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Journal of Anthropology of Sport and Physical Education

ORIGINAL SCIENTIFIC PAPER

State coaches' educational qualifications as an indicator for the coaches' legal duties knowledge in Edo State

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Abstract

The study examined state coaches' educational qualifications as an indicator for the coaches' legal duties knowledge in Edo State. The survey research design was adopted for this study. The population of the study comprised 187 coaches in Edo State. The multistage sampling technique was used to obtain 100 coaches that were used as the sample for this study. A Knowledge of Duty of Care Questionnaire (KDCQ) was the instrument used to collect data, which was validated and its reliability was established using the Crombach- Alpha statistic. A reliability of 0.72 was obtained. A null hypothesis was tested and analyzed using the Fishers exact test, at 0.05 alpha level. The Fisher's exact test gave a p-value of 0.246, leading to the conclusion that there was no significant difference in coaches' legal duties knowledge based on their educational qualifications. The null hypothesis was therefore retained and it was recommended that further studies should be carried out to investigate other factors that could be militating against coaches' legal duties knowledge towards athletes.

Keywords: *Coaches, Coaching, Athletes, injuries, legal duties knowledge and Educational Qualifications*

Introduction

The growing interest of Nigerians to participate in sports and other physical activities because of the anticipated social, mental and physical benefits has brought an upsurge in the number of young athletes in Nigeria. This led to an increase in the demand for competent coaches. (Alla, Ajibua & Amasiatu , 2015).

Worthy of note, the nature of sports has made participation enjoyable, desirous and thrilling, but at the same time it exposes participants to high risks and fatal injuries (Adodo, 2022). Consequently, there is a need to ensure that every athlete is safe enough to continue participation. Coaches should possess the required knowledge for planning and programming of the training process, in order to minimize the risk of injuries in the course of participation. In a situation where coaches do not have enough knowledge about working with athletes, ensuring their health and keeping them safe from injuries, athletes placed under their supervision may be unsafe and perhaps, the coaches could be at risk of liabilities for negligent practice.

Previous studies have shown that the relationship between knowledge and practice must be strengthened for proper and prompt usage of coaches' legal duties towards athletes. (Mohammedinejad, 2014). It is very likely that a social demographic factor such as educational qualifications, amongst other factors, could create some differences in the coaches knowledge of legal duties towards athletes. In the same vein, Mallet (2010) reported that disposition to risks by athletes during participation increases, as these athletes graduate by installment into the elite group from the amateur or grass root level. The perceived increases in the number of injuries amongst grass root athletes, that may be preventable, in most cases reflects poor coaches knowledge of legal duties towards athletes.

According to Mohamedinejad (2014), it is important to note

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that a coach cannot always be responsible for every injury suffered by an athlete just because it is presumed that it is the coach's responsibility to ensure the safety of the athlete. However, the coach would be considered responsible if it fails to accomplish reasonable care in the prevention of an athlete injury (Mirsafian, 2016). There have been research attempts to provide a comprehensive list of the items that should constitute a coach's legal duties towards athletes (Hensch, 2006).

Existing literature has revealed that amidst these plethora of items believed to constitute coaches legal duties towards athletes, researchers are unanimous that the classification of items given by Figone (1989), which was completed by Engelhorn (2005) because of its relative comprehensiveness, should be adopted as a role model for coaches legal duties towards athletes. They listed the following items:

1. Sequential planning of the activity.
2. The use of appropriate equipment.
3. Provision of warnings and instruction where necessary.
4. Appropriate supervision of athletes,
5. Provision of appropriate conditions to the athlete,
6. Warning about the risks of the activity,
7. Provision of post injury care,
8. Offer of appropriate activities,
9. Keeping records as appropriate
10. Abiding by the appropriate rules and regulations.

The listed legal duties according to Mirsafian (2016), has become the standard upon which coaches' legal duties towards athletes, are evaluated, especially in the concluding years of the second decade of this century.

Methods

The descriptive survey research design was adopted as the design of this study. It enabled researchers to gather information about the knowledge of coaches with regard to their legal duties towards athletes.

The populations under study includes 187 coaches across the Edo State Sports Commission, tertiary institutions and registered sports clubs in Edo State, as shown in Table 1.

Table 1. The Population of Coaches in Edo State

S/N	Institution /Facility	Local Government	Number of Coaches
1	Ambrose Alli University, Ekpoma	Esan West	3
2	Benson Idahosa University, Ugbor	Oredo	11
3	Edo State Sports Commission	Oredo	143
4	Edo State Polytechnic- Usen	Ovia North East	1
5	Edo State University- Uzairue	Etsako West	4
6	Federal Polytechnic – Auchi	Etsako West	11
7	Igbinedion University- Okada	Ovia North East	1
8	University of Benin- Ugbowo	Ovia North East	10
9	Registered Professional Clubs	Ovia North East and Etsako West.	3
		Total	187

Source: Offices of the Directors of Sports (2021)

Sample and Sampling Technique

A total of 100 coaches were drawn as the sample for this study, using the multistage sampling procedure. The multistage sampling procedure was employed as follows;

Stage one: Purposive sampling technique was used to select the local government areas based on the availability of sports facilities and the presence of coaches with responsibilities of legal duties. 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 selected was: Esan West, Etsako West, Oredo and Ovia North East.

Stage Two: Proportionate sampling technique was employed at this stage. Fifty percent (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 Three: Simple random sampling technique was then used to draw out the 50% of the coaches to be used as sample. This was done through balloting with replacement.

Research Instrument

The instrument used in this study was a questionnaire tagged "Knowledge of Duty of Care Questionnaire" (KDCQ). The Knowledge of Duty of Care Questionnaire (KDCQ) developed by Mohamedinejad (2014), was adapted to collect data on the knowledge of coaches with respect to their legal duties.

The Knowledge of Duty of Care Questionnaire (KDCQ) was made up of two sections; sections A and B. Section A elicited demographic information about age, gender, educational qualification, years of coaching experience and employment status and section B, was comprised of 40 items, covering the scope of coaches knowledge of legal duties towards athletes and this includes: sequential planning of the activity, ensuring the use of appropriate equipment, providing 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, offering appropriate activities, keeping records as appropriate and abiding by the appropriate rules and regulations. Responses were rated as; Strongly Agree (SA) =4, Agree (A) = 3, Disagree (D) =2 and Strongly Disagree (SD) =1.

Validity and Reliability of the Instrument

The instrument was validated and the reliability of the instrument was tested using the Cronbach alpha (α) statistic. The Knowledge of Duty of Care Questionnaire (KDCQ) was administered to thirty randomly selected coaches, 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 yielding a reliability coefficient of 0.72. This indicated that the internal consistency of the items in the instrument was good and the instrument was considered reliable.

Method of Data Collection

The research instrument, KDCQ, was administered by the re-

searcher and three trained research assistants to the respondents. A two-week duration was given to enable the respondents to complete the KDCQ. Upon the completion of the KDCQ, questionnaires were retrieved from the respondents by the researcher and the research assistants.

Results

Ho: There is no significant difference in coaches' knowledge of legal duties based on their educational qualifications.

The result in Table 2 shows the descriptive and Fisher's exact test of difference in coaches' knowledge of legal duties towards athletes based on educational qualifications. The frequency of responses shows that coaches with Primary Sch. Cert strongly agree, three coaches with National Certificate in Education agree and twelve coaches with National Certificate in Education strongly agree respectively. Coaches with Higher National Diploma had two disagreeing while majority twenty-five strongly agreed. Similarly, coaches with B.sc (Ed) in coaching had majority (23) and one coach agreeing, while two disagreed. Coaches with B.sc in Human Kinetics also had majority strongly agree and one agree. Finally coaches with M.sc and other higher qualifications had all of them strongly agree. Majority (91 coaches) indicated strongly agree to the knowledge of duty of care of athletes statements. This is an indication that the coaches' knowledge of legal duties was generally high.

However, the Fisher's exact test shows a p-value of 0.246 at 0.05 alpha level. The p-value of 0.246 is greater than the alpha level of 0.05, and this indicates a no significant difference in coaches' knowledge of legal duties based on their educational qualifications. The null hypothesis is therefore retained

Table 2. Fishers-Exact test of difference in Knowledge of Duty of Care towards Athletes based on Coaches Educational Qualifications.

Descriptive					
		Knowledge category			Total
		Disagree	Agree	Strongly Agree	
Educational Qualifications	Primary Sch. Cert	0	0	1	1
	National Cert. Educ.	0	3	12	15
	Higher National Diploma	2	0	25	27
	B. sc (Ed) coaching	2	1	23	26
	B. sc (Ed) Human kinetics	0	1		17
	M.sc and Others	0	0	14	14
	Total	4	5	91	100

Chi-Square					
	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	12.873a	10	0.231	0.188	
Likelihood Ratio	13.580	10	0.193	0.189	
Fisher's Exact Test	11.576			0.246	
Linear-by-Linear Association	1.298b	1	0.255	0.276	0.145
N of Valid Cases	100				

a. 13 cells (72.2%) have expected count less than 5. The minimum expected count is .04.
b. The standardized statistic is 1.139.

Discussion

This study sought to find out the differences in coaches' knowledge of legal duties towards athletes based on their educational qualifications. The findings show that coaches knowledge of legal duties towards athletes across the various educational levels was high. The Fisher's exact test analysis showed that there was no significant difference in coaches' knowledge of legal duties towards athletes based on their educational qualification. The finding of this study was in agreement with the findings of the study of Gilbert and Trudel, (2001) and Werthner and Trudel (2006), who reported that formal education of coaches was merely a personal endeavor because it was done for arbitrary reasons (e.g. job promotion and other intrinsic factors) and not because they wanted to know more about coaches legal duties with respect to the demands of the coaching profession. It is also important to state that Nelson, Cushion and Potrac (2006) had in an earlier study reported that formal education programmes had little effects on the development of coaches. The finding of this study further confirms the report of Okoro (2000), who reported that graduates from the Human Kinetics programme in Nigeria, could at best, function as game masters. These reports put a question mark on the course content of the Human Kinetics programme in Nigeria Universities.

Findings in this study are not in line with the study of Castro (2010), who reported that educational background (i.e., bachelor's degree, master's degree or Ph.D.) was a key factor in the knowledge of coaches about their legal duties towards athletes. However, Amusa (2000) and Okoro (2000) explicitly argued that the undergraduate course content in Physical Education, now Human Kinetics, in Nigeria Universities, was not designed in a way that would make graduates proficient in the coaching profession. Perhaps, this assertion cannot be glossed over, based on the understanding that the Human Kinetics programme in Nigeria Universities remains the only graduate programme available to coaches, as against the Higher National Diploma (HND) awarded by National Institute of Sports, Nigeria. It is undisputable that the education and continuous training of coaches is considered an essential process in the improvement of sports coaching globally.

In Nigeria, graduates of Human Kinetics can only specialize in coaching at the post graduate level, or perhaps if they elect to enroll themselves at the National institute for sports. The Human Kinetics and Sports Science department of the University of Benin, Benin City-Nigeria, has made an impressive attempt to change the method of training, by ensuring that students will fulfill internship programmes called practicum that will include coaching in any sport of their choice. Perhaps, this may trigger the impetus needed for the innovation and change of the undergraduate curriculum as advocated by Ojeme (2000), in line with the contemporary realities of sports and the coaching profession in Nigeria.

The Human Kinetics curriculum since inception has also been reputed to be a teacher education programme designed specifically, in all ramifications to produce teachers of physical and health education, which no doubt has affected its orientation, application and perception (Ojeme,2000). One of the major weaknesses identified by researchers (Ojeme, 1987; Ojeme 2000) was its inability to provide the needed content to its graduates, to enable them provide the expected solutions to some social problems in the society. Ensuing from this background, there seems to be a manifest problem, which is, its relevance to the needs of the coaching profession in particular and society in general.

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

Taking everything into consideration, further studies with respect to the competence of Nigerian coaches will be required. It is rather too unfortunate, that coaching has become everybody's business in Nigeria. There have been numerous instances where uncertified individuals are employed as Coaches to coach teams at the grassroots and elite levels on the basis of being an ex-international or related to those in the corridors of power. These by any stretch of imagination, are not enough to certify an individual as a coach. According to Okoro (2000), the lack of knowledge in any of the course experience that have been designed for coaches, will make such a coach ineffective on the job. The practice of hiring coaches without evidence of exposure to the core experience designed for coaches in Nigeria, but on the basis of being a former athlete or player, is not appropriate for sports development in any state.

Conclusion

Based on the findings of this study, the following conclusions were made:

- Coaches' knowledge of legal duties towards athletes across the various educational levels was high.
- Coaches' knowledge of legal duties towards athletes was not affected by their educational qualifications.
- The upsurge in preventable sports injuries could be as result of the poor practice of legal duties towards athletes and not as a result of lack of knowledge.

Recommendations

Based on the findings, the following recommendations were made:

- Further studies should be carried out to investigate other factors militating against coaches' knowledge of legal duties towards athletes.
- Qualitative studies should be carried out with respect to the practice of legal duties towards athletes by coaches, as this could possibly help in the understanding of how much of this knowledge are put into practice.
- There is need for a review of coaches' education in Nigeria to reflect the best global practices with respect to coaches' legal duties towards athletes.

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ORIGINAL SCIENTIFIC PAPER

Challenge-based games' impact on manipulative motor skills, direction-following, and body awareness in children with mental disabilities

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Abstract

Children with mental disorders have a variety of barriers to social behavior and physical function, which causes many disruptions in motor activities. The purpose of the current study is to show how manipulative basic movement, directions, and body awareness in mentally challenged people are affected by the application of development games. Children with mild mental disabilities will receive treatment using the five basic games. The major conclusions of this study point to the effectiveness of the game model developed for strengthening the manipulative fundamental movement abilities, directions, and body awareness of mildly mentally impaired individuals.

Keywords: *Manipulative movement, Directions and body awareness, Mental disabled*

Introduction

Due to their learning challenges, social impairments, and learning limits, children with mental disabilities require learning assistance that are referred to as special needs. To understand the limitations of children who are mentally impaired, it is thought vital to identify their condition (Linden, 2017; Zhang et al., 2020). A teacher must be able to adapt lessons to the needs of a mentally impaired student by being aware of the limitations of the child.

The physical functioning and social behavior of children with mental disorders are frequently hampered, which causes numerous interruptions in motor activities. As a result of central abnormalities connected to mental and intellectual function, the motor center of the brain has been disturbed. (Lai, Ang, Por, & Liew, 2018; Nijhof et al., 2018; Suherman, Dapan, Guntur, & Muktiani, 2019). The development of kinesthetic awareness-related behavioral traits, such as body awareness, spatial awareness, and directional awareness, is required to help mentally impaired children to move more effectively. This may enhance the quality of their physical functions and accelerate their development as well. As a result, physical education classes are necessary for providing learning services for children who are intellectually challenged.

Children with mental disorders are not exempt from the rules of engaging learning, one of which is playing (Mesa, Le, & Beidel, 2015; Ogden, Carroll, Kit, & Flegal, 2014). Children can develop their bodies, minds, emotions, and social skills through play. Playing allows children to develop physically.

Running, throwing, catching, striking, and jumping are fundamental manipulating movement skills that benefit from, and are influenced by net play (Nacher, Jurdi, Jaen, & Garcia-Sanjuan, 2019; Stylianou, Kloeppel, Kulinna, & Mars, 2016). The occurrence of movements in online games that result in fundamental manipulative movement abilities serves as evidence for this. Additionally, mentally challenged kids can learn directional awareness skills through online games, which will help them stimulate their nerve function and grow normally. Applying fundamental manipulating movement techniques, such as throwing to the right, throwing left, hitting forward, hitting backward, and so on, can also help with direction awareness (Nacher et al., 2019; Yang, Hwang, & Sung, 2020). Children have the ability to respond to direction information by experiencing these motions.

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Children with modest mental disabilities still have very limited basic manipulation skills, and their kinesthetic awareness is still underdeveloped. This is due to the difficulties that mentally retarded children face in developing their physical abilities. As a result, they struggle with their perceptual motor skills, lack of directional awareness and a lack of ability to adapt to game variations that can increase manipulative basic movements. Therefore, the purpose of this study was to examine the extent to which developmental games can affect the ability of mentally disabled children to manipulate their bodies and follow orders.

Methods

Additionally, the pretest and posttest outcomes will be compared using the same design as the one-group pretest-posttest design study. Children with mild mental retardation will receive treatment with 5 core games (throw the shuttlecock, shuttlecock soar, the ball entered the ring, basket ball, shoot the ball), which were developed in this study to improve basic manipulative and directional awareness in children with mild mental retardation. These games will be used 4 times during the course of the treatment.

Mild mental retardation is characterized by having an IQ between 50 and 75, experiencing delays in physical development, motor abilities, language, intelligence, and social skills, and having limits in some areas of life, however basic life skills can still be taught. The study was approved by the Universitas PGRI Semarang Ethics Committee.

Statistical analysis

Prior to the start of field trials, quantitative data analysis was done on data collected from the observations of physical education teachers for mentally challenged children, adaptive sports experts, and physical education learning experts. The models developed, especially in the field trial stages, both on a small and large scale, were subjected to qualitative data analysis on data from observations of physical education learning experts, mentally impaired sports specialists and/or physical education teachers. In order to compare the pretest and posttest outcomes, a t-test for dependent samples was applied. The significance level was set to $p<0.05$.

Results

The outcomes demonstrated the game's efficacy by demonstrating a significant change at $p<0.05$, and the game was therefore deemed successful in enhancing the cognitive abilities of kids with mental disabilities (table 1). Similarly, there are notable differences, therefore the game is thought to be useful for enhancing the affective qualities of kids with mental retardation (table 2).

Children with mental retardation can significantly improve their psychomotor skills by playing the game of throwing right at the target (table 3). According to the results of the t-test in Table 4, the significant value is $p<0.05$, indicating that the game of throwing in the direction is also very beneficial for enhancing the psychomotor features of throwing according to the direction in mentally retarded children.

Table 1. Cognitive aspects' in pretest and posttests.

No	Games	Pre-test	Post-test	Sig
1	Send the shuttlecock flying	6.78±0.28	8.56±0.67	0.001
2	Jumping Shuttlecock	5.66±0.33	7.68±0.65	0.003
3	The ball rolled into the ring.	5.78±0.35	8.76±0.14	0.001
4	Basket Ball	5.78±0.35	7.78±0.22	0.001
5	Strike the Ball	6.48±0.25	8.76±0.13	0.033

Table 2. Affective aspects in pretest and posttest.

No	Games	Pre-test	Post-test	Sig
1	Send the shuttlecock flying	6.13±0.51	8.21±0.12	0.001
2	Jumping Shuttlecock	5.25±0.48	8.21±0.71	0.001
3	The ball rolled into the ring.	4.78±0.67	7.22±0.13	0.001
4	Basket Ball	5.68±0.37	8.32±0.22	0.001
5	Strike the Ball	6.20±0.38	7.32±0.13	0.001

Table 3. Psychomotor aspects (throwing on target) in pretest and posttest

No	Games	Pre-test	Post-test	Sig
1	Send the shuttlecock flying	12.76±0.21	16.75±0.23	0.001
2	Jumping Shuttlecock	13.50±0.22	15.72±0.22	0.001
3	The ball rolled into the ring.	16.57±0.32	21.68±0.72	0.001
4	Basket Ball	17.21±0.33	21.79±0.48	0.001
5	Strike the Ball	16.62±0.34	23.48±0.48	0.001

Table 4. Psychomotor aspects (throwing according to direction) in pretest and posttest

No	Games	Pre-test	Post-test	Sig
1	Send the shuttlecock flying	12.21±0.18	14.71±0.25	0.001
2	Jumping Shuttlecock	13.68±0.10	15.24±0.11	0.002
3	The ball rolled into the ring.	12.42±0.21	15.25±0.76	0.001
4	Basket Ball	13.31±0.19	15.74±0.25	0.001

Discussion

Children with mental retardation can benefit from playing net games like "throw the shuttlecock," "throw the shuttlecock soar," "the ball entered the ring," "basket ball," and "shot the ball" over the course of four meetings. After receiving the game, youngsters with mental retardation showed complete completion of their abilities in all areas.

This is supported by pertinent research by Kennedy-Behr et al (2013) which demonstrates the creation of a game model that is highly structured, efficient, and enjoyable. This is further supported by Frantz et al (2011), who found that the integrated physical activity game for kindergarten students contains seven models, each of which is a good and useful tool for transferring the objectives of the cognitive, affective, perceptual-motor, and psychomotor domains to be accomplished with each game.

The improvement in skills is the result of the child associating knowledge from the previous meeting with new knowledge, and the association gets stronger with each repetition. This is based on the law of practice learning theory proposed by Griffiths et al (2010), which claims that repetition is the key to learning and that the more times a subject is practiced, the more proficient a student will become. Research by Hands & Martin (2003), which discovered that physical activity learning programs (basic movements) combined with learning in schools can considerably improve cognitive, psychomotor, and emotional capacities, lends credence to the findings of this study.

Furthermore, Hardy et al (2010) contend that given the advantages it confers on physical, social, and psychological health, physical activity is crucial for all kids. Children's health—physical, social, and emotional—benefits greatly from physical activity. This demonstrates how engaging in physical activity helps children develop socially, psychomotorly, and intellectually, as well as how it improves their physical health.

The findings of a study by Fedewa (2011), which revealed that physical activity has a significantly good impact on children's cognitive outcomes and academic achievement, support the claim that physical activity influences cognitive development. Children's academic progress and increased cognitive capacities are both benefits of physical activity. In addition, physical activity helps enhance kids' social skills. According to Liu et al (2010), physical education can have a positive psychological impact through fostering children's ability to respond appropriately in social and personal contexts as well as helping them develop their psychomotor abilities. According to the study's findings, playing large-scale ball games with children repeatedly will create permanent brain connections that will enhance children's ability to recognize letters, concepts, and number symbols (cognitive abilities), fundamental motor skills, and the development of active and happy (affective) lifestyles.

Conclusion

The goal of strengthening manipulative basic movement skills, following directions, and body awareness in mildly mentally disabled children who wish to be achieved in every game is effectively transferred by the game model that has been developed. The output of this development only takes the form of a net game model that helps kids with minor mental retardation learn their basic manipulating movement abilities and body and directional awareness. For additional research, it can create different game-like tasks or continuing creating game models while trying to improve other skills.

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Conflict of Interest
The authors declare that there are no conflicts of interest.

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ORIGINAL SCIENTIFIC PAPER

Differences in morphological characteristic of footballers over two preparatory periods

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Abstract

The morphological characteristics of athletes are one of the essential factors of sporting achievements in different sports. Football is one of the sports where monitoring changes in the morphological characteristics is a standard process for monitoring training effects. Purpose of this paper was to show changes in the morphological characteristics of footballers over two preparatory periods during one year. Morphological characteristics of footballers were analyzed using a bioelectric impedance method on body analyzer Tanita MC 780, height was measured using SECA type 220. Statistical analysis was done with IBM SPSS Statistics 26, with statistical significance set at p≤0.05. During the first preparatory period, statistically significant changes were found for the following variables: Total body water (TBW) (MD= -0.86; p=0.02), Intra celular water (ICW) (MD= -0.70; p=0.03), Percent Muscle Mass (PMM) (MD= -1.04; p=0.012). During the second preparatory period, statistically significant changes were found for the following variables: Percent Body Fat (PBF) (MD= -1.40; p=0.02), TBW (MD= 1.25; p=0.01), ICW (MD= 0.10; p=0.004), PMM (MD= 1.30; p=0.01). Concerning the obtained results, we conclude that the training process is not the only factor influencing the morphological characteristics of athletes.

Keywords: *Body Composition, Body Water, Athletes, Muscles*

Introduction

Different sports require different adaptations of athletes in terms of motor and functional ability development. Training processes are intended for the development of specific sports needs in order for athletes to achieve the best possible results. Except for the development of specific abilities of athletes, training processes influence the composition of the athletes' body, percentage of fat and muscle, amount of water in the body etc. Football is an extremely demanding sport activity that requires specific physical adjustments from sportsmen in order to achieve maximum impact on the field. Physique of the football player is closely related to its performance (Spehnjak et al., 2021).

In football, the specific position on the field and the level of competition are set by different requirements, which is why the players differ among themselves in the structure of the body considering the position they have on the ground and the level of competition they participate in (Leao et al., 2019; Slimani & Nikolaidis, 2017) The correlation between morphological characteristics and specific test results for footballers was also found in younger age groups (Esco et al., 2018).

Football is an extremely popular sport all over the world and there are many players as well as research related to fotball. Over time, the minimum requirements that a football player has to meet for a certain level of competition in order to be successful have been defined (Dodd & Newans, 2018), which helps athletes selection. Everything is further complicated considering that performance and body structure are also affected by other factors such as nutrition (Hulton et al., 2022), and periods of the season (Clemente et al., 2021). In order to establish the current condition of the player, i.e. its performance and morphological characteristics, various measurement and testing methods are used. As regards to morphological characteristics, the sim-

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ple, widely represented and reliable method of analysis is the bioelectric impedance (BIA) (Tereso et al., 2021; Vasold et al., 2019). Analysing the morphological characteristics of football players, we receive feedback about the positive impact or lack of training processes on the athletes' organism, as well as indirect information about eating habits. (Devlin et al., 2017). The aim of this paper was to analyse changes in the morphological characteristics of football players during two preparatory periods in one season.

Methods

The research was conducted at the College of Applied Sciences „Lavoslav Ružička" in Vukovar during 2021. The measurements were taken on the 29th of January, 16th of March, 15th of July and 18th of September. The sample consisted of football players from 1st team of the Vukovar '91 football club competing in the 3rd Croatian National League.

The initial sample consisted of 11 players age 22.11 ± 1.9 years, 2 players did not participated in all measurements and their results were not taken into account.

The morphological characteristics of the players were analysed using the bioelectric impedance (Tanita MC 780), the height was measured using the SECA 220 with an accuracy of 0.1 cm. The measurements were made 4 times, before and after each preparatory period. Body weight (TT/kg), body height (TV/cm), body mass index (BMI/kg/m^2), percent body fat (PBF/%), total body water (TBW/%), extra cellular water (ECW/%), intra cellular water (ICW/%), percent muscle mass (PMM/%) were measured. All measurements were made at the same time between 08:00 and 09:30 hours, at the same room temperature (22°C) according to the BIA method: without food and drink before measurement, empty bladder, without intense physical activity during the previous 24 hours.

Ethics

This study was approved in advance by the Ethics comitee of College of Applied Sciences „Lavosalv Ružička" in Vukovar. Each participant voluntarily provided written informed consent before participating.

Statistical reporting

One factor analysis of variance for repeated measurements with Bonfferoni correction was used for statistical data processing. Statistical significance was determined at p≤0.05. Data were processed using IBM SPSS Statistics 26 (IBM Statistics, 2019).

Results

Under the influence of factor time/training, body weight did not change significantly during four measurements (F(3, 0.77)=0.57; p=0.64; Part η^2=0.07). The body mass index did not change significantly (F(3, 0.79)=0.56; p=0.65; Part η^2=0.07) (Table 1).

Table 1. Basic Descriptive Statistics and Characteristics of Distribution for Variables: Age, Height, Body Weight, Body Mass Index Presented by Arithmetic Mean and Standard Deviation

variables	N	Minimum	Maximum	AM	SD	p value
age	9	20,00	26,00	22,11	1,90	
height	9	158,00	197,50	175,61	10,78	
BW1	9	61,50	87,20	70,70	8,59	0.64
BW2	9	61,10	84,60	70,78	8,06	
BW3	9	60,50	86,60	71,36	8,97	
BW4	9	61,90	85,80	70,99	8,14	
BMI1	9	19,50	25,10	22,92	1,61	0.07
BMI2	9	19,40	25,10	22,96	1,72	
BMI3	9	19,20	25,50	23,13	2,00	
BMI4	9	19,60	25,30	23,02	1,80	

Note. TT: body weight; BMI: body mass indeks; AM: arithmetic mean; SD: standard deviation; N: number of cases

Statistically significant changes occurred in the variables percent body fat (F(3, 6.14)=4.91; p=0.008; Part η^2=0.38) and percent muscle mass (F(3, 4.47)= 9.83; p=0.00; Part η^2=0.55) (Table 2).

Variables related to body water, total body water (F(3, 3.65)=11.39; p=0.000; Part η^2=0.59), intracellular water (F(3,

Table 2. Basic Descriptive Statistics and Characteristics of Distribution for Variables Percentage of Body Fat, Percentage of Muscle Mass Presented by Arithmetic Mean and Standard Deviation

variables	N	Minimum	Maximum	AM	SD	p value
PBF1	9	9,40	16,90	14,86	2,21	0.008
PBF2	9	6,20	16,70	13,53	3,23	
PBF3	9	7,10	17,70	13,31	3,10	
PBF4	9	9,70	18,20	14,83	2,68	
PMM1	9	49,80	70,60	57,16	6,90	0.00
PMM2	9	50,50	71,20	58,13	6,82	
PMM3	9	50,70	74,00	58,72	7,52	
PMM4	9	49,90	71,20	57,44	7,00	

Note. PBF: percent body fat; PMM: percent muscle mass; AM: arithmetic mean; SD: standard deviation; N: number of cases

Table 3. Basic Descriptive Statistics and Distribution Characteristics for Variables Total Body Water, Extracelluar Water, Intracellular Water Represented by Arithmetic Mean and Standard Deviation

variables	N	Minimum	Maximum	AM	SD	p value
TBW1	9	40,00	52,20	43,90	4,45	0.000
TBW2	9	40,60	52,80	44,76	4,39	
TBW3	9	40,80	55,20	45,29	4,99	
TBW4	9	40,10	52,70	44,09	4,57	
ECW1	9	15,80	20,30	17,27	1,54	0.01
ECW2	9	15,90	20,10	17,42	1,42	
ECW3	9	16,00	20,60	17,58	1,60	
ECW4	9	15,10	20,10	17,22	1,57	
ICW1	9	23,70	31,90	26,63	2,94	0.001
ICW2	9	24,70	32,70	27,33	3,01	
ICW3	9	24,80	34,60	27,71	3,41	
ICW4	9	23,80	32,60	26,76	3,16	

Note. TBW: total body water; ECW: extracellular water; ICW: intracellular water; AM: arithmetic mean; SD: standard deviation; N: number of cases

2.29)=11.92; p=0.000; Part η^2=0.60) and extracellular water (F(3, 0.23)=4.33; p=0.01; Part η^2=0.35) have also changed significantly (Table 3).

After Bonfferoni correction statistically significant differences were maintained for the following variables: percent body fat between the third and fourth measurement, i.e. within the second preparatory period (13.31%±3.10% vs. 14.83%±2.68%; MD=-1.52; p≤0.05), total body water between the first and second measurement during the first preparatory period (43.90%±4.45% vs. 44.76%±4.39%; MD=-0.86; p≤0.05) and between the first and the third measurements (43.90%±4.45% vs. 45.29%±4.99%; MD=-1.38; p≤0.05), between the initial measurement and the end of the first part of the season. Statistically significant changes of total body water were also recorded in the second preparatory period between the third and fourth measurement (45.29%±4.99% vs. 44.09%±4.57%; MD=1.20; p≤ 0.05) (Table 4.).

Intracellular water changed significantly during the first preparatory period between the first and second measurement (26.63%±2.94% vs. 27.33%± 3.01%; MD=-0.70; p≤0.05), as well as between the first and the third measurement (26.63%±2.94% vs. 27.71%±3.41%; MD=-1.08; p≤0.05). Statistically significant changes were also observed during the second preparatory period between the third and fourth measurement (27.71%±3.41% vs. 26.76% ±3.16%; MD=0.96; p≤0.05) (Table 4.).

Table 4. Differences between observed variables after Bonferroni correction

variables		AM±SD	MD	p value
PBF3 (13,31±3,10)	PBF1	14,85±2,20	-1,54	0.31
	PBF2	13,53±3,23	-0,22	1.00
	PBF4	14,83±2,68	-1,52	0.03
TBW1 (43,90±4,45)	TBW2	44,75±4,40	-0,86	0.04
	TBW3	45,29±5,00	-1,39	0.01
	TBW4	44,09±4,57	-0,19	1.00
TBW3 (45,29±5,00)	TBW4	44,09±4,57	1,20	0.02
ICW1 (26,63±2,94)	ICW2	27,33±3,01	-0,70	0.02
	ICW3	27,71±3,41	-1,08	0.01
	ICW4	26,75±3,16	-0,12	1.00
ICW3 (27,71±3,41)	ICW4	26,75±3,16	0,96	0.01
PMM1 (57,15±6,90)	PMM2	58,13±6,82	-0,98	0.05
	PMM3	58,72±7,52	-1,57	0.02
	PMM4	57,44±7,00	-0,29	1.00
PMM3 (58,72±7,52)	PMM4	57,44±7,00	1,28	0.03

Note. PBF: percent body fat; TBW: total body water; ICW: intracellular water; PMM: percent muscle mass; AM: arithmetic mean; SD: stansard deviation; MD: mean difference.

Percent muscle mass changed significantly between the first and second measurement during the first preparatory period (57.16%±6.90% vs. 58.13%±6.82; MD=-0.98; p≤0.05), as well as between the first and the third measurement (57.16%±6.90% vs. 58.72%±7.52%; MD=-1.57; p≤0.05). Statistically significant changes were also observed during the second preparatory period or between the third and fourth measurement (58.72%±7.52% vs. 57.44%±7.00%; MD=1.28; p≤0.05) (Table 4.).

Discussion

Total body weight did not change significantly during both the preparation periods and the season, however, there were significant changes in morphological characteristics. Percent body fat (PBF) which is one of the important factors affecting the performance of players, with its lowest value (13.31±3.10%), is far greater than for elite players in Croatia (11.9 ± 3.1%) (Sporiš et al., 2009). During the first preparatory period, there was a decline in PBF which was not significant, the decline continued during the season at the end of which it reached the abovementioned lowest value. It is interesting that the only significant change in PBF was recorded during the second preparatory period and was negative, there was an increase in the percentage of fat tissue. The expected result for PBF during the preparations is its reduction (Krespi et al., 2018). The reason for this result is probably the combination of the training process and the diet of the athletes (Devlin et al., 2017).

The total body water (TBW) as well as intracellular water (ICW) increased significantly during the first preparatory period and during the season, then significantly reduced during the second preparatory period. Since water is the basic component of the human body and represents 76% of muscle mass (Lorenze et al., 2019) these changes also indicate changes in muscle mass. ICW is associated with muscle strength and functional capacity, indicating the quality of muscle and cellular hydration (Lorenze et al., 2019). As the content of TBW and ICW is positively linked to the muscle function (Hetherington-Rauth et al., 2019), and hence to the performance of the players (Martins et al., 2021), it can be assumed that their reduction during the second preparatory period affected the reduction of the same, which is contrary to what the preparations are intended to achieve.

Since the muscle mass is directly related to the amount of body water, this change in the amount of TBW and ICW is directly related to the changes in the percentage of muscle mass (PMM), which was changed in the same way as TBW and ICW. There was an increase during the first preparatory period and during the season, while during the second preparatory period there was a decrease. Since muscle mass is positively related to muscle function (Alvero-Cruz et al 2021), it should be emphasized that reduction in PMM during the second preparatory period is a negative effect.

The goal of training processes during the season or preparations in every sport, including football is to improve the ability of athletes. Specific training lead to the improvement of certain abilities and morphological characteristics of athletes (Styles et al., 2016; Suares - Aroness et al., 2018).

This study analyses only the body components of football players without testing their motor and functional abilities. Regardless of this deficiency and considering the relationship between morphological characteristics, muscular and functional abilities, it can be said that the first preparatory period has achieved its goal and the second has not.

Analysing the morphological characteristics of football players using a bioelectric impedance over a shorter period of time would help prompt interventions to avoid any adverse changes.

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ORIGINAL SCIENTIFIC PAPER

Body height prediction of young volleyball female players

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Abstract

The aim of this study is to predict the „adult" body height of female volleyball players by using the method of Sherar et al. The sample of participants included 49 senior Croatian female volleyball players (22.14±1.26 years). Varibales assessed were: Body height, Body mass, Age at Peak height velocity (PHV), Coefficient of variation in PHV, Prediction of adult height, and Variation in predicted adult height. T test was used to analyze the differences between active volleyball players and drop-outs, 8 years after the first measurement of anthropometric characteristics, with the level of significance set at p≤0.05. By using the Bland-Altman method, a plot of the differences between the measured body height and the lowest predicted body height was presented. The obtained results indicate that the predictive values of adult body height in active volleyball players are lower than the actual values, i.e., drop-outs have lower values of deviation from actual adult body height. Significant differences were found between active and inactive volleyball players/drop-outs in the 4 applied variables.

Keywords: *Anthropometric characteristics, Bland-Altman method, Prediction of body height, Volleyball*

Introduction

Volleyball is a sport that is divided into 2 complexes (attack and counter-attack); complexes consist of phases (serving, receiving serve, setting for spike in attack, spike in side-out attack, spike coverage for side-out attack, blocking, court defense, setting for counter attack, spike on counterattack and spike coverage on counterattack) (Valladares, García-Tormo & João, 2016). The phases consist of technical and tactical elements and volleyball players perform five specific playing roles during the game (outside hitter, libero, setter, middle blocker, opposite). (Valladares, García-Tormo & João, 2016). Regardless of the specificity of the playing roles, each player should be able to perform the elements of volleyball with equal quality so that the player can specialize in a particular position. Specialization in volleyball is very complex and demanding, and the determination of playing positions is based on various factors, body height being one of the most important.

Body height is largely genetically determined, and there are various indicators of final body height. Arm span has proven to be one of the more reliable predictors of body height (Popović, Bjelica, Tanase, & Milasinovic, 2015; Mitrović, 2018; Radulović and Kovačić, 2018; Vukotić, 2018; Radulović, 2019). Also, the following indicators are used: sitting height, upper arm length, upper leg length (Mirwald, Baxter-Jones, Bailey & Beunen, 2002). Previous research has shown differences in the longitudinal dimensionality of the skeleton and the volume and mass of the body between female volleyball players of different age groups (Grgantov, Katić & Janković, 2006). According to Milić (2014), indicators of biological age significantly affect differences between playing positions when observing body height, body mass and body mass index.

Furthermore, Mirwald, Baxter-Jones, Bailey & Beunen (2002) longitudinally track a sample of 152 Canadian children (79 boys, 73 girls) through adolescence from the ages of 8 to 16 years. To calculate the age of Peak height velocity, (PHV) they used 3 morphological measures (body height, sitting height and leg length). Likewise, Sherar, Mirwald, Baxter-Jones & Thomis, (2005) in a sample of 224 boys and 120 girls determined how

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adult body height can be predicted using maturity-derived reference values and sex-specific cumulative velocity curves. The authors finally conclude that this method is valid, non-intrusive, cheap and simple and can predict adult height within ±5.35 cm with 95% certainty in boys and ±6.81 cm with 95% certainty in girls.

Following the above, in this work we will apply the modified Mirwald equation according to Sherar, Mirwald, Baxter-Jones & Thomis (2005) applying it in the calculation of the prediction of the final height of young volleyball players. The main goal of the research is to predict the final body height of volleyball players. Also, the goal is to compare the values obtained by the mentioned method with the currently measured (achieved) body height, and to determine possible differences between two groups of volleyball players: active and those who have given up sports activities in the meantime.

Methods

Subjects

The sample of subjects represents 49 Croatian volleyball players of the senior age group, with an average chronological age of 22.14±1.26 years. The subjects were divided into 2 groups: active (N=26) and inactive (N=23). The inactive group is represented by those volleyball players who, during a period of 8 years, have given up actively playing volleyball.

Variables and procedures

Body height and Body mass were measured according to the ISAK protocol (Stewart, Marfell-Jones, Olds and De Ridder, 2011). Measurements were repeated twice and the mean average was considered for analysis (Milić, 2014). The values represent the achieved final body height and body mass.

Age at Peak height velocity (PHV) was determined according to the method of Mirwald, Baxter-Jones, Bailey and Beunen (2002), Coefficient of deviation from PHV and Prediction of body height was calculated using the method of Sherar et al. (2005) which were performed based on the initial measurement of variables 8 years ago (body height, sitting height, chronological age) and the variable deviation from final body height (difference between achieved and predicted body height).

Experimental procedure

In the first phase of the research, in 2014, with the prior consent of the volleyball clubs, dates and volleyball training halls were agreed for conducting the measurements. The parents of the volleyball players (minor of age at that time) received instructions and were informed about the purpose of the research. The coaches collected written consent from the parents for their children to participate in the study. Permission was also obtained from the regional volleyball associations and the Croatian Volleyball Association. All measurements were made in the morning by only one assessor (Milić, 2014).

In the second phase of the research, after 8 years, the anthropometric characteristics (body height and body weight) were measured again, and the status of the volleyball players was determined with regard to their active training or giving up on volleyball.

Statistical analysis

Data processing methods included the calculation of descriptive statistical indicators of the distribution of the 6 variables used: arithmetic mean (AS), standard deviation (SD), minimum (Min) and maximum (Max) values. The sensitivity of the metric feature was tested by the coefficients of asymmetry (Skewness) and roundness (Kurtosis) of the distribution. The Kolmogorov-Smirnov test was used to determine the normality of the distribution.

T-test was used to analyze the differences between active and retired volleyball players for anthropometric characteristics with a significance level set on $p \leq 0.05$.

By applying the Bland Altman method, a plot of the difference between the final (achieved) body height and the predicted body height is shown.

The data were processed with the Statistica version 13 computer software.

Results

Table 1 shows the results of descriptive statistics of all 6 used variables, on the total sample of subjects (N=49). Also, the metric features of the measuring instrument are shown.

Analysis of Table 1 shows that the average final height of female volleyball players is 178.38±6.39 cm, while the average predicted body height is 175.45±6.16 cm. The first measurement was made in 2014, when the volleyball players belonged to the younger cadet age category, and the average value of PHV was 11.77±0.43 years, that is, the average coefficient of PHV was 2.45±0.83. All symmetry and roundness coefficients indicate a good sensitivity of the used variables. The analysis of the distribution indicators of the total sample of volleyball players shows that there are no significant deviations from the normal distribution in any variable, which means that all variables are suitable for further parametric statistical processing.

Table 1. Descriptive characteristics and sensitivity of the used variables on the total sample of female volleyball players (N=49)

Variable	AM	SD	MIN	MAX	SKEW	KURT	MAX D
Coefficient of deviation PHV (years)	2.45	0.83	0.52	3.90	-0.32	-0.42	0.08
PHV (years)	11.77	0.43	10.59	12.85	-0.14	0.49	0.10
Final body height (cm)	178.38	6.39	161.00	191.00	0.01	-0.04	0.13
Final body mass (kg)	65.79	7.40	54.00	81.00	0.25	-0.86	0.10
Predictor of final body height (cm)	175.45	6.16	160.00	187.67	0.04	-0.12	0.06
Deviations from the final body height (cm)	2.99	2.99	-3.19	9.84	0.44	-0.13	0.14

Note: AM – mean; SD – standard deviation; MED – median; MIN – minimal reult; MAX – maximal result; SKEW – skewness (measures the symmetry of the distribution); KURT – Kurtosis (measure of degree of tailedness in the distribution) ; MAX D – maximal result distance

Table 2 shows the values of the analysis of differences of two subgroups: active volleyball players (N=26) and those who gave up (N=23) in 6 applied variables, using the T-test for independent samples.

Analysis of Table 2 shows a significant difference in 4 of the 6 applied variables. The final (achieved) body height of active volleyball players is 181.15±6.08 cm, and that of retired volleyball players is 175.24±5.25 cm with a significance level of $p<0.001$. The two subgroups differ significantly in the variables Final body mass and Deviation from final body height with a significance

Table 2. Analysis of differences in variables according to groups with regard to the continuation of playing volleyball (active or retired) (N=49)

VARIABLE	CONTINUATION OF VOLLEYBALL PRACTICE				T-test	P
	ACTIVE (N=26)		RETIRED (N=23)			
	AM	SD	AM	SD		
Coefficient of deviation PHV (years)	2.57	1.00	2.30	0.56	1.13	0.26
PHV (years)	11.71	0.41	11.83	0.44	-1.00	0.32
Final body height (cm)	181.15	6.08	175.24	5.25	3.62	0.00**
Final body mass (kg)	68.48	7.78	63.10	6.03	2.62	0.01*
Predictor of final body height (cm)	177.17	6.81	173.50	4.74	2.16	0.04*
Deviations from the final body height (cm)	3.98	3.10	1.86	2.46	2.63	0.01*

Note: AM – mean; SD – standard deviation; P – value; * p<0.05; ** p<0.01.

level of p=0.01, while the values of the variable Predictor of final body height significantly differentiate active (3.98±3.10 cm) from retired volleyball players (1, 86±2.46) with a significance level of p=0.04. All significant variables have higher values in the subjects who are still active in volleyball.

Graph 1 shows the results of the Bland Altman plot of the difference between the achieved final body height and the lowest predicted body height.

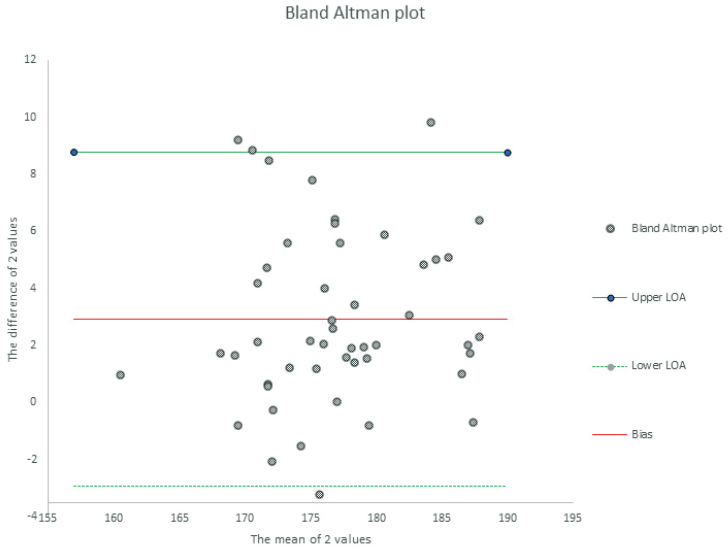

FIGURE 1. Bland Altman plot of the difference between actual body height and predicted body height

Analysis of Figure1 shows a comparison of the achieved final body height of senior volleyball players and the predicted final body height of adult volleyball players. In the Bland Altman procedure, the averages of the predicted and realized final body height of adult volleyball players are shown in relation to the difference between these two values.

Discussion

The aim of this study was to predict the final body height and analyze the predicted and achieved body height between active and retired volleyball players. Active volleyball players have greater deviations from the final values for the measured anthropometric parameters than inactive ones. Furthermore, differences were found in some variables between the groups, namely: Final body height, Final body mass, Deviation from final body height and Predictor of final body height with a significance level of p<0.05.

By applying the method of predicting body height (Sherar et al., 2005), it was determined that inactive volleyball players have a lower body mass and predicted final body height as well as deviation values from final body height. The obtained findings indicate that the predicted values of the final body height in active volleyball players are lower than the actual values, that is, the retired volleyball players have smaller values of deviation from the achieved final body height.

Also, a significant difference was found in 4 out of a total of 6 applied variables: Final body height, Final body mass, Deviation from final body height and Predictor of final body height with a significance level of p<0.001 to p=0.04. All significant variables have higher values in the subjects who are still active in volleyball. The values of deviations from the final body height: active (3.98±3.10 cm) and retired volleyball players (1.86±2.46) can be precisely compared with the findings in the research of Sherar et al., (2005) who obtained higher deviations in predicted body height of an adult within ±5.35 cm with 95% certainty in boys and ±6.81 cm with 95% certainty in girls. The significantly higher body height of active compared to retired volleyball players is probably partly a consequence of the selection process. Body height is a very important success factor in volleyball for all playing roles characterized by play above the net, namely middle blockers-attackers of the first tempo, receivers-attackers and opposites. A possible cause of giving up active training can be the

independent decision of volleyball players of lower body height due to insufficient motivation and non-objective self-assessment of their capabilities, short participation in competitions, or poor performance in training and competitions. (Botić, 2019).

Furthermore, we could speculate that the significantly larger difference between the predicted and realized body height in active volleyball players points to a possible positive influence of the training process in volleyball on the growth of the body in height. However, Malina (1994) states that the data obtained in the study suggest that regular physical activity, participation in sports and training for sports have no effect on final body height, PHV time and height growth rate.

Conclusion

By using the method according to Sherar (2005), smaller differences between the predicted and achieved final height were obtained compared to previous research. Also, the findings obtained in this research indicate a significantly higher achieved final body height in active volleyball players. Furthermore, the results indicate a significant difference in the predicted and actual final body height as well as significantly greater differences between the predicted and achieved body height of active volleyball players compared to those who gave up.

Therefore, it can be concluded that the obtained results are probably the result of the selection process. The influence of the training process, which is full of jumps, landings and changes in the direction of movement, could be an additional cause, but the research so far does not support this speculation. Further research is needed with the stated research problems.

Future research should involve a larger number of subjects. Also, measurements should be carried out in men's volleyball players.

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ORIGINAL SCIENTIFIC PAPER

Employing the teaching games for understanding model to improve social responsibility in a Physical Education class with children who have special needs: A qualitative study approach

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Abstract

The purpose of the study was to explore whether children with special needs taking part in physical education (PE) could improve their levels of social responsibility using the Teaching Games for Understanding (TGfU) model over a fourteen-lesson period. The study used a qualitative semi-structured interviews approach in which the design consisted of an assessment after lesson 7 and then again after lesson 14. A TGfU dodgeball intervention was carried out during the study and the participants (n = 14) were in their second and third years of secondary education within a special needs school specifically established for children who have social, emotional, and mental health concerns (SEMH). According to the background and ability levels of the students the teacher-researcher decided to implement the full use of the original TGfU model using its features to act as a strategy for intervention. The teacher-researcher was an experienced teacher of PE who undertook a dual role throughout the study including assessing the data and undertaking the semi-structured interviews. Qualitatively, data was open and coded line-by-line and incident-to-incident, categorised into themes and then analysed further into sub-themes. The qualitative information supported that the pedagogical strategies within the original TGfU model could have a clear impact on the levels of democracy, empowerment and reflections of children with special educational needs. In conclusion, the TGfU model should be considered as an approach and positive intervention to improve the social responsibility levels of children with special needs.

Keywords: *Teaching games, Special needs, Children, Physical education*

Introduction

The Teaching Games for Understanding (TGfU) model is a pedagogical teaching approach where the focus is on the game and the players involved in the game (Bunker & Thorpe 1983). The emphasis of the TGfU model is placed on player decisions, strategies, tactics and not just the techniques and skills needed to perform movements in isolation. Instead of game play being viewed as an opportunity for individual players to perform discrete skills, it is experienced as a dynamic opportunity of engagement where there is learning with others (Butler, 2017). The teacher is the facilitator of this learning, and the students are constantly involved in social interactions with one another as the game evolves. The games can be modified by the teacher to allow them to become more or less challenging and differentiated depending on the ability levels of the students, therefore placing the emphasis of the TGfU model on inclusion rather than elitism (Light, 2002). Kirk (2013) defined these interactions as communities of practice and the students are continually engaged within these communities of practice as the teacher facilitates the use TGfU model with the students during their physical education (PE) lessons.

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Social responsibility in PE was defined by Butler (2013) as an individual's interest and interactions within a lesson and the collective group dynamics as the game within the lesson develops. These interactions or values can be broadly defined as the characteristics which allow successful game play to develop, including decision making, democracy and playing fairly within the rules of the game. Goodlad (2004) undertook research into situated ethics within PE and he argued that having effective social skills was the most important factor for successful social learning within PE lessons. The values above is not meant to be exhaustive, as there have been other studies by Varela, (1999) and Hellison, (2003) which have also looked at other areas of social responsibility such as an individual's character, social justice, and levels of communication. The aim of this study was to determine whether the TGfU model could positively impact the social responsibility a group of students individually and collectively with special needs during their PE games unit over a fourteen-week period.

In a study by Memmert et al, (2015) authors created ten-questions which have remained largely under-researched, and the final question of the study was whether social development can be fostered using the TGfU model to influence PE. The study drew upon the work of other studies such as Harvey et al (2010) who discovered that student athletes' (with a focus on soccer) cognitive ability levels could be improved to enhance the outcomes of their games. However, one limitation of this study was that it was conducted in a coaching environment with students who wanted to become better soccer players and they all had a passion for playing the game and none of the participants had any form of special educational needs. In another study by Mandigo and Corlett (2010) they reported evidence that the TGfU model can promote better social skills such as fairness, democratic behaviours, and levels of social responsibility. However, they did note that their study could have further researched inclusive behaviour and the integration of disabled people within a wider review. Memmert et al (2010) concluded his study by recommending more integration across other scientific fields and that any future research into the TGfU model should focus on the cultural development of the learner. Bell (2016) stated that social responsibility was both a goal and a process to be followed and that a single definition of the concept is complex and challenging to define. Therefore, it's the objective of the study to take the areas of democracy, empowerment, and critical reflections within the overarching area of social responsibility to determine whether they could have a positive impact on the learning of PE with students who have special needs using the TGfU model.

The TGfU model was first developed by Bunker and Thorpe (1983) as an alternative approach to games teaching that prior to this research focussed heavily on the development of skills and techniques. They stated that the teaching of games was often focussed on the development and acquisition of skills and techniques, within highly structured lessons that made little connection between technical proficiency and effective game play. They proposed that for students to play games well, they needed to know not only how to perform skills, but also when, where, why and how these skills could be applied into a range of game situations. The TGfU model is an instructional approach to learning the skills and tactics of games within the context of a game. It highlights the cognitive elements of learning such as decision making, tactical understanding and teamwork, which is where the cross over between social responsibility and the TGfU model is found. The model recognises the relationships between the students and provides them with an opportunity to express themselves by communicating with one another and allows the teacher to observe these interactions without having to be too involved in leading the lesson. The teacher can take on the role of a facilitator by encouraging the students to think about a range of problems and situations by asking them questions based on their ability levels and tactical scenarios.

Methods

The unit of learning in this study focussed on Dodgeball. Each lesson began with games which were modified to allow the students to immediately engage in the playing of the game with a specific focus on the tactical dimensions of the activity. Each lesson started with a dodgeball specific throwing and catching dynamic warm-up, and then moved seamlessly into a full game of 6 vs 6 dodgeball with a focus on a specific tactic or adaptation each lesson. The students were encouraged to develop a greater sense of game appreciation and tactical awareness by solving specific problems or modifications created by the teacher. The teacher was able to observe the students recognise some game specific options, make appropriate decisions, and perform appropriate game skills. Questioning periods between games allowed the students to reflect on their learning and it was during these periods that the teacher was able to discuss the main rules and tactics from the lesson by asking a range of questions that was able to draw out student knowledge to inform play in the next game activity. The skill demands were differentiated so that students were free to engage more in the cognitive dimensions of the games and encouraged to consider their social responsibility within the context of their team.

The research took place at an 11-16 social, emotional, or mental health (SEMH) special educational need school (SEN) in the Northeast of England in the UK and all of the students had an educational health care plan (EHCP) associated with their specific learning needs. The school was situated in a medium-sized city and was coeducational, part of an academy trust, urban and non-religious. The school had a small physical education department and in total there were approximately 150 students with special needs. None of the students had a physical disability, but all of the students had another condition such as ADHD or Autism. In total 14 students volunteered to take part in the study over a period of one-term lasting for 14 weeks. All of the students were White British and a high proportion of them were on Free School Meals (84%). Ten of the students were male and aged either 12 or 13 and the other four students were female and also aged the same as the boys. The students who took part in the study attended their normal timetabled PE lessons as the teacher-researcher did not want to alter the routine for the students as this can affect the mental health of the students and the validity of the results due to a change in their normal routines. Each lesson of dodgeball was timetabled for 45 minutes, and the unit consisted of fourteen lessons in total, taught once per week over the period of one autumn term. However, none of the students had any previous knowledge or practical experience with the TGfU approach during their PE lessons. This would be a new experience and expose to an instructional model for the students who took part in the study.

According to Morelas-Belando et al (2020) the experience levels of the teacher can have a significant impact on the findings of a study using the TGfU model. The teacher-researcher in the study was an experienced PE teacher (over 16 years' of teaching experience), teaching PE in several different schools. The teacher-researcher had also taught more than 8 units of work using the TGfU model (across multiple classes and age groups) and had undertaken several research studies on TGfU. Therefore, this has to be noted as a strength of this study in that the teacher at the heart of the study was experienced in teaching children with special needs and also in applying the TGfU model with student who have a specific learning disability.

Permission from Trust CEO was obtained to carry out the

study ensuring there was no students named in the research for safeguarding purposes. The next step in the process was to ensure that an informed consent form was collected from all of the participating students' parents. The informed consent form explained the study to the student's families and encouraged them to ask any questions prior to their son or daughter taking part. The teacher-researcher undertook the necessary reading about safeguarding and research with children from British Educational Research Association (BERA) and gained full consent from all participating students' parents about the study. He was also open with the students about his dual role as both a teacher and as a researcher and no distinction or discrimination was made between participants and non-participants in lessons. Data in the form of questionnaires and observations were only gathered from students who took an active part in the dodgeball lessons. The teacher-researcher ask for volunteers from a broad range of abilities from across the school community and this was to give a more accurate and reliable set of results.

The students were interviewed twice during the study, at the end of the lessons seven and fourteen (Table 1). The depth of questions and the language differed depending on the ability levels of the students. The interviews lasted approximately ten minutes and data was collected using a digital audio-recorder. The interview questions targeted the students' perceptions of their improvements in their levels of social responsibility (democracy, empowerment, and critical reflections). The interviews began with pre-established questions about social variables using questions such as "What did you do to play fairly during the game; how did you show good teamwork?" The teacher-researcher led each interview using questions based on social responsibility to explore the meanings of the statements in greater depth. There were four group interviews in total encompassing all fourteen of the students during these interviews. The teacher-researcher specifically focussed on what students said about their experiences in the TGfU lessons after reading each of the transcriptions to get a sense of their scope and to detect recurring topics. Then to seek further clarity the teacher-researcher identified a range of emerging themes which were subsequently broken down into a set of final sub-themes to help with the validity and reliability of the data.

Table 1. Student Questionnaire

Question Topics Improved levels of…	Positive Replies	Neither positive nor negative reply	Negative Replies	No replies
Q1 – Fairness	64.29%	14.29%	14.29%	7.14%
Q2 – Teamwork	50%	28.57%	14.29%	7.14%
Q3 – Attitude to learning	64.29%	28.57%	7.14%	0%
Q4 – Democracy Skills	42.86%	28.57%	14.29%	7.14%
Q5 – Listening Skills	64.29%	14.29%	14.29%	7.14%
Q6 – Communication	57.14%	21.43%	21.43%	0%
Q7 – Reflections	71.43%	28.57%	0%	0%
Q8 – Engagement	64.29%	21.43%	14.29%	7.14%
Q9 – Empowerment	42.86%	42.86%	14.29%	0%
Q10 – Decision Making	50%	21.43%	21.43%	7.14%

Qualitative analysis

The qualitative findings show that the students enjoyed using the TGfU approach during their PE lessons. For example, one student commented that "we feel that we are learning in a more logical order of lessons, making our lessons more interesting". Another student felt that they had improved their knowledge of the rules of dodgeball by commenting that "I feel I can remember more of the rules of dodgeball, and this helps me to play better". One further student also said that they had improved their teamworking skills by saying "I feel that I can play better with my teammates, and this helps us to win more games". A further students liked how the lessons were more games based and said, "I have enjoyed learning in this way because the lessons let us play more and there are some questions that make us think about how to improve". Another student also commented that they had liked the independence the lessons had given them by saying that "the lessons have allowed us to pick our own teams and feel like we can play in fair games with more confidence". These comments suggest that the students were able to become more independent and inclusive learners and that they were able to behave in a more democratic and empowered way. For example, as the teacher-researcher was able to facilitate more of the learning the students felt in more control of their lessons, and this appeared to help them to enjoy their dodgeball lessons more.

Also, another student mentioned how the teacher helped them to improve their social skills by asking them questions about how to play better together to be more successful and said, "I feel like I have learned more during these lessons as I was able to play with my friends and to help them improve their skills". Finally, a further student also mentioned that they were given time to think about their learning by stating "we were given some time to reflect on our lessons because the teacher would stop the lesson at different times to ask us how we were doing". This shows that the students were thinking about how the lessons had been structured with the teacher-researcher giving them time to reflect on their learning and also how they were given key questions from the TGfU model to help them to improve their learning. Again, suggesting that through their dodgeball lessons the students enjoyed learning with others more than they had previously. Also they had been building better social relationships with their peers during the unit of dodgeball as well. These comments were reflected both during and after the unit of dodgeball and the sub-themes were easily identified as a result of the student interviews. For example, one theme and sub-theme which was highlighted often by the students is that their democratic behaviours had improved. They were able to select fair teams and play competitive dodgeball fairly using the correct rules.

Discussion

The purpose of this work was to explore whether children with special needs in their physical education lessons could improve their democratic, critical reflection and empowerment psy-

chosocial variable skills using the TGfU model to a greater extent after a unit of work focussed on playing dodgeball. The qualitative approach of the study indicates that there was a greater level of social responsibility shown by the students who took part in the study. The qualitative analysis show that the students individually and collectively came together to become more team cohesive members as a result of empowering them to select and manage their own teams during the dodgeball lessons. According to Jarrett and Light (2018), the teacher's role is especially relevant in using the TGfU approach to help students grow as learners, and this is especially prevalent if they are in groupings which make them feel comfortable. This was always the intention of the author to help encourage the students to become more positively democratic, to enable them to become better at collaborating with their peers and working together as a dodgeball team. This supporting of one another has also been positively reported in studies by both Koekoek and Knoppers (2013) and Bracco et al (2019), as having positive support of your peers was necessary to become more effective collaborators within a team. In the study by Koekoek and Knoppers (2013), they also reported that the social values learned from positive interactions between peers assisted each other to make better decisions as a group, and learn the social values of communication, teamwork and commitment when working towards a goal. The study also found that levels of empowerment and reflections were more positive as a result of using the TGfU model and that the students felt they had more ownership of their learning. As a consequence, this lead to higher levels of enjoyment from the students.

Limitations

However, the results from the study should be interpreted with some caution because there was no control group, only a small number of participants, and a single-teacher-researcher. Furthermore, the teacher-researcher was an established member of teaching staff within the school and many of the students involved in the study had been taught by the teacher-researcher in previous years and across other PE units. Another limitation could be the length of the study (14 weeks) as it could be considered a short-term investigation in comparison to other studies in the same field with students who do not have special needs (Light, 2002). The study could have involved more than the 14 students involved also as this would have given the results more validity, but due to the small size nature of the classes within the school this was a broad spectrum of students with a range of SEMH issues such as depression. The teacher-researcher would focus on the analysis of data within a further study, and this could involve a Chi-Squared Test to determine whether there is a statistically significant difference between the expected frequencies and the observed frequencies in one or more categories of the questionnaire or in other words to see whether two variables are independent of one another. This would allow future research to observe a range of students and determine whether the expected values were equal to the observed values and if not how much of a statistical difference there was.

Conflict of Interests

None

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Revised October 2017

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Original Scientific Paper

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United States

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Word count: 2,946

Word count: 4259

Abstract word count: 211

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Results of the analysis of

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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 bellow 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%	✓ 10º	✓ 10 kg	✓ 12:2	✓ 0.056
× 10 %	× 10 º	× 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*

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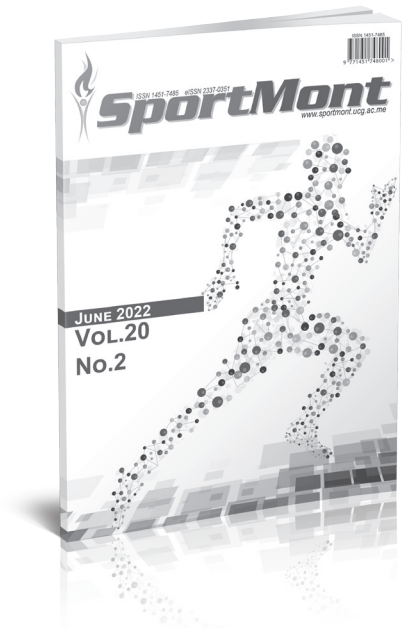

ISSN 1451-7485

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

- Open-access and freely accessible online;
- Fast publication time;
- Peer review by expert, practicing researchers;
- Post-publication tools to indicate quality and impact;
- Community-based dialogue on articles;
- Worldwide media coverage.

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

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

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

Dusko BJELICA, Editor-in Chief – sportmont@t-com.me
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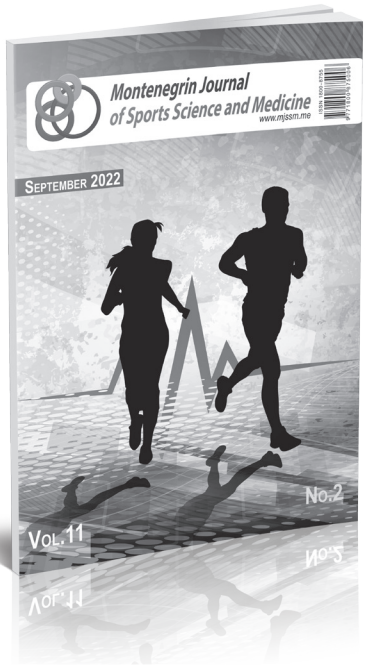
Nedim COVIC, Managing Editor – nedimcovic@gmail.com

Publication date: Autumn issue – October 2022
Winter issue – February 2023
Summer issue – June 2023

Montenegrin Journal of Sports Science and Medicine

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



ISSN 1800-8755

CALL FOR CONTRIBUTIONS

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

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

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

Dusko BJELICA, Editor-in Chief – sportmont@t-com.me
Damir SEKULIC, Editor-in Chief – damirsekulic.mjssm@gmail.com

Publication date: Spring issue – March 2023
Autumn issue – September 2022

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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www.csakademija.me/conference

MSA Dubrovnik 2023

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

MSA Dubrovnik 2023

20th - 23th April 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.

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.

Look inside!

Montenegrin Journal of Sports Science and Medicine

Volume 11, 2022, 2 issues per year;
Print ISSN: 1800-8755, Online ISSN: 1800-8763

www.mjssm.me

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

www.jaspe.ac.me

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.

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.

USEFUL CONTACTS

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Marketing Manager
Email: **damirsekulic.mjssm@gmail.com**

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

Editors-in-Chief: **Dusko Bjelica**, Montenegro; **Zoran Milosevic**, Serbia
Managing Editor: **Borko Katanic**, Montenegro; **Nedim Covic**, Bosnia and Herzegovina

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Montenegrin Journal of Sports Science and Medicine

Editors-in-Chief: **Dusko Bjelica**, Montenegro; **Damir Sekulic**, Croatia
Executive Editor: **Selcuk Akpinar**, Turkey
Associate Editors: **Mehmet Uygur**, USA; **Catalina Casaru**, USA; and **Predrag Bozic**, Serbia

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http://www.csakademija.me/conference/

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20th - 23th April 2023,
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