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ORIGINAL SCIENTIFIC PAPER

Gender as a determinant of coaches' legal duties towards athletes accomplishment in Edo State

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Abstract

The study examined gender as a determinant of coaches' practice of legal duties towards athletes in Edo State. The population of the study comprised of 187 coaches in Edo State. The multistage sampling technique was used to draw the 100 coaches that were selected as the sample for this study. A Situational Judgment Test (SJT) was the instrument applied. The research instrument was validated and its reliability was tested using the Alpha statistic and reliability of 0.67 was obtained as reliability coefficient. The Fisher's exact test gave a p-value of 0.136, leading to the conclusion that there was no significant difference in coaches' practice of legal duties towards athletes based on their gender. The null hypothesis was therefore retained. It was concluded that that men are not more likely to take reasonable care of the athletes due to their preference for coaching roles. As a result, more women should be given the opportunity to coach since gender does not determine the practice of legal duties towards athletes.

Keywords: *Coaches, Athletes, Practice of legal duties, Gender*

Introduction

The role of coaches in the physical, mental and skill development of athletes cannot be overemphasized. According to Jowett (2005) there is a shift in the coaching process from just physical development towards improvement in mental and athletic performances. Murray, Lord and Lorimer (2018) reported that the rate of these developments and improvement in athletes are not just only a function of the knowledge and competences of their coaches, but also a product of the quality of the interaction between coaches and athletes. Fundamentally, the coach enables the athlete achieve levels of optimum performance that the athlete cannot achieve alone. Therefore, in this journey towards attainment of physical, mental and skill development, there is an implied relationship between coaches and athletes that is evoked.

Wylleman (2000) reported that sports is a shared experience and a complex social environment that arise from the intra and inter relationship between those involved. Therefore, as a result of this implied relationship, there is a statutory responsibility for coaches to take reasonable care of the athletes during participation in physical activities and sports. The legal duties of coaches towards athletes are well documented in the plethora of cases in

Europe, United States of America and South Africa (Oyakhire, 2021). In these countries, the law courts and their National Sports Federations are unanimous about the importance of strict practice of legal duties in the protection of athletes from both foreseeable and unforeseeable harm, and therefore a key to safe participation in sports. Davis (2008) observed that while the courts in Europe ruled that coaches owed no duty to mitigate or prevent the risks that arose from a sport, because of their inherent risks, he pointed out that these courts have also stated explicitly that coaches owed the athletes the responsibility of ensuring that the risks that are inherent in a sport were not exacerbated.

However, it has been observed that there is a gender bias with respect to which gender of coaches is more effective in the discharge of the responsibility to take reasonable care of athletes. Eagly and Karau (2002) stated that men are more often perceived to be more effective in coaching than women. Therefore, this study aimed to examine whether the gender of coaches influenced their discharge of legal duties towards athletes.

Gender and Coaching in sports

There is evidence in literature that there is still a huge gap with

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respect to the ratio of male to female coaches in the coaching profession, amidst the increasing number of female participation in sports globally. Eagly and Karau (2002) argued that female coaches were often not accepted as been effective as their male counterparts. This is indeed a stereotypical bias that continues to plague the coaching roles of women in sports even nowadays. According to Wood and Eagly (2012) a bias is widely accepted on account of a disproportionate number of a specific social group which could be gender based, race or even nationality. Female coaches are perceived to be involved with a particular role, thereby setting up a bias towards any entrant who is not a member of the social group.

In the studies of Kerr, Marshall and Sharp (2012); Swim, Walker, Turick and Judge (2021), an increase in the number of women participating in the United States intercollegiate athletics was observed, without an accompanying increase in the coaching roles for women. This gap is not unconnected to the various perceptions or views about women and the coaching profession.

Interestingly, Okaka and Omoifo (2010) opined that men still constituted a greater number of the stakeholders in sports either as athletes, coaches, referees or sports administrators. In Edo State, Nigeria, the four prominent female teams in football, namely; Edo Queens, Fortress Ladies, Brave heart Queens and Genesis Queens, had males as head coaches. Although, there is a steady increase in the appointment of women into coaching roles, this is still not adequate enough to set the anticipated balance in coaching roles as a result of the increase in women participation and contributions to sports development in Nigeria.

Method and Materials

Population of the Study

The population sample consisted of 187 coaches across the Edo State Sports Commission, tertiary institutions and registered sports clubs in Edo State.

Sample and Sampling Techniques

A total of 100 coaches were used as sample for this study. The multi-stage sampling procedure was employed to select them as follows;

Stage 1: Purposive sampling technique was used to select the local government areas based on the availability of sports facilities and the presence of coaches. Four local government areas in Edo State were purposively and subsequently selected, out of the 18 local government areas in Edo State. The local government areas se-

lected were: Esan West, Etsako West, Oredo and Ovia North East.

Stage 2: Proportionate sampling technique was employed at this stage. 50% was chosen as the proportion to be selected from each institution or facilities where the coaches were more than 10. However, in institutions or facilities where the number of coaches was less than 10, all the coaches were selected.

Stage 3: Simple random sampling technique was subsequently used to draw out the 50% of the coaches through balloting with replacement.

Research Instrument

The instrument used in this study was a Situational Judgment Test (SJT) which was developed by Persich (2016) and was adapted to collect data of this study.

The Situational Judgment Test was employed, against the background that the practice of legal duties is situational based, implying a contextual application. Furthermore, it requires the application of a body of knowledge, in this case the items constituting duty of care, with respect to the profession from which the scenarios are drawn to give appropriate response to the items. This confers on it, the appropriateness of its use for testing practice or competence. The ratings were as follows; Strongly Agree=4, Agree= 3, Disagree=2 and Strongly Disagree=1.

Validity of the Instrument

To ensure that the research instrument measured what it ought to measure, the SJT was given to one research expert each in the field of Human Kinetics and Sports Science, and Law respectively; and an expert in Measurement and Evaluation, University of Benin, who assessed the content and construct validity of the instrument. Their respective corrections were appropriately effected in the final draft of the instrument.

Reliability of the Instrument

The reliability of the instrument was tested using the Cronbach alpha (α) method. The SJT was administered to twenty randomly selected coaches respectively, that participated in the 2021 Federation Cup play-off held in Benin City, Edo State, and who were not part of the sample used for this study. The data generated were analyzed using Cronbach alpha statistics and a reliability coefficient of 0.67 was obtained. This indicated that the internal consistency of the items in the instrument was good and the instrument was considered reliable.

Table 1. Fishers exact test of difference in Coaches Practice of legal duties towards athletes based on their Gender

	Strongly Disagree	Practice Category			Total	
		Disagree	Agree			
Gender	Male	4	66	6	76	
	Female	0	19	5	24	
	Total	4	85	11	100	
Chi-Square Tests						
		Value	df	Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
	Pearson Chi-Square	4.165a	2	0.125	0.119	
	Likelihood Ratio	4.730	2	0.094	0.125	
	Fisher's Exact Test	3.513			0.136	
	Linear-by-Linear Association	4.123b	1	0.042	0.064	0.042
	N of Valid Cases	100				

Note: a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is .96. b. The standardized statistic is 2.031.

Method of Data Collection

The research instrument, SJT, was administered by the researchers and three trained research assistants to the respondents. A duration of one week, and for some of the respondents on national assignments at the time of collecting the data for this study, a two-week duration was given by the researchers to enable the respondents complete the SJT. Upon the completion of the instrument (SJT), it was retrieved from the respondents accordingly by the researchers and the research assistants.

Results

Hypothesis 1: There is no significant difference in coaches' practice of legal duties based on their gender.

The results in table 1 shows the descriptive and Fisher's exact test of difference in coaches practice of legal duties towards athletes based on their gender. The frequency of responses is as follows; male (strongly disagree= 4, disagree= 66, agree= 6) and female (strongly disagree= 0, disagree= 19, agree= 5).

However, the Fisher's exact test shows a p-value of 0.136 at 0.05 alpha levels. The p-value of 0.136 is greater than the alpha level. This reveals that there is no significant difference in coaches' practice of legal duties towards athletes based on gender. Therefore, the null hypothesis is retained.

Discussion

This study sought to find out the differences in coaches' practice of legal duties based on the gender of coaches. The findings show that practice of legal duties of coaches irrespective of gender was low. The Fisher's exact test analysis showed that there was no significant difference in coaches' practice of legal duties based on their gender. The finding of this study was in agreement with the findings of the study of Bon (1996) who stated that gender only nominally differentiated male and female coaches and had no significant impact in their practices.

However the finding of this study is in disagreement with the study of Newell (2007) who opined that female coaches were more active in the instruction of athletes and supervising trainings. Furthermore, Murray, Lord and Lorimer (2018) noted that female coaches were perceived to be more empathic towards athletes. Although, Manley, Greenless, Thelwell and Smith (2010) reported that based on initial impressions, athletes perceive female coaches to be less competent than male coaches.

A cursory look at coaches' gender and practice of legal duties to athletes shows Mirsafian (2016) stating that the standard upon which coaches are evaluated with respect to their duty to take reasonable care of the athletes are; sequential planning of the activity, ensure the use of appropriate equipment, provision of warnings and instruction where necessary, appropriate supervision of athletes, provision of appropriate conditions to the athlete, warning about the risks of the activity, provision of post injury care, offer appropriate activities, keeping records as appropriate, and abiding by the appropriate rules and regulations. It is important to state that these items have become the legal duties of coaches towards athletes.

According to Partington (2016), coaches are the principal supervisors of any organized physical activities and participation in sports; thereby placing them in a position of the Greek maxim of loco parentis. The importance of practice, which has been operationally defined in this study to mean how coaches carry out the items of their legal duties towards athletes, cannot be overemphasized. This is because of the prevalence of many foreseeable risks as a result of participation (Miles & Tong, 2013).

Chepyator-Thomson's (2005) revealed that cultural beliefs and practices still defined Kenyan women's roles in sports despite their inestimable contributions to the development of sports in

Kenya. In the study of Mohammedinejad (2014), male coaches were reported to have more knowledge about the supervision of athletes, instructing athletes and training, facilities and equipment as well as warning the athletes about risks. However, Newell (2007) opined that female coaches were more active in the instruction of athletes and supervising trainings. No doubt, from the assertions above, it is therefore discernable that gender could be a factor in the practice of legal duties by coaches. More importantly, Bon (1996) had earlier stated that male coaches were just nominally different from female coaches, and this difference did not really have significant impact on their practices.

Also, with respect to the coach-athlete relationship as equally is related to the study, the major objectives of the coach-athlete relationship are enhancement of sports performance and the well-being of the athlete (Jowett & Poczwadowski, 2007). According to Jowett and Shanmugam (2016), athletes form many relationships in the course of their active career, however, amidst all these relationships formed, their relationship with their coaches forms the epicentre, and this is because of its potential to initiate development and success. Furthermore, the coach-athlete relationship forms the basement of the responsibility to take reasonable care of the athlete. Davis, Jowett and Tafvelin (2019) asserted that a coach-athlete centered approach to coaching has a proclivity to serve as an avenue for the creation of the assurances, motivation, satisfaction and support for the sporting experience and performances of the coach and the athlete.

Against this background of the importance of adopting a coach-athlete centered approach in coaching, there is a need for coaches to ensure that the athletes are well protected from injuries or loss, that has the capacity of punctuating the goal of optimum performance of the athlete as well as the expectations of the coach, whence there is a need to take reasonable care of the athlete.

It must be unconditionally stated that everyone involved in the business of sports coaching, has a responsibility to ensure that participation is both pleasurable and memorable, especially for younger participants and athletes. This responsibility to ensure memorable and pleasurable participation is nested within the scope of coaching responsibilities, because of their proximity to the athletes on one hand, and the factors that could predispose the athletes to unforeseeable harm, on the other hand.

Based on the result from the Fisher's exact test analysis, the null hypothesis of no significant difference in coaches' practice of legal duties based on their gender was therefore retained, leading to the conclusion that there was no significant difference in coaches' practice of legal duties as a result of their gender.

Conclusion

Based on the findings of this study, it was concluded that coaches' practice of legal duties was low for both male and female coaches. Also, gender does not create any difference in the practice of legal duties amongst coaches.

Recommendations

Based on the findings, the following recommendations were made:

1. More women who have interest in coaching should be encouraged to take up careers in the coaching profession, so as to sustain the increase in the participation of women in sports.
2. As against the popular bias that men were more effective in coaching roles than women, as such the reason for their preference for coaching roles should be abrogated because gender had no influence in coaches' discharge of their duty to take reasonable care of athletes.
3. There is need for a review of coaching education in Nigeria, to enable coaches understands their duties towards athletes, as

well as strengthens their practices.

4. As part of the coaches' certification programme, provision should be made for a course on sports law, where these coaches are educated on legal liability in sports; so as not to fall victim of any legal offence as regards the practice of their duty of care to their athletes.

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ORIGINAL SCIENTIFIC PAPER

Emergency remote learning - the experiences of higher education Physical Education students

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Abstract

The impact of Covid-19 caused significant disruptions to student learning, where online delivery and assessment represent a critical consideration for physical education teacher education (PETE). The Covid-19 pandemic posed a problem with sectoral disruption in higher education, sport, and physical activity. Students specialising in Physical Education (PE) had to experience a temporary shift of instructional delivery in the practical modules to an alternative delivery mode. The improvisation and rapid conversion of delivering learning activities were purely experimental to facilitate student learning. There is a general apprehension about online learning for students in PETE, most notably, the absence of face-to-face education through movement that is difficult to replicate digitally. Emergency remote learning engendered questions and challenges regarding pedagogical approaches. Lecturers explored the effectiveness of emergency remote learning through student experiences. Descriptive research was conducted, following a mixed-method approach to understand students' experiences, perceptions, and challenges. 140 students specialising in PE completed an online questionnaire. The quantitative data were analysed using the statistical package for the social sciences programme, and the qualitative data was thematically analysed. The majority of the students feel they have successfully reached the outcome of each module respectively. The availability of online class recordings assisted students in their self-paced approach to learning. Collaborative learning was preferred only if the lecturer was involved, as it seemed a significant challenge when student-driven. A PE programme needs a face-to-face approach and can benefit from a blended teaching approach. Educators transitioning suddenly to remote operation can consider adopting a similar pedagogical approach.

Keywords: *emergency remote learning, higher education, physical education, physical education teacher education, student experiences*

Introduction

The impact of the Covid-19 global lockdown caused significant disruptions to student learning, assessment, and professional qualifications (Burgess & Sievertsen, 2020), where online delivery and assessment represent a critical consideration (Dymnt & Downing, 2020). The Covid-19 global pandemic posed a particularly acute problem for sports. Universities were closed with the hard-national lockdown in the Republic of South Africa (RSA), starting on 23 March 2020 (South African Government, 2020). Education undergraduate students specialising in Physical Education (PE) had to experience a temporary shift of instructional delivery in the PE practical modules to an alternative delivery mode

due to the crisis circumstances. Emergency remote learning (ERL) involves using fully remote teaching solutions for instruction that would otherwise be delivered face-to-face or as blended or hybrid modes that would return to the original instructional format once the crisis or emergency has ended. The primary objective in these circumstances is not to re-create a robust educational ecosystem but rather to provide temporary access to instruction and instructional support in a manner that is quick to set up and is reliably available to students during an emergency or a crisis (Hodges, Moore, Lockee, Trust & Bond, 2020).

ERL posed several questions and challenges to the lecturers involved regarding their pedagogical approaches. The lecturers

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were concerned about whether students engaged critically with the modules' content, whether the teaching and learning were effective, and, most importantly, whether students were adequately prepared for their careers as teachers. This paper explores undergraduate students' experiences in ERL of PE practical modules. It is significant to state the vast distinction between the normal type of effective online instruction and ERL that which we are doing in a hurry with bare minimum resources and scant time as the delivery of PE teacher education (PETE) through online learning is a contentious discussion regarding the implications for producing quality, well-rounded graduates (Goad & Jones, 2017). Effective online learning results from careful instructional design and planning, using a systematic model for design and development (Branch & Dousay, 2015). Central to the concern of the difference between ERL and online learning is the experiential nature of teaching and learning in PE (Quennerstedt, 2019), specifically the importance of pre-service teachers developing knowledge and skills through connected face-to-face experiences. Learning is social in nature (Molleman, van den Berg & Weissing, 2014). The value of social interaction is embedded in collaborative learning and engagement between the students (Laal & Laal, 2012). Vygotsky's (1978) well-established collaborative theory has a critical role in effective PETE programme delivery, specifically to ensure that pre-service teachers within their academic and professional careers attain higher-level thinking and preserve information for longer (Richards et al., 2020). The mode of delivery changed; however, the learning outcomes remained the same during the transformation in the PE programme. The experiment to transform the instructional mode of the pedagogical approach for it to become digital education was meant to be a temporary shift from the standard methods of teaching.

During ERL of the PE practical modules, all completed assessments were uploaded by the students to the higher education institution's (HEI) learning management system (LMS) and assessed online by the lecturer. Most of the evaluations were completed collaboratively, with groups of students working together. The lecturers incorporated video creation in the assessments to overcome some of the PE practical modules' challenges and ensure that the student's online learning experience would be enhanced. Students video recorded themselves applying sports training principles in their video demonstration and uploaded the videos using the LMS, google drive, or YouTube channels to receive feedback from the lecturer and their peers. In other instances, students were given different topics to research with some actual content and guidelines, then asked to create a video about their specific topic and share it with other students. The videos were used in the assessments as a means of scaffolding student progress in conjunction with other assessment methods. These assessment methods included students engaging with content and completing multiple-choice questions; other assessment activities also included students creating podcasts or narrated presentations focusing on physical activities that could be used to improve technical skills in the respective sports. Furthermore, the guidelines and the assessment criteria were discussed with the students,

which guided them in completing assessments. Collaborative online feedback sessions were scheduled after evaluations were completed, enabling the lecturers to minimise individual queries after the assessments were graded.

This research has two objectives to reach: 1) Whether teaching and learning were effective during ERL to develop the skills and knowledge students need to succeed in work, life, and citizenship in the 21st century; and 2) To explore the students' experiences during ERL. The findings and results of our study may be especially relevant for other lecturers since they can consider adopting a similar pedagogical approach.

Methods

Research design

To understand the experiences, perceptions, and challenges of the undergraduate students regarding the ERL of the PE practical modules, descriptive research was conducted, which involved a mixed-method research design (Kumar, 2019) and therefore included both quantitative and qualitative measurements (Thomas, Nelson & Silverman, 2011; Creswell, 2015). The rationale for choosing the mixed methods research approach for this study was to broaden the perspective of the study and enhance the accuracy of the findings and interpretation of the data. The study was conducted eight months after implementing ERL at an HEI in Pretoria, South Africa, for the first time.

Ethical clearance

All relevant people, committees, and authorities were consulted, and the principles guiding this study were accepted before commencing the research. To ensure objectivity and transparency in this research and ensure accepted principles of ethical and professional conduct, ethical clearance was received from an HEI in Pretoria, South Africa.

Participants / Respondents

The respondents consisted of 140 undergraduate education students specialising in PE at the HEI in Pretoria. All the students experienced ERL as a teaching and learning mode of instruction for the first time. The students were enrolled in three different PE practical modules, of which 2% were students enrolled in the practical soccer module, 26% the students enrolled in the motor development module, and the rest of the students were enrolled in the athletics practical module.

Data collection

An online questionnaire was used to collect data from the students enrolled in the PE practical modules (Singh, 2017). The questionnaire consisted of three closed - and one open-ended question. The measure of reliability was calculated using the Cronbach alpha scores of each question of the questionnaire. The reliability analysis (Table 1) was determined by using a questionnaire comprising 3 items. Cronbach's alpha showed the questionnaire to reach acceptable reliability, $\alpha = 0.36$. Most items appeared to be worthy of retention, and no items were considered for removal (Bonett & Wright, 2015).

Table 1. Reliability statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.359	0.371	3

The first question on the extent to which the module outcomes of PE practical modules were achieved was measured according to a 5-point Likert-type scale. The second question was related to a practical module's teaching and learning preference and was measured according to the 3-point Likert-type scale. The

third question was based on the assessment method preference for a practical module and was measured according to the 3-point Likert-type scale. The fourth question was analysed qualitatively as it was an open-ended question that focused on the students' experiences, perceptions, and challenges of ERL.

Data analysis

The SPSS (Statistical Package for Social Sciences) was a comprehensive statistical programme used to score and analyse quantitative data (Bryman & Cramer, 2009). The data was analysed using SPSS to determine the standard deviation and arithmetic mean. The qualitative data was analysed using thematic analysis. Thematic analysis is the most widely used qualitative approach to analyse data or information. It identifies and provides meaning and insight into the data (Braun & Clarke, 2012). In this study, the analysis methods were used for statistical and thematic analysis to have a broader perspective of the meanings and experiences drawn from the data.

The thematic analysis has enabled us to understand students' diverse experiences, perceptions, and challenges. This approach

allowed the researchers to understand the students' assessment method, teaching and learning preferences, and challenges and opportunities to accelerate innovation concerning ERL and improve the pedagogical approach relevant to ERL.

Findings

The descriptive statistics are based on the mean, standard deviation, and percentages of the response from quantitative data. The results are presented based on the (1) extent to which the module learning outcomes were achieved, (2) teaching and learning preference for a practical module, and (3) assessment method preference for a practical module of ERL. Table 2 provides descriptive statistics.

Table 2. Mean and Standard Deviation of the raw data of module outcomes, teaching and learning preference, and assessment methods.

Rank	Item	Mean	SD
1	To what extent do you feel that you have successfully achieved the module outcomes	3.82	1.045
2	What is your teaching and learning preference for a practical module	2.23	0.763
3	What is your assessment method preference for a practical module	1.87	0.520

Firstly, the overall mean score for the question on the extent to which the module outcomes were achieved was above the midpoint (3) of a 5-point Likert scale, which indicated that more than half of the students gave high scores for reaching the module learning outcomes, 37.1% of the respondents agree, and 20.7% strongly agree that the module learning outcomes were achieved.

The respondents reported academic performance, support and lecturers' presence in the online environment, timely feedback received from the lecturers, and overall performance in the module as some factors that contributed to the attainment of the module learning outcomes. Figure 1 illustrates the extent to which the module learning outcomes were achieved.

To what extent do you feel that you have successfully achieved the module outcomes

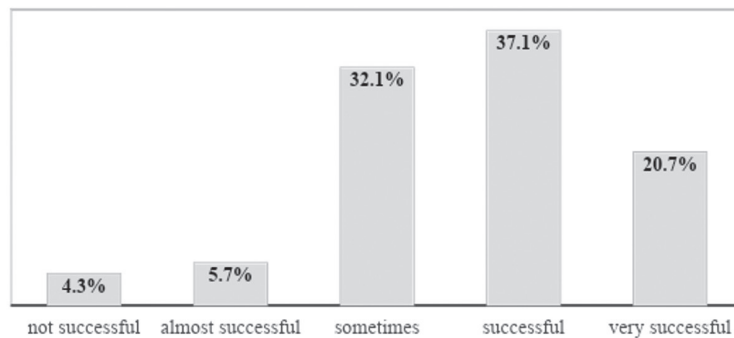


FIGURE 1. The extent to which the module learning outcomes were achieved

Secondly, in the case of teaching and learning preference, face-to-face teaching and learning were found to be the most preferred approach, with 41.7% of the respondents indicating that the face-to-face approach is the preferred mode of teaching and

learning and 36% opting for the blended approach of teaching and learning, while 22.3% indicated that ERL (online) is the preferred mode of teaching and learning.

Thirdly, 69.1 % of the respondents reported practical assess-

What is your teaching and learning preference for a practical module

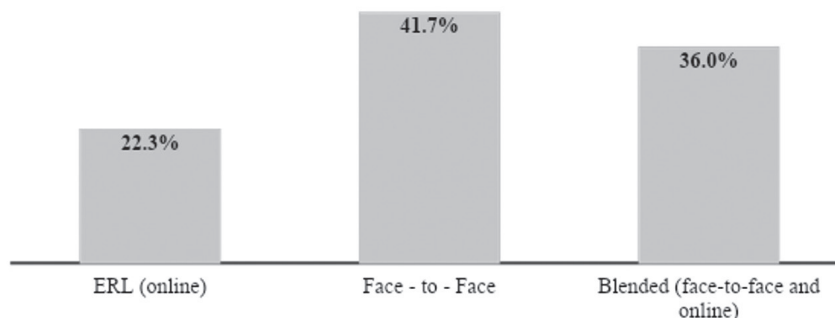


FIGURE 2. Teaching and learning preferences

ment as the preferred assessment method. The responses are linked to the practical nature of the PE practical modules; for example, one of the respondents stated that "... The content is understood better by applying the theory to real-life experiences"

therefore, the responses underline the fact that ERL cannot satisfy all educational needs and goals, more so when it comes to the PE practical modules, where students are required to demonstrate and apply their knowledge practically.

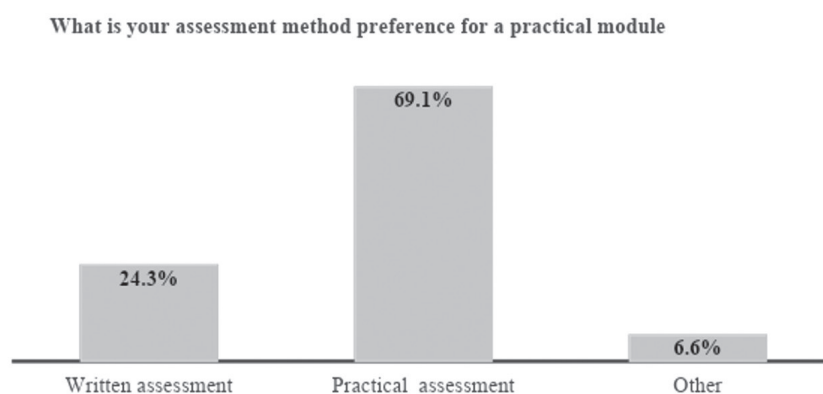


FIGURE 3. Assessment method preference

Lastly, the qualitative data based on the thematic analysis, the respondents identified some key factors that influenced their individual growth relating to the learning experiences in ERL. The respondents reported that these factors should be considered during the ERL. Some of these factors are related to technological challenges (network connection, data, infrastructure) and pedagogical challenges (for example, PE practical modules should address the issues of "knowing about something" (concepts and knowledge) and always how to do it (practical aspect). Regardless of the self-paced approach to learning, innovative approach to teaching and learning, and efforts by the lecturers to engage the students, the respondents believe that the practical aspect of the module should be done through a face-to-face teaching and learning mode.

Discussion

As lecturers and researchers, we strive for quality teaching in the PE programme. ERL influenced the programme and forced us to revise the PE practical modules. There is a general apprehension from most stakeholders concerned with PE about the online learning experience for students in PETE, most notably, the potential absence of 'physical' contact with academic staff (Varea & González-Calvo, 2020). Careful considerations need to be developed for PETE in HEIs in the ERL context that COVID-19 highlighted to ensure that, at the very least, the respective degree programmes can maintain their intended learning outcomes toward pre-service PETE.

The primary purpose of the PE practical modules was to introduce the students to the field of PE, sport, and the practical application and pedagogy thereof in a school context. These modules also equip the students to teach in the area of the subject of Life Orientation and Life Skills, precisely the outcomes dealing with physical development and movement, physical well-being, and recreation. A variation of teaching styles during each PE practical lesson was so that the students as a collective receive, process, and recall knowledge during collaborative learning. It was important for lecturers to explore how knowledge is constructed and how knowledge is acquired. Student learning through the process of adult education programmes, such as PETE, suggests that lecturers should consider and provide learning opportunities that are not isolated events in time. In 1966, Muska Mosston made a monumental contribution to the methodology of teaching PE with his description of teaching styles, also called teaching methods, which ranged from command to discovery styles. Academics

have recognised that a lecturer rarely teaches a whole lesson using one style, but rather the lecturer chooses different styles to meet different learning objectives. The spectrum of teaching styles has a prominent position in PE literature and is widely included in PETE programmes (Sanchez, Byra & Wallhead, 2012). Teaching styles are principles of instruction implemented by lecturers to achieve the desired learning by students. Using a variety of teaching styles throughout a PE programme was perceived as the most effective way to include all students and meet the diverse needs of all students.

The technological challenges, like lack of access to educational technologies, were a clear difference between the student's experiences of those living in rural areas and those students living in urban areas. Poor internet connections were a burden across the board. Over the years, those who have built online programmes will attest that effective online learning aims to be a learning community and supports learners, not just through instructional but with co-curricular engagement and other social support (Bouilheres, Le, McDonald, Nkhoma & Jundug-Montera, 2020). How much infrastructure exists around the educational ecosystem of face-to-face delivery that supports student success that facilitates socialisation with peers, library resources, housing, career services, and health services needs considerations. Lecturers are one instructional aspect of an educational ecosystem specifically designed to support learners with formal, informal, and social resources. Effective online education requires an investment in an educational ecosystem of learner support, which takes time to identify and build (Hodges, Moore, Lockee, Trust, & Bond, 2020).

The pedagogical approach, social constructivism, used by the lecturers during ERL, replicate what would have otherwise been face-to-face or hybrid teaching of the PE practical modules. The collaborative learning theory was used for student engagement and to promote effective teaching and learning. Opportunities were created for flexible learning, as lecture recordings were available throughout the modules for students to refer back to whenever needed. The module outcomes were achieved as the lecturers supported the students in promoting their learning experiences by scaffolding learning so that students could reach the required outcomes. This pedagogical approach was a way of clarifying learning objectives and content. Teaching and learning in the PE practical modules were effective as the students' overall perception was that they attained the module learning outcomes.

Including the technological challenges and the pedagogical aspect, the aim to explore the experiences of undergraduate stu-

dents in the ERL of PE practical modules was reached as the students experienced face-to-face teaching and learning as the most preferred approach and practical assessment was the preferred method of assessment.

In summary, the majority of the students feel they have successfully reached the outcome of the practical module they have enrolled for. The availability of online class recordings assisted students in their self-paced approach to learning. Collaborative learning was preferred only if the lecturer was involved, as it seemed a significant challenge when student-driven. A PE programme needs face-to-face contact with students and can sometimes benefit from a blended teaching approach. Exploring ERL's effectiveness through student experiences is relevant, as other PE lecturers and PETE programmes making a sudden transition to remote operation can consider adopting a similar pedagogical approach.

Conclusion

The success of ERL in enhancing the students' learning experiences is not only based on the effectiveness of students or module outcomes, collaborative learning, and innovative pedagogical approaches used by the lecturers. The online environment requires students to have access to the online learning environment and a well-established online educational ecosystem. Lack of technological access might exclude students from effective learning in the PE practical modules for economic or logistic reasons. Teaching and learning of PE in higher education are considered effective through a face-to-face delivery as education through movement is difficult to replicate digitally.

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All relevant people, committees, and authorities were consulted, and the principles guiding this study were accepted before commencing the study.

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Data availability: Raw data were generated at a university in Pretoria, South Africa. Derived data supporting the findings of this study are available from the corresponding author on request.

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ORIGINAL SCIENTIFIC PAPER

Maternal awareness of nutrition and physical activities as determinants of BMI in Nigerian School pupils

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Abstract

The study investigated the influence of maternal awareness of nutrition and physical activities on body mass index (BMI) of Nigerian school pupils. Three hundred school pupils participated in this study. A structured questionnaire was used to assess the maternal awareness of nutrition and physical activities. Body height and body-mass were measured with a stadiometer and a bathroom weighing scale, respectively. BMI was calculated using the formula weight (kg)/height (m²). Pearson coefficient of correlation and independent-sample t-test were used to test the hypotheses. Statistical significance was accepted for a p-value <0.05. The results showed that the maternal awareness of nutrition is a proportionate and a significant (p<0.05) correlate of children's BMI. On the other hand, there was no significant correlation between the maternal awareness for physical activities and children's BMI. Thus, we suggest that the maternal awareness of nutrition can determine children's BMI.

Keywords: Knowledge of nutrition, knowledge of physical activities, body mass index, grade-schoolers

Introduction

Nutrition plays a key role in human health and well-being, starting from conception to the later stages of childhood and geriatrics. However, the knowledge of the type, time and quantity of nutritional intake to ensure energy balance remains a great challenge especially among mothers. It has been confirmed that well-nourished infants, children and adolescents grow, develop and learn better compared to their mal-nourished counterparts (Youngson, 2004). The quality of children's diets can have implications for physical growth, cognitive development, and health (Pooja et al., 2016). According to Kaikkonen, Mikkilä and Raitakari (2014), the problem of both over and under-consumption of the right type of nutrients can be a predisposing factor for children's risk for dietary related diseases in their later years. One particularly worrisome trend is the increase in childhood overweight or obesity.

It is pertinent to state that maternal nutritional awareness can

enable her to choose the right diet for her children which will help them maintain a healthy body mass. Children are generally not aware of the health hazards of poor nutrition and weight gain. Therefore, mothers' nutritional awareness and health concerns can influence children's eating patterns (Yabancı, Kısac, & Karakus, 2013). Based on previous scientific evidence mothers nutritional awareness and their knowledge of child nutrition and child-care practices have a significant impact on their children's nutritional status and body mass. Meanwhile, some studies have observed a positive relationship between childhood malnutrition, maternal awareness and beliefs regarding nutrition (Al-Shookri, Al-Shukaily, Hassan, Al-Sheraji & Al-Tobi, 2011; Parul, Rita, Sunder & Tara, 2010; Wardle, Carnell & Cooke, 2005).

Anthropometric measures such as body mass constitute the new vital signs of the 21st century, that must be assessed, if the tide of overweight or obesity is to be upturned (Campbell & Crawford, 2001). According to Deurenberg, Yap and van Stav-

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eren (1998) body mass index (BMI) remains the simplest, safer and non-invasive way through which body fat percentage can be estimated, a person's health can be assessed as well as nutritional status. According to the World Health Organisation (2012), obesity has nearly doubled over the last three decades. Worldwide, the proportion of adults with a BMI of 25 kg/m² or greater increased between 1980 and 2013 from 28.8% to 36.9% in men, and from 29.8% to 38.0% in women. Prevalence has increased substantially in children and adolescents in developed countries; 23.8% of boys and 22.6% of girls were overweight or obese in 2013 (Ng et al., 2013). Interestingly, Childhood overweight is said to be one of the most serious public health challenges of the 21st century and has become a global epidemic. It is one of the leading causes of morbidity and mortality in both developed and developing countries (Kelishadi, 2007). Besides physiological and genetic properties as well as nutrition and regular physical activity is also considered an important component of good health and prevention of childhood obesity (Haskell, Lee & Pate, 2007). Physical activity has been shown to be associated with healthy weight status, bone and skeletal health, motor skill development, psychosocial health, cognitive development and aspects of cardio-metabolic health (Carson, Hunter & Kuzik, 2015). Nelson, Li, Vuan and Lam (2002) concluded that, physical inactivity and sedentary behaviours, such as television viewing, are strongly related to obesity in Canadian children and adolescents. In addition, Chelen, Post, Roos and Lips (2000), reported that children with low levels of physical activity are significantly more likely to be overweight or obese than more active children of similar age and gender. Therefore, this study evaluates the maternal awareness of nutrition and physical activity as determinants of body weights of Nigerian school pupils.

Methods

The study received ethical approval from the Research Ethics Committee of the University of Benin, Nigeria. An informed consent form was issued to each of the respondents and then the objectives of the study were explained. The population for this study included primary school pupils between the age of 7 and 11 years from five primary schools in the 2018/2019 academic session in Oyo State, Nigeria. A total of 150 males and 150 females participated in this study. They were recruited using proportionate random sampling technique. However, participants with any physical disability were excluded from the study.

A structured questionnaire was used to assess the maternal awareness of nutrition and physical activities. All questions were scored on a scale from 1 to 4; with 4 representing the highest level of awareness possible. That is, Highly Aware (HA) =4, Aware (A) =3, Not Aware (NA) =2 and Highly Not Aware (HNA) =1. The questionnaire was validated by three experts in the certain matter

from the University of Benin, Benin City. The questionnaire was administered to twenty (20) mothers in order to test the reliability. The reliability coefficient of the instrument was 0.77.

The standing heights of the participants were measured using Shorrboard Stadiometer (Model:ICA 420, USA, 2018) in centimeters. Also, the calibrated electronic auto-zeroing bathroom weighing scale (Escali USTT200, Amazon, 2018) was used to measure the body mass of the participants. Then, BMI was calculated using the formula: weight (kg)/height (m²). Thereafter, the children were categorized into different classes of BMI based on the recommendation of Centers for Diseases Control and Prevention (2015), which is age and sex-specific for children and teens from two years old through 20 years. The measurement of the pupil's anthropometric characteristics, as well as the administration of the questionnaire were done with the help of two trained research assistants. These assistants helped in the administration of the questionnaire and also in recording of the illiterate mother's answers on the questionnaires. The questionnaire forms were retrieved immediately after being completed and the rate of retrieval was 100%. Aggregate scores were compiled as total points possible. The scores from those questions that address each specific area of the maternal awareness (nutrition and physical activities) were then averaged together, for a final score within each area measured.

The anthropometric profile of the pupils was analyzed using frequency counts and percentages. The relationship of maternal awareness of nutrition and physical activities and children's BMI was analyzed using the Pearson coefficient of correlation, and then differences in children's body mass across gender categories were analyzed using the independent sample t-test. Statistical significance was accepted for a p value of <0.05. All the analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 22.0.

Results

From the Table 1, the percentage body mass categories of the Nigerian school children for underweight, desirable, overweight and obesity are 5.0%, 25.3%, 55.7% and 14.0% respectively. Moreover, majority of the children were found to be overweight (55.7%) based on their age and sex, while those that were underweight have the lowest percentage (5.0%). Table 1 revealed that an insignificant difference ($p > 0.05$) existed between maternal awareness of nutrition and children's body mass. Therefore implying that there was no influence of maternal awareness of nutrition on body mass of Nigerian school children for both boys and girls. Table 1 also revealed that there was an insignificant difference ($p > 0.05$) between maternal awareness of physical activities and children's body mass for both boys and girls. Table 2 showed that maternal knowledge of nutrition is a proportionate

Table 1. Descriptive Statistics and Independent Sample T-Test For Maternal Educational Qualification and Children's Bodyweights.

	Bodyweight Categories	Frequency	Percent	Valid Percent	Cumulative Percent	
	Underweight	15	4.9	5.0	5.0	
	Desirable	76	25.0	25.3	30.3	
	Overweight	167	54.9	55.7	86.0	
	Obesity	42	13.8	14.0	100.0	
		F	Sig	T	Df	Sig. (2-tailed)
MKN	Equal variances assumed	0.004	0.949	-1.318	298	0.188
	Equal variances not assumed			-1.318	297.959	0.188
MNPA	Equal variances assumed	2.841	0.093	-1.167	298	0.244
	Equal variances not assumed			-1.167	297.700	0.244

MKN-maternal knowledge of nutrition, MNPA-maternal knowledge of physical activities

Table 2. Correlations of Children's BMI with Maternal Knowledge of Nutrition and Physical Activities.

	BW	MKN	MNPA	Gender	BMI
BW	1	0.131*	0.070	0.041	1.000**
		0.023	0.227	0.474	0.000
MKN	0.131*	1	0.925**	0.076	0.131*
	0.023		0.000	0.188	0.023
MNPA	0.070	0.925**	1	0.067	0.070
	0.227	0.000		0.244	0.227
Gender	0.041	0.076	0.067	1	0.041
	0.474	0.188	0.244		0.474
BMI	1.000**	0.131*	0.070	0.041	1
	0.000	0.023	0.227	0.474	

BW-bodyweights, MKN-maternal knowledge of nutrition, MNPA-maternal knowledge of physical activities, BMI-body mass index

($r = 0.131$) and significant ($p < 0.05$) correlate of children's BMI. This might be an indication that maternal awareness of nutrition is a predictor of BMI of Nigerian school children. It was also observed from the Table 2 that there is no correlation ($r = 0.070$, $p > 0.05$), between maternal awareness of physical activities and children's BMI. This implies that maternal awareness of physical activities does not have the ability to predict the BMI in Nigerian school children.

Discussion

Maternal nutritional awareness was found in this study to have a significant influence on children's BMI. In this line, related studies showed that maternal nutritional awareness significantly influence children's body mass (Parul et al., 2010; Al-Shookri, Al-Shukaily et al., 2011; Baughcum, 2015). Similarly, the results of Ali, Layla, Fouad, Sadeq and Saif (2011) on the effect of mothers' nutritional awareness and attitudes on Omani children's dietary intake showed that there was a positive relationship between children's dietary food intake scores with the mothers' nutritional awareness scores. Previous evidence with support from our findings are indicating that nutrition-related education and information for mothers can improve their offspring's BMI. Maternal nutritional awareness acts as a pathway through which maternal education influences children's diets. In other words, maternal awareness of nutrition is a determinant of an ideal BMI among school children.

Maternal awareness for physical activities was observed not to have substantial relationship with children's BMI in the present study. This is in disagreement with the studies of Mulcherjee and Dhara (2014) and Coelho et al. (2012) that indicated maternal awareness of physical activities as a significant predictor of children's BMI. Discrepant findings within studies might be due to methodological nuances, such as the timing of measurements and statistical modeling. On the other hand, our results conform to the results of the studies of Tchicaya and Lorentz (2014) and Uthman and Aremu (2012).

Infact, many children today are growing up in environments that encourage weight gain and obesity. Changes in food availability and type, and a decline in parental awareness for physical activity, could be a reason for energy imbalance among school children. However, it has been observed that affinity for physical activity, both in and out of school, have been reduced and more time is spent on screen-based and sedentary leisure activities. Furthermore, this kind of behavior can be passed from one generation to the next, as children inherit socioeconomic status, cultural norms and behaviours, and family eating and physical activity behaviours. Moreover, physical activity behaviours across

the life-course can be heavily influenced by their parents especially the mothers. Thus, we therefore suggest that creating a safe, physical activity-friendly homes and communities, which enable, and encourage the use of active transport (walking, cycling and so on) and participation in an active lifestyle and physical activities will benefit both young and old individuals.

Conclusion

This study therefore concluded that maternal awareness for nutrition may possibly determine children's BMI. It is therefore recommended that further studies are conducted to evaluate the influence of parental socioeconomic status on their children's BMI.

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ORIGINAL SCIENTIFIC PAPER

Morphological Characteristics and Body Composition in Female Kata and Kumite Karatekas

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Abstract

Elite female karatekas should have specific morphological characteristics suitable for their specializations. This study aimed to determine the differences in morphological characteristics and body composition of female karatekas according to different specializations. This study consisted of a total of 15 female karatekas divided according to specialization in kumite (fighting) and kata (form or movement pattern) disciplines. The subject sample included healthy, female senior karatekas, with no prior injuries divided into kumite (n=8, 22.75±4.65 years) and kata (n=7, 22.00±4.58 years) athletes. Morphological characteristics and body composition were evaluated by a battery of 11 variables: body height (BH), body mass (BM), triceps skinfold (TS), biceps skinfold (BiS), back skinfold (BS), abdominal skinfold (AS), upper leg skinfold (UIS), lower leg skinfold (LIS), body mass index (BMI), fat percentage (FP), and muscle mass percentages (MP). Based on the t-test for small independent samples, findings showed that female kata and kumite karatekas do not have different morphological characteristics. Although there was no difference in morphological characteristics, for more complete conclusions an analysis should be performed on a larger sample of elite female karate athletes.

Keywords: karate, anthropometrics characteristics, body composition, female karatekas, Montenegro

Introduction

Karate is considered one of the most popular martial arts, which includes two competitive disciplines: forms (kata) and sports fighting (kumite) (Koropanovski et al., 2011; Tabben et al., 2013). Kata technique involves rhythm, expressiveness, and kime (short isometric contraction). Kata karatekas perform one Tokui (free-style Kata) and one Shitei (fixed Kata styles), and have 60–80 s to complete the Kata (World Karate Federation, 2021). While Kumite represents combat between two karatekas under certain rules where judges count kicks and punches - Ippon (3 points), Waza-ari (2 points), and Yuko (1 point). The duration of the Kumite match is 3 min (World Karate Federation, 2021).

The morphological status of athletes is very important and it is known that morphological characteristics play an important role in achievements in most sports (López-Plaza, Alacid, Muyor, & López-Miñarro, 2017; Slimani & Nikolaidis, 2019, Banjevic et al., 2022). When selecting athletes, it is necessary that they possess an optimal level of morphological characteristics according to the re-

quirements of a particular sport (Popović, Akpınar, Jakšić, Matić, & Bjelica, 2013; Slankamenac et al., 2021; Banjević et al., 2022).

The same situation is in karate, where elite karatekas in addition to other characteristics, must have suitable anthropometric characteristics (Lehmann & Jedliczka, 1998; Amusa & Onyewadume, 2001; Jukic, Katic, & Blazevic, 2012). It was determined that female karatekas have significantly higher subcutaneous and body fat percentages compared to males. While, male karatekas have higher skeletal muscle mass compared to female athletes (Nawarathna, Bandara, Weerasinghe, & Adikari, 2021). Also, female karatekas showed a healthy anthropometric profile, although mean BMI values were slightly above normal values. As in adults and in younger people, total fat percentages are higher in girls compared to boys (de Quel, Alegre, Castillo García, & Ayán, 2021).

Only one study (de Quel, Izquierdo, & Ayán, 2020) was found that examined differences in morphology between female kata and kumite karatekas. It was observed that there are some differences in morphology status between the groups, although this is certain-

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ly not enough to draw any general conclusions.

Although morphological characteristics are important in karate, there is a lack of research that examined the morphology of female karate athletes, and especially the differences between kumite and kata competitors in morphological characteristics (Koropanovski et al., 2011). Consequently, the study aimed to identify differences in morphological characteristics and body composition between female kata and kumite karatekas.

Methods

Sample of respondents

This cross-sectional study consisted of a total of 15 female karatekas divided according to specialization in kata (form or movement pattern) and kumite (fighting) disciplines. The subject sample included healthy, senior female athletes, with no prior injuries divided into kumite (n=8, 22.75±4.65 years) and kata (n=7, 22.00±4.58 years) athletes. Athletes voluntarily participated in the research process, also this research was carried out following the Helsinki Declaration.

Measurements

The standard international biological procedure was used to determine morphological characteristics (Eston & Reilly, 2013). Morphological characteristics and body composition were evaluated by a battery of 11 variables: body height (BH), body mass (BM), triceps skinfold (TS), biceps skinfold (BiS), back skinfold (BS), abdominal skinfold (AS), upper leg skinfold (UIS), lower leg skinfold (LIS), body mass index (BMI), fat percentage (FP), and muscle mass percentages (MP). Anthropometer, caliper, and

measuring tape were used for morphological measurements. To evaluate the body composition, Tanita body fat scale - model BC-418MA, was used.

Statistics

Basic parameters of descriptive statistics were calculated: arithmetic mean, standard deviation, minimum, maximum, and range. To determine differences in morphological characteristics, and body composition among groups of karatekas, a t-test for small independent samples was used. For all statistical analyses, significance was accepted at $p < 0.05$. Data processing was performed using the statistical program SPSS 26 (Statistical Package for Social Sciences, v26.0, SPSS Inc., Chicago, IL, USA).

Results

Table 1 indicates descriptive values of morphological parameters. Female kumite karatekas have an average height of 171.06±7.93 cm and a body weight of 64.23±8.89 kg, respectively, which are slightly lower than kata karatekas (164.79±3.78 cm, and 65.01±11.41 kg). Body mass index values are similar for female kumite (21.90±2.20) and kata (23.94±4.41) athletes, as well as fat percentage values (18.83±5.37% for kumite and 20.69±8.12% for kata karatekas). It is noticeable that kumite has lower values for muscle mass (29.33±2.40%) compared to kata female karatekas (31.70±9.30%). While the skinfold values are approximately similar.

Based on the T-test (Table 2), it was determined that there was no significant difference between female kumite and kata karatekas in any of the morphological variables.

Table 1. Descriptive data of morphological parameters between the groups

Groups	Mean	St. Dev.	Minimum	Maximum	Range	
Kumite	Age	22.75	4.65	18.0	31.0	13.0
	Body height	171.06	7.93	160.0	185.0	25.0
	Body mass	64.23	8.89	55.3	78.9	23.6
	Triceps skinfold	12.71	3.73	7.6	20.0	12.4
	Biceps skinfold	8.05	3.37	5.0	15.0	10.0
	Back skinfold	9.33	1.98	7.0	12.2	5.2
	Abdominal skinfold	8.00	2.79	5.6	14.6	9.0
	Upper leg skinfold	10.43	2.63	7.2	15.8	8.6
	Lower leg skinfold	14.54	4.08	9.8	23.2	13.4
	Body mass index	21.90	2.20	18.9	26.2	7.3
	Fat percentage	18.83	5.37	9.6	25.0	15.4
	Muscle mass	29.33	2.40	27.1	33.5	6.4
Kata	Age	22.00	4.58	18.0	31.0	13.0
	Body height	164.79	3.78	159.0	170.0	11.0
	Body mass	65.01	11.41	54.9	88.9	34.0
	Triceps skinfold	13.60	5.22	7.0	21.0	14.0
	Biceps skinfold	7.56	3.17	5.6	14.0	8.4
	Back skinfold	11.91	5.66	7.4	24.0	16.6
	Abdominal skinfold	10.26	6.29	5.8	23.0	17.2
	Upper leg skinfold	12.89	3.21	10.0	19.0	9.0
	Lower leg skinfold	14.94	7.41	9.0	28.0	19.0
	Body mass index	23.94	4.41	20.8	33.5	12.7
	Fat percentage	20.69	8.12	8.0	34.6	26.6
	Muscle mass	31.70	9.30	24.6	52.0	27.4

Table 2. Descriptive data and t-test of 15 female karate athletes enrolled in the study

	Grupe	Mean	St. Dev.	t	p
Age	Kumite	22.75	4.65	0.314	0.759
	Kata	22.00	4.58		
Body height	Kumite	171.08	7.93	1.910	0.078
	Kata	164.79	3.77		
Body mass	Kumite	64.23	8.89	-0.151	0.883
	Kata	65.01	11.41		
Triceps skinfold	Kumite	12.71	3.73	-0.383	0.708
	Kata	13.60	5.21		
Biceps skinfold	Kumite	8.05	3.37	0.290	0.776
	Kata	7.56	3.17		
Back skinfold	Kumite	9.33	1.98	-1.218	0.245
	Kata	11.91	5.66		
Abdominal skinfold	Kumite	8.00	2.79	-0.920	0.374
	Kata	10.26	6.29		
Upper leg skinfold	Kumite	10.43	2.63	-1.632	0.127
	Kata	12.89	3.21		
Lower leg skinfold	Kumite	14.54	4.07	-0.134	0.896
	Kata	14.94	7.41		
Body mass index	Kumite	21.90	2.20	-1.160	0.267
	Kata	23.94	4.41		
Fat percentage	Kumite	18.83	5.37	-0.530	0.605
	Kata	20.69	8.12		
Muscle mass	Kumite	29.33	2.40	-0.700	0.496
	Kata	31.70	9.30		

* statistical significance.

Discussion

This study aimed to identify differences in morphological characteristics and body composition between female kata and kumite karatekas. Based on the t-test for small independent samples, it was indicated that there are no differences in morphological parameters between groups of female kata and kumite karatekas.

There are no significant differences in the average height of female kumite and kata karatekas and these values are in line with the values of female karate athletes in other studies (Gloc, Plewa, & Nowak, 2012; Burdukiewicz, Pietraszewska, Andrzejewska, & Stachoń, 2016; Przybylski, Janiak, Szewczyk, Wieliński, & Domaszewska, 2021), and slightly higher values compared to the one study (de Quel et al., 2020). It should also be added to the study of Slankamenac et al. (2021), where the height of all female kumite karatekas matches our results, except for the +68kg category whose average height parameters (181.0 cm) are higher than our athletes.

Also, both groups achieved approximately similar average body weight, and these data correspond to some studies (Gloc et al., 2012; Burdukiewicz et al., 2016), and higher than in others (de Quel, et al., 2020; Przybylski et al., 2021). Body mass index is also similar between our groups and corresponds to karatekas in other studies (Gloc et al., 2012; Burdukiewicz et al., 2016; de Quel et al., 2020).

Abdominal and back skinfold values are approximately similar between groups of female kata and kumite athletes and correspond to the study of Przybylski et al. (2021). It should be noted

that there was no difference in skinfolds between kata and kumite karatekas, which corresponds to the fact that there was no difference in the percentage of fat mass. Since it is known that skinfolds are the main indicators of body fat percentage, because over 60% of body fat is located precisely in the subcutaneous region (Wang, Thornton, Kolesnik and Pierson, 2000). In this regard, body mass percentage is also the same between our groups and corresponds to the study of de Quel et al. (2020). There was also no difference in the percentage of muscle mass between the groups. Since there was no difference in the percentage of muscle and fat mass between the groups, it can be considered that body composition was similar between kata and kumite female karatekas.

In our study, no significant difference was found between the female kata and kumite karatekas in any morphological variable. Since only one study (de Quel, et al. 2020) dealt with the difference in morphology between female kata and kumite karatekas, in that study a significant difference was found between the groups in body height and body mass on the side of Kumite fighters, which corresponds to studies (Koropanovski et al., 2011; Katanić et al., 2022) which it is considered that Kumite karateka are somewhat more robust than Kata athletes. It should be added that in the study (de Quel et al. 2020) there was no difference between the groups in BMI and percentage of fat mass, which corresponds to our data.

The main limitation of the study is the small sample size, which decreases the effect size of the results. In this regard, the proposal for further research on the body composition of female karatekas should be carried out on a larger sample and with the

assistance of more cutting-edge equipment that would determine the morphological status of the whole body, as well as individual body segments. This will allow more comprehensive data to be collected and determine whether female kumite and kata karateka have different body types. Despite this, this study made a significant contribution to determining the morphological status of female karate athletes and especially the difference between kata and kumite athletes.

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Conflict of Interest

The author declares that there is no conflict of interest.

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A SYSTEMATIC REVIEW

Examination of sports performance parameters aimed to be explored in research on amputee football players: A Systematic Review

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Abstract

This systematic review aims to examine the research on the sports performance of amputee football players in terms of content and to critically analyze the significance of the tested parameters in order to improve the sports performance of amputee footballers. Research data was collected considering the inclusion and exclusion criteria on PubMed, Web of Science and Google Scholar. 88 articles were found in the first search on the Web of Science, Google Scholar and PubMed databases using predefined keywords. As a result of the evaluation made within the scope of inclusion and exclusion criteria, 15 research articles were included in this study. As a result, it has been determined that studies on amputee footballers do not carry out research to improve the sports performance of athletes, but mostly focus on studies examining the relationship between anthropometric characteristics and physical performance of athletes, or examining two or more existing sports performance parameters. Although it is important to obtain these findings, it is also important to design training models to improve current performance and investigate their effects rather than determining the current performance of athletes. It is recommended for researchers to develop new training models in future studies and to carry out studies to improve the sports performance of amputee athletes.

Keywords: *Amputee Football, Amputee Soccer, Sports Performance, Examination, Measurement*

Introduction

While sports or any physical activity are of great importance in ensuring the social, physical and psychological development of people, these activities are much more important for people with disabilities (PWD) (Esatbeyoğlu and Karahan, 2014). There are many sports activities that PWD can participate in, and it is known that one of the most popular of these activities is amputee football. Athletes who have either a unilateral lower limb amputation (defensive, midfield, and offensive players) or a unilateral upper limb amputation (goalkeeper) or who are classified as other groups (group with congenital hand, foot, and upper limb anomalies) compete in the team sport of "amputee football" (Simim et al., 2018; Maehana et al., 2018). A total of 50 minutes (25 minutes in each half and 10 minutes

between halftime) is played on an artificial or natural grass field with a field size of 60 x 40 m (WAFB, 2016). Since the duration of the game is 50 minutes in total, amputee football is a sport where both aerobic and anaerobic pathways are involved in energy production (Mikami et al., 2018). Especially, anaerobic performance is very important due to sudden explosive movements such as sprinting, sudden changes of direction and accelerations during the match (Tatar et al., 2018; Aytar et al., 2012). Also, it is a fact that this game requires speed, agility, balance and flexibility in terms of game dynamics (Lowther et al., 2002). Moreover, the use of prostheses during the game is prohibited and only the use of crutches is allowed. In that regard, it can be argued that it is a sport branch in which upper limb muscular strength and endurance are dominant due to isomet-

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ric, concentric, and eccentric contractions while using crutches (Tatar et al., 2018; Aytar et al., 2012; Özkan et al., 2014).

In order to perform at an elite level in football, it is necessary to have the physiological and morphological characteristics required by the sport branch and positions (Slimani and Nikolaidis, 2019; Hazir et al., 2010), similarly, in amputee football, the muscular strength and endurance required by the branch and the position played, it is necessary to have an appropriate body composition and somatotype body structure (Simim et al., 2013; Miyamoto et al., 2019). Therefore, the development of such features has been the subject of many studies. However, the primary issue with studies aiming to improve the athletic performance indicators of amputee football players in the literature is that it is not yet clear which sports performance indicators researchers focus on improving athletes. Therefore, it is important for future research to determine the sports characteristics of these athletes that are most desired to be developed and ignored. In this context, the aim of the research is to examine the research on the sports performance of amputee football players in terms of content.

Methods

This research was designed using the systematic review technique. Research data was collected considering the inclusion and exclusion criteria of the research published, as a result of the search made by using the keywords "amputee football, amputee soccer" in English. The search was performed on Web of Science, Google Scholar and PubMed databases in an electronic environment between 25.06.2022-15.08.2022. In accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines, a systematic review of the available literature was undertaken (Moher et al., 2009) (Figure 1.). The first search identified 88 articles. In the

initial assessment carried out in accordance with the inclusion and exclusion criteria, 15 articles were found suitable and were included in the study, while 73 studies were excluded. More precisely, in the initial evaluation carried out on the Google Scholar database in compliance with the inclusion and exclusion criteria 7 articles were found suitable and were included in the study, while 41 were excluded. Then, from the Web of Science database, 7 articles were found suitable and were included in the study, while 20 were excluded. Finally, from PubMed database, 1 article was included, while 12 were excluded, which made a total of 15 studies that were included in the research (Figure 1).

Inclusion Criteria

- The sample of subjects should consist of amputee football players.
- In the research, it should be aimed to measure and examine at least one of the sports performance parameters (strength, power, endurance, speed, flexibility, reaction time) of amputee football players.
- The research should be published as an article in English between the years of 2012. and 2022.
- The research should be published as original article in full-text on English language.

Exclusion Criteria

- Not examining at least one of the sports performance parameters (strength, power, endurance, speed, flexibility or reaction time) of amputee football players.
- Articles where only an abstract is available or systematic reviews were not included in the research.
- Articles were not included if they were not in English language.

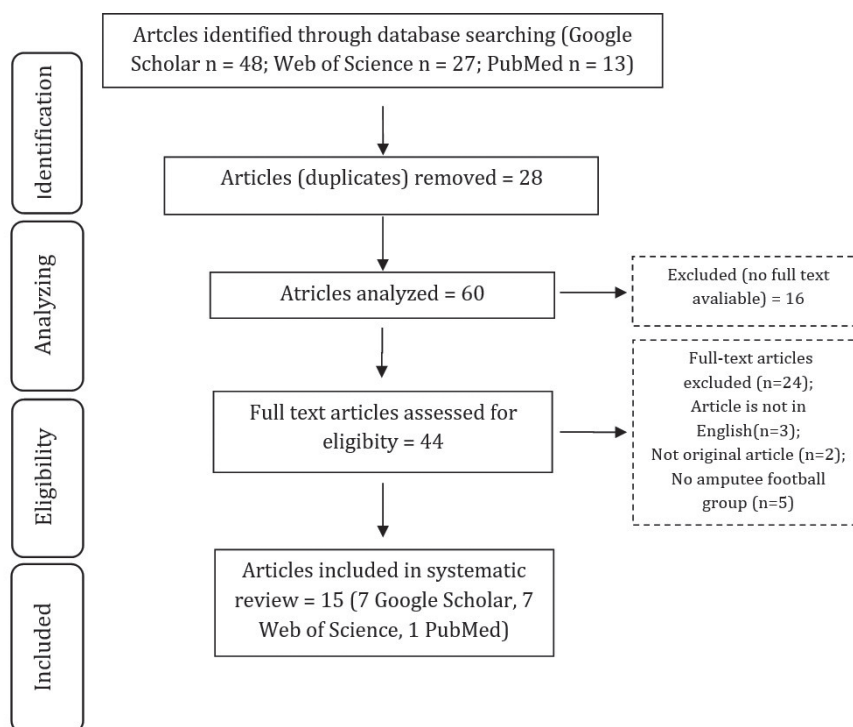


FIGURE 1. PRISMA flow chart of article selection process

Description of selected studies

First, the basic parameters of the study are shown, such as the sample (age and number of respondents), then the tested parameters and finally the results of the study (Table 1).

Results

The results of the study are summarized in Table 1.

In the selected research, there was a group that had to fulfill the inclusion criteria (the amputee football players) in order

Table 1. Research results

Authors	Sample	Purpose	TP	Results
Ozkan et al. (2012)	n = 15 25.5 ± 5.8 years	Examining the connection between anaerobic capacity, body composition, and sprint performance	BH, BW, BMI, BF%, speed, strength	Sprint performance was described as an important factor in anaerobic performance whereas body composition play a decisive role in anaerobic and sprint performance
Aytar et al. (2012)	n = 11 24.63 ± 6.48 years	Investigating the relationship between strength, balance and core stability	BH, BW Trunk strength, sacroiliac joint movement, dynamic core stability, Disability level	For the purposes of performance analysis and evaluation, the relationship between balance and sacroiliac mobility should be taken into consideration.
Simim et al. (2013)	n = 12 29.3 ± 8.6 years	Aim was to determine the physical and anthropometrical characteristics of amputee football athletes	BH, BW, heart rate peak, maximum heart rate, endurance (aerobic), speed, triceps, subscapular, suprailiac, and abdomen skinfold, BF%	The BF% between midfielders and defenders differed significantly..
Mine et al. (2014)	n = 10 25,80 ± 4,32 years	Examining the relationship between acceleration and speed performance in amputee footballers	BH, BW, speed, acceleration	Speed and acceleration (quickness) correlate positively. Both correlate positively, aswell, with sports success
Wieczorek et al. (2015)	n = 13	Investigating the relationship between strength, sprint time and hand grip	HG, speed, acceleration, WBW, BH	Results suggest that hand grip strength has no relationship with sprint effectiveness in elite players
Simim et al. (2017)	n = 16 32 ± 5 years	A research examined the match demands for amputee soccer and how they affected strength and endurance.	BH, BW, WBW Explosive strength, repetitive strength, (upper body strength)	Muscle endurance and upper body strength positively impacted the performance
Maehana et al. (2018)	n = 12	The aim of this study was to evaluate the heart rate response and match performance in amputee football players.	BH, BW total distance in match, high-intensity running : (≥13 km·h) RPE, HR	Exercise/match intensity was high in amputee soccer. Thus, it can be said that anaerobic capacity is crucial for their performance
Tatar et al. (2018)	n = 15 24.5 ± 5.8 years	Objective was to investigate the load distribution of players during kicking the ball, running and walking	BH, BW Loads on their non-amputated lower extremity, loads on their upper extremities	The frequency of repeated kicking during play may raise the risk of upper extremity injuries
Yildiz et al. (2018)	n = 12 28 ± 7 years	Purpose was to compare the acute effects of dynamic warm-up exercises and static stretching on free kick performance	BH, BW, free kick speed	The findings imply that dynamic warm-up exercises may be preferable for amputee soccer players before engaging in activities requiring a high power output
Gunaydin (2019)	n = 12	Determining the relationship between horizontal jump and sprint performance	BH, BW, BMI, speed, acceleration, horizontal jump	Results showed strong correlation between the one leg hop and 30m and 20m sprint tests and no correlation with 10m sprint performance.
Miyamoto et al. (2019)	n = 12 42.3 ± 4.6 years	Purpose was to determine the relationship between sprint motion and sprint speed	BH, BW, Speed, acceleration	Findings indicate that enhancing sprint speed requires the step length increase within a shorter time period in first foot step and crutch stance
Gunaydin (2020)	n = 20	Investigating the relationship between upper extremity strength and performance	BH, BW, speed, agility, jumping performance	Findings showed that the sprinting performance of amputee players was not related with lower extremity strength only, but also with upper extremity strength.

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Table 1. Research results

Authors	Sample	Purpose	TP	Results
Nowak et al. (2021)	n = 23	Determining anaerobic performance and antropological profile of elite AFP	Type of lower limb impairment, experience, BH, BW, BF%, HG, WBW, anaerobic performance	AFP with greater WBW have a lower ability to maintain power and may become exhausted faster
Nowak et al. (2021)	n = 11 28.45 ± 8.73 years	Finding correlation between locomotion speed, maximum power and upper limbs	BW, BH, BMI, BF%, LBM, anaerobic capacity, speed	Body composition, especially % BF may impact the anaerobic performance of amputee football players.
Kurtoğlu et al. (2022)	n = 35 16-48 years	Comparing strength parameteres depending on degree of amputation	BW, BH HG, Leg strenth	Level of amputation may affect motor abilities such as flexibility, speed, agility and endurance

TX – Training experience; TT – Type of training; TP – Tested parameters; n – number of respondents; BW- body weight; BH – Body height; HG – Hand grip strength; WBW – Whole body weight; BF% - Body fat percentage; AFP - amputee football player/s; LBM- lean body mass; BMI – Body mass index; RPE - rating of perceived exertion; HR – heart rate.

to participate in the research. The number of participants varied from research to research. The smallest number of subjects was included in the research by Mine et al. (2014) with only 10 participants, and the largest number in the research by Kurtolu et al. (2022) with as many as 35 participants. The total number of respondents in the systematic review amounted to 229 participants in the age range from 16 to 48 years. All the articles included were of experimental design. Every article measured body composition variables and also motor ability variables. Most of the articles included speed, acceleration and strength measurements.

Discussion

PWD can participate in competitions and thus feel the true feeling of sports. This allows them to perceive themselves as "athletes" rather than as PWD. With the confidence of this feeling, individuals can learn to cope with their obstacles (Özer, 2001) and their lives can become more enjoyable. Therefore, it is very important to continue scientific research on PWD.

The aim of this research was to examine the research on the sports performance of amputee football players in terms of content. In the initial assessment carried out in accordance with the inclusion and exclusion criteria, 15 articles were found suitable for the study and were included in the study.

When the studies on amputee football players were examined, it was shown that these studies did not focus on improving the physical performance parameters of the athletes. We show that many studies compare physical performance parameters of athletes according to their anthropometric structures (Simim et al., 2013; Ozkan et al., 2012; Nowak et al., 2021) or their current athletic capacities (Simim et al., 2017; Aytar et al., 2012; Tatar et al., 2018; Maehana et al., 2018; Kurtoğlu et al., 2022). In addition, we show that many studies examine the relationship between two or more sports characteristics (Gunaydin, 2019; Miyamoto et al., Mine et al., 2014; 2019; Gunaydin, 2020; Nowak et al., 2021; Wiczorek et al., 2015). Moreover, one study examined the effect of different warming practices on sports performance (Yildiz et al., 2018). Within this frame of reference, it is important to conduct studies investigating various training models in order to improve the sports performance parameters of amputee football players.

It is thought that it is possible to optimize the sports performance of athletes with new training models. In addition to traditional training models, it can be recommended to apply new training models such as artificial electrical muscle stimulation

(EMS) training (İlbak and AÇak, 2022). In this context, innovative methods in training will be an effective strategy for individuals with missing limbs. Because even muscles that are very difficult to operate can be exercised with EMS (Taşpınar, 2007). Therefore, it will be possible to prevent the situation of not being able to get full efficiency from the training of athletes who are faced with movement restrictions due to the lack of limbs.

It is known that physical characteristics such as bodily structure are the leading factors affecting performance. If the athletes do not have the body composition (weight, BMI, % fat etc.) suitable for their branch, it is not possible for them to reach the desired performance level for this branch. In this context, Kurtoğlu et al. (2022), reported that sports performance is affected by the amputee level (Kurtoğlu et al. 2022). Moreover, just because the physical features are suitable does not mean that the athlete can show the best performance (Özkan et al., 2005). In line with the study's findings, there is a linear association between anthropometric characteristics and athletic performance (Ozkan et al., 2012; Nowak et al., 2021), and that there is a difference between athletes in terms of anthropometric characteristics according to the position played (Simim et al., 2013).

When the sports performance parameters emphasized in the research papers on amputee football players were examined, it was shown that the most examined ones were speed, strength and acceleration. However, it we see that little attention was paid to sports performance parameters such as agility, flexibility, and other motor skills. Whereas, Lowther et al. (2002) emphasized that sports performance parameters such as high-level speed, endurance, strength, agility, flexibility and the technical and tactical skills are very important in amputee football. In addition, since football is a game that requires all these features due to its game structure and rules, it is a fact that improving all these features of the athletes will positively affect the results of the competitions.

Conclusion

Our findings indicate that studies on amputee footballers do not carry out research to improve the sports performance of athletes, but mostly focus on examining the relationship between anthropometric characteristics and physical performance of athletes, or examining two or more existing sports performance parameters. Although it is important to obtain these findings, it is also important to design training models to improve current performance and investigate their effects rather than determining the

current performance of athletes. In this context, it is recommended for researchers to develop new training models in future studies and to carry out studies to improve the sports performance of amputee athletes.

Limitations

This study has potential limitations. Only scientific studies published in English were included in this study. Only scientific studies published in article format were included in this research. Only articles published on the Web of Science, Google Scholar and PubMed databases were included in this study. Also, the heterogeneity of the studies included prevented us from performing a meta-analysis.

Future research

Although it is important to obtain findings regarding anthropometric characteristics and relations between motor abilities and their current performance, it is also important to design training models to improve athletic performance and investigate their effects. In this context, it is recommended for researchers to develop new training models in future studies and to carry out studies to improve the sports performance of amputee football players.

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Revised October 2017

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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.

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Original Scientific Paper

Diet and Body Composition of Female Athletes

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Word count: 2,946

Word count: 4259

Abstract word count: 211

Number of Tables: 3

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- ✓ In one study (Reilly, 1997), soccer players
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Works by two authors

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- ✓ 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 tests 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*

Montenegrin Sports Academy welcomes you to *Dubrovnik, Croatia*

KEY DATES

- » **1st of July 2022, 24:00 CET**
Abstract submission opening and opening of registration
- » **1st of December 2022, 24:00 CET**
Abstract submission deadline
- » **15th of January 2023, 24:00 CET**
Notification to authors about acceptance
- » **1st of February 2023, 24:00 CET**
Deadline for early-bird registration for presenting authors
- » **15th of February 2023, 24:00 CET**
Deadline for late registration for presenting authors

* CET = Central European Time

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+382 69 040 150
(Available Mo-Fr 9-12 AM local Time)

E-Mail: conference@csakademija.me
www.csakademija.me



MSA Dubrovnik 2023

CONFERENCE VENUE

Hotel Croatia Cavtat, situated across the bay from the historic walls of Dubrovnik, Hotel Croatia Cavtat is a leading five-star resort and conference hotel on the southern part of Adriatic. Hotel Croatia's architecture blends seamlessly with its natural surroundings. Shaded by a pine tree forest, while offering spectacular sea views, all 487 accommodation units feature balconies which overlook the Adriatic Sea or Cavtat Bay. State-of-the-art facilities include numerous gourmet restaurants, a spa centre, and private beaches. Hotel Croatia is ideal for a broader experience of the Dubrovnik Riviera. Suited for business and relaxation alike, Hotel Croatia serves as an excellent base for exploring the city of Dubrovnik and the Dubrovnik Riviera.



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MSA Dubrovnik 2023

20th Annual Scientific Conference
of Montenegrin Sports Academy
"Sport, Physical Activity and Health:
Contemporary Perspectives"

20th - 23th April 2023

WELCOME TO DUBROVNIK

Regardless of whether you are visiting Dubrovnik for the first time or the hundredth, the sense of awe never fails to descend when you set eyes on the beauty of the old town. Indeed it's hard to imagine anyone becoming jaded by the city's white limestone streets, baroque buildings and the endless shimmer of the Adriatic, or failing to be inspired by a walk along the ancient city walls that protected a civilised, sophisticated republic for centuries.

LANGUAGE

The official Conference language is English.



FIRST ANNOUNCEMENT

Dear Friends and Colleagues,

Montenegrin Sports Academy will mark its 20th Anniversary by organising the 20th Annual Scientific Conference during 20.-23. April 2023 in Dubrovnik Croatia. The 20th Anniversary Conference will be held in Hotel Croatia, Cavtat.

Reserve your calendars, let us gather in person after these turbulent times and make our conference even more prestigious. Guarantee for our further prosperity is our international partners and Montenegrin Sports Academy. See you in Dubrovnik next spring!

We look forward to seeing you in spring 2023,

Prof. Duško Bjelica, Conference President



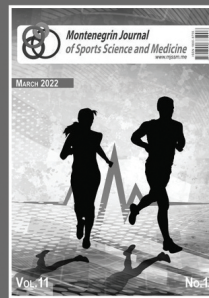
Conference sub-themes include:

Adapted Physical Activity; Anthropology; Architecture and Urbanism; Biochemistry; Biomechanics; Coaching; Economics; Health and Fitness; History; Molecular Biology; Motor Learning; Neuromuscular Physiology; Nutrition; Olympism; Philosophy and Ethics; Physical Education and Pedagogics; Physiology; Physiotherapy; Psychology; Rehabilitation; Sociology; Sport Management and Law; Sport Statistics and Analyses; Sport Technology; Sport Tourism; Sports Medicine and Orthopaedics; Training and Testing; Traumatology; and other Multi- & Interdisciplinary Themes.

CALL FOR ABSTRACTS

Research scholars and students are invited to present their original work in any of the conference sub-themes. The list of the conference sub-themes is not exhaustive and, therefore, authors should not feel limited by them. Authors can submit their original work in the form of an ABSTRACT, free of charge. An author may submit only one abstract as the first author and two abstracts as the co-author. After undergoing the reviewing process, all authors will be notified about the condition of their submission (accepted or rejected). Presenters (= the first authors) must be registered and have paid registration fees for the conference to secure their oral or poster (not debated) presentation during the conference and the publication in Montenegrin Journal of Sports Science and Medicine that is abstracted/indexed in Emerging Sources Citation Index, SCOPUS and other database, under the condition that the first author has paid registration fee.

Look inside!



Montenegrin Journal of Sports Science and Medicine

Volume 11, 2022, 2 issues per year;
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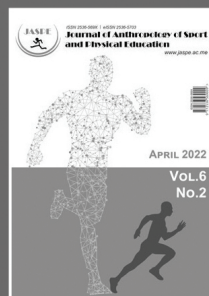
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Sport Mont

Volume 20, 2019, 3 issues per year;
Print ISSN: 1451-7485, Online ISSN: 2337-0351

www.sportmont.ucg.ac.me



Journal of Anthropology of Sport and Physical Education

Volume 6, 2022, 4 issues per year;
Print ISSN: 2636-569X, Online ISSN: 2536-5703

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CALL FOR PAPERS

Full-length manuscripts may be submitted for publishing in the Sport Mont journal (see at HYPERLINK "http://www.sportmont.ucg.ac.me" www.sportmont.ucg.ac.me), an international peer-reviewed scientific journal, indexed in Scopus, DOAJ, SPORTDiscus, Index Copernicus, ERIH PLUS, et cetera. Full-length paper submission is free of charge but author(s) has to pay additional 50 euros per accepted full-length paper to cover publication costs. Full manuscripts should be submitted for consideration of publication by the 15th of March, 2023 and prepared according to the guidelines for authors.

REGISTRATION FEES

For participants 260 EUR (220 EUR early-bird)
For students 190 EUR (160 EUR early-bird)
For accompanying persons 140 EUR (110 EUR early-bird)



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 19th Annual Scientific Conference of Montenegrin Sports Academy "Sport, Physical Activity and Health: Contemporary Perspectives" to be held in Dubrovnik, Croatia, from 7 to 10 April, 2022. 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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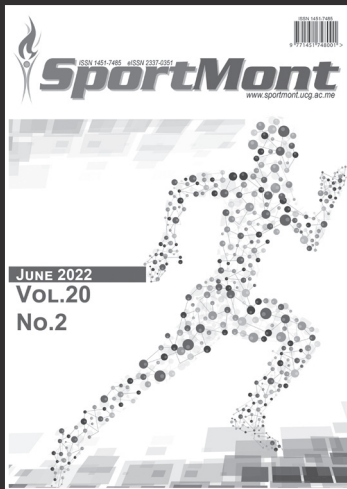
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Sports Science and Medicine Journals from Montenegrin Sports Academy

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.

Look Inside!



Sport Mont Journal

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Montenegrin Journal of Sports Science and Medicine (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.

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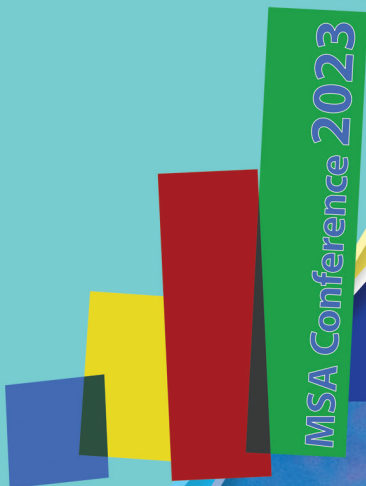
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20th - 23th April 2023,
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