the carbon cost change trends of individual conferences in football games with line charts as shown below. We also added detailed information of conference realignments on the charts. We estimated the average carbon cost per game of each conference and reported them following the descending order of their average travel distance in 2024.

First, we examined the ACC conference footprint (Figure 2). Up until 2024, the carbon cost of the ACC conference remained relatively stable. When Pittsburgh and Syracuse joined in 2013, there was an increase of 1,553 kg compared to 2012. In 2014, with Louisville joining and Maryland leaving, the carbon cost rose by 750 kg. The upcoming realignment in 2024 is expected to significantly escalate carbon dioxide emissions, soaring from approximately 26,395 kg to 52,412 kg, mainly due to the addition of California, Stanford, and SMU to the ACC. Consequently, emissions in 2024 are projected to nearly double compared to 2023.

[4] *Retrieved from [Accessed March 13, 2024]: https://www.carbonindependent.org/22.html#:~:text=CO2%20emissions%20from%20aviation%20fuel%20are%203.15,90%20kg%20CO2%20per%20passenger%20per%20hour*

[5] *Retrieved from [Accessed March 13, 2024]: https://travelandclimate.org/transport-calculations#:~:text=The%20calculation%20is%20also%20based,of%20CO2%20per%20passenger%20kilometer*

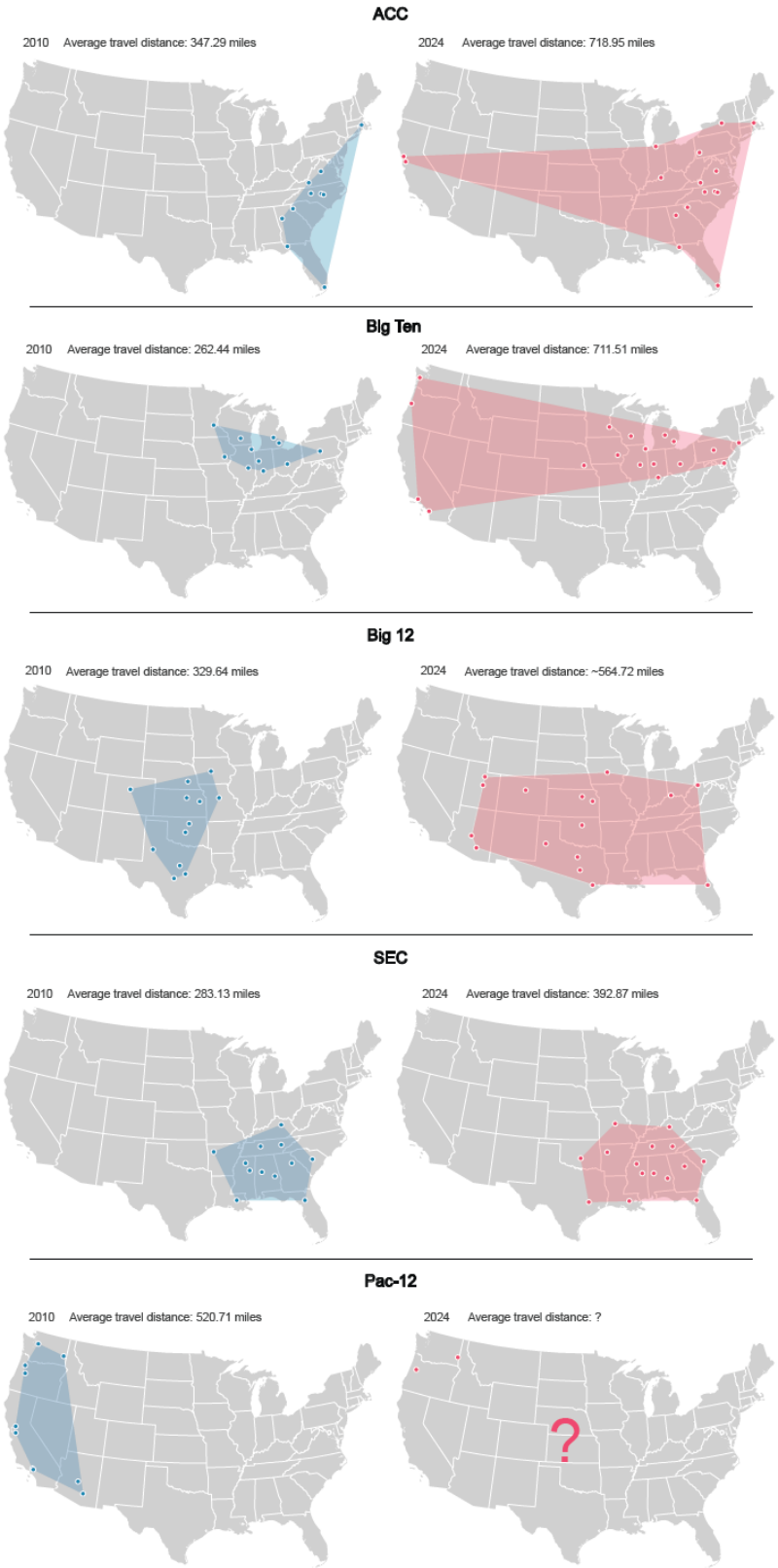

Figure 1. The alignment changes of each conference from 2010 to 2024 (arranged in descending order of average travel distance in 2024).

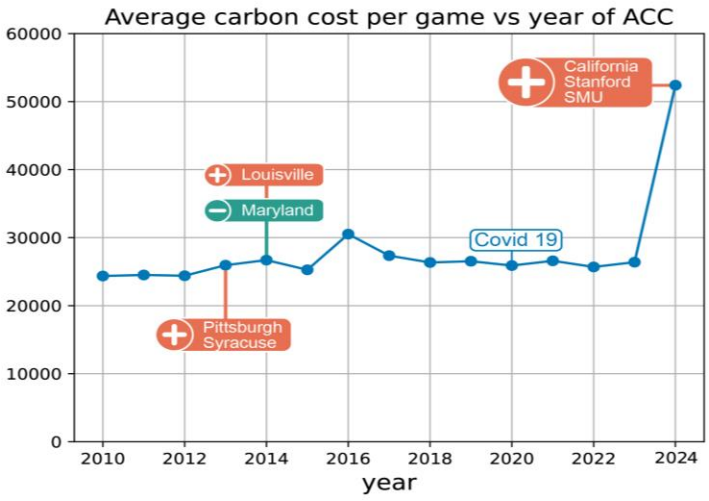

Figure 2. The average carbon cost per intraconference game of ACC football games from 2010-2024.

RESULTS

Every realignment of the Big Ten conference leads to a rise in carbon emissions, reflecting the conference's ongoing growth. When Nebraska joined in 2011, emissions increased by 16% the following year. In 2014, with Maryland and Rutgers joining, emissions rose by 6% compared to the previous year. The trend is expected to continue in 2024, mirroring the ACC's emissions pattern. Projections for 2024 show emissions reaching 56,502 kg, a 2.48-fold increase from 2023's 22,790 kg. This surge is primarily due to new member schools from the west coast, such as USC, UCLA, Oregon, and Washington, moving from the Pac-12 to the Big Ten. These additions will necessitate numerous cross-country trips, significantly boosting emissions. However, emissions are predicted to stabilize in the subsequent years, as depicted in Figure 3.

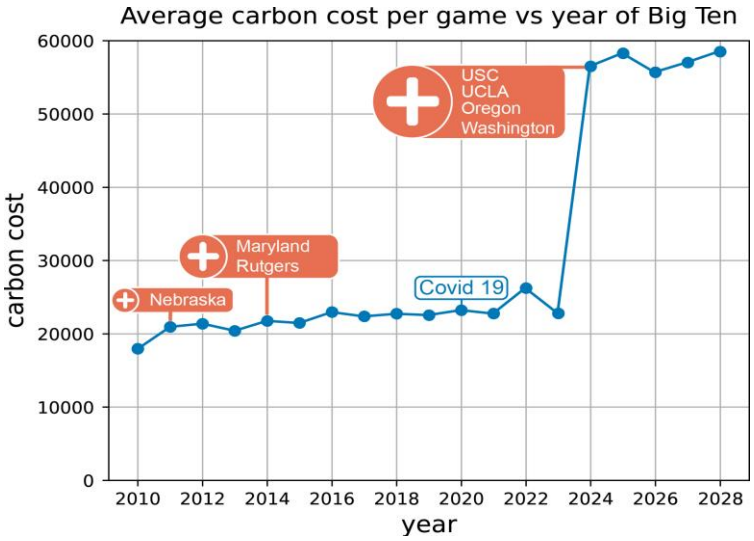

Figure 3. The carbon cost of Big Ten football intraconference games from 2010-2028.

Despite losing two teams, Colorado and Nebraska, in 2011, the Big 12 saw a 1,915 kg increase in the average carbon cost per game. Subsequently, in 2012, when Missouri and Texas A&M departed and West Virginia and TCU joined, the carbon cost rose by 6,381 kg, accounting for over 25.37% of the costs in 2011. The trend of increasing carbon dioxide emissions is expected to continue for the Big 12 in 2023 and 2024 (see Figure 4). In 2023, four schools—BYU, Cincinnati, Houston, and UCF—joined the conference, leading to a 32.59% increase in carbon cost. This trend is set to continue in 2024, with Colorado, Utah, Arizona, and Arizona State joining, resulting in a 23.65% increase in carbon cost.

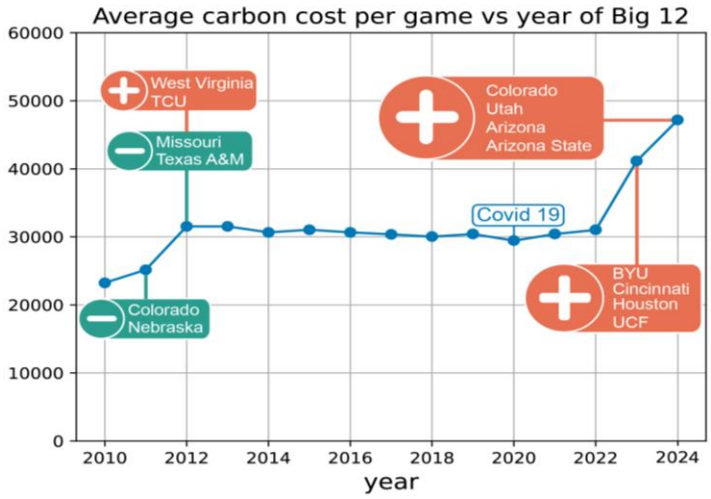

Figure 4. The carbon cost of Big 12 intraconference football games from 2010-2024.

The carbon footprint remained roughly stable during the years (2010-2022) for the Pac-12, though in 2020, because of Covid-19, the carbon emission decreased from 37740kg in 2019 to 32279kg in 2020, and in 2023, it increased a little bit compared again as seen in Figure 5. It creased from around 37816kg to about 44224kg, indicating a growth of 6418kg. The potential carbon dioxide emission in 2024 remains unknown as ten schools are leaving the Pac-12, namely USC, UCLA, Oregon, Washington, Colorado, Utah, Arizona, Arizona State, California, and Stanford.

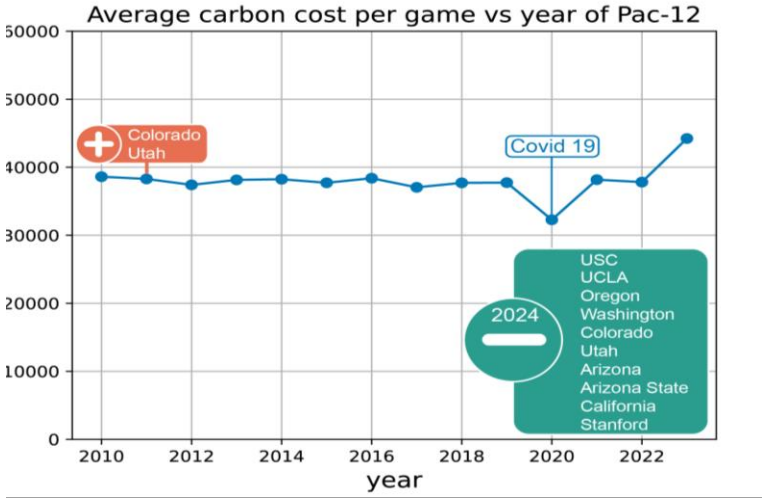

Figure 5. The carbon cost of Pac-12 intraconference football games from 2010-2023.

Overall, SEC is the conference that produced the least carbon cost per game. When Missouri and Texas A&M joined the SEC in 2012, carbon costs increased by 3,007 kg, marking a 15.19% rise from 2011. Despite no changes in membership since then, the SEC will experience a 5.31% increase in carbon costs in 2024 compared to 2023, as Texas and Oklahoma are set to join the conference (Figure 6).

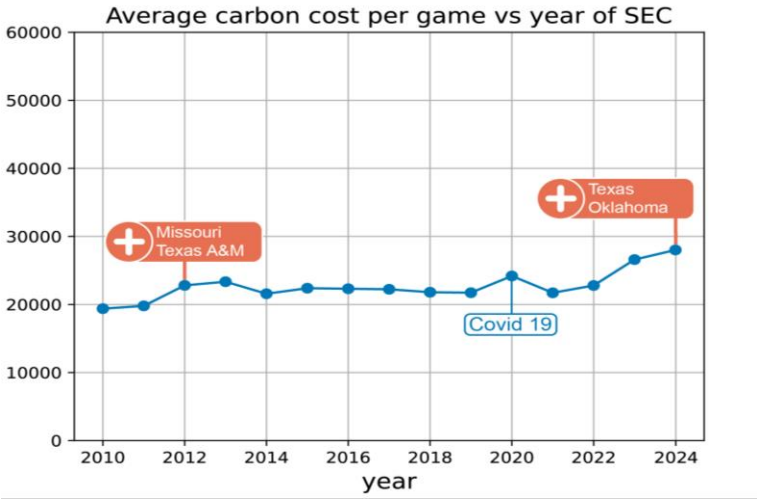

Figure 6. The carbon cost of SEC intraconference football games from 2010-2024.

DISCUSSION

Analyzing the results, it becomes evident that recent realignments have, on the whole, led to a significant increase in carbon dioxide emissions. This escalation can be primarily attributed to the broadening of conference boundaries, particularly in the cases of the ACC, Big Ten, and Big 12 conferences as seen in Figure 1. To illustrate this point, we take California as an example. According to its most recent schedule announcement, California teams will travel extensively across the country in 2024. These journeys include destinations such as Miami, Pittsburgh, Syracuse, and Oregon State, covering considerable distances. It is important to acknowledge that realignment decisions are multifaceted, taking into account factors such as recruiting opportunities, the economic impact on fans and schools, and the intensity of games. Yet, we contend that there is potential to strike a more optimal balance between the benefits and environmental costs of these realignments. One potential avenue for achieving this goal is to consider the geographical proximity and competitive skill levels of schools when making realignment decisions. By aligning schools that are closer to each other both geographically and in terms of performance, tradition, and academic mission, it may be possible to reduce the carbon footprint associated with travel as well as maintain the excitement of games. Additionally, a strategic approach could involve a thorough review of the scheduling process. For instance, in the case of the 2024 realignment in the Big Ten, where teams are spread across the country, it may not be feasible for every team to play every other team. In such scenarios, organizing matches between teams with shorter travel distances can be an ideal solution. The use of geographically defined conference divisions, since every team can not play every other team in large conferences anyway, is a simple and logical approach for reducing carbon footprint. Furthermore, arranging games in close proximity to each other can also help minimize travel-related emissions. For example, the Big 12 includes Arizona, Arizona State, and Iowa State in 2024. If a scheduling arrangement is made for Iowa State to compete against both Arizona and Arizona State, a more practical approach would be to schedule these games in close temporal proximity. By doing so, Iowa State can avoid the need for two separate trips to Arizona, significantly reducing travel-related

emissions. Similarly, when one team is required to cover a substantial distance to participate in a game, it makes sense to consider scheduling additional matches with teams located along the way. This approach not only minimizes the overall travel burden but also contributes to a reduction in carbon emissions associated with air travel. While this may be impractical for football, this approach is often applied to other sports such as baseball and basketball, and could be extended. Even in football, consideration of schedules such as Saturday - Wednesday instead of Saturday only might facilitate combining two distant trips. As for future work, we plan to develop more statistically driven descriptive simulation approaches and prescriptive optimization approaches to assess the impact of realignments and minimize environmental/personal impacts, thus providing decision-makers with insights to identify the most sustainable solutions for school alignments. Incorporating demographic data by geographic region will provide an opportunity to prescribe conference and division alignments that minimize environmental impact subject to desired levels of population and economic fan-based coverage. Additionally, we aim to create an interactive tool to facilitate this decision-making process.

CONCLUSIONS

In this manuscript, we comprehensively studied the carbon emissions associated with football intra-conference matches within the Power Five since 2010. Our analysis revealed a significant surge in carbon footprint in the year 2023, and it is projected to continue its upward trajectory in the subsequent years. This increase can be primarily attributed to the spatial expansion resulting from recent realignment initiatives.

AUTHOR CONTRIBUTIONS

Jiayi Hong: formal analysis, writing - original draft. Sia Sheguri: formal analysis, writing - original draft. Ronald G. Askin: methodology, writing - review & editing. Ross Maciejewski: conceptualization, methodology, writing - review & editing, supervision, project administration.

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DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

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SUSTAINABILITY & SPORTS SCIENCE JOURNAL

ORIGINAL ARTICLE

Technical and relational analysis of Michael Jordan in the 1995-1996 NBA Finals

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ABSTRACT

This article aimed to analyse the technical skills of Michael Jordan by studying his technical actions, shots, and relationship with teammates. The study focused on the six games of the 1995-1996 NBA playoff finals, utilizing an ad hoc instrument with 14 dimensions and 147 categories. The data underwent synchronous analysis to assess the relationship between variables and various success criteria. The results indicated by this data revealed the percentage of Jordan's involvement and his manner of participation. Additionally, a diachronic analysis was conducted using polar coordinate analysis to measure associative consistency among different behaviours. This allowed for the observation and analysis of Jordan's relationship with teammates. The obtained data highlights the significance of dribbling, free throws and fadeaway shot as frequent and effective technical actions used by Jordan. Moreover, they illustrate how Michael was a prominent player in the game, actively contributing to the offensive actions of his team.
Keywords: Sport science, Michael Jordan, Basketball, Dribbling, Free throws, Fadeaway, Polar coordinates.

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INTRODUCTION

Basketball is one of the most practiced sports in the world (Quispe, 2023) and research has traditionally focused on aspects such as training, biomechanics, health and injuries, and physiology (Amirnordin et al., 2023; Shah et al., 2023; Shi & Wu, 2024). However, technical-tactical studies, carried out from systematic observation, have not been sufficiently developed (Remmert, 2003) to date. Nevertheless, the emergence of increasingly sophisticated data analysis software, combined with the development of rigorous methodological approaches, provided researchers the tools to prove or disprove numerous theories about basketball that, until then, lacked scientific credibility. A particularly prominent area of the current research in the field of basketball is the relationship between physiological demands and the technical-tactical performance that players develop (Figueira et al, 2022). The depth and sophistication of these interactions, directly related to creativity and intra-team coordination (Furley & Memmert, 2015), confirm that basketball, along with its underlying structures, is a complex system (Klostermann et al., 2018).

This complexity of the game generates complex data when studied, which, if simplified and decomposed into measurable units, becomes easier to analyse (Bakeman & Quera, 1996). In the case of basketball, this "*simplification*" is the only way to validate associations and/or causal relationships that occur during the game and obtain behavioural structures and interactions between them, from a certain distance, that does not affect their development. In this complex game, the whole, which means the team, is more than the sum of its parts, hence the importance of understanding how different players interact and relate to each other. One of the main data analysis techniques to analyse complex interactions in sports is polar coordinate analysis applied to data collected through systematic observation (Anguera & Hernández-Mendo, 2015; Castañer et al., 2016, 2017). Polar coordinate analysis can be used to measure the spontaneous behaviour of players interacting in their natural environment from the perspective of a specific behaviour, known as focal behaviour, having been performed with a high degree of success in other team sports such as soccer (Maneiro & Amatria, 2018) or handball (Navarro et al, 2018).

In this sense, this typology of analysis has proven to be an effective tool to decompose the complexity of the game (Lago & Anguera, 2002; Castellano & Hernández-Mendo, 2003; Perea et al., 2012; Robles et al., 2013). Its application to the study of several of the best athletes in the world from various collective sports disciplines (Castañer et al., 2016; Castañer et al., 2017; Maneiro and Amatria, 2018) has allowed researchers to obtain practical conclusions about what makes these players excellent and, in return, make recommendations to improve the offensive and defensive aspects of the game.

However, polar coordinate analysis has not yet been tested in players with a specific demarcation such as shooting guards. Most of the research on shooting guards is based on different groups of players based on their position in the field between this specific demarcation and point guards, obtaining interconnected results, which in no case can be confirmed as definitive for this type of demarcation, that is, the data analysed is generally outside the specific context of the actions and tactical technical performance developed by these players (Gómez et al, 2007; Sampaio et al., 2008).

On the other hand, the relationships that occur between players are usually viewed through a prism focused on their traditional role according to their position on the field. However, in today's basketball, where greater versatility is increasingly required from players, only three key positions (guard, forward and centre) are identified, according to Sampaio et al. (2006), leaving the shooting guard position diluted and integrated in a non-specific way as such.

This happens since the traditional mission of the shooting guard is characterized by their permeability, being a driving force that helps the point guards to organize the game and raise the ball, as well as having mastered shots at all distances (outside, inside and free throws), an aspect that conditions him to be the team's highest scorer and the player with the greatest responsibility attacking. This is why his identification as such is not defined, since he shares the functions of point guard and small forward. In this sense, Fransen et al. (2016), in their study on leadership in sport, determine that the players with main rolls in the game are in a very beneficial spatial position that, in combination with their high tactical responsibilities, positions them as team leaders. Following this line, there are many current examples of great international players that play this position such as Stephen Curry, Luca Doncic or James Hardem, who have as role models players like Kobe Bryant, who had at the same time Michael Jordan as an idol to emulate, latter considered the best shooting guard of all time (Greer, 2023).

Given the above, it is considered appropriate to carry out an in-depth analysis of one of the best shooting guards of all time in his natural environment. This will be carried out through the study of his interactions between teammates and his executed technique, aiming to unequivocally and scientifically establish the elements that must be present in players who play or wish to play in this position that is so relevant in basketball. Applying a robust methodological approach, combined with in-depth multidimensional analysis of rigorously coded data, will help provide objective insights into how Michael Jordan interacts with his environment and makes him unique. The specific objective is to analyse Michael Jordan's technical skills in the NBA playoff final of the 1995-1996 season through his technical actions, his shoots and his relationship with his teammates.

METHOD

To carry out the development of the present research, the Observational Methodology (Anguera, 1979) has been applied. The research design, in accordance with Sánchez-Algarra and Anguera (2013), follows an Idiographic model –given that a single team is the unit of study–, a Tracking model –studying during the games that constitute the finals of the 1995-1996 playoffs–, and a Multidimensional model –due to the categories that form the dimensions constituting the observation instrument. The conducted observation has been guided by scientific criteria with total perceptiveness and as a non-participating observer.

Participants/Sample

The observational sampling conducted has been intentional (Anguera, et al., 2011) with the American professional basketball team Chicago Bulls during the development of the playoff finals for the NBA Champion title in the 1995-1996 season (in this season, the Chicago Bulls won 72 games, breaking the all-time record for most victories in a season, a record that lasted for 20 years). The videos used are publicly available television broadcasts that have been retrieved for the study. All offensive sequences developed by the team during the 6 games that make up the finals of that season –1995-1996– have been coded. The 521 coded offensive sequences consist of 4798 multi-events.

Intersessional consistency has been ensured through the following elements: the same ball size, the same court dimensions, the same game time, the same players on the roster, and the same jersey assignments.

Observation instrument

The present research required the development of an ad hoc observation instrument –see Table 1– which drew from the following sources: the works of Alsasua et al. (2018) and Arroyo et al. (2022). The instrument adapted their contributions and included new dimensions –Player Position, Defensive System, and

Consequence– which will provide a solid foundation for addressing the research objective. The instrument is a combination of nested category systems in field formats –dimensions. These categories adhere to the premise of being exhaustive and mutually exclusive.

Table 1. Observation instrument.

No.	Dimension	Category System
1	Offense	Positional) offense with defenders positioned; Fast Break) offense in a fast-break situation.
2	Player Positions when passing the half-court line	PJ500) 5 outside players; PJ104) 1 outside player, 4 in the paint; PJ410) 4 outside players, 1 inside the three-point line; PJ401) 4 outside players, 1 in the paint. PJ140) 1 outside player, 4 inside the three-point line; PJ320) 3 outside players, 2 inside the three-point line; PJ302) 3 outside players, 2 in the paint; PJ203) 2 outside players, 3 in the paint; PJ230) 3 outside players, 3 inside the three-point line; PJ311) 3 outside players, 1 inside the three-point line, 1 in the paint; PJ131) 1 outside player, 3 inside the three-point line, 1 in the paint; PJ113) 1 outside player, 1 inside the three-point line, 3 in the paint; PJ212) 2 outside players, 1 inside the three-point line, 2 in the paint; PJ221) 2 outside players, 2 inside the three-point line, 1 in the paint; PJ122) 1 outside player, 2 inside the three-point line, 2 in the paint.
3	Defensive System	DI) individual defence; DZ) zone defence; DMX) mixed defence; PT) full-court pressure; P34) three-quarter-court pressure; P12) half-court pressure.
4	Player	J23) Michael Jordan; J33) Scottie Pippen; J91) Dennis Rodman; J13) Luc Longley; J07) Toni Kukoč; J09) Ron Harper; J25) Steve Kerr; J34) Bill Wennington; J08) Dickey Simpkins; J22) John Salley; J30) Jud Buechler; J00) Randy Brown; J53) James Edwards; J35) Jason Caffey.
5	Technical action executed by the player with the ball	RP) receives and shoots; PerRP) loss after receiving and shooting; PerR) loss after receiving; Bot) bounces once; PerBot) loss after bouncing once; Drib) dribbles multiple times; PerDrib) loss after dribbling multiple times; Pas) passes; PerPas) loss after passing; Lan) shoots at the basket.
6	Starting Zone	ZI1, ZI2, ZI3, ZI4, ZI5, ZI6, ZI7, ZI8, ZI9, ZI10, ZI11, ZI12, ZI13, ZI14, ZI15, ZI16, ZI18, ZI19, IN) unobservable.
7	Ending Zone	ZF1, ZF2, ZF3, ZF4, ZF5, ZF6, ZF7, ZF8, ZF9, ZF10, ZF11, ZF12, ZF13, ZF14, ZF15, ZF16, ZF18, ZF19.
8	Off-ball Player Action	Bloq) pick and roll; BloqC) pick and cut; C) cut; Apo) approach support to the ball; Puer) backdoor cut.
9	Interceptions and Interruptions	SF) inbound pass; SB) sideline inbound pass; SBF) sideline inbound pass after the ball has been out of bounds; R) rebound; Ro) steal; Int) ball interception; F) foul; FT) technical foul; FA) unsportsmanlike foul; Fx2) foul by two players; TM) timeout; Sx2) jump ball; TresS) three seconds in the key; Lucha) hustle; 24s) end of shot clock; Defl) illegal defence (three seconds in the key).
10	Outcome	CO1) change of possession; CO2) loss of possession; CO3) regaining possession.
11	Shooting Zones	ZT1, ZT2, ZT3, ZT4, ZT5, ZT6, ZT7, ZT8, ZT9, ZT10, ZT11, ZT12, ZT13, ZT14, ZT15, ZT16, ZT18, ZT19.
12	Type of Shot	TSus) jump shot; TEs) set shot; TAtr) fadeaway shot; TMov) moving shot; En) layup; MEst) static dunk; MMov) moving dunk; G) hook shot; AO) Alley-Oop; StepB) step-back shot; B) bomb; Pal) tip-in.
13	Scoring	P0) missed shot; P1) made free throw; P2) made two-point shot; P3) made three-point shot.
14	Moment	M1) start and end of the first quarter; M2) start and end of the second quarter; M3) start and end of the third quarter; M4) start and end of the fourth quarter; PR1) start and end of the first overtime; PR2) start and end of the second overtime; PR3) start and end of the third overtime.

Recording and coding

The data was recorded (Hernández-Mendo et al., 2014) using Lince software, version 1.2.1 (Gabin et al., 2012), achieving an intra-observer agreement value of .91. The obtained data is of type IV, i.e., concurrent and time-based (Anguera et al., 2011).

Subsequently, two additional programs were employed. The first one was Gseq v5.1 (Bakeman & Quera, 2011), through which sequential analysis of delays was conducted. Later, the program Hoisan, version 1.2 (Hernández-Mendo et al., 2012), was utilized. The data obtained from the previous software was entered and analysed for obtaining polar coordinates. Finally, for the representation of results, the ObserTools application (Rodríguez-Medina et al., 2021) was employed.

Data quality

The data collection was carried out by two graduates in Sports Science with extensive experience in the studied sport and the use of observational methodology. However, the observers received specific training for data collection in this study following the phases recommended by Anguera (2003). The primary observer recorded all sequences comprising the observational sampling, while the second observer recorded 16.7% of the total sample.

The reliability of the obtained data was calculated using Cohen's (1960) Kappa coefficient. This coefficient measures the agreement between nominal classifications where there is no order of ranking. GSEQ software version 5.1 was used for the calculation of this coefficient following the recommendations established by Bakeman & Quera (2011). The concordance index achieved by the primary observer was .91 (intra-observer agreement). Regarding the result of inter-observer agreement, it was higher than .86 in all games included in the study (game 1 = .93; game 2 = .87; game 3 = .94; game 5 = .88, game 6 = .87). Considering these concordance data, it can be stated that the agreement is almost perfect (Landis & Koch, 1977).

Data analysis

Two types of data analysis have been employed to address the stated objectives: synchronous analysis and diachronic analysis.

Synchronous analysis through inferential statistics has been used to assess the relationship between variables and various success criteria, using the Pearson chi-square statistic (χ^2). This was done by applying the following formula:

$$\chi^2 = \sum_{i,j=1}^{k} [\frac{(F_{ij} - \hat{F}_{ij})^2}{\hat{F}_{ij}}]$$

The computation of this statistic was carried out using SPSS software version 20.0.

Regarding the diachronic analysis, polar coordinates analysis has been employed, which is a very recent typology of analysis in sports science (Anguera and Hernández-Mendo, 2015). Cochran's Zsum (1954) is the foundation and origin of this analysis technique, which applies and is based on the principle that the sum of N independent z scores is normally distributed, with $Z = 0$ and $s = N$. Thus, the statistic $Z\text{sum} = \sum_l^m \frac{z}{\sqrt{n}}$ (where n is the number of delays), according to Sackett (1980), allows measuring the strength or associative consistency between different behaviours.

The polar coordinates technique, developed by Sackett (1980) and later refined by Anguera (1997), is utilized to identify the relationships between behaviours. The technique involves one of these behaviours: the conditioning behaviour or focal behaviour and the remaining behaviours, which constitute the various dimensions of the observation instrument (conditioned behaviours). This analysis is performed both prospectively (+1 to +5) and retrospectively (-1 to -5), resulting in a vector for each behaviour related to the focal behaviour, with a specific angle and radius.

Based on the angle obtained by the vector, it can occupy one of the four quadrants or sectors that make up the polar coordinate. Depending on the quadrant the vector occupies, the activation or inhibition relationship between behaviours varies. In quadrant I, the focal behaviour activates the presence of the mating behaviour both in the prospective and retrospective planes. In quadrant II, the focal behaviour is activated by the mating behaviour in the retrospective plane, while it is not in the prospective plane. In quadrant III, the focal behaviour inhibits the presence of the mating behaviour in both the prospective and retrospective planes. Lastly, in quadrant IV, the focal behaviour is activated by the mating behaviour in the prospective plane, while it is not in the retrospective plane.

RESULTS

During Jordan's participation in the 6 games that make up the sample, he interacts with the ball a total of 536 times out of the team's total of 2996 interventions, accounting for 17.89% of the actions in the offensive play where the ball goes through his hands.

Regarding the technical actions executed by Michael Jordan, the obtained results indicate the presence of significant differences ($\chi^2 = 163006$; $p < .001$). Standout actions include dribbling –Drib– with 35.9%, Free-throw shooting –Lan– (11.9%), and Dribble –Bot– (12.6%), percentages superior in all cases to the results achieved by his teammates. On the other hand, RP –reception and pass– and Pas –pass– actions present lower percentage results compared to the rest of the teammates with 34.0% and 2.7%, respectively (Table 2).

Table 2. Technical action executed by the player with the ball.

	RP	PerRP	PerR	Bot	PerBt	Drib	PerDrib	Pas	PerPas	Lan
Other players	44.1%	0.8%	0.6%	9.4%	0.6%	23.9%	0.3%	16.0%	0.1%	4.2%
Michael Jordan	34.0%	0.7%	0.0%	12.6%	0.9%	35.9%	1.2%	2.7%	0.0%	11.9%

In terms of the type of shot executed, Michael Jordan exhibits shooting percentages that amount to 207 finishing actions, both following a previous technical action and from the free-throw line, resulting in a shooting rate of 38.61%.

Table 3. Type of shot executed.

	Tsus	Tes	Tart	Tmov	En	Mest	Mmov	G	B	Pal
Other players	47.0%	20.7%	3.8%	4.6%	10.6%	1.3%	2.3%	6.1%	.2%	3.5%
Michael Jordan	34.3%	31.9%	15.9%	4.3%	12.1%	0.0%	1.0%	0.0%	0.0%	.5%

Table 3 presents the results corresponding to the analysis of the type of shot executed when comparing Michael Jordan with the rest of his teammates. The obtained results from this analysis show significant differences ($\chi^2 = 64137$; $p < .001$). Notably, the actions of TEs –Static Shot– (31.9%) and TAtR –Backward Jump Shot– with 15.9% stand out in this regard.

Effectiveness

Regarding shooting effectiveness, i.e., the success of making or missing the shooting action, the results obtained, when comparing the performances of Michael Jordan with the rest of his teammates, show significant differences ($\chi^2 = 1615$, $p < .001$) in favour of Michael Jordan, presenting much higher shooting efficiency percentages than the rest of his teammates –Table 4.

Table 4. Shooting effectiveness.

	Ineffective	Effective
Other players	54.1%	45.9%
Michael Jordan	48.8%	51.2%

There are no significant differences in Jordan's involvement and the moment of the game, nor between the moment and the effectiveness of the shot, nor between the moment and the effectiveness between games.

Finally, the results obtained are presented regarding the associative analysis through the use of polar coordinates technique, where Michael Jordan is related to the rest of the players in the squad who participated in the different games played.

For the development of this analysis, the focal behaviour J23 has been related to the rest of the categories that make up the dimension (J33, J91, J13, J07, J09, J25, J34, J08, J22, J30, J00, J53, and J35), as well as with itself (J23). This analysis aims to verify the relationship established between Michael Jordan and the rest of the teammates throughout the final phase. The results obtained (Table 5 and Figure 1) show the criterion category J23 (Michael Jordan) with a radius of 7.24 and an angle of 45 degrees in quadrant I, where the focal behaviour activates the presence of the mating behaviour both in the prospective and retrospective planes.

Also, the categories J25 (Steve Kerr), J22 (John Salley), J00 (Randy Brown), J34 (Bill Wennington), and J30 (Jud Buechler) are observed with radii of 5.96, 3.69, 3.02, 3.33, and 2.96, and angles of 223.63°, 230.61°, 259.26°, 226.63°, and 238.32° respectively, in quadrant III, where the focal behaviour inhibits the presence of the mating behaviour both in the prospective and retrospective planes.

Table 5. Results of the polar coordinates of analysis for the focal category J23 in relation to his teammates in the 1996 finals matches.

Category	Quadrant	Prospective Zsum	Retrospective Zsum	Radius	Significance–Sig.	Angle
J23	I	5.12	5.12	7.24	**	45
J33	I	0.71	1.41	1.58		63.36
J91	III	-0.2	-0.34	0.39		239.04
J13	IV	0.82	-1.63	1.83		296.63
J07	II	-0.95	0.04	0.95		177.57
J09	II	-0.41	1.74	1.79		103.17
J25	III	-4.31	-4.11	5.96	**	223.63
J34	III	-2.29	-2.42	3.33	**	226.63
J22	III	-2.34	-2.85	3.69	**	230.61
J30	III	-1.56	-2.52	2.96	**	238.32
J00	III	-0.56	-2.97	3.02	**	259.26

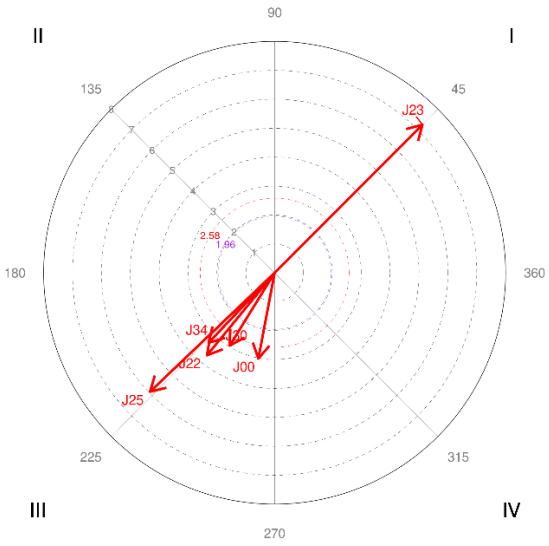

Figure 1. Representation of the behavioural map establishing category J23 as the focal behaviour in relation to his teammates in the 1996 finals matches.

DISCUSSION

Following Anguera and Hernández-Mendo (2015), the effectiveness of observational methodology lies in its ability to conduct a diachronic analysis with type II and type IV data, meaning data that include an order and a time component. However, conventional synchronic statistical analyses are also relevant, seeking associations between dimensions that provide categorical data to meet the objectives established in match analysis (O'Donoghue, 2009).

Regarding the technical actions performed by Michael Jordan, dribbling stands out as the most prominent. This technical action is characteristic of shooting guards, who, unlike point guards, not only have offensive construction responsibilities, but also play a role in breaking the repetitive dynamics of the attack and are players with a high degree of technical proficiency (Okazaki et al., 2004; De Rose et al., 2004; Gómez et al., 2007).

Regarding his shooting performance, Jordan demonstrates a particular expertise in free throw shooting, with a very high success rate. In this regard, this proficiency, coupled with his publicly acknowledged dedication to practicing this technique after daily training sessions, is closely linked to dribbling, as through these one-on-one situations, he manages to draw personal fouls in his favour, and these situations end up leading to free throw attempts, proving to be a decisive performance factor in basketball (Csataljay et al., 2009; Paulauskas et al., 2018).

On the other hand, concerning the type of shot Jordan executes most notable, it is the fadeaway. This shooting style became his signature move, not only due to its repetition as the team's offensive finish but also because of his accuracy in scoring. This shooting technique serves as a counterpoint to the previously mentioned dribbling technique. Jordan uses dribbling as a deceptive move or feint to create optimal space, combined with the slight distance gained from the defender when jumping backward, allowing for a higher likelihood of successful execution (Courel-Ibañez et al., 2017).

In this regard, considering Jordan's shooting efficiency during the finals, especially if we take into account the volume and relevance of his shots, it can be observed the significance of this player in the team's scoring success. The precision in field goals is a crucial factor in achieving success in a game, as these variables represent both individual and collective offensive effectiveness (García et al., 2013; Malarranha et al., 2013).

Undoubtedly, professional basketball has undergone significant development and evolution in the game over the last decade, showcasing players with increasingly versatile profiles (Courel-Ibáñez et al., 2017; Mateus et al., 2015). Therefore, it is essential to update knowledge about performance profiles in young players with professional potential and assess their suitability for today's high-level basketball (Ibáñez et al., 2018). However, it is crucial not to overlook the qualities and capabilities of players who have left their mark on the history of international basketball, particularly in the NBA, where players often exhibit a higher degree of specialization in their game compared to other competitions (Paulauskas et al., 2018).

CONCLUSIONS

The objective set in this research was to analyse the technical skills of Michael Jordan in the NBA 1995-1996 playoff finals through his technical actions, shooting, and his relationship with his teammates. To address this objective, two types of analyses, synchronous and diachronic, have been employed, through which, based on the results obtained, the following conclusions can be reached:

- Regarding his actions, dribbling stands out, as well as the execution of free throws, which are strongly related elements. Here, Jordan demonstrates excellent ball control and 1x1 skills, forcing defences to engage with more than one opponent and causing defensive personal fouls.
- The type of shot he performs that stands out is the fadeaway, a shooting action strongly linked to 1x1 situations. This provides a wide variety of resources and solutions to different 1x1 and even 1x2 scenarios for this player, making defending him a very complex situation due to the unpredictability of his actions.
- Jordan is a completely consistent player with effectiveness indices in his actions and a level of participation that remains constant during all four quarters of each game and throughout the six games that make up the NBA finals.
- The relationship between Jordan and his teammates does not show significant results exclusively with himself. This is interpreted as a player with great adaptability who both includes his teammates and is included by them in the plays, and the results clearly identify the team as rotation or non-participative.

These types of studies allow us to advance and better understand the game of one of the best basketball players in the world. This enables the replication of his actions and a deeper comprehension and appreciation of the evolution of this sport. Similarly, this study serves as guidance for coaches and players in developmental categories, where the specificity of the position is less emphasized, and a more versatile player profile is increasingly valued, capable of effectively participating in the entire development of offensive actions.

AUTHOR CONTRIBUTIONS

Natán Andrés Cook Vaquero: data registration, analysis and interpretation, writing and translating the article. Mario Amatria Jiménez: data verification, analysis and interpretation, methodology approach, and writing the article.

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