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ORIGINAL SCIENTIFIC PAPER

Youth Experiences of a Sport Development Programme in a Rural South African Context

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Abstract

Sport is a powerful development tool and social connector. Sport development programmes are often perceived as an effective means of encouraging youth development and teaching positive values, as well as providing opportunities for developmental experiences. This study was set out to understand youth experiences of a rural South African sport development programme and to identify the factors which contributed to the youth experiences. Thus, the study aimed to construct authentic knowledge and respond to tensions and debates about youth development and rurality in an African context. This study followed a qualitative, descriptive research design. Purposive sampling was applied and arts-informed methods such as drawings and photovoice, combined with semi-structured interviews, were used for data construction. Qualitative data analysis computer software ATLAS.ti (v.8.4.15) was used, and semiotic visual data analysis, photovoice data analysis strategies, thematic data analysis and member reflection were used as methods for data analysis. The results of this study highlighted multiple perspectives of the participants' experiences and complexities of relationships within the social context of the youth participants in the study. Therefore, youth experiences and perspectives cannot be viewed in isolation. The sports development programmes need to consider working with schools, parents, teachers and coaches. It emerged from the results that social interaction, a sense of family, the desire for positive relationships and a conducive sports environment were considered critical aspects that promoted positive experiences in the sport development programme.

Keywords: *arts-informed methods, community, developmental experiences, rurality, sport development programme, youth development*

Introduction

There are numerous benefits derived from regular participation in physical activity and sport. Sport and physical activity have the potential to contribute to physical and psychosocial development (Eime, Young, Harvey, Charity, & Payne, 2013). Sport is viewed as a mechanism that leads to personal development and social development experiences. According to Coakley (2011), sport is perceived as a tool that leads to multiple forms of development and improves the quality of life, however, depend on multiple factors, such as social relationships, the contexts in which participation occurs, and personal sport experiences (Coakley, 2011). Coalter (2010) warns that the popularity of sport as a tool for development and the proliferation of sport development programmes is often poorly articulated

and raises concern about the narrow concept of the contribution of sport to development. It is important to acknowledge that a social system is complex and that sport should not be viewed in isolation and asserted as a magic box, but rather understood within a specific context in society.

Sport development programmes are perceived as effective means of encouraging youth development and providing opportunities to enhance youth experiences (Bruner, Hall and Cote, 2011). A major argument is that despite the benefits of sport development programmes and money invested by these organisations in youth development, experiences are diverse and cannot be assumed unitary. Therefore, sport development programmes cannot be assumed to provide the same benefits and outcomes for all youth participants.

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The top-down approach (pre-designed programmes) to youth development and the absence of youth voices in the context of designing sport development programmes that are based on the youth's needs and experiences, are some of the challenges in articulating the contribution of sport development programmes to the experiences of youth.

A wide spectrum of Non-Governmental's (NGOs) and non-profit organisations are using sport as a tool to address social challenges and to promote positive development of the youth (Coalter, 2010; Darnell, 2010). This belief is underpinned by a view of sport as a social connector and progressive instrument for social change and as a mean to deliver a wide range of personal development and positive outcomes (Coakley, 2011). NGOs and other civil society organisations play a critical role in partnership with government to ensure that expected initiatives and outcomes are achieved. These organisations are needed to address areas where the government partially fails to deliver sport development programmes (Sanders, Phillips, & Vanreusel, 2014). The notion that sport contributes to the social agenda has a wider social function, and has been embraced by a number of international organisations, including the United Nations, the International Working Group on Women and Sport, the Sport for Development and Peace International Working Group, and the International Council of Physical Education and Sport Science.

The current study was undertaken in conjunction with the Dreamfields sport development programme in South Africa. Dreamfields Project is a South African non-profit organisation which aims to enrich the educational environment in rural schools, empower youth, and develop individuals and community through sport. The organisation provides a range of youth sport programmes, including school sport and community sport programmes across South Africa. The Dreamfields Project is currently engaged in 24 major projects at 284 schools and 63 community sports clubs in six provinces in South Africa. The study focused specifically on youth in the rural area located in Ingwavuma, northern KwaZulu-Natal (KZN), South Africa. The organisation works with the Department of Basic Education (DBE) to develop sport development programmes consisting of regular league-based matches known as the DreamLeagues, which are played in schools every week. The DreamLeagues sport development programme aims to encourage youth to participate in football and netball activities and strives to enhance sport skills as well as

social development skills.

The aim of this study was to explore youth experiences of a rural South African sport development programme and to identify factors that have influenced said experiences. To achieve the aims of the study, we explored youth development using the Youth Developmental Experiences Through Sport (YDETS) theoretical framework. The YDETS framework emanated from the model for the Positive Youth Development (PYD) framework and Self-determination Theory (SDT). The YDETS framework bears some similarities to the model of Positive Youth Development through Sport (PYDTS) developed by Holt et al (Holt, Neely, Slater, Camiré, Côté, Fraser-Thomas, MacDonald, Strachan, & Tamminen, 2017). For example, the notion of social contexts reflects the PYD climate and external assets components identified in the model for PYDTS (Holt et al., 2017).

Methods

Research design

This study followed a qualitative, descriptive research design, and was positioned within the parameters of an interpretivist discourse. Qualitative research is rooted in the philosophy of empiricism, follows a flexible approach, and emphasises the perceptions and experiences of the participants (Kumar, 2019). Therefore, this study used a flexible design, which allows the methods of inquiry to evolve contextually in response to the data gathered (Sarantakos, 2013). The research design of this study was influenced by the intent to explore the views and experiences of participants.

Research sample

The sample of this study was composed of South African youth who live in the rural area of Ingwavuma, KwaZulu Natal, and had participated for a minimum of two years in the Dreamfields sports development programme. The purposive sampling in selecting the participants from three high schools was based on the premise that the schools had implemented the sport development programme for more than four years and had participants between the ages of 14 and 20 years who were willing to participate in the study. The various stages and sampling strategies used to recruit and select the participants from three high schools in Ingwavuma, are presented in Figure 1. The sample size in the first phase of data collection consisted of 31 participants; 23 participants were included in the second phase (Figure 1).

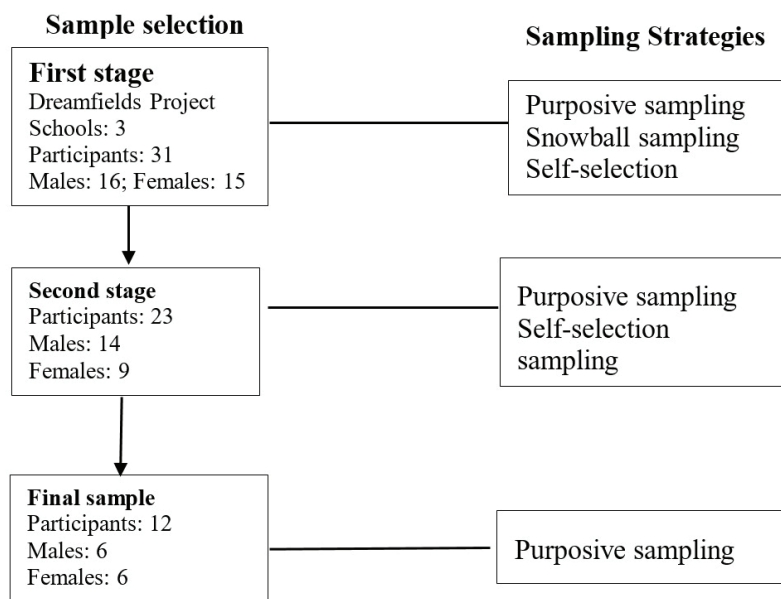


FIGURE 1. Sample selection and sampling strategies

According to O'Reilly and Parker (2013), the qualitative researcher should be flexible when considering sampling and focus more on sample adequacy and data saturation rather than sample size. This resonates with Vasileiou, Barnett, Thorpe and Young (2018): the more insights and information provided in the sample, the smaller the sample required in the qualitative study. In the context of this study, most of the responses from the participants data were the same and repetitive. Having considered all of this, the sample size had decreased from 31 to 23 participants. We further considered reducing the sample size to 12 participants - six males and six females, aged between 14 and 17 years. The decision to reduce the sample size stemmed from Manson (2017) and Bell, Harley and Bryman (2022), who imply that the emphasis of qualitative inquiry should be based on generating quality, detail, and sufficient depth of information rather than on acquiring a fixed number of participants.

Ethical clearance

This study secured procedural ethics by subscribing to the ethical principles of voluntary participation in which the participants could withdraw from the investigation at any time. This study met all the ethical and procedural requirements and was approved by the University of Pretoria's Ethics Committee [UP 19/04/01 SCHWELLNUS 19-001].

Data collection

To obtain an in-depth understanding of participants' experiences, the arts-informed methods of drawings and photovoice was used and combined with in-depth semi-structured interviews to construct data. Arts-informed methods are based on the premise of using art to understand human conditions and experiences through unconventional processes of inquiry (Knowles & Cole, 2008). In the context of this study, arts-informed methods were used to contextualise the dynamic views of the participants and provide depth and complexities of their experiences of the sport development programme.

Data collection was carried out in two phases. The first and second phase took place from 8 March 2021 to 11 March 2021 and 29 March 2021 to 31 March 2021, respectively. Drawings and in-depth semi-structured interviews were used in the first phase as data construction methods. The drawings were used during the first phase of data collection to elicit the participants' views and experiences about the sport development programme. Drawing, as a data generation method, provided the opportunity for constructive engagement with the participants and gain insight into the lived experiences of young people (Capous-Desylla & Bromfield, 2018). The photovoice method combined with semi-structured interviews was used in the second phase for data collection. Photovoice is a method whereby individuals take photographs to capture images that document the reality of their lives and experiences (Nykiforuk, Vallianatos & Nieuwendyk, 2011). The process included semi-structured interviews related to the photos taken by participants. During the interviews, participants were asked to select the two most meaningful or most descriptive photographs from five presented and share their views and experiences. The decision to conduct semi-structured interviews was aimed at creating a comfortable environment for engagement where participants would share their experiences freely. Each semi-structured interview lasted approximately 30 to 40 minutes, and all the interviews were audio-recorded and transcribed verbatim. The interview questions focused on the experiences of the participants, perceived outcomes and barriers of the sport development programme, and contributing factors to their experiences.

Data analysis

In this study, we adopted multimodal data analysis methods, such as semiotic, photovoice, and thematic data analysis. One researcher carried out the data analysis of the drawings, photographs, and interviews. However, the codes and themes that emerged from the three data sets were reviewed by all the researchers for interpretation, and a consensus was reached. The semiotic analysis technique was used to analyse the drawings. The analysis included reviewing each drawing produced by the participants, identifying themes based on the interview and drawing of each participant, and comparing and integrating all the themes that emerged from the participants' data. Subsequently, an adapted photovoice analysis approach suggested by Ciolan and Manasia (2017) was conducted to analyse the photographs. In addition, thematic analysis of the verbal data was applied to support and complement the visual analysis (drawings and photographs). From such analysis emerged meta-themes, which was reviewed from 4 researchers in order to integrate and unify it. The focus was to establish a relational combination between themes to create main themes and interpret the results.

Six main themes emerged from the youths' drawings, photographs and interviews. For the purpose of this article, only the themes related to personal development, social development, and physical development are presented and discussed in the section that follows. Trustworthiness, rigour, and diligence were ensured by crystallising data from the drawings, photographs, and semi-structured interviews. Reflection between the authors and peer debriefing with colleagues were conducted to establish whether the research results were consistent with the data gathered.

Results

The results from the study are presented based on the themes relating to youth experiences of a sport development programme. These include personal development, social development experiences, and physical development.

Personal development experiences

In this study the participants perceived that their personal development skills had been enhanced because of their participation in the programme. Some of the personal development experiences mentioned by the participants included enhanced confidence, commitment, competence, and determination. The comments below highlight these results:

I managed to play together with my teammates, respect everyone on the sport field and had to abide by the rules. This will help me to continue playing netball because I can work and cooperate with other learners.

The sport programme encouraged me to focus and commit myself to everything I do. I exercise so that I can improve and perform better than before, and so that I do not behave in a bad manner. People can be happy and be proud of me.

The participants indicated that the sport development programme provided opportunities for personal development, (e.g., motivation, a sense of purpose, improved self-esteem, and positive values through interaction with peers, teachers and coaches). In this regard, one of the participants stated:

When I am on the sport field, I should be prepared about what I am going to do, I should do it well, and with confidence. It is important because if you are determined to do something, you will succeed.

Participants frequently described the role of the sport development programme in empowering youth to be responsible and committed. It emerged from the participants' experiences that the

sport development programme offered them the opportunity to improve these important personal development skills.

Social development experiences

Programme experiences facilitated social interaction and social development experiences. The programme was perceived by the participants to have provided a socialisation experience for them to interact, encourage new friendships, and enhance positive relationships between teachers and participants. The following views of participants illustrate youth social development experiences:

What I like the most about the sport programme is meeting people I did not know before. I have learned from the players to work well with others, and speak well with them. If we are playing in the playground, we must not shout at each other, do not push them if they step on us by mistake. Coaches also encourage us not to step on each other when we are playing on the sport field. If maybe there is someone who stepped on you, you should apologise.

What I like about the sport programme is that we get along and talk about what we are going to do, and how we are going to do it. We should get along as a team and not hate each other. In case, we finish playing and someone doesn't have money, we buy food and eat together.

The participants attributed the enhanced social development experiences to teacher support. Participants frequently mentioned that they appreciated working together, and strong relationships appeared to be important for most of the participants.

Physical development experiences

Another result that emerged from the participants' experiences was the perceived positive contribution of the sport to improved health and physical development. The participants cited physical development experiences such as enhanced physical skills, sport skills, and physical fitness among the prominent features experienced in the programme. The participants believe that the programme afforded them the opportunity to improve sport skills. Excerpts below illustrate the participants perceived physical development benefits derived from participating in the sport development programme:

I enjoy playing netball. The sport programme has helped me a lot because diseases don't get to me easily - I always exercise.

Soccer helps me to be active, even diseases that can infect me will not be able to make me sick.

The sport development programme has done a lot for me. It has encouraged me to continue being involved in sport so that I can be able to realise my goals of reaching the peak of my performance. When you exercise, you enhance your physical fitness and minimise the risks of injuries. When you exercise, you do not get sick easily.

The participants attributed their good health and physical fitness to the sport development programme. They also ascribed improved sport skills to their participation in the programme. Additionally, participants were convinced that by participating in the programme, their health improved. In the process, they experienced an improvement in their capacity to live healthily.

Discussion

This study aimed to explore youth experiences of a sport development programme. The positive experiences that resulted in the participants' enhanced personal development experiences concur with the notion that positive development occurs when youth's feeling of self-governance and self-direction are aligned with positive experiences through social interaction with the community, family, friends and school (Bowers, Li, Kiely, Brit-

tian, Lerner & Lerner, 2010). In this regard, the participants in this study highlighted the positive role of the programme in enhancing their competencies and providing positive development opportunities for youth gaining personal development skills. This result concurs with the study conducted by Holt and Kacey (2011) who found that individuals acquire personal development experiences through their involvement in organised sport programmes. In this context, personal development experiences are essential to rural youth as it may help them to be effective and have control of their lives.

The results of this study related to social development experiences concur with the assertion that sport programmes could promote social development experiences (Coalter, 2010). According to Camiré and Trudel (2013), the strength of sport development programmes is based on being able to utilise physical activity and sport as a vehicle to promote social development. The results from this study have shown that the sport development programme contributed to social development skills such as creating opportunities for social interaction, connectedness, and improved positive relationships.

The results further highlighted that the participants acquired sport-specific skills through their involvement in the sport programme and guidance by the teachers and coaches. This perspective is consistent with several previous studies focusing on the sport development programme and sport-specific outcomes (e.g., Chinkov & Holt, 2016; Holt & Kacey, 2011; Holt et al., 2009). Arguably, these studies highlight that sport-specific skills in the sport development programme are acquired and enhanced through implicit rather than explicit processes.

Conclusion

This study set out to explore youth experiences of a rural South African sport development programme to provide a better understanding of youth experiences of a sport development programme. The results showed that most of the participants in this study considered the Dreamfields sports development programme to be a great opportunity to enhance their developmental experiences through regular sports participation. The sports programme participants mentioned improvement in their level of sports skills and enhanced social competencies as some of the programme outcomes. These results are consistent with the study conducted by Bonell, Hinds, Dickson, Thomas, Fletcher, Murphy, Melendez-Torres, Bonell & Campbell, (2015) which suggests that youth who participate in a sports programme have the potential to develop and enhance their internal assets, such as positive values and self-identity. Therefore, it is important for sport programmes similar to the Dreamfields sport development programme to recognise youth's strengths and deliberately structure their programmes to nurture and enhance individual skills.

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Conflict of interest

The authors declare there are no conflicts of interest.

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ORIGINAL SCIENTIFIC PAPER

Differences in obesity status among adolescents living in urban and rural areas of the municipality of Pljevlja

Erol Vrevic¹¹Faculty for Sport and Physical Education, University of Montenegro, Niksic, 81400, Montenegro**Abstract**

Overweight and obesity are one of the biggest challenges today, and they can vary by the type of settlement in which adolescents live. The aim of this study is to assess the general state and differences in obesity status among adolescents by type of settlement. This research included 139 respondents of both genders from urban and rural areas of the municipality of Pljevlja, with an average age of 15.6 ± 0.6 . Body Mass Index (BMI), Waist to Height Ratio (WHtR), and body fat (BF) were used to assess obesity status. To assess the difference by type of settlement, the Chi-square test was used with a statistical significance of $p \leq 0.05$, and data processing was performed in the statistical program SPSS version 23. According to BMI values, 23.3% of male adolescents were overweight, and 12.3% were obese, while 7.6% of female adolescents were overweight and 3% are obese. By WHtR values, 24.7% of male and 9.1% of female adolescents belonged to the obese group. According to the BF values, female adolescents from rural areas were significantly more overweight than their peers from urban areas ($p = 0.025$), while no differences were found in other variables. When it comes to male adolescents, no differences were found in any variables. The problem of overweight and obesity should be considered in future research, especially in male adolescents.

Keywords: adolescents, obesity, urban, rural, Pljevlja

Introduction

Pljevlja is a municipality in the very north of Montenegro, and it covers an area of 1346 km², which territorially makes it the third largest municipality in Montenegro (Radojicic, 2015). According to Mostat (2011), Pljevlja has 30,786 inhabitants, of which 19,489 (63.30%) live in urban, and 11,297 (36.70%) live in rural areas, while the number of adolescents aged 10 to 19 is 3,773. Adolescence is a period of life of 10 up to 19 years and is one of the fastest and most important phases of human development, both physical, emotional, cognitive, social, and many others (WHO, 2017). Therefore, in this period, it is very important to take care of all the components that can affect their health.

Obesity status is one of the important components that affect the health of adolescents. Today, we have an increasing trend of overweight and obesity in children and adolescents, which together represent one of the leading health problems (WHO, 1995).

Childhood obesity is associated with an increased incidence of hypertension, diabetes, metabolic disorders, heart disease, and an increased risk of premature mortality during adulthood (Mohan et al., 2019). In addition to all the other problems that overweight and obesity lead to, it poses a great risk that children and adolescents who were overweight or obese during that period will remain so in adulthood (Jain, Pant, Chopra, & Tiwari, 2010). It is estimated that in 2010, overweight and obesity caused 3.4 million deaths (Ng et al., 2014). The sheer numbers of the overweight and obese population are alarming. It is estimated that in the USA 20% of children belong to the overweight group (Matsushita, Yoshiike, Kaneda, Yoshita, & Takimoto, 2004), while 4% of the entire youth population is considered severely obese (Skelton, Cook, Auinger, Klein, & Barlow, 2009). Also in China, from 1985 to 2014, overweight increased from 2.1% to 12.2%, and the obesity rate from 0.5% to 7.3% (Sun et al., 2020). If these trends continue

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without adequate interventions, overweight and obesity in China will amount to 28% in 2030, that is, it will reach the number of 48.49 million overweight and obese children (Larsen, Wang, & Popkin, 2014). When it comes to Montenegro, the results are also not to be praised. According to the data of Milasinovic, Bojanic, Cvorovic, and Kukic (2019), every third child in Montenegro, aged 9 to 13, is overweight or obese.

It was found that many aspects of health (Berkman, Kavachi, & Glimoru, 2000), and obesity status (Aberle et al., 2009) differ in relation to the socioeconomic position and type of settlement. If once various diseases related to obesity status were considered an urban problem, today they have spread alarmingly to the rural population as well (Vafa, & Ghazali, 2020). This is supported by the data of a global study (NCD Risk Factor Collaboration, 2019) that the global increase of BMI from 1985 to 2017 increased by more than 55%, and in some low and middle-income regions by more than 80%, due to growth in rural areas. Therefore, the aim of this research is to assess the obesity status and the differences among adolescents living in urban and rural areas in the territory of the municipality of Pljevlja.

Metod

Procedure

This research is of a cross-sectional type, while the measurements were carried out in accordance with the standards of the

ISAK manual (Marfell-Jones, Olds, Stev, & Carter, 2006). Initially, confirmation of access to the experimental procedure was obtained from the school directors in the schools where the testing was conducted. The testing was conducted by teaching assistants of the Faculty for Sports and Physical Education from Niksic in the morning hours. Measurement lists were provided for each individual, and the assessors were aware and previously trained about the measurement procedure and data entry. The type of settlement was defined by students entering the place where they live in a modified questionnaire. On the basis of the place of residence, and with the help of the spatial urban planning solution of the municipality of Pljevlja, the students are divided into urban and rural areas. The spatial urban planning solution was taken over in the Pljevlja municipality building from the secretariat for spatial planning.

Participants

The sample of respondents in this research consisted of 139 students of the first and second grades of secondary schools in the municipality of Pljevlja, with an average age of 15.6 ± 0.6 years. Of these, 73 respondents were male adolescents, and 66 were female adolescents, while 77.7% of adolescents lived in urban and 22.3% in rural areas (Table 1). The sample of respondents was obtained by random sampling. Adolescents with chronic diseases, physical or mental deficiency were excluded from this research.

Table 1. Sample of respondents

Participants	Male	Female	Overall
Urban	58	50	108
Rural	15	16	31
Overall	73	66	139

Variables

For obesity status, the following anthropometric measures were measured: body height (BH), body mass (BM), waist circumference (WC), subscapular skinfold (SS), and triceps skinfold (TS). By measuring anthropometric characteristics, anthropometric indexes were calculated: Body Mass Index (BMI), Waist to Height Ratio (WHtR), and percentage of body fat (BF).

The assessment of obesity status was determined by calculating the percentage values for the BMI values for each respondent according to the standards of the Center for Disease Control and Prevention (CDC) where the respondents were classified into groups of underweight (<5th percentage), normal (5th - 85th), overweight (>85th ≤95th), and obese (>95th). WHtR is also one of the most reliable methods for assessing obesity status and

Table 2. Differences in obesity status by type of settlement

	Male				Female				Chi	p				
	Urban		Rural		Overall		Urban				Rural		Overall	
	n	%	n	%	n	%	p	n	%	n	%	n	%	p
BMI														
Underweight	3	5.2	0	0	3	4.1	0.546	2	4	0	0	2	3	0.072
Normal	33	56.9	11	73.3	44	60.3		44	88	13	81.3	57	86.4	
Overweight	15	25.9	2	13.3	17	23.3		4	8	1	6.3	5	7.6	
Obese	7	12.1	2	13.3	9	12.3		0	0	2	12.5	2	3	
WHtR														
Normal	43	74.1	12	80	55	75.3	0.639	47	94	13	81.3	60	90.9	0.123
Obese	15	25.9	3	20	18	24.7		3	6	3	18.8	6	9.1	
Body Fat														
Underweight	8	13.8	4	26.7	12	16.4	0.542	2	4	0	0	2	3	0.025
Normal	25	43.1	7	46.7	32	43.8		44	88	10	62.9	54	81.8	
Overweight	10	17.2	2	13.3	12	16.4		4	2	3	18.8	4	6.1	
Obese	15	25.9	2	13.3	17	23.3		0	6	3	18.8	6	9.1	

Legend: BMI - Body Mass Index; WHtR - Waist to height ratio; Chi - Chi-squared test; p - significant value;

represents the ratio of waist circumference to body height. A respondent whose WHtR is more than 0.5 is considered to belong to the obese group (Ashwell, Gunn, & Gibson, 2012). The BF was calculated by the Slaughter equation, using the subscapular skinfold (SS) and the triceps skinfold (TS) (Slaughter et al., 1988), after which were calculated fat percentages for each subject, which are classified into groups of underweight (<5th percentage), normal (5th - 85th), overweight (>85th ≤95th) and obese (>95th) (McCarthy, Cole, Fry, Jebb, & Prentice, 2006).

Statistical analysis

The data obtained in this research were processed using descriptive statistical procedures, and the arithmetic means and standard deviation were determined. Chi-square test with a statistical significance of $p \leq 0.05$ was used to assess the differences in the obesity status among adolescents by type of settlement.

Results

The results that show the obesity status of adolescents and their differences by type of settlement are shown in Table 2. For BMI values, it was shown that 23.3% of male adolescents were overweight, and 12.3% obese. When it comes to female adolescents, 7.6% were overweight, and 3% were obese. For WHtR values, 24.7% of male, and 9.1% of female adolescents belonged to the obese group. According to BF values, 16.6% of male adolescents were overweight and 23.3% obese, while 6.1% of female adolescents were overweight and 9.1% obese. When it comes to differences in the obesity status of adolescents by type of settlement, it was shown that according to the BF values, 18.8% of female adolescents living in rural areas showed a statistically significant higher overweight level compared to 2% of their peers from urban areas ($p=0.025$). Differences in BMI and WHtR values were not found.

Discussion

The aim of this research was to estimate the level of obesity and its differences among adolescents living in urban and rural areas in the territory of the municipality of Pljevlja. Based on the above results, it can be seen that according to the BMI values, the municipality of Pljevlja has 23.3% overweight and 12.3% obese male adolescents, and 7.6% overweight and 3% obese female adolescents. The results of this research are similar to those obtained by Malovic (2019) where 22.2% of respondents were overweight and 16.3% obese, and those obtained by Bacovic where 19.6% were overweight and 16.4% obese. Also, when looking at the data of Vrevic, Malovic, Bacovic, Bojanic, and Bajramovic (2021), where 12.3% of children from Herceg Novi were overweight, and even 27.69% were obese, it can be concluded that Montenegrin cities have a problem with overweight and obesity. If, in addition to the BMI values, we look at the WHtR values, where 24.7% of male adolescents and 9.1% of female adolescents belong to the obese group, and the BF values, where 16.6% of male adolescents were overweight and 23.3% were obese, and 6.1% of female adolescents were overweight and 9.1% obese, it can be seen that the results are not commendable, especially when it comes to male adolescents. If these values are compared with the values of a global study (Health at a Glance: Europe 2020, 2020) where, according to BMI values, 23% of male adolescents and 15% of female adolescents were overweight or obese, it can be concluded that male adolescents are above these values, while female adolescents are within normal limits compared to their peers from Europe.

When it comes to the differences in the obesity status by type of settlement, it was shown that female adolescents living in rural areas were significantly more overweight compared to their

peers living in urban areas ($p=0.025$) according to the BF values, while there were no differences for BMI and WHtR values. There were no differences for for male adolescents. If we take into account that the assessment of the obesity status obtained on the basis of the percentage of fat by skinfold values gives more accurate data compared to other indices (Etchison et al., 2011), we can say that female adolescents living in rural areas of Pljevlja have bigger issues with overweight and obesity, in relation to those living in rural areas. Similar results were also shown by the research of Joens-Matre et al. (2008), which suggests that the prevalence of obesity in rural regions was 25% and was significantly higher than children who lived in urban regions (19%) and children who lived in small towns (17%). Furthermore the research by Biehl et al. (2013) showed that Norwegian children living in rural regions have a 1.5 times higher risk of being overweight or obese by BMI values and 2.2 times by WHtR values in relation to their peers living in urban areas. The reason for the increasing obesity of children and adolescents living in rural areas can be the consumption of high-calorie foods, lower rates of physical activity caused by lack of space and resources, more time spent in front of computers and TV screens, and lack of health education, all of them significantly affecting overweight and obesity (Davis, Bennett, Befort, & Nollen 2011).

Based on the results of this research, it can be concluded that Pljevlja as a municipality has a problem with overweight and obesity. This should be considered as an alarm to approach the process of solving obesity through informing parents, better involvement of physical education professors, better affirmation of physical activities through different forms especially in the population of male adolescents. Also, as our findings suggest that girls living in rural areas were more obese than their peers living in urban areas, it is necessary to pay more attention to rural regions by providing resources, equipment, and adequate space for performing physical activities, as well as providing the necessary health education. Also, this research can be an excellent starting point for future research on this topic, especially for assessing the difference by type of settlement. Further research on this topic, and with higher sample size - especially in Montenegro - is necessary in order to reinforce our findings.

This research also has limitations. Namely, the biggest limitation is reflected in the small number of respondents, especially the percentage of respondents from the rural areas of Pljevlja. Also, when it comes to assessing the obesity status of adolescents, only adolescents from the first and second grades of secondary schools were included in this research. Therefore, recommendations for future research are to include a larger sample of respondents, and respondents of different ages in order to obtain an even more accurate picture. It is also necessary to carry out the same and similar research in other cities, as well as a national study in order to determine the general condition and raise awareness of the importance of the problem of overweight and obesity.

Conclusion

Based on our findings, it can be concluded that solving the problem of overweight and obesity is necessary for both urban and rural adolescents. Greater attention should be paid to female adolescents living in rural areas, as according to this study's results, the overweight trend has increased more among them compared to their peers living in urban areas. It should also be noted that further research on similar topics is necessary in all cities of Montenegro in order to raise awareness of this problem, which has been characterized by the World Health Organization for a long time as one of the biggest health problems (WHO, 1995).

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ORIGINAL SCIENTIFIC PAPER

Analysis of Perceptions Towards Individuals Who Exercise and Those Who do not Through Metaphors

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Abstract

The analysis of perceptions towards individuals who exercise and those who do not is important for determining the meaning and significance attributed to exercise. In this respect, the aim of the study was to examine the perceptions of individuals who exercise and those who do not through metaphors. The sample of the research consisted of 82 individuals residing in the province of Malatya, Türkiye. The study was designed qualitatively using a case study design, and the research data was collected through a semi-structured interview form. The obtained metaphors were analyzed using content analysis technique. In the study, a total of 29 metaphors were produced for individuals who exercise, and 10 themes were formed from these metaphors. For individuals who do not exercise, a total of 39 metaphors were produced, and 8 themes were formed from these metaphors. According to the research findings, the participants used the metaphors “iron” (n=18), “steel” (n=8), and “lion” (n=6) most frequently to describe individuals who exercise, while the metaphors “panda” (n=9), “sponge” (n=7), and “rusty iron” (n=6) were used most frequently to describe individuals who do not exercise. As a result, it was shown that the participants generally associated individuals who exercise with factors such as being strong, healthy, durable, and powerful, and had a positive perception towards them. On the other hand, it was suggested that the participants associated individuals who do not exercise with factors such as being lazy, weak, and dysfunctional, and had a negative perception towards them.

Keywords: *Exercise, Sport, Metaphor, Health, Body perception*

Introduction

The relationship between exercise and health has been studied and examined by researchers from various disciplines for many years. The studies emphasize that regular exercise plays an important role in combating obesity (Bouchard et al., 1993; Petridou et al., 2019), diabetes (Peirce, 1999; Zisser et al., 2011), osteoporosis (Todd and Robinson, 2003; Forwood and Larsen, 2000), and many other health problems. Additionally, it is a fact that exercise creates positive changes in individuals' physical appearances (Donaldson and Ronan, 2006; Teke and Karakuş, 2022) and thus has an effective role in body perception.

The body is a reflection of human existence and therefore a way for individuals to present themselves to the outside world (Okumuş, 2009). In patriarchal and heterosexist cultures, it is known that women are expected to have a “thin and sexy” body, while men are expected to have a “strong and muscular” body (Murnen and Don, 2012). In addition, the ideal male body in Western societies is defined as muscular and lean (Hausenblas and Fallon, 2002). The “V-shaped” muscular male body is presented as the ideal male body image in modern society and is also accepted as a symbol of many positive qualities such as happiness, success, and attractiveness (McCabe and Ricciardelli, 2005;

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Tiggemann, 2011). Therefore, exercise is an effective phenomenon that has the power to affect both individuals' external body perception and the perception of others (Dökmen, 2004; Karagöz and Karagün, 2015). In this context, examining the perceptions of individuals who exercise and those who do not is important for determining the meaning and significance attributed to exercise.

When reviewing studies related to perception, it is observed that the metaphor technique is frequently used (Di Tore, 2017; Kurtipek et al., 2017; Alan, 2021; Onag et al., 2021; Çar et al., 2022). The metaphor technique is defined as expressing emotions and thoughts about a phenomenon using a word or phrase. Particularly, the metaphor technique is considered an effective method to make a complex, abstract or theoretical concept more explanatory (Ortony, 1993; Kovecses, 2010; Saban, Koçbeker, & Saban, 2006). In the literature, it is also observed that the metaphor technique is frequently used in studies related to sports.

However, researchers in the field of sports have generally focused on the conceptual and perceptual aspects of sports in metaphor studies (Yetim & Kalfa, 2019; Arpa, 2014; Çar et al., 2022; Kaya et al., 2018; Koç et al., 2015; Sevinç & Ergenç, 2017). Additionally, studies examining individuals' perceptions of physical activity, sports branches, and sports management are also present (Baydar & Arıcan, 2021; Ceylan & Kozak, 2021; Güllü, 2021; Karakaya & Salici, 2016; Kurtipek & Gungor, 2019). In this context, a metaphorical study examining perceptions of individuals who engage in sports and those who do not engage in sports has not been encountered in the literature. Therefore, it is a matter of curiosity what the perception of the public is regarding individ-

uals who exercise and those who do not exercise in revealing the meaning and importance attributed to exercise. In this context, the aim of this study was to examine the metaphors created for individuals who exercise and those who do not exercise.

Methods

Research Model

This research was designed using the phenomenological approach of qualitative research methodology (Patton, 2002), while a semi-structured interview form was used for data collection. A content analysis technique (Braun and Clarke, 2006) was employed to evaluate the obtained data. The findings were documented and presented in a report. The adherence of the research to ethical principles was approved by the İnönü University Non-Interventional Clinical Research Ethics Committee with decision number 2022/3569. All participants were informed about the research and included in the study voluntarily by signing a consent form.

Sample of respondents

The sample group for the research was determined using convenience sampling technique (Stratton, 2021). In qualitative research, large sample groups are not necessary since data collected from interview and observation techniques tend to repeat themselves after a certain point (Morse, 2016; Shenton, 2004). In this context, 82 individuals residing in Malatya were included in the study. The demographic characteristics of the participants are presented in Table 1.

Table 1. Demographic characteristics of the participants

Variable	F	
Sex	Female	40
	Male	42
Age	18-24	33
	25-30	29
	31-36	20
Marital Status	Single	58
	Married	24
Education Level	Bachelor's Degree	41
	Associate's Degree	21
	Master's Degree	13
	Doctorate	7
Exercise Status	Does exercise	43
	Does not exercise	39

Data Collection Tool

The demographic information of the participants and their metaphoric perceptions towards individuals who exercise and those who do not were collected through a semi-structured interview form. The semi-structured interview form was developed based on the relevant literature (Başarır & Sarı, 2015; Topuz & Erkanlı, 2016; Ateş & Karatepe, 2013; Dikme et al., 2019) by examining previous studies in the field. Metaphoric perceptions of the participants towards individuals who exercise and those who do not were collected through open-ended questions added to the semi-structured interview form, as follows: "Individuals who exercise are like... because..." and "Individuals who do not exercise are like... because...". By using the phrase "like" in the first sentence and "because" in the second sentence, participants were encouraged to create metaphors and to provide a logical reason for their

metaphors. The research data was collected through a Google Form between October 11, 2022 and October 19, 2022.

Data Collection Process and Analysis

For the study, a semi-structured interview form was sent to the participant group via Google Forms, and they were asked to answer the relevant questions. The data obtained through Google Forms was downloaded and saved in the Microsoft Excel program. The output of the document in Excel format was sent to two field experts for evaluation of the data. The experts individually examined the documents, taking into account the explanations after the "Because, ..." expression, where the justifications for the metaphors were expressed, and first determined the categories and then the themes. If there were multiple themes/categories relevant to the metaphor in the comprehensive justifications provid-

ed by the participants, the experts added the metaphor to multiple themes/categories. Later, two researchers came together to test the compatibility of the metaphors with the identified categories and themes. In addition, 17 forms were excluded from the study because they were incomplete or insufficiently filled out.

The data was analyzed using content analysis. In content analysis, similar data is organized and interpreted under certain concepts and themes (Yıldırım and Şimşek, 2011). The obtained data was primarily conceptualized through content analysis and grouped under specific categories. Then, categories that were deemed to be related to each other were combined under certain themes. The findings were grouped into categories and themes were quantified and analyzed.

The reliability of the research was tested by the formula Reliability = [Agreement / (Agreement + Disagreement) x100] of Miles and Huberman (1994), to ensure consistency in coding among the researchers. A near or above 90% agreement percentage among the researchers indicates the reliability of the study (Miles and Huberman, 1994). In the examination conducted on the themes created for individuals who exercise, it was shown that there was 9 agreement and 1 disagreement, and in the examination conducted on the themes created for individuals who do not exercise, there was 8 agreement and 0 disagreement. Then, the experts came together and any themes and categories with conflicting opinions that arose during the interview and analysis

were resolved through consensus, and the analysis was concluded. Thus, with the agreed-upon categories and themes, a final form was obtained.

In this context, the reliability of the themes created for individuals who exercise has been tested using Miles and Huberman's (1994) formula of Reliability = [Agreement / (Agreement + Disagreement) x100]. The analysis showed that the agreement was 9 and the disagreement was 1, resulting in a reliability level of 90% (9 / (9 + 1) x 100) for the themes created for individuals who exercise. Similarly, the reliability of the themes created for individuals who do not exercise was found to be 100% with an agreement of 8 and no disagreement (8 / (8 + 0) x 100 = 100). Afterwards, the experts reconciled their differences regarding the themes and categories, and the analysis was concluded. Thus, the categories and themes were finalized based on the agreement reached. Based on these results, the research has achieved the desired level of reliability.

Results

The participants generated 29 metaphors in total for individuals who engage in exercise, which were then grouped into 10 themes. Among these themes, the participants predominantly used "animal" (n=19), "element" (n=18), and "object" (n=12) metaphors (Table 2). It is observed that the metaphors produced by the participants for individuals who engage in exercise are positive in nature.

Table 2. Metaphors of the participants towards individuals who exercise

Themes	Metaphors	f	Number of metaphors
Animal	Ant (2), bird (1), horse (4), cheetah (3), lion (6), Gazelle (1), eagle (1), tiger (1)	19	8
Plant	Radish (4), tree (1)	5	2
Alloy	Steel (8), gunmetal (2)	10	2
Element	Iron (18)	18	1
Vehicle	Ferrari car (2)	2	1
Nature	Stone (4), stream (1), water (1), sun (2)	8	4
Abstract	Monster (1), superhero (1)	2	2
Human	Dependent (3), warrior (1), investor (1)	5	3
Object	Machine (6), arrow (1), statue (1), stock (1), armor (3)	12	5
Food	Cream biscuits (1)	1	1
Total		82	29

Animal theme; Participants produced the most metaphors related to animals (n=8) for individuals who engage in sports. In this theme, the metaphors "lion" (n=6) and "horse" (n=4) stand out (Table 2).

Plant theme: In this theme, the participants compared exercise enthusiasts to "radishes" (n=4) the most.

Alloy theme: Participants used the "steel" (n=8) metaphor the most to describe exercise enthusiasts.

Element theme; With this theme, the participants compared the individuals who exercised to "iron" (n=18) the most.

Vehicle theme; The participants compared the exercisers to "Ferrari" (n=2) with this theme.

Nature theme; Participants used the metaphor of stones (n=4) the most for individuals who exercise.

Abstract and food theme; While the metaphors that the participants produced within the context of the abstract theme for individuals doing sports were "monster and superhero" (n=2), they produced the metaphor of "creamy biscuit" (n=1) in the food theme.

Human theme; In this theme, the participants compared the

individuals who exercised to "addicts" (n=3) the most.

Object theme; In this theme, the participants describe the individuals who exercise with the most "machine" (n=6).

The metaphors produced by the participants for individuals who do not exercise are shown in Table 3.

According to Table 3, the participants have produced a total of 39 metaphors for individuals who do not exercise and have created 8 themes from these metaphors. In these themes, the participants have used the "panda" (n=9), "sponge" (n=7), and "rusty iron" (n=6) metaphors the most to describe individuals who do not exercise. It can be observed that the metaphors used by the participants to describe individuals who do not exercise are negative.

Animal theme; In this theme, the participants compared the individuals who do not exercise to "panda" (n=9) the most.

Plant theme; It was determined that the metaphors produced by the participants within the scope of the plant theme for individuals who do not exercise were mostly "potato and tree" (n=4).

Element theme; In this theme, individuals produced the most "rusty iron" (n=6) theme for individuals who did not exercise.

Table 3. Metaphors of Participants for Non-Exercise Individuals

Themes	Metaphors	f	Number of metaphors
Animal	Horse (1), koala (3), panda (9), lion (1), butterfly (1), bear (1), cicada (1), bat (1), turtle (1), Sheep (1)	20	10
Plant	Potato (2), cotton (1), tree (2), pear (1), rotten fruit (1), tomato (1), dry branch (1)	9	7
Element	Rusted iron (6)	6	1
Vehicle	car (3), truck (1)	4	2
Nature	Field (1), moon (2)	3	2
Human	Prisoner (5), sluggish (1), dead (3), carrion (1), sick (3), clumsy (1)	14	6
Object	Machine (5), pillow (2), wood (2), battery (1), sponge (7), spring (1), sack (2), ball (2), nylon (2)	24	9
Food	Loaf of bread (1), gum (1)	2	2
Total		82	39

vehicle contact; In this theme, the participants compared the individuals who do not exercise to a “broken car” (n=3) the most.

Nature theme; In this theme, individuals who do not exercise are most likened to the “Moon” (n=2). The explanations of the participants are as follows.

Human theme; Within the scope of the human theme of the participants for individuals who do not exercise, they mostly produced the metaphors of “convict” (n=5) and “sick” (n=3).

Object theme; In this theme, the participants mostly used the metaphors of “sponge” (n=7) and “machine” (n=5) to describe individuals who do not exercise.

Food theme; In this theme, the metaphors used by the participants for individuals who do not exercise are the metaphors of “loaf of bread and gum” (n=2).

Discussion

This study examined the metaphorical perceptions of individuals who exercise and those who do not. Animal, plant, alloy, element, vehicle, nature, abstract, human, object, and food themes were created, and evaluations were made within the scope of these themes. Although the participants generated metaphors for both individuals who exercise and those who do not in the same themes, when the justifications for the generated metaphors were examined, it was understood that the metaphors created for individuals who exercise were positively oriented, while the metaphors created for individuals who do not exercise were negatively oriented.

When animal, plant, alloy, element, nature, and object themes were examined, the metaphors generated for individuals who exercise emphasized that they are strong, healthy, resilient, and powerful. The metaphor “iron” (n=18) was used the most for individuals who exercise. According to the relevant literature, in the study conducted by Baydar Arıcan (2021), metaphors generated for physical activity were determined to be mostly under the theme of need, and the most frequently used metaphors were listed as lifestyle, water, and breathing. In another similar study by Koç (2020), health, need, and entertainment metaphors were used. In addition, in studies conducted on the concept of exercise, it was found that participants mostly generated need, movement, and health metaphors (Çar et al., 2022; Kurtipek & Sönmezoglu, 2018; Yetim & Kalfa, 2019). Furthermore, in Güllü’s (2021) study, participants used quality of life, lifestyle, and freedom metaphors, while Sevinç and Ergenç’s (2017) study found peace, happiness, and satisfaction metaphors. Based on all this information, it seems that concepts such as sports, physical activity, and exercise have a positive perception in society. Additionally, Arslan et al.

(2011), İnal (2003), and Yıldız and Çetin (2018) suggested that individuals who exercise are in a better mental, physical, and spiritual state. Moreover, studies have reported a positive relationship between physical activity and happiness (Toptaş Demirci, 2019; Zhang & Chen, 2019). Therefore, it is believed that the positive perception of exercise in society is related to these findings.

When examining other similar studies related to the topic, it has been shown that there are studies conducted on various sports activities and branches. For example, in studies that examine the perceptions of individuals actively participating in zumba, metaphors related to psychological benefits, health, pleasure, happiness, and socialization were produced for individuals participating in zumba (Ceylan and Kozak, 2021; Domene et al., 2016; Lakoff and Johnson, 2005). In addition, according to the results of our study, the participants created the metaphors “iron” (n=18), “steel” (n=8), and “lion” (n=6) most frequently to describe individuals who exercise. Therefore, it is understood that exercise is widely accepted in society and holds great importance in terms of the benefits it provides.

When the metaphors produced by participants regarding individuals who do not exercise were examined, it was shown that the most commonly produced metaphors were “panda” (n=9), “sponge” (n=7), and “rusty iron” (n=6). In this context, it seems that the metaphors were created for individuals who do not exercise by emphasizing laziness, weakness, and dysfunction. However, as Dixon (2007) also stated, in sports, qualities such as perseverance, hard work, pushing one’s limits, or gaining superiority over competitors are always at the forefront. Therefore, it is thought that the metaphors produced by participants regarding individuals who do not exercise are negative.

Additionally, previous evidence indicates that exercise, physical activity, and sports not only affect individuals’ external perceptions but also their internal perceptions, that is, self-perceptions (Jetzke and Mutz, 2019; Mutz et al., 2021; Zhang and Chen, 2019). For instance, Avan (2015) examined body perceptions of individuals in a sports center, and reported that overweight, normal, and thin male and female individuals were more satisfied with their bodies, as well as found themselves more attractive compared to overweight individuals. In another similar study, Merdinoğlu et al. (2017) reported a significant difference in body perception between individuals who exercise and those who do not, especially in exercising women. Weinberg and Gould (2003) found that sedentary individuals had low body perception. Furthermore, there are studies that demonstrate the positive change in individuals’ self-perceptions of their bodies when they start engaging in physical activity (Durmaz and Özcan, 2021; Kuru and Baştuğ,

2008; Küçükapan and Civan, 2021). Therefore, it is believed that in addition to the positive perceptions of individuals who engage in physical activity and sports towards those who exercise, the reason for the negative metaphors created by individuals who do not exercise towards those who do exercise, may be explained by previously mentioned findings.

Conclusion

In conclusion, exercising not only provides individuals with health, happiness, peace and a good physique, but also gives them a social identity and positively influences the perception of others.

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SHORT REPORT

Validity and Reliability of an Inertial Measurement Unit (BTS G-Walk) for Measurement of Countermovement Jump Height: A pilot-study

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Abstract

This pilot-study aimed to analyse the validity and reliability of an inertial measurement unit (IMU; BTS G-walk) for measuring the countermovement jump (CMJ) height. Sixteen collegiate male students (age: 19.1 ± 1.4 years; height: 172.7 ± 5.2 cm, body mass: 64.1 ± 6.7 kg) participated in the study. Three trials were conducted for CMJ with the intent of achieving maximal height. The CMJs were concurrently assessed with the IMU and My Jump 2 application. The intercorrelation coefficient (ICC), Pearson correlation (r), and paired t test were used to assess validity. In addition, the ICC, Cronbach alpha (α), and coefficient of variation (CV) were used to assess within-session reliability. The ICC between both devices for measurement of jump height was excellent (ICC = 0.96 [0.90 – 0.99]) with large correlation ($r = 0.973$). Paired t test showed no difference between both measurement devices. Furthermore, within-session ICC for both devices were good and excellent (ICC = 0.92 [0.82 – 0.97] for IMU; ICC = 0.97 [0.92 – 0.99] for My jump application) and reported acceptable CV (<10%). In conclusion the findings of current study suggest that IMU (BTS G-walk) is a valid and reliable tool for assessment of CMJ height.

Keywords: *plyometric exercise, exercise test, exercise, human activities, athletic performance*

Introduction

Ability to leap vertically is one of the most prevalent fundamental motor skills among human. Indeed, in variety of sports (e.g., volleyball, basketball) having the ability to jump higher (e.g., compared to an opponent) may be advantageous. The vertical jumping ability is often assessed using the countermovement jump (CMJ) test, where the individual uses the stretch-shortening cycle action (i.e., eccentric, amortization and concentric phases). Therefore, practitioners who consider developing athletes' vertical jumping ability to be a key goal, frequently gauge sports performance and physical condition by measuring vertical jumps using the CMJ test (Claudino et al., 2017). Indeed, the CMJ is considered as an important indicator of athletic performance and is been included in assessments of studies that incorporate plyometric jump training, complex training, resistance training etc. (Ramirez-Campillo et al., 2022; Thapa et al., 2021) and across different population (e.g., soccer, swimmers, physically active

adults) (Kumar et al., 2023; Ojeda-Aravena et al., 2023; Phukan et al., 2021; Thapa et al., 2022; Thapa et al., 2019).

The CMJ height can be assessed with myriad technologies that are validated and reliable (e.g., contact mat, force platform, software [e.g., MyJump app]) (Balsalobre-Fernández et al., 2014; McHugh, 2018). One such technology is the inertial sensors that are built into inertial measurement unit (IMU), which are multi-sensory devices (i.e., gyroscope, accelerometer, magnetometer) and can be used to aggregate acquired data to measure motion precisely (Andrenacci, 2021). These sensors use the law of inertia to measure angular velocities or linear accelerations and therefore can be used to estimate jump height during CMJ. The BTS Bioengineering corporation manufactures an IMU that also measures the jump height during the CMJ task. However, the validity and reliability of this IMU for CMJ jump height estimation has not been established previously. Therefore, the aim of the present study was to analyse the validity and reliability of

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BTS G-walk device for measuring the CMJ height. The authors hypothesised that the BTS G-Walk device would be a valid and reliable instrument to measure CMJ height.

Materials and methods

Participants

A total of 16 male participants (age: 19.1 ± 1.4 yrs, height: 172.7 ± 5.2 cm, body mass: 64.1 ± 6.7 kg) were selected for the study. The participants were all healthy physical education students of the university. To be included in the study, the participants had to 1) be free from any lower limb injury in past three months; 2) be able to execute the CMJ with correct form (including landing technique); 3) be able to complete the familiarization and testing sessions. The participants were informed about the procedure of the study and related risk associated during the study. Thereafter, informed consent forms were signed by the participants and/or parents in case participant was minor. The study was approved by internal review board of the university and was conducted following the Helsinki's Declaration.

Procedure

Prior to the commencement of the study, three familiarization sessions were conducted for the CMJ. The anthropometric data were collected during this familiarization sessions. The CMJ test was conducted inside a laboratory. The participants underwent a warm-up protocol of ~10 minutes including running at self-selected speed, dynamic stretching of lower limb muscles, and CMJs. Thereafter, each participant performed three CMJs with the intent of achieving maximal height. Participants were instructed to jump maximally following a countermovement with a self-selected magnitude of knee flexion. All CMJs were performed with hands placed on the hips. No flexion of the legs was allowed during the flight time. The trials deviating from the guidelines of the CMJ were rejected and a new

trial was conducted. The jump height was measured concurrently with BTS G-walk and My Jump 2 application. The My Jump 2 is a validated (jump height: r = 0.99) (Balsalobre-Fernández et al., 2014; Wee et al., 2018) IOS application and was installed on an iPhone 13 pro (Apple Inc., California, USA) with a 240-Hz high-speed camera at a quality of 720 p. The camera was directed as low as possible facing each participant in the frontal plane ~2 m away to best record jump performance.

Statistical analysis

Descriptive characteristics of the studied population are reported as mean and standard deviations. Normality of the data was tested using the Shapiro-Wilk test. To establish concurrent validity, interclass correlation coefficient (ICC; two-way random single measures [absolute agreement]), Pearson correlation coefficient, and paired t-test were used. In addition, for reliability analysis ICC, Cronbach's α, and coefficient of variation (CV) were used. The ICC between trials was interpreted as poor (<0.5), moderate (0.5-0.75), good (0.75-0.9), and excellent (>0.9) reliability based on the lower bound of the 95% confidence interval (CI) (Koo & Li, 2016). The CV represented the typical error of measurements expressed as a percentage of mean and a value <10% was considered acceptable (Cormack et al., 2008). Lastly, to complement the ICC analysis, Band-Altman plots were created, which are known to give a good representation of the agreement between the two instruments (Bland & Altman, 1986). All statistical analyses were conducted using IBM SPSS version 20 (IBM, New York, USA). The CV was calculated using the Microsoft Excel sheet. The level of statistical significance was set at p ≤ 0.05.

Results

Mean, standard deviations, and validity statistics are reported in Table 1. The ICC between BTS G-walk and My Jump app was

Table 1. Statistical analysis for validity

	BTS G-walk	My jump app	ICC (95%CI)	r	Mean difference
	Mean ± standard deviation				
Countermovement Jump height	30.18 ± 4.50	30.38±5.17	0.96 (0.90 – 0.99)	0.973	0.2 ±1.3

Note: ICC (95%CI) – Interclass correlation coefficient with 95 % confidence interval, r - Pearson product moment correlation coefficient

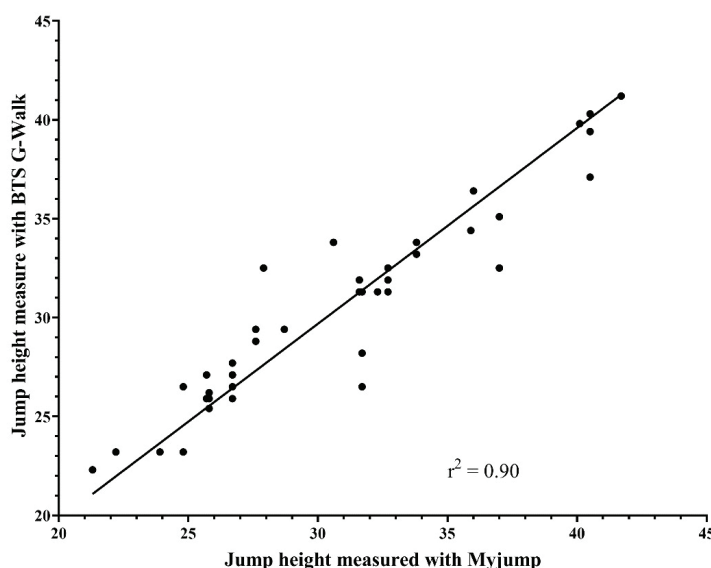


FIGURE 1. Linear regression correlations between jump height obtained from the inertial moment unit (BTS G-Walk) and video-based mobile applications (MyJump 2). Note: The thick solid line represents the regression line and r2 is the coefficient of determination of the regression line.

Table 2. Statistical analysis for within-session reliability

	BTS G walk			My jump app		
	ICC (95%CI)	α	CV	ICC (96%CI)	α	CV
Countermovement Jump height	0.92 (0.82 – 0.97)	0.92	5.57±3.77	0.97 (0.92 – 0.99)	0.97	4.35 ± 2.89

Note: ICC (95%CI) – Interclass correlation coefficient with 95 % confidence interval, α - Cronbach's alpha, CV – coefficient of variation

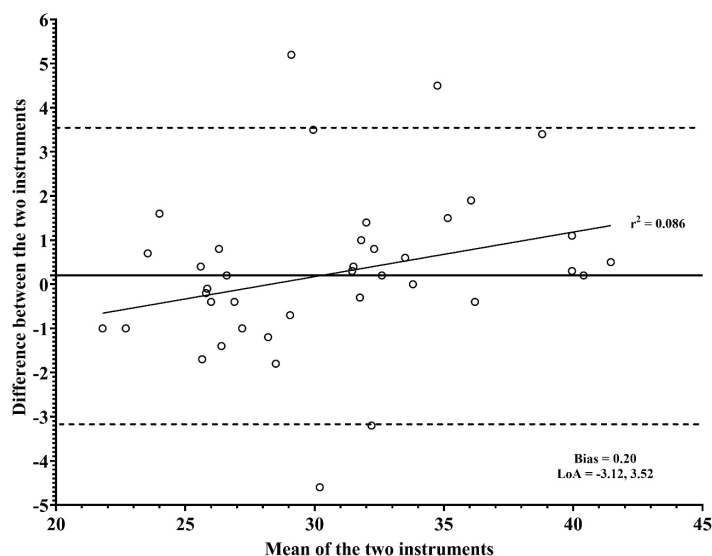


FIGURE 2. Bland-Altman plot for the measurement of jump height using inertial measurement unit (BTS G-walk) and video-based application (MyJump 2 app). The horizontal thick bold line represents the observed bias, and the thin dashed horizontal lines represents \pm level of agreement (± 1.96 standard deviation), while the thin line intersecting the thick line is the regression line of the data points. r^2 : coefficient of determination of the regression line

reported to be excellent. In addition, an almost perfect correlation ($r = 0.973$) was also reported. Paired t-test reported no significant difference between both the instruments ($p = 0.550$) with a mean difference of 0.2. The reliability statistics is presented in Table 2. Within-session ICC for BTS G-walk and My Jump were good and excellent, respectively. Both instruments reported acceptable CV. The scatterplot graphs between the instruments are presented in Figure 1. Similarly, the Bland-Altman plot for the IMU and My Jump application is presented in Figure 2.

Discussion

The aim of this pilot-study was to establish the validity and reliability of an inertial moment sensor - BTS G-walk for measuring the CMJ height in a small sample of 16 participants. Participants were assessed for CMJ height using the BTS G-walk concurrently with a validated video-based analysis software (i.e., My Jump application). The findings of this pilot-study indicate that BTS G-walk may be a valid and reliable instrument to measure the vertical jump of individuals during the CMJ test. Moreover, this pilot-study will serve as a starting point for a further validation in a bigger population sample.

Of note, we observed an excellent correlation between both methods, suggesting that the BTS G-walk can be alternatively used to measure jump height of the individuals. Our findings could be of importance to the scientific community considering that the BTS G-walk is mainly designed for the gait analysis. Therefore, our study supports the multiple use that this device can entail for practitioners, considering its applicability in numerous assessments. However, it should be noted that our study only validates the use of the device for CMJ height assessments. Indeed, in a similar fashion

many IMU devices has been validated for different task assessments (Clemente et al., 2022). For example, VERT classic (Mayfonk INC, USA) can be used to record jump counts, consistency of jump, best jump, etc. during the training session or competitive matches. In addition, it can be used to assess CMJ height (Benson et al., 2020). Similarly, another IMU device Gyko (Microgate, Bolzono, Italy) can be used to analyse walking, running, to do posture analysis, as well as to measure jump heights (Lesinski et al., 2016). Furthermore, global positioning system (Catapult Innovations, Australia) can be used to assess the external training load in addition to measure jump height (Rantalainen et al., 2018).

Although our pilot-study shows that the IMU can measure CMJ height validly, there are few limitations of our study that should be acknowledged. Firstly, the sample size was very low (i.e., 16 participants) considering the pilot nature of the study. However, this study should serve as the basis to validate the IMU with larger population. Secondly, although we used a valid software (i.e., My Jump) to establish the validity of the IMU, using the force platform that is considered 'gold standard' would be an advantage. Thirdly, we could not include female participants in the study. Considering different anthropometric and physiological characteristics between male and female, inclusion of female participants would offer better understanding across population.

Conclusion

In conclusion, the findings of this pilot-study indicate that the BTS G-walk may be a valid instrument to measure jump height in CMJ and that practitioners may use it as a device to track the vertical jump progress of their athletes. Moreover, it may serve as a starting point for further validation study in a bigger population sample.

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Conflict of interest

All authors declare that they do not have any conflict of interest regarding the conduct of this study.

Availability of data and material

All data generated or analyzed during this study will be/are included in the published article as Table(s) and Figure(s). Any other data requirement can be directed to the corresponding author upon reasonable request.

Author's contribution

Sandeep Kumar and Rohit K. Thapa conceived the idea and designed the study. Sandeep Kumar and Punam Pradhan were involved in the data collection procedures. Rohit K. Thapa conducted the formal analysis and interpretation of the data. Sandeep Kumar and Rohit K. Thapa wrote the first draft of the manuscript. Joseph Singh, Punam Pradhan, and Sanjeev Kumar critically revised the draft. All authors read and approved the final version of the manuscript.

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ORIGINAL SCIENTIFIC PAPER

Bibliometric analysis on sports-associated infections in athletes

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Abstract

This bibliometric study aims to provide a comprehensive analysis of the scientific literature on sports-associated infections in athletes by conducting an examination of articles indexed in the Scopus database from 2013 to 2023. A systematic search was conducted in the Scopus database using relevant keywords related to sports-associated infections and athletes. The search was limited to articles published between 2013 and 2023. Co-authorship and co-occurrence analyses were performed using VOSviewer software, version 1.6.19. A total of 540 articles were included in the analysis. The publication output on sports-associated infections in athletes demonstrated a consistent upward trend during the study period, indicating a growing interest in the field. The United States emerged as the leading country in terms of publication volume, followed by European countries such as the United Kingdom, Italy, and Germany. Notably, there was a notable absence of literature from Asian and African countries. Interestingly, COVID-19 was the most frequently studied topic in the sports-associated infections in the last several years. This bibliometric study provides a comprehensive overview of the scientific literature on sports-associated infections in athletes indexed in the Scopus database from 2013 to 2023. The findings highlight the increasing research interest in this field and the prominent contributions from countries in America and Europe. However, it also underscores the need for enhanced research efforts in Asian and African regions. The identified research gaps and collaboration opportunities can guide future research directions, ultimately contributing to the prevention, management, and overall well-being of athletes regarding sports-associated infections.

Keywords: *bibliometric analysis, sports-associated infections, athletes, publication trends, COVID-19*

Introduction

Sport has been widely recognized for its positive impact on overall health (Rohmansyah, Ka Praja, Phanpheng, & Hiruntrakul, 2023). However, sports-related infections are a significant concern for athletes, as they can lead to detrimental health effects, performance decline, and potential transmission to others (Ahmadinejad, Alijani, Mansori, & Ziaee, 2014). The field of sports medicine has increasingly recognized the impact of infectious diseases on athlete health and performance. Sports activities, characterized by close physical contact, shared equipment, and communal spaces, create an environment conducive to the transmission of pathogens (Braun & Kahanov, 2018). In recent years, numer-

ous studies have been conducted to investigate various aspects of sports-associated infections, including etiology, risk factors, prevention strategies, and management approaches (Chesson et al., 2021; Friman & Wesslén, 2000; Ruuskanen, Luoto, Valtonen, Heinonen, & Waris, 2022). However, there remains a need to assess the overall research landscape and identify key research areas that require further attention.

Bibliometric analysis provides a quantitative evaluation of research output, enabling a comprehensive overview of the scientific literature. It allows the identification of influential publications, leading authors, contributing institutions, and collaborative networks within a specific research field (Donthu, Kumar, Mukher-

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jee, Pandey, & Lim, 2021; Glynatsi & Knight, 2021). Such analyses can provide valuable insights into the growth of research in a particular area, highlight geographical and institutional contributions, and identify potential research gaps and emerging trends (Mejia, Wu, Zhang, & Kajikawa, 2021; Sweileh, 2020).

To our knowledge, no comprehensive bibliometric study has been conducted specifically focusing on sports-associated infections in athletes. By conducting a systematic analysis of the Scopus database, we aim to fill this knowledge gap and provide a comprehensive overview of the scientific literature published on this topic from 2013 to 2023. The Scopus database is widely recognized as a reliable and inclusive source of scientific publications, encompassing a broad range of journals and disciplines (Pham-Duc, Tran, Huu Hoang, & Bao Do, 2022).

Understanding the landscape of research on sports-associated infections is crucial for identifying research trends, knowledge gaps, and areas requiring further exploration. This study will enable us to identify the publication trends, prominent authors and institutions, collaborative networks, and citation patterns within the field of sports-associated infections in athletes. The findings will not only contribute to the existing body of knowledge but also guide future research directions and facilitate evidence-based decision-making in the prevention and management of sports-related infections. In this study, we aim to conduct a comprehensive bibliometric analysis of the scientific literature on sports-associated infections in athletes by examining articles indexed in the Scopus database from 2013 to 2023.

Methods

Data collection

A systematic search was conducted by 2 researchers independently, R.K.P., and N.A.R., in the Scopus database using relevant keywords related to sports-associated infections and athletes ("Infection in sport" or "Infection in athlete" or "Infectious disease in sport" or "Infectious disease in athlete"). The search was limited to articles published between 2013 and 2023, ensuring a comprehensive coverage of the literature on the topic. The inclusion criteria for this bibliometric analysis were original articles written in English. The exclusion criteria were (i) non original articles such as conference papers, editorials, letters, commentaries, and book chapters and (ii) studies not specifically related to sports-associated infections in athletes, such as general infection research or studies focusing on non-athletic populations. Through the systematic search, a total of 540 articles were identified. Data were extracted by R.K.P. from the Scopus database, including publication titles, authors, affiliations, keywords, publication year, and citation information.

Data preprocessing

The collected data were imported into VOSviewer version 1.6.19, a widely used bibliometric software (Li et al., 2023; Liu, Zhu, Wu, Lu, & Yu, 2022; Sweileh, 2020; van Eck & Waltman, 2010). Data preprocessing was performed to clean the dataset, remove duplicates, and standardize author names and affiliations.

Co-occurrence analysis

Co-occurrence analysis was conducted to identify frequently co-occurring terms in the field of sports-associated infections. Relevant keywords or terms related to sports-associated infections were extracted from the dataset. VOSviewer version 1.6.19 was employed to visualize co-occurrence networks, where terms were represented as nodes and co-occurrence relationships were depicted as links (van Eck & Waltman, 2010). The size of the nodes represented the frequency of term occurrence, while the thickness of the links indicated the strength of co-occurrence between terms.

Co-authorship analysis

Co-authorship networks were created to visualize collaborations among authors in the field of sports-associated infections. VOSviewer version 1.6.19 was used to generate co-authorship maps, where authors were represented as nodes and co-authorship relationships were represented as links (van Eck & Waltman, 2010). The size of the nodes indicated the productivity or number of publications by each author, while the thickness of the links represented the strength of collaboration between authors.

Data visualization and analysis

The co-authorship and co-occurrence maps generated by VOSviewer 1.6.19 were further analyzed and interpreted. Key clusters of collaboration among authors and significant co-occurring terms were identified. In addition, the most frequently studied key themes were also identified.

Ethical Considerations

The study adhered to the principles of responsible research conduct and confidentiality by only utilizing aggregated data without identifying individual authors or institutions.

Results

Trend in publication output

A total of 540 articles were included in the bibliometric analysis. The analysis of publication output over the period from 2013 to 2023 revealed a significant increase in the number of publica-

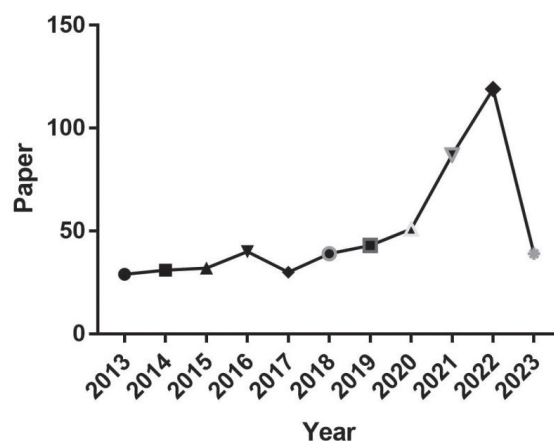


FIGURE 1. Research trend in sports-associated infections from 2013 to 2023.

tions related to sports-associated infections in athletes. Figure 1 presents the trend in publication output over time.

The findings demonstrate a steady growth in the number of publications on sports-associated infections. The initial years (2013-2017) witnessed a relatively modest number of publications, but there was a noticeable upward trend starting from 2018. The growth continued to accelerate, reaching its peak in 2022. This upward trajectory signifies the increasing attention

and research focus on sports-associated infections and their implications for athlete health.

Co-occurrence analysis findings

The co-occurrence analysis provided insights into the main research themes and key concepts in the field of sports-associated infections. Figure 2 presents the co-occurrence network of terms, highlighting the most frequently co-occurring terms in the literature.

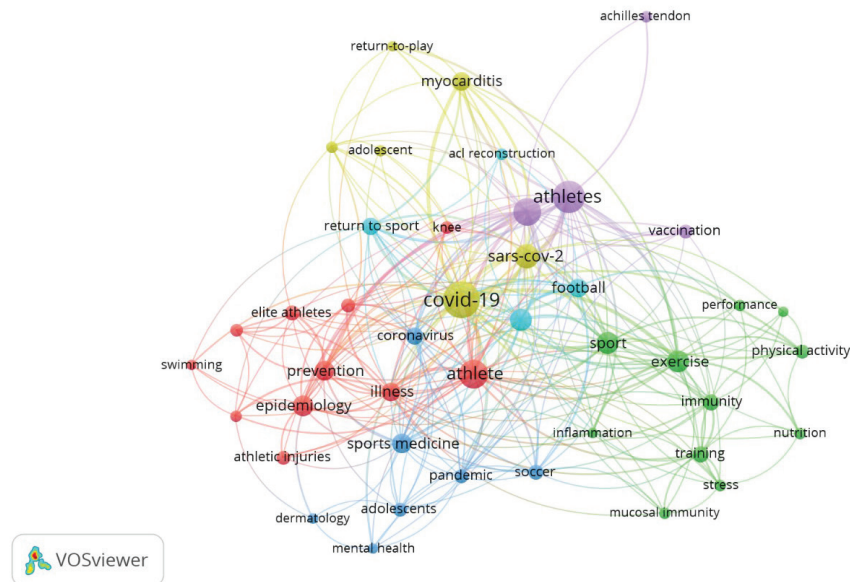


FIGURE 2. Network visualization result of co-occurrence analysis of sports-associated infections in the Scopus database (2013-2023).

The analysis revealed several prominent terms that frequently co-occurred in the literature. These included “covid-19,” “athletes,” “epidemiology,” “prevention,” and “myocarditis.” The strong co-occurrence links between these terms indicated their interconnectedness and relevance within the research domain. These findings highlight the emphasis on understanding the prevention, epidemiology, and management of covid-19 infections in the context of sports and athletes.

Furthermore, specific subthemes emerged from the co-oc-

currence analysis, such as “vaccination,” “football” and “return to sport.” These subthemes represent important areas of research focus for addressing sports-associated infections and ensuring the well-being of athletes especially for football.

The analysis of publication output specifically related to COVID-19 infection within the broader field of sports-associated infections revealed a significant increase in the number of publications. Figure 3 presents the trend in publication output on COVID-19 infection over time.

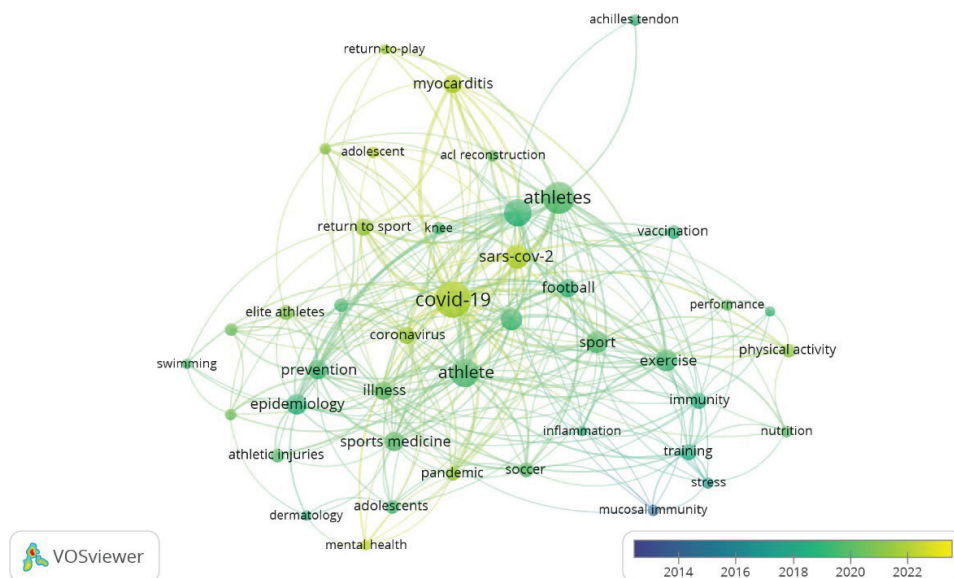


FIGURE 3. Overlay visualization result of co-occurrence analysis of sports-associated infections in the Scopus database (2013-2023).

The findings demonstrate a notable surge in the number of publications on COVID-19 infection in athletes starting from the year 2020. The COVID-19 pandemic had a profound impact on sports and athlete health, leading to increased research focus on understanding the implications of the virus in sports settings. The publication output related to COVID-19 infection continued to rise steadily, highlighting the urgency and relevance of this topic.

Co-authorship analysis findings

The co-authorship analysis revealed collaboration patterns among countries in the field of sports-associated infections in athletes. The co-authorship network demonstrated the collaborative relationships between countries based on their joint publications. Figure 4 illustrates the co-authorship network by country, highlighting the countries with the highest collaboration.

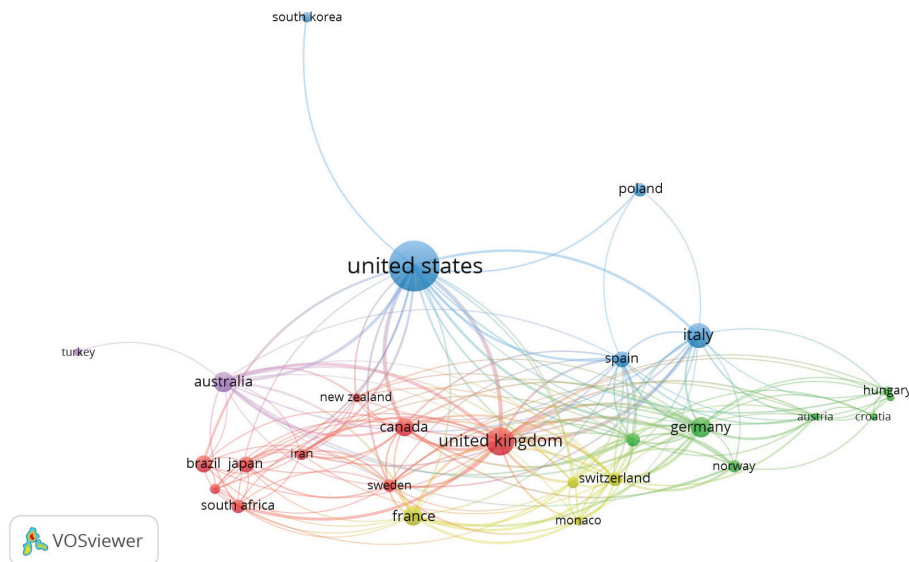


FIGURE 4. Co-authorship network by country conducting research on of sports-associated infections in the Scopus database (2013-2023).

The analysis identified several prominent countries that actively contributed to the literature on sports-associated infections. The top collaborating countries included the United States, the United Kingdom, Italy, Germany and Australia. These countries exhibited a high degree of collaboration, as evidenced by the strong links between their nodes in the co-authorship network. Their collaborative efforts

have significantly contributed to advancing knowledge in the field.

The analysis of publication output on sports-associated infections in athletes from 2013 to 2023 revealed the top ten active countries in terms of the number of publications in the field. Table 1 presents the top ten countries and their corresponding publication counts.

Table 1. Top ten active countries publishing papers on sports-associated infections in the Scopus database (2013-2023).

No.	Country	Document	Citations	Total link strength
1	United States	199	2644	83
2	United Kingdom	61	1704	94
3	Italy	49	515	39
4	Germany	33	287	49
5	Australia	31	801	43
6	France	28	802	40
7	Canada	26	905	51
8	Brazil	23	308	13
9	Spain	21	355	39
10	Japan	20	100	14

The results highlight the countries that have made significant contributions to the literature on sports-associated infections. The United States emerged as the leading country, with a substantial number of publications, followed by the United Kingdom, Italy, Germany, and Australia. These countries demonstrated a strong research focus on sports-associated infections and have actively contributed to advancing knowledge in the field.

Other notable countries in the top ten list included France, Canada, Brazil, Spain, and Japan. Their contributions through research publications have enriched the understanding of sports-as-

sociated infections and have provided valuable insights for the implication of sports-associated infections. Additionally, these findings underscore the global attention given to sports-associated infections and the collaborative efforts of researchers from various countries to address this important health issue in athletes.

Discussion

Sports-associated infections pose a significant health concern for athletes and understanding the research landscape in this area is crucial for guiding future studies and interventions. This biblio-

metric study aimed to analyze the publication trends and contributions in the field of sports-associated infections in athletes using the Scopus database from 2013 to 2023. The findings provide valuable insights into the research landscape, highlight research gaps, and identify areas for further investigation.

The analysis revealed a notable increase in the number of publications related to sports-associated infections over the study period. This trend indicates the growing recognition of the importance of athlete health and the need for evidence-based approaches to prevent, diagnose, and treat infections in sports settings. The surge in publications related to COVID-19 infection in athletes during the years 2020 to 2023 further reflects the profound impact of the pandemic on the sports community and the urgent need to address the unique challenges posed by the virus (Breidenbach & Mitze, 2021; Hughes, Orchard, Partridge, La Gerche, & Broderick, 2022).

The results also shed light on the top active countries in terms of publication output in the field. The United States, the United Kingdom, Italy, Germany, and Australia emerged as the leading contributors, highlighting their research productivity and commitment to advancing knowledge in sports-associated infections. These countries have established research networks, funding opportunities, and academic resources that facilitate research collaboration and knowledge exchange, enabling them to lead in this field. It is worth noting that the presence of several European countries in the top ten active countries indicates the strong research focus on sports-associated infections in Europe.

While the findings demonstrate the overall growth in research on sports-associated infections, it is important to acknowledge

certain limitations. First, the analysis relied on the Scopus database, and while it provides a comprehensive collection of scholarly literature, it may not capture all relevant publications in the field. Second, the study focused on bibliometric analysis, which primarily examines publication output and does not assess the quality or impact of the included studies. Future research could incorporate other metrics, such as citation analysis and expert opinion, to gain a more comprehensive understanding of the field.

The results of this bibliometric study provide a foundation for further research on sports-associated infections in athletes. The identified research gaps and areas with limited publication output highlight opportunities for future investigations. For instance, there is a need for more studies focusing on specific types of infections, preventive strategies, athlete demographics, and long-term health outcomes. Additionally, collaborative efforts among researchers, institutions, and sports organizations could foster interdisciplinary research and knowledge translation, leading to effective interventions and guidelines for athlete health and well-being.

Conclusion

In conclusion, this bibliometric study on sports-associated infections in athletes highlights the growing interest and research activity in the field. The findings underscore the importance of continued research efforts to better understand, prevent, and manage infections in sports settings. By addressing research gaps and fostering collaboration, the scientific community can contribute to improving the health and performance of athletes worldwide.

Conflict of Interest

The author declares that there is no conflict of interest.

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1. UNIFORM REQUIREMENTS

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Use Times New Roman font, size eleven (11) point.

Number (Arabic numerals) the pages consecutively (centering at the bottom of each page), beginning with the title page as page 1 and ending with the Figure legend page.

Include line numbers (continuous) for the convenience of the reviewers.

Apart from chapter headings and sub-headings avoid any kind of formatting in the main text of the manuscripts.

1.2. Type & Length

JASPE publishes following types of papers:

Original scientific papers are the results of empirically- or theoretically-based scientific research, which employ scientific methods, and which report experimental or observational aspects of anthropology of sport and physical education from five major fields of anthropology: cultural, global, biological, linguistic and medical. Descriptive analyses or data inferences should include rigorous methodological structure as well as sound theory. Your manuscript should include the following sections: Introduction, Methods, Results, and Discussion.

Open Submissions

Indexed

Peer Reviewed

Original scientific papers should be:

- Up to 3000 words (excluding title, abstract, tables/figures, figure legends, Acknowledgements, Conflict of Interest, and References);
- A structured abstract of less than 250 words;
- Maximum number of references is 30;
- Maximum combined total of 6 Tables/Figures.

Review papers should provide concise in-depth reviews of both established and new areas, based on a critical examination of the literature, analyzing the various approaches to a specific topic in all aspects of anthropology of sport and physical education from five major fields of anthropology: cultural, global, biological, linguistic and medical.

Open Submissions

Indexed

Peer Reviewed

Review papers should be:

- Up to 6000 words (excluding title, abstract, tables/figures, figure legends, Acknowledgements, Conflict of Interest, and References);
- A structured abstract of less than 250 words;
- Maximum number of references is 100.

Editorials are written or commissioned by the editors, but suggestions for possible topics and authors are welcome. It could be peer reviewed by two reviewers who may be external or by the Editorial Board.

Open Submissions

Indexed

Peer Reviewed

Editorials should be:

- Up to 1000 words (excluding title, abstract, tables/figures, figure legends, Acknowledgements, Conflict of Interest, and References);
- A structured abstract of less than 250 words;
- Maximum number of references is 10.

Short reports of experimental work, new methods, or a preliminary report can be accepted as two page papers. Your manuscript should include the following sections: Introduction, Methods, Results, and Discussion.

Open Submissions

Indexed

Peer Reviewed

Short reports should be:

- Up to 1500 words (excluding title, abstract, tables/figures, figure legends, Acknowledgements, Conflict of Interest, and References);
- A structured abstract of less than 250 words;
- Maximum number of references is 15.

Peer review - fair review provides authors who feel their paper has been unfairly rejected (at any journal) the opportunity to share reviewer comments, explain their concerns, and have their paper reviewed for possible publication in JASPE.

Open Submissions

Indexed

Peer Reviewed

Peer review - fair review should be:

- Up to 1500 words (excluding title, abstract, tables/figures, figure legends, Acknowledgements, Conflict of Interest, and References);
- A structured abstract of less than 250 words;
- Maximum number of references is 15.

Invited papers and award papers include invited papers from authors with outstanding scientific credentials. Nomination of invited authors is at the discretion of the JASPE editorial board. JASPE also publishes award papers selected by the scientific committee of the publisher's conferences.

Open Submissions

Indexed

Peer Reviewed

Invited papers and award papers should be:

- Up to 3000 words (excluding title, abstract, tables/figures, figure legends, Acknowledgements, Conflict of Interest, and References);
- A structured abstract of less than 250 words;
- Maximum number of references is 30;
- Maximum combined total of 6 Tables/Figures.

1.3. Submission

JASPE only accepts electronic submission to the e-mail of the Journal Office: **office.jaspe.mne@gmail.com; vasileva.jaspe@gmail.com**.

Submitted material includes:

- A manuscript prepared according to the Guidelines for the Authors;
- A signed form that states the study was not previously published, nor has been submitted simultaneously for consideration of publication elsewhere, that states that all of the authors are in agreement with submission of the manuscript to JASPE, and that, for studies that use animal or human individuals, authors must include information regarding their institution's ethics committee, and which identifies the official approval number;
- A signed form that there is no conflict of interest.

Name the files according to the family name of the first author. Authors submitting revised versions of the manuscript can use the identification number of their manuscript as provided by the Journal Office. *See example:*

- ✓ FAMILY NAME-manuscript.doc – (main manuscript file)
- ✓ FAMILY NAME-statement.PDF – (authorship statement)
- ✓ FAMILY NAME-declaration.PDF – (declaration of potential conflict of interest)
- ✓ FAMILY NAME-fig1.tiff – (Figure 1)

1.4. Peer Review Process

A manuscript submitted for publication will be submitted to the review process as long as it fits the following criteria:

- The study was not previously published, nor has been submitted simultaneously for consideration of publication elsewhere;
- All persons listed as authors approved its submission to JASPE;
- Any person cited as a source of personal communication has approved the quote;
- The opinions expressed by the authors are their exclusive responsibility;
- The author signs a formal statement that the submitted manuscript complies with the directions and guidelines of JASPE.

The editors-in-chief and associate editors will make a preliminary analysis regarding the appropriateness, quality, originality and written style/grammar of the submitted manuscript. The editors reserve the right to request additional information, corrections, and guideline compliance before they submit the manuscript to the ad-hoc review process.

JASPE uses ad-hoc reviewers, who volunteer to analyze the merit of the study. Typically, one or two expert reviewers are consulted in a double-blind process. Authors are notified by e-mail when their submission has been accepted (or rejected). Minor changes in the text may be made at the discretion of the editors-in-chief and/or associate editors. Changes can include spelling and grammar in the chosen language, written style, journal citations, and reference guidelines. The author is notified of changes via email. The final version is available to the author for his or her approval before it is published.

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JASPE only publishes studies that have been approved by an institutional ethics committee (when a study involves humans or animals). Fail to provide such information prevent its publication. To ensure these requirements, it is essential that submission documentation is complete. If you have not completed this step yet, go to JASPE website and fill out the two required documents: Declaration of Potential Conflict of Interest and Authorship Statement. Whether or not your study uses humans or animals, these documents must be completed and signed by all authors and attached as supplementary files in the originally submitted manuscript.

1.6. After Acceptance

After the manuscript has been accepted, authors will receive a PDF version of the manuscripts for authorization, as it should look in printed version of JASPE. Authors should carefully check for omissions. Reporting errors after this point will not be possible and the Editorial Board will not be eligible for them.

Should there be any errors, authors should report them to the Office e-mail address jaspe@ucg.ac.me. If there are not any errors authors should also write a short e-mail stating that they agree with the received version.

1.7. Code of Conduct Ethics Committee of Publications



JASPE is hosting the Code of Conduct Ethics Committee of Publications of the **COPE** (the Committee on Publication Ethics), which provides a forum for publishers and Editors of scientific journals to discuss issues relating to the integrity of the work submitted to or published in their journals.

2. MANUSCRIPT STRUCTURE

2.1. Title Page

The first page of the manuscripts should be the title page, containing: title, type of publication, running head, authors, affiliations, corresponding author, and manuscript information. *See example:*

Analysis of Dietary Intake and Body Composition of Female Athletes over a Competitive Season

Original Scientific Paper

Diet and Body Composition of Female Athletes

Svetlana Nepocatyč¹, Gytis Balilionis¹, Eric K. O'Neal²

¹Elon University, Department of Exercise Science¹, Elon, NC 27215

²University of North Alabama, Department of Health, Physical Education and Recreation, Florence, AL 35632

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100 Campus Dr.

2525 CB

Elon, NC 27244

United States

E-mail: snepocatyč@elon.edu

Word count: 2,946

Word count: 4259

Abstract word count: 211

Number of Tables: 3

2.1.1. Title

Title should be short and informative and the recommended length is no more than 20 words. The title should be in Title Case, written in uppercase and lowercase letters (initial uppercase for all words except articles, conjunctions, short prepositions no longer than four letters etc.) so that first letters of the words in the title are capitalized. Exceptions are words like: "and", "or", "between" etc. The word following a colon (:) or a hyphen (-) in the title is always capitalized.

2.1.2. Type of publication

Authors should suggest the type of their submission.

2.1.3. Running head

Short running title should not exceed 50 characters including spaces.

2.1.4. Authors

The form of an author's name is first name, middle initial(s), and last name. In one line list all authors with full names separated by a comma (and space). Avoid any abbreviations of academic or professional titles. If authors belong to different institutions, following a family name of the author there should be a number in superscript designating affiliation.

2.1.5. Affiliations

Affiliation consists of the name of an institution, department, city, country/territory (in this order) to which the author(s) belong and to which the presented / submitted work should be attributed. List all affiliations (each in a separate line) in the order corresponding to the list of authors. Affiliations must be written in English, so carefully check the official English translation of the names of institutions and departments.

Only if there is more than one affiliation, should a number be given to each affiliation in order of appearance. This number should be written in superscript at the beginning of the line, separated from corresponding affiliation with a space. This number should also be put after corresponding name of the author, in superscript with no space in between.

If an author belongs to more than one institution, all corresponding superscript digits, separated with a comma with no space in between, should be present behind the family name of this author.

In case all authors belong to the same institution affiliation numbering is not needed.

Whenever possible expand your authors' affiliations with departments, or some other, specific and lower levels of organization.

2.1.6. Corresponding author

Corresponding author's name with full postal address in English and e-mail address should appear, after the affiliations. It is preferred that submitted address is institutional and not private. Corresponding author's name should include only initials of the first and middle names separated by a full stop (and a space) and the last name. Postal address should be written in the following line in sentence case. Parts of the address should be separated by a comma instead of a line break. E-mail (if possible) should be placed in the line following the postal address. Author should clearly state whether or not the e-mail should be published.

2.1.7. Manuscript information

All authors are required to provide word count (excluding title page, abstract, tables/figures, figure legends, Acknowledgements, Conflict of Interest, and References), the Abstract word count, the number of Tables, and the number of Figures.

2.2. Abstract

The second page of the manuscripts should be the abstract and key words. It should be placed on second page of the manuscripts after the standard title written in upper and lower case letters, bold.

Since abstract is independent part of your paper, all abbreviations used in the abstract should also be explained in it. If an abbreviation is used, the term should always be first written in full with the abbreviation in parentheses immediately after it. Abstract should not have any special headings (e.g., Aim, Results...).

Authors should provide up to six key words that capture the main topics of the article. Terms from the Medical Subject Headings (MeSH) list of Index Medicus are recommended to be used.

Key words should be placed on the second page of the manuscript right below the abstract, written in italic. Separate each key word by a comma (and a space). Do not put a full stop after the last key word. *See example:*

Abstract

Results of the analysis of

Key words: *spatial memory, blind, transfer of learning, feedback*

2.3. Main Chapters

Starting from the third page of the manuscripts, it should be the main chapters. Depending on the type of publication main manuscript chapters may vary. The general outline is: Introduction, Methods, Results, Discussion, Acknowledgements (optional), Conflict of Interest (optional), and Title, Author's Affiliations, Abstract and Key words must be in English (for both each chosen language of full paper). However, this scheme may not be suitable for reviews or publications from some areas and authors should then adjust their chapters accordingly but use the general outline as much as possible.

2.3.1. Headings

Main chapter headings: written in bold and in Title Case. *See example:*

✓ **Methods**

Sub-headings: written in italic and in normal sentence case. Do not put a full stop or any other sign at the end of the title. Do not create more than one level of sub-heading. *See example:*

✓ *Table position of the research football team*

2.3.2 Ethics

When reporting experiments on human subjects, there must be a declaration of Ethics compliance. Inclusion of a statement such as follow in Methods section will be understood by the Editor as authors' affirmation of compliance: "This study was approved in advance by [name of committee and/or its institutional sponsor]. Each participant voluntarily provided written informed consent before participating." Authors that fail to submit an Ethics statement will be asked to resubmit the manuscripts, which may delay publication.

2.3.3 Statistics reporting

JASPE encourages authors to report precise p-values. When possible, quantify findings and present them with appropriate indicators of measurement error or uncertainty (such as confidence intervals). Use normal text (i.e., non-capitalized, non-italic) for statistical term "p".

2.3.4. 'Acknowledgements' and 'Conflict of Interest' (optional)

All contributors who do not meet the criteria for authorship should be listed in the 'Acknowledgements' section. If applicable, in 'Conflict of Interest' section, authors must clearly disclose any grants, financial or material supports, or any sort of technical assistances from an institution, organization, group or an individual that might be perceived as leading to a conflict of interest.

2.4. References

References should be placed on a new page after the standard title written in upper and lower case letters, bold.

All information needed for each type of must be present as specified in guidelines. Authors are solely responsible for accuracy of each reference. Use authoritative source for information such as Web of Science, Medline, or PubMed to check the validity of citations.

2.4.1. References style

JASPE adheres to the American Psychological Association 6th Edition reference style. Check "American Psychological Association. (2009). Concise rules of APA style. American Psychological Association." to ensure the manuscripts conform to this reference style. Authors using EndNote® to organize the references must convert the citations and bibliography to plain text before submission.

2.4.2. Examples for Reference citations

One work by one author

- ✓ In one study (Reilly, 1997), soccer players
- ✓ In the study by Reilly (1997), soccer players
- ✓ In 1997, Reilly's study of soccer players

Works by two authors

- ✓ Duffield and Marino (2007) studied
- ✓ In one study (Duffield & Marino, 2007), soccer players
- ✓ In 2007, Duffield and Marino's study of soccer players

Works by three to five authors: cite all the author names the first time the reference occurs and then subsequently include only the first author followed by et al.

- ✓ First citation: Bangsbo, Iaia, and Krstrup (2008) stated that
- ✓ Subsequent citation: Bangsbo et al. (2008) stated that

Works by six or more authors: cite only the name of the first author followed by et al. and the year

- ✓ Krstrup et al. (2003) studied
- ✓ In one study (Krstrup et al., 2003), soccer players

Two or more works in the same parenthetical citation: Citation of two or more works in the same parentheses should be listed in the order they appear in the reference list (i.e., alphabetically, then chronologically)

- ✓ Several studies (Bangsbo et al., 2008; Duffield & Marino, 2007; Reilly, 1997) suggest that

2.4.3. Examples for Reference list

Journal article (print):

Nepocatyč, S., Balilionis, G., & O'Neal, E. K. (2017). Analysis of dietary intake and body composition of female athletes over a competitive season. *Montenegrin Journal of Sports Science and Medicine*, 6(2), 57-65. doi: 10.26773/mjssm.2017.09.008

Duffield, R., & Marino, F. E. (2007). Effects of pre-cooling procedures on intermittent-sprint exercise performance in warm conditions. *European Journal of Applied Physiology*, 100(6), 727-735. doi: 10.1007/s00421-007-0468-x

Krstrup, P., Mohr, M., Amstrup, T., Rysgaard, T., Johansen, J., Steensberg, A., Bangsbo, J. (2003). The yo-yo intermittent recovery test: physiological response, reliability, and validity. *Medicine and Science in Sports and Exercise*, 35(4), 697-705. doi: 10.1249/01.MSS.0000058441.94520.32

Journal article (online; electronic version of print source):

Williams, R. (2016). Krishna's Neglected Responsibilities: Religious devotion and social critique in eighteenth-century North India [Electronic version]. *Modern Asian Studies*, 50(5), 1403-1440. doi:10.1017/S0026749X14000444

Journal article (online; electronic only):

Chantavanich, S. (2003, October). Recent research on human trafficking. *Kyoto Review of Southeast Asia*, 4. Retrieved November 15, 2005, from <http://kyotoreview.cseas.kyoto-u.ac.jp/issue/issue3/index.html>

Conference paper:

Pasadilla, G. O., & Milo, M. (2005, June 27). *Effect of liberalization on banking competition*. Paper presented at the conference on Policies to Strengthen Productivity in the Philippines, Manila, Philippines. Retrieved August 23, 2006, from <http://siteresources.worldbank.org/INTPHILIPPINES/Resources/Pasadilla.pdf>

Encyclopedia entry (print, with author):

Pittau, J. (1983). Meiji constitution. In *Kodansha encyclopedia of Japan* (Vol. 2, pp. 1-3). Tokyo: Kodansha.

Encyclopedia entry (online, no author):

Ethnology. (2005, July). In *The Columbia encyclopedia* (6th ed.). New York: Columbia University Press. Retrieved November 21, 2005, from <http://www.bartleby.com/65/et/ethnolog.html>

Thesis and dissertation:

Pyun, D. Y. (2006). *The proposed model of attitude toward advertising through sport*. Unpublished Doctoral Dissertation. Tallahassee, FL: The Florida State University.

Book:

Borg, G. (1998). *Borg's perceived exertion and pain scales*: Human kinetics.

Chapter of a book:

Kellmann, M. (2012). Chapter 31-Overtraining and recovery: Chapter taken from Routledge Handbook of Applied Sport Psychology ISBN: 978-0-203-85104-3 *Routledge Online Studies on the Olympic and Paralympic Games* (Vol. 1, pp. 292-302).

Reference to an internet source:

Agency. (2007). Water for Health: Hydration Best Practice Toolkit for Hospitals and Healthcare. Retrieved 10/29, 2013, from www.rcn.org.uk/newsevents/hydration

2.5. Tables

All tables should be included in the main manuscript file, each on a separate page right after the Reference section.

Tables should be presented as standard MS Word tables.

Number (Arabic) tables consecutively in the order of their first citation in the text.

Tables and table headings should be completely intelligible without reference to the text. Give each column a short or abbreviated heading. Authors should place explanatory matter in footnotes, not in the heading. All abbreviations appearing in a table and not considered standard must be explained in a footnote of that table. Avoid any shading or coloring in your tables and be sure that each table is cited in the text.

If you use data from another published or unpublished source, it is the authors' responsibility to obtain permission and acknowledge them fully.

2.5.1. Table heading

Table heading should be written above the table, in Title Case, and without a full stop at the end of the heading. Do not use suffix letters (e.g., Table 1a, 1b, 1c); instead, combine the related tables. *See* example:

✓ **Table 1.** Repeated Sprint Time Following Ingestion of Carbohydrate-Electrolyte Beverage

2.5.2. Table sub-heading

All text appearing in tables should be written beginning only with first letter of the first word in all capitals, i.e., all words for variable names, column headings etc. in tables should start with the first letter in all capitals. Avoid any formatting (e.g., bold, italic, underline) in tables.

2.5.3. Table footnotes

Table footnotes should be written below the table.

General notes explain, qualify or provide information about the table as a whole. Put explanations of abbreviations, symbols, etc. here. General notes are designated by the word *Note* (italicized) followed by a period.

✓ *Note.* CI: confidence interval; Con: control group; CE: carbohydrate-electrolyte group.

Specific notes explain, qualify or provide information about a particular column, row, or individual entry. To indicate specific notes, use superscript lowercase letters (e.g. ^{a,b,c}), and order the superscripts from left to right, top to bottom. Each table's first footnote must be the superscript ^a.

✓ ^aOne participant was diagnosed with heat illness and n = 19.^bn = 20.

Probability notes provide the reader with the results of the texts for statistical significance. Probability notes must be indicated with consecutive use of the following symbols: * † ‡ § ¶ || etc.

✓ *P<0.05, †p<0.01.

2.5.4. Table citation

In the text, tables should be cited as full words. *See* example:

- ✓ Table 1 (first letter in all capitals and no full stop)
- ✓ ...as shown in Tables 1 and 3. (citing more tables at once)
- ✓ ...result has shown (Tables 1-3) that... (citing more tables at once)
- ✓ ...in our results (Tables 1, 2 and 5)... (citing more tables at once)

2.6. Figures

On the last separate page of the main manuscript file, authors should place the legends of all the figures submitted separately.

All graphic materials should be of sufficient quality for print with a minimum resolution of 600 dpi. JASPE prefers TIFF, EPS and PNG formats.

If a figure has been published previously, acknowledge the original source and submit a written permission from the copyright holder to reproduce the material. Permission is required irrespective of authorship or publisher except for documents in the public domain. If photographs of people are used, either the subjects must not be identifiable or their pictures must be accompanied by written permission to use the photograph whenever possible permission for publication should be obtained.

Figures and figure legends should be completely intelligible without reference to the text.

The price of printing in color is 50 EUR per page as printed in an issue of JASPE.

2.6.1. Figure legends

Figures should not contain footnotes. All information, including explanations of abbreviations must be present in figure legends. Figure legends should be written below the figure, in sentence case. *See* example:

- ✓ **Figure 1.** Changes in accuracy of instep football kick measured before and after fatigued. SR – resting state, SF – state of fatigue, * $p > 0.01$, † $p > 0.05$.

2.6.2. Figure citation

All graphic materials should be referred to as Figures in the text. Figures are cited in the text as full words. *See* example:

- ✓ Figure 1
 - × figure 1
 - × Figure 1.
 - ✓ ...exhibit greater variance than the year before (Figure 2). Therefore...
 - ✓ ...as shown in Figures 1 and 3. (citing more figures at once)
 - ✓ ...result has shown (Figures 1-3) that... (citing more figures at once)
 - ✓ ...in our results (Figures 1, 2 and 5)... (citing more figures at once)

2.6.3. Sub-figures

If there is a figure divided in several sub-figures, each sub-figure should be marked with a small letter, starting with a, b, c etc. The letter should be marked for each subfigure in a logical and consistent way. *See* example:

- ✓ Figure 1a
- ✓ ...in Figures 1a and b we can...
- ✓ ...data represent (Figures 1a-d)...

2.7. Scientific Terminology

All units of measures should conform to the International System of Units (SI).

Measurements of length, height, weight, and volume should be reported in metric units (meter, kilogram, or liter) or their decimal multiples.

Decimal places in English language are separated with a full stop and not with a comma. Thousands are separated with a comma.

Percentage	Degrees	All other units of measure	Ratios	Decimal numbers
✓ 10%	✓ 10°	✓ 10 kg	✓ 12:2	✓ 0.056
× 10 %	× 10 °	× 10kg	× 12 : 2	× .056

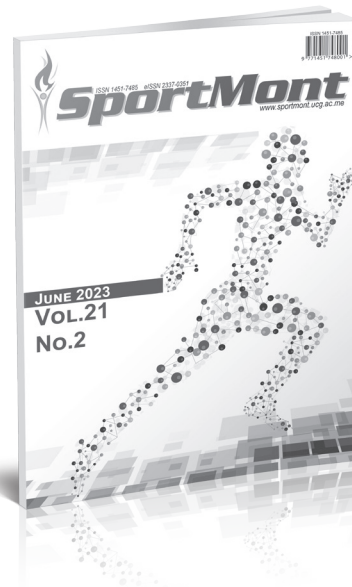
Signs should be placed immediately preceding the relevant number.

✓ 45±3.4	✓ p<0.01	✓ males >30 years of age
× 45 ± 3.4	× p < 0.01	× males > 30 years of age

2.8. Latin Names

Latin names of species, families etc. should be written in italics (even in titles). If you mention Latin names in your abstract they should be written in non-italic since the rest of the text in abstract is in italic. The first time the name of a species appears in the text both genus and species must be present; later on in the text it is possible to use genus abbreviations. See example:

✓ First time appearing: *musculus biceps brachii*
Abbreviated: *m. biceps brachii*



ISSN 1451-7485

Sport Mont Journal (SMJ) is a print (ISSN 1451-7485) and electronic scientific journal (eISSN 2337-0351) aims to present easy access to the scientific knowledge for sport-conscious individuals using contemporary methods. The purpose is to minimize the problems like the delays in publishing process of the articles or to acquire previous issues by drawing advantage from electronic medium. Hence, it provides:

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- Post-publication tools to indicate quality and impact;
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- Worldwide media coverage.

SMJ is published three times a year, in February, June and October of each year. SMJ publishes original scientific papers, review papers, editorials, short reports, peer review - fair review, as well as invited papers and award papers in the fields of Sports Science and Medicine, as well as it can function as an open discussion forum on significant issues of current interest.

SMJ covers all aspects of sports science and medicine; all clinical aspects of exercise, health, and sport; exercise physiology and biophysical investigation of sports performance; sport biomechanics; sports nutrition; rehabilitation, physiotherapy; sports psychology; sport pedagogy, sport history, sport philosophy, sport sociology, sport management; and all aspects of scientific support of the sports coaches from the natural, social and humanistic side.

Prospective authors should submit manuscripts for consideration in Microsoft Word-compatible format. For more complete descriptions and submission instructions, please access the Guidelines for Authors pages at the SMJ website: <http://www.sportmont.ucg.ac.me/?sekcija=page&p=51>. Contributors are urged to read SMJ's guidelines for the authors carefully before submitting manuscripts. Manuscripts submissions should be sent in electronic format to sportmont@ucg.ac.me or contact following Editors:

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Summer issue – June 2024



*Montenegrin Journal
of Sports Science and Medicine*



MONTENEGRIN **J**OURNAL OF **S**PORTS **S**CIENCE AND **M**EDICINE



ISSN 1800-8755

CALL FOR CONTRIBUTIONS

Montenegrin Journal of Sports Science and Medicine (MJSSM) is a print (ISSN 1800-8755) and electronic scientific journal (eISSN 1800-8763) aims to present easy access to the scientific knowledge for sport-conscious individuals using contemporary methods. The purpose is to minimize the problems like the delays in publishing process of the articles or to acquire previous issues by drawing advantage from electronic medium. Hence, it provides:

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MJSSM is published biannually, in September and March of each year. MJSSM publishes original scientific papers, review papers, editorials, short reports, peer review - fair review, as well as invited papers and award papers in the fields of Sports Science and Medicine, as well as it can function as an open discussion forum on significant issues of current interest.

MJSSM covers all aspects of sports science and medicine; all clinical aspects of exercise, health, and sport; exercise physiology and biophysical investigation of sports performance; sport biomechanics; sports nutrition; rehabilitation, physiotherapy; sports psychology; sport pedagogy, sport history, sport philosophy, sport sociology, sport management; and all aspects of scientific support of the sports coaches from the natural, social and humanistic side.

Prospective authors should submit manuscripts for consideration in Microsoft Word-compatible format. For more complete descriptions and submission instructions, please access the Guidelines for Authors pages at the MJSSM website: <http://www.mjssm.me/?sekcija=page&p=51>. Contributors are urged to read MJSSM's guidelines for the authors carefully before submitting manuscripts. Manuscripts submissions should be sent in electronic format to office@mjssm.me or contact following Editors:

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MONTENEGRIN SPORTS ACADEMY

Founded in 2003 in Podgorica (Montenegro), the Montenegrin Sports Academy (MSA) is a sports scientific society dedicated to the collection, generation and dissemination of scientific knowledge at the Montenegrin level and beyond.

The Montenegrin Sports Academy (MSA) is the leading association of sports scientists at the Montenegrin level, which maintains extensive co-operation with the corresponding associations from abroad. The purpose of the MSA is the promotion of science and research, with special attention to sports science across Montenegro and beyond. Its topics include motivation, attitudes, values and responses, adaptation, performance and health aspects of people engaged in physical activity and the relation of physical activity and lifestyle to health, prevention and aging. These topics are investigated on an interdisciplinary basis and they bring together scientists from all areas of sports science, such as adapted physical activity, biochemistry, biomechanics, chronic disease and exercise, coaching and performance, doping, education, engineering

and technology, environmental physiology, ethics, exercise and health, exercise, lifestyle and fitness, gender in sports, growth and development, human performance and aging, management and sports law, molecular biology and genetics, motor control and learning, muscle mechanics and neuromuscular control, muscle metabolism and hemodynamics, nutrition and exercise, overtraining, physiology, physiotherapy, rehabilitation, sports history, sports medicine, sports pedagogy, sports philosophy, sports psychology, sports sociology, training and testing.

The MSA is a non-profit organization. It supports Montenegrin institutions, such as the Ministry of Education and Sports, the Ministry of Science and the Montenegrin Olympic Committee, by offering scientific advice and assistance for carrying out coordinated national and European research projects defined by these bodies. In addition, the MSA serves as the most important Montenegrin and regional network of sports scientists from all relevant subdisciplines.

The main scientific event organized by the Montenegrin Sports Academy (MSA) is the annual conference held in the first week of April.

Annual conferences have been organized since the inauguration of the MSA in 2003. Today the MSA conference ranks among the leading sports scientific congresses in the Western Balkans. The conference comprises a range of invited lecturers, oral and poster presentations from multi- and mono-disciplinary areas, as well as various types of workshops. The MSA conference is attended by national, regional and international sports scientists with academic careers. The MSA conference now welcomes up to 200 participants from all over the world.

It is our great pleasure to announce the upcoming 21th Annual Scientific Conference of Montenegrin Sports Academy "Sport, Physical Activity and Health: Contemporary Perspectives" to be held in Dubrovnik, Croatia, from 18 to 21 April, 2024. It is planned to be once again organized by the Montenegrin Sports Academy, in cooperation with the Faculty of Sport and Physical Education, University of Montenegro and other international partner institutions (specified in the partner section).

The conference is focused on very current topics from all areas of sports science and sports medicine including physiology and sports medicine, social sciences and humanities, biomechanics and neuromuscular (see Abstract Submission page for more information).

We do believe that the topics offered to our conference participants will serve as a useful forum for the presentation of the latest research, as well as both for the theoretical and applied insight into the field of sports science and sports medicine disciplines.





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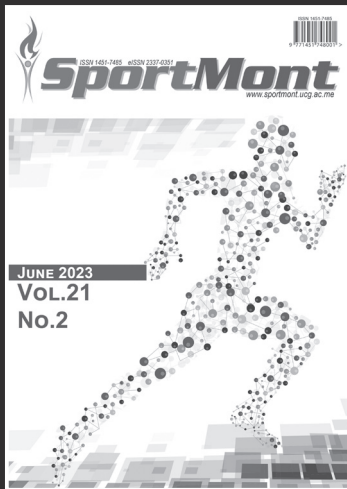
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Sports Science and Medicine Journals from Montenegrin Sports Academy

We have expanded the quality of our journals considerably over the past years and can now claim to be the market leader in terms of breadth of coverage.

As we continue to increase the quality of our publications across the field, we hope that you will continue to regard MSA journals as authoritative and stimulating sources for your research. We would be delighted to receive your comments and suggestions, mostly due to the reason your proposals are always welcome.

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