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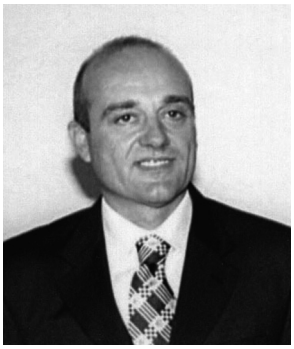

Dear Readers,

In recent years, the Montenegrin Journal of Sports Science and Medicine has shown important advances in both the content and quality of its published articles, and the volume of submissions has increased substantially. Since the end of 2013, over 100 manuscripts have been processed (peer- and editorial-reviewed, and accepted or rejected). Now indexed in eight databases, Montenegrin Journal of Sports Science and Medicine has earned recognition as one of Montenegrin leading scientific journals in the area of sports science and medicine. This is reflected in its MR4 status, as recognized by the University of Montenegro, the Department specialized for the classification of scientific publications. Additionally, Montenegrin Journal of Sports Science and Medicine has earned a current score of ICV 5.02, as reported in the IC Journals Master List 2012. As a consequence of these accomplishments, on behalf of our authors, journal board members and anonymous reviewers, all of people who have volunteered to contribute to the success of the journal, I have a pleasure to invite additional members to join us in an effort to make the Montenegrin Journal of Sports Science and Medicine widely recognized international publication.

In January 2014, the Montenegrin Journal of Sports Science and Medicine's guidelines were modified to meet the goal of making it an international journal. Journal Management decided that all manuscripts should comply with the APA (American Psychological Association) guidelines for the writing style, references, citations, and other technical details. The APA system is the most commonly used citation and writing style in the fields of psychology, education, and the social and behavioral sciences, and it replaces the previously adopted. The last manuscripts were approved for publications under the previous guidelines are available in the Montenegrin Journal of Sports Science and Medicine, Volume 3, Issue 1, dated March 2014. From the January 1, 2014, all authors have to prepare their manuscript according to new guidelines and Volume 3, Issue 2, will launch a new phase of the journal "ahead of print."

After four successful issues of the Journal, I can freely emphasize the compelling reasons for launching a new open-access journal in this ever-expanding area of research such as sports science and medicine, as well as to emphasize our aspirations and vision for the future. I must highlight it is more than beneficial to have a journal, which gives free access to its contents and promotes high-quality research and intellectual output of scientists who have limited access to mainstream journals in the past. Hence, we aim to bridge the gap so that authors get a wider audience for their high-quality scientific achievements. I also believe we will be increasing the number of high-quality original scientific papers, review papers, editorials, short reports, peer review - fair review, as well as invited papers and award papers, and be able to continue functioning as an open discussion forum on significant issues of current interest.

Lastly, I would highlight that the Montenegrin Journal of Sports Science and Medicine's transition period has been a challenging process, both for the community of researchers - those who collaborate with the journal (editors and reviewers), and for prospective authors. Hence, we also need your help in the future and I wish to encourage more contributions from the scientific community and industry practitioners to ensure a continued success of the Journal. Authors, reviewers and guest editors are always welcome. We also welcome comments and suggestions that could improve the quality of the journal.

Thank you much for reading the Montenegrin Journal of Sports Science and Medicine and we hope you will still find the Journal informative enough,

Editor-in-Chief
Prof. Duško Bjelica, PhD

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Future of Alpine Skiing Schools-gender related programs

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A B S T R A C T

Gender differences in anthropological characteristics may influence success in adopting skiing skill if different teaching methods are applied. This study aimed to determine the difference between the level of adopted skiing skill for female and male ski-beginners applying 2 different teaching programs. 126 subjects (30 females; 96 males), average age 23,3±1,6 years participated in 7 days ski-school. Within the male and female group ski-teaching was carried out using 2 different methods: combination method [CM], which implies using of snowplough and parallel ski technique, and direct method [DM], where only parallel ski technique is used. Following the learning process, subjects were tested through 7 elements of skiing technique. For female subjects no difference between two teaching models was recorded, while CM appeared to be more efficient for males in elements traversing to the right (p=0,03), short turn (p<0,05) and parallel turn (p=0,01). Through factor analysis 7 main components were extracted, the first being defined as total skiing knowledge [TSK]. TSK was then compared to two programs carried out on males and females. Difference was determined in the level of TSK for male who learned through CM in comparison to the participants who were learning through the DM (p=0,01), while no difference in the same variable was determined for female. These findings lead to conclusion that using CM in men achieved better results compared to the DM. For the practice, it means that it is not necessary to separate male and female while forming ski groups for beginner skiers, since females will advance the same, regardless of the learning method.

Key words: *learning methods, beginner skiers, females, gender diferences.*

Introduction

In order to enable children and young people to involve in sports systematically in primary and secondary schools, school sport clubs are formed. Students can choose a sport in their schools and then become involved in trainings and competitions of different level, from school competitions to national competitions. Within every club, all activities of school sports are carried out within the extracurricular program of physical and health culture. In every school sports club several sections are active, and where conditions exist, it is possible to organize skiing section, too. In the winter camps, both children and adolescents can learn and excel their skiing. Such programs last for six or seven days, during which students who are beginners in skiing learn how to maneuver skies, while the others are perfecting their skiing technique, all with the goal of controlled and safe mastering of different skiing terrains[1,2]. As instructors possibly use different teaching methods depending on their knowledge in those winter camps, different efficiency can be expected, depending on teaching method used in the process[3,4]. Nevertheless, the progress of every skiing novice does not depend entirely on learning program, but on the conditions for learning and on the abilities of those who learn, too[5,6,7]. Didactic tools used in teaching, different skiing equipment that participants own and skiing terrains on which skiing knowledge is learnt present the conditions of the learning process. In skiing schools organized and carried out during winter camps, three different programs are usually used, through which ski beginners are taught. One of the teaching programs consists entirely of elements of parallel ski technique. Such an approach teaches the skiers immediately to make parallel turns, so that method is called direct way of learning. The other teaching approach uses the elements of snow plough technique as well as the elements of parallel ski technique, and this method is called traditional or conventional way of learning, while combining the two mentioned methods brings out the third, combination approach to passing the ski knowledge[8]. All three approaches described above are set logically so that every learnt element of ski technique represents starting position for further upgrading of ski knowledge, and all with the goal of mastering different kind of turns. Which of the mentioned ways to use depends on the choice of teacher who teaches alpine skiing, but depends also on conditions in which skiing is learnt. Besides the program through which teacher is teaching, it is extremely important to recognize student's possibilities and abilities, and according to that, choose convenient ski terrain, adjust pace of teaching and use suitable methodic training for learning of ski technique. Also, during teaching, it is necessary to respect differences in anthropological characteristics between boys and girls, respectfully, male and female. Namely, it is possible to expect their various reactions to the one teaching program, and by this, in the end, different levels of skiing knowledge acquired[9]. Having in mind evident differences between them, the goal of this research is set, and it is to determine whether it is necessary to separate male and female students during teaching alpine skiing.

Materials and Metods

The research included 96 male and 30 female participants, average age 23,3±1,6 years; 22,3±0,6 years for female and

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24,5±1,1 years for male participants. All participants were prior the investigation in detail informed of the study protocol and had the opportunity to decide weather or not to participate. None of the participants had previous experience of independent learning of alpine skiing, nor attended alpine skiing school prior to the research. Participants were randomly assigned into two equal groups considering the number of males and females, which were learning skiing knowledge through two different methods. One group (consisting of 15 female and 46 male participants) was learning alpine skiing through direct way, which implies using only parallel ski technique. The participants of the other group (consisting of 15 female and 50 male participants) were learning through combination method, using parallel as well as snow plough ski technique.

The participants of both programs had the same conditions during learning, considering: the size of the group (10 participants pro group), 4 hours of learning and 2 hours of training daily, ski equipment, ski terrains, quality and education level of the teachers and duration of the program (seven days). Each day of skiing school, regardless of the applied learning method (CM or DM), was unified according to period of warming up in general (10 minutes), skiing warming up (20 minutes), time necessary for the teacher to explain certain task, exercise or element of ski technique (up to 3 minutes), and number of repetitions of specific exercises and elements of ski technique. At the end of the program, participants were joined together into one group and had to demonstrate seven elements of ski technique, which they had been learning during seven days learning process. On the basis of grades given by the independent examiners, the level of ski knowledge for every participant was determined. The evaluation was given through five-grade scale, in which one represents the lowest, and five the highest level of the knowledge demonstrated. The participants were evaluated on elements of ski technique: traversing left, traversing right, uphill turn to the left, uphill turn to the right, basic turn, parallel turn and short turn.

To determine statistically significant difference between two groups of participants concerning the method of learning ski knowledge applied, one-way variance analysis (ANOVA) was used. Eventual existence of difference was determined by Fisher test. Obtained data was processed by factor analysis too, with the aim of isolating components that represent skiing knowledge. In order to determine statistical significance of differences between the two learning programs applied, considering the obtained main components of skiing knowledge, Student t-test was used. The level of statistical significance (p) was considered significant if it was below or equal to 0,05.

Results

In order to determine the difference between the two applied programs for alpine skiing learning with male and female participants in this research, means and standard deviations of grades given for demonstration of ski technique elements were first calculated.

TABLE 1
BASIC DESCRIPTIVE STATISTIC PARAMETERS GRADES FOR SKI TECHNIQUE ELEMENTS FOR FEMALE AND MALE PARTICIPANTS APPLYING THE TWO LEARNING PROGRAMS AND RESULTS OF THE ONE-WAY VARIANCE ANALYSIS

Ski technique elements	Female participants					Male participants				
	Combination program		Direct program		ANOVA	Combination program		Direct program		ANOVA
	M	SD	M	SD	p	M	SD	M	SD	p
Traversing to the right	3,43	0,66	3,38	0,74	0,84	3,54	0,70	3,22	0,68	**0,03**
Traversing to the left	3,16	0,69	3,04	0,64	0,61	3,47	0,83	3,35	0,68	0,44
Uphill turn to the right	3,26	1,08	2,92	0,92	0,36	3,19	0,70	2,94	0,64	0,07
Uphill turn to the left	3,40	1,07	2,84	0,94	0,14	3,25	0,67	3,02	0,73	0,11
Basic turn	2,87	0,99	2,75	0,65	0,70	3,01	0,86	2,69	0,78	0,06
Short turn	2,71	1,13	2,57	0,62	0,68	2,89	0,73	2,39	0,89	**0,00**
Parallel turn	3,07	0,82	2,85	0,91	0,48	3,24	0,74	2,85	0,73	**0,01**

Legend: M - arithmetic mean, SD - standard deviation

Results presented in Table 1 show that mean values of female participants grades for evaluated ski technique elements are higher if combination program is applied compared to the mean values of grades of female participants that used direct program to learn ski knowledge. In the same way it is possible to notice that mean values of male participants grades are higher for all seven ski technique elements for ski beginners that learned applying combination program which consists of snow plough and parallel ski technique compared to the mean grades when direct program is applied, which consists entirely of parallel ski technique elements. In order to determine whether the difference in mean grades shown in Table 1 is statistically significant or not, results of one-way variance analysis were analyzed, and they show existence of statistically significant differences between male, but not female participants in the two learning programs applied (see Table 1).

It was determined that for female participants averagely higher grades for applying combination program weren't statistically significant compared to the lower grades achieved using direct learning program. On the other hand, for male participants statistically significant difference was determined in the level of knowledge achieved for the elements: traversing to the right ($p=0,03$), short turn ($p<0,05$) and parallel turn ($p=0,01$). The mentioned statistically significant difference was gained in favor of the combination program, which consists of the snow plough ski technique as well as the parallel ski technique.

TABLE 2
RESULTS OF THE FACTOR ANALYSIS

Main components	Female participants				Male participants			
	Combination program		Direct program		Combination program		Direct program	
	λ	%	λ	%	λ	%	λ	%
1	**4,51**	**64,44**	**4,76**	**67,97**	**4,36**	**62,29**	**3,96**	**56,50**
2	**1,27**	**18,18**	**1,08**	**15,43**	0,93	13,29	**1,08**	**15,50**
3	0,68	9,66	0,64	9,18	0,69	9,81	0,71	10,20
4	0,28	4,06	0,24	3,41	0,44	6,30	0,58	8,22
5	0,14	1,94	0,19	2,66	0,30	4,23	0,27	3,87
6	0,08	1,11	0,06	0,84	0,20	2,84	0,25	3,56
7	0,04	0,62	0,04	0,51	0,09	1,25	0,15	2,16

Legend: λ - Eigen values; % - percent of described variance

Using the factor analysis matrix of main components on the basis of achieved grades for male and female participants on seven ski technique elements was calculated. Through the insight into the Eigen values for females, and applying GK (Guttman-Kaiser) criterion, two statistically significant main components are separated (λ=4,51; λ=1,27) in combination program, and two statistically significant main components (λ=4,76; λ=1,08) in direct program, that explain 82,62%, respectfully 83,4% of total variance. Using GK criterion for males also, one statistically significant main component (λ=4,36) in combination learning program, and two statistically significant main components (λ=3,96; λ=1,08) in direct program of ski knowledge acquisition were detected. Through those main components in total 62,29%, respectfully 72,03% of total variance was explained. Concerning the subject and the way the participants used for evaluation in this research, it can be concluded that joint contribution of the first, respectively first two main components is the skiing knowledge. Namely, with the shown share statistically significant first, respectfully first two main components explain the results in evaluation of acquired ski knowledge in seven analyzed elements of ski technique. On the basis of their joint contribution it can be concluded that those main components participate to a large degree in the variance of all the results (82,62% and 83,40% for females and 62,29% and 72,03% for males). Concerning the achieved results and the way the examiners used for evaluation of ski knowledge in participants, it can be concluded that first main component represents total ski knowledge, while the other main component represents achieved level of specific ski movements. To compare total knowledge in alpine skiing in females and males who acquired ski knowledge using two different learning programs, in further analysis calculated results for the first significant main component were used. There were no statistically significant differences in acquired ski technique knowledge for female participant if two learning methods were compared (p=0,40). On the other hand, when results were analyzed for male participants, there was a statistically significant difference in acquired ski technique knowledge while using two learning programs (p=0,01).

It can be concluded that between females that were learning alpine skiing using two different learning programs no significant difference in level of acquired ski knowledge appeared, while with males statistically significant difference between the two ski learning methods was detected. Determined significant difference in the level of ski knowledge in male participants is assigned to the combination program, by which ski beginners were acquiring the knowledge using snow plough and parallel ski technique, which is shown in Table 1.

Discusion and Conclusion

Precondition for acquiring ski technique are very specific body movements that skier must learn regardless of different programs that are applied in the ski schools. Specific movements mentioned are participating in different ratio in performing all kind of turns[10,11]. Good ski teacher should know physical laws that occur when skier performs certain ski movement. Elementary knowledge on biomechanics of skiing and knowledge of the forces that affect the skier during performing the turns, represent baseline for understanding of ski movements, and with it make the process of teaching easier. Mentioned knowledge will enable ski teachers to discern what teaching approach will lead to better results for a specific student[12]. To teach beginners ski movements, teachers are trying to find the best way of transferring knowledge. Problem is not only in recognizing the most efficient program for teaching of alpine skiing, but in applying the most adequate program for certain students. Ski teachers meet with mentioned problems in their work on everyday basis, because ski beginners react differently on the same learning program. There are many factors that define efficiency of ski knowledge acquisition, such as: previous sports experience, level of motor, functional and cognitive abilities, motivation and expectations of students and conditions in which the process of ski knowledge transfer is taking place[13,14]. One of the factors that can affect the level of acquired ski knowledge in ski beginners is sex. Because of the differences between males and females, first in motor abilities and probably in psychological characteristics as self-confidence and fear, it is possible that skiing beginners, male compared to female, are reacting differently to the same ski learning program[9]. In this research two different learning programs were applied with the aim of determining the differences in the level of acquired ski knowledge in female and male participants. Combination program is traditional and implies that ski beginners do their first turns using snow plough ski technique, while in direct program ski beginners are performing first turns in parallel ski technique[8]. Positive sides of snow plough ski technique, which is the part of combination program, is that it enables the skier to take better control of the speed and to have better stability on the skis compared to the position of skier moving on skis in parallel ski position. Namely, stability of skier depends on: size of the stand fast surface, height of the gravity center above the stand fast surface, position of gravity center above stand fast surface and the level of ski knowledge[15]. Since this research is carried out on ski beginners, whose level of ski knowledge is very low, every other mentioned conditions of good stability of skier will be achievable more easily applying snow plough technique. On the other hand, the goal of every program of alpine skiing teaching is to teach the skiers to master

skiing slope applying elements of parallel skiing technique, which is the basic concept of the direct method of skiing knowledge acquisition. By that teaching program skiers are performing turns in parallel skiing technique from the very beginning, and in the combination approach they use parallel technique only after they completely master the turn using snow plough ski technique. The results of this research showed that female participants did not learn ski technique significantly different by neither combination nor direct learning program. However, with males it is determined that absence of the snow plough ski technique represents downside since using the combination program they learnt significantly more compared to the participants who were learning through direct program. Learning through CM, i.e. not excluding the snow plough technique improves the beginners' stability and balance and helps in speed control, so in addition to beginners skills and general gender inborn differences in motor abilities, can be an indispensible phase of learning[16,17]. It can be concluded that because of the efficiency of ski knowledge acquisition process it is not necessary to separate female and male participants because females will not acquire less ski knowledge through program that proved to be more efficient for males. Namely, if female and male participants are learning ski knowledge as a part or the same group and through the program that proved to be efficient for males, they will progress equally well as if they are learning separately either by combination or by direct program. In the future researches it would be good to repeat the experiment with the different participant sample that would be of some other age. In that case results of this research could be compared with the results of research acquired on the sample from other population and that would definitely give even better insight into necessity of separating females and males during ski knowledge acquisition.

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BUDUĆNOST ŠKOLA ALPSKOG SKIJANJA - PROGRAMI ORJENTISANI NA RODNE RAZLIKE

S A Ž E T A K

Rodne razlike u antropološkim osobinama mogu uticati na uspjeh u usvajanju vještine skijanja ako se primjenjuju različiti metodi nastave. Ova studija je imala za cilj da utvrdi razliku između nivoa usvojene vještine skijanja kod početnika ženskog i muškog pola koji su pratili dva različita nastavna programa. Studija je obuhvatila 126 ispitanika (30 ženskog i 96 muškog pola), prosječne starosti 23,3 ±1,6 godina. Oni su učestvovali u sedmo-dnevnoj školi skijanja. U okviru grupnog nastave skijanja za žene i muškarce primijenjena su dva različita metoda: metod kombinovanja [CM], koji je podrazumijevao korišćenje pluga i paralelne tehnike skijanja, i direktni metod [DM], kod kojeg je korišćena, isključivo paralelna tehnika skijanja. Nakon završetka nastave, ispitanici su testirani kroz sedam tehničkih elemenata skijanja. Kod ispitanika ženskog pola se pojavila razlika kod oba modela nastave, dok se metod kombinovanja pokazao kao efikasniji za ispitanike muškog pola kod sljedećih tehnički elemenata: zaokret udesno ($p=0,03$), kratki zaokret ($p<0,05$) i paralelni zaokret ($p=0,01$). Dalje je faktorskom analizom izolovano sedam glavnih komponenti, prije svega ukupno skijaško znanje [TSK] koje je, zatim upoređeno sa dva primijenjena programa koji su izvedeni sa muškarcima i ženama. Razlika je utvrđena na nivou ukupnog skijaškog znanja u korist muškaraca koji su obučavani metodom kombinovanja, u odnosu na ispitanike koji su obučavani direktnom metodom ($p=0,01$), dok razlike na kod ženske populacije nije bilo. Ovi nalazi upućuju na zaključak da je korišćenje metoda kombinovanja kod muškaraca doveo do boljih rezultata u odnosu na direktni metod. Kada je praktična primjena ovih znanja u pitanju, to bi trebalo da znači da nije neophodno da se odvajaju muškarci i žene prilikom formiranja grupa u školi skijanja za početnike, budući da će žene napredovati bez obzira na metod obučavanja.

Ključne riječi: metodi obučavanja, početnici, žene, rodna raznolikost.

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The Coaching Process in Football – A qualitative perspective

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A B S T R A C T

This study aims to understand what the coaches observe in the game, and how they evaluate and make their intervention based on this observation. The participants were 8 experienced First Portuguese League coaches. Semi-structured interviews were carried out and the data were analysed through the technique of content analysis. The software QSR NVivo 9 was used in coding the transcripts of the interviews. According to these coaches to effectively observe and analyze the game it is crucial to have a detailed knowledge of the game and of the individual characteristics of players. They consider that the most important aspects to observe in the game are: i) the 4 moments of the game; ii) set pieces; iv) individual characteristics of players; v) random aspects of the game. Coaches have the perception that over the years their observation has become more effective and they value different aspects in the game. They consider that the factors responsible for the evolution of their observations are: i) the accumulated experience; ii) a better knowledge of the game; iii) the academic formation. These coaches evaluate the teams in a general way focusing mainly on strengths and weaknesses and they follow a specific logic of prioritization for the evaluation of these aspects that is based mainly, in their model of the game. The intervention is done mainly through the adaptation of the training exercises, but also through visual strategies (movies, photos, etc.) and meetings (individual, by sector or in group).

Key words: *Soccer, Match analysis, Tactic, Coach.*

Introduction

In football, successful performance is usually characterized as an interaction of different technical, tactical, mental[1] and physiological factors[2]. Given the need to better understand the constraints that promote the sporting success, match analysis has assumed a very important role in sports games[1]. Thus, it seems natural that in recent years the scientific interest in the study of the football game has increased considerably[3].

Much of the activity of football coaches is embodied in the observation of player technique and team dynamics in implementing strategy and responding to opponents. Thus, it is important to clearly define the behavior which can be observed in a game[1] to produce an intervention to increase performance based on that information. However, despite a vast literature devoted to the match analysis[1,3], there are few studies that focus on the characterization of the coach's thoughts about the observation of the game and his/her intervention before the information is collected.

A fact that becomes even more surprising is related to the lack of confrontation of the results of a great number of studies about football match analysis[1,3] with the understanding that the coaches have about the main results of this research.

Because coaching is rapidly evolving as a profession it is important to structure the content of the coaching domain to promote its advancement as a profession[4]. Consequently, conceptual models of coaching have been developed in the context of gymnastics[4] or in the perspective of qualitative analysis of human movement technique[5]. However, the models developed in the context of football do not adequately represent in a detailed way the tasks of the coaching process[1,3].

Thus, this study aims to understand what the coaches observe in the game and how they evaluate and make their interventions based on this observation.

Methods

Participants

The participants in this study were 8 expert high-performance Portuguese first league football coaches with a professional experience (as first coach) ranging from 2 to 30 years (14.9 ± 8.6 years). All of the coaches, who were initially selected to participate in the study and accepted the invitation, were involved in coaching at the time of the interviews, and had worked at some time in their careers as first coaches within the Portuguese first league.

Because of the in-depth character of each interview, the interpretational nature of the analysis, and the number of the teams in the first league (n=16), 8 coaches were considered representative and met the objectives of the study, as well as the criteria of expert selection.

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Instruments

The methodology for collecting data in this study was the semi-structured interview[6,7]. The advantages of using this type of interview are diverse when compared with other methods of data collection[7].

The interview schedule was designed to identify the issues most relevant to the coach and to focus on these issues in detail. The certification of the content validity of the interview was done according to common qualitative research methods[7].

The certification of the content validity of the interview was fulfilled after a preparation and discussion of previous drafts of the transcript, based on the following steps: i) preparation of first draft of the transcript based on the specific aims of the study and also on the literature review[3,4,8]; ii) evaluation of the interview transcripts by three senior researchers in sports pedagogy, who have substantial experience with interview methods; iii) reformulation based on the presented suggestions; iv) a pilot study was with a Portuguese first league coach; v) minor adaptations in the transcripts resulting from the reflections of the pilot study: vi) resubmission of this version of the transcripts to the experts. This ultimately resulted in the final version of the interview guide.

Data Collection

All the interviews were done by the first author, between December 2011 and February 2012, in a tranquil place (normally in the office) located in the football academies where the coaches work. The same format was used for each interview that began with general information about the purpose of the project. Next, the interviewer focused on background and demographic information. Finally, the knowledge elicitation took place using questions related to the purpose of the study. None of the interviews were rushed, and the coaches had time to clarify and reformulate their thinking. Each interview lasted between 1 and 2½ hours and was transcribed verbatim.

Data analysis

The objective of the analysis was to build an organizing system of categories that emerged from the unstructured data and that represented the organization and utilization of expert high-performance football coaches' knowledge.

Data analysis was performed using content analysis[4,6,9,10]. Using a combination of inductive and deductive approaches[10], the text units were coded and text units with comparable meanings were organized into specific categories. Three researchers conducted the analysis independently to ensure that the resulting classification system was suitable and best fitted with the data. The software QSR NVivo 9 was used in coding the transcripts of the interviews.

Results

The analysis of the data allowed to establish the four main tasks of the football coaching: preparation; observation; diagnostic/evaluation; intervention.

Preparation

We define the task of "preparation" in this study as being not only the set of procedures performed by the coaches in order to implement a strategy that allows them to effectively perform the observation and analysis of the game, but also the basic knowledge necessary to perform this procedure (Figure 1).

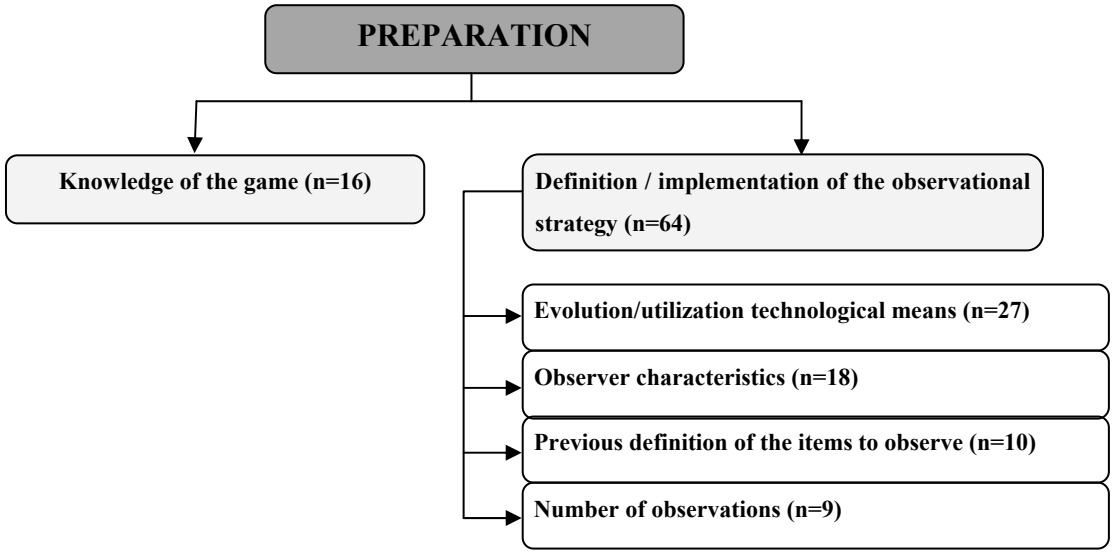

FIGURE 1
Graphical representation of the categories and sub-categories for the task "Preparation". The number "n" reported represents the number of independent mentions of this idea/concept by the eight expert coaches.

The coaches interviewed consider that to perform the observation effectively it is essential to have a detailed knowledge of the game.

> "Most important of all is the knowledge of the game (...) first you have to understand the game…" (Coach 1)

Moreover, coaches assigned significant importance to the procedures developed towards the definition/implementation of the observational strategy. Within this category all coaches referred to the development/utilization of media technology as a valuable aid for the observation and analysis of the game, especially the use of video technology and specific software. However, this analysis assumes only one objective importance if the information is correctly selected. Aware of this premise, there are coaches who feel the need to adapt the technological means in order to make its use more practical and functional in accordance with its objectives.

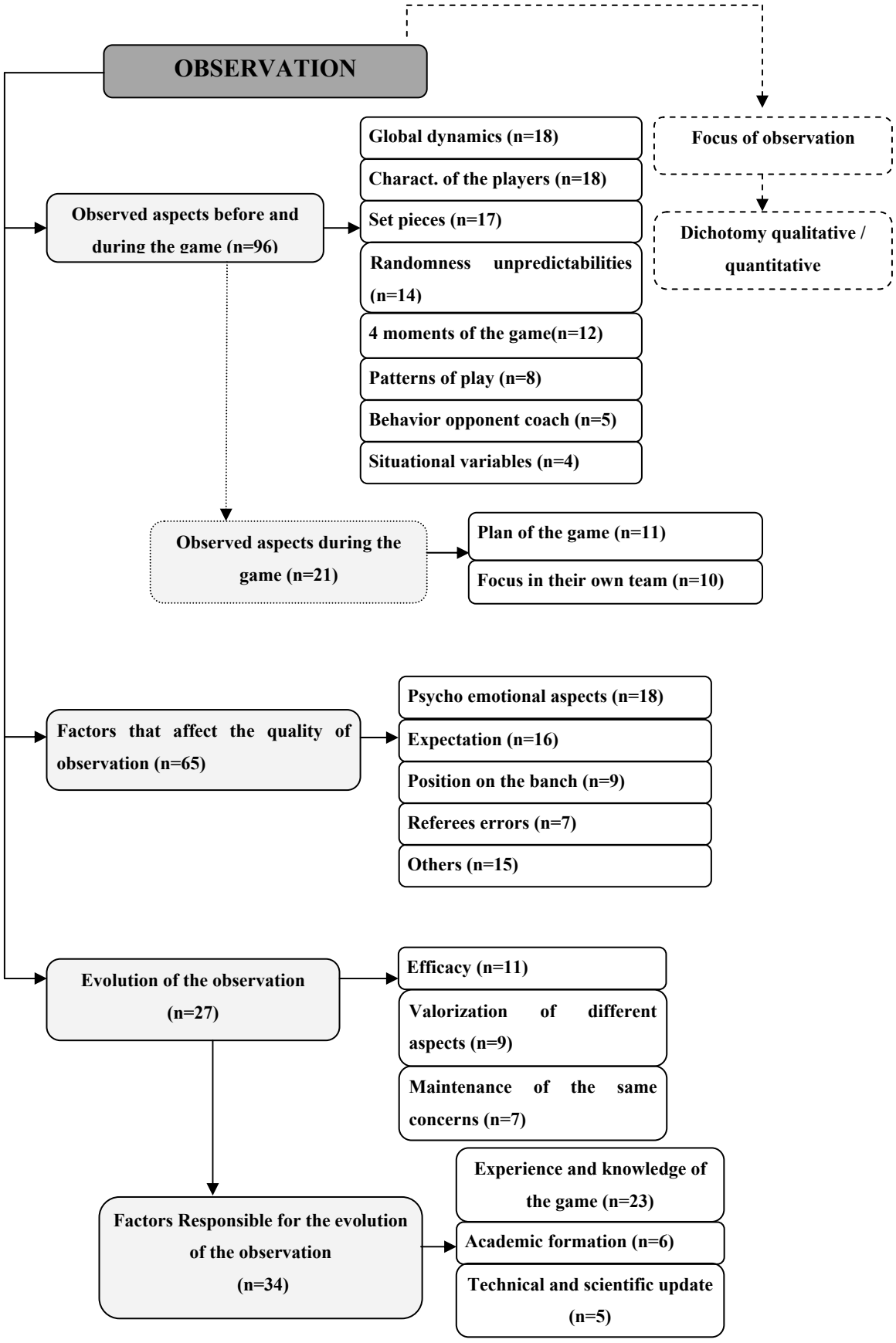

FIGURE 2
Graphical representation of the categories and sub-categories for the task "Observation"

> "…we tried to develop a system that consists of the following: having an Ipad with the game matrix (the way we see the game) on the bench connected to the stadium system of video images and to a television or a touchpad in the dressing room, so it would be an integrated system in which the game was enough to identify something positive that was happening and that we want to positively reinforce at half time. Touching the screen the pictures were captured five seconds before or five seconds after the relevant event (the same thing when something was not going well) and then just had to get there (dressing room), select and present, that is, we present and talk with the support of the footage." (Coach 2)

The coaches also feel that the particular observer characteristics are essential in the process of watching the game. Thus, whenever they recruit a specialist to work in this area, they look for someone who has a similar understanding and sensitivity to the game that they themselves have.

> "A good analyst, a good observer is one who sees the game not with his eyes, but with the eyes of the coach …" (Coach 3)

In order to minimize the effects that different sensitivities may exercise in the analysis of the observed aspects, the coaches opt for previously defining the items to watch in the game, resulting in a standardized reporting instrument with pre-defined categories. Regarding the number of observations made to the opponents, we found they vary according to the coaches but especially according to the economic resources (2-6 games). Although much of the observation work is done by analysts, coaches reported that whenever possible they like to observe the opponents during live competition, because it allows them to have a more realistic perception of the intensity and rhythm of play beyond the observation of global team dynamics.

> "Watching the game live is more important, because video only allows you to see the action on the ball. When I see a game on television, I cannot adopt the attitude of a professional or an analyst (…) it is too limited to evaluate a team just by what you see on the television". (Coach 4)

Observation

The second task of qualitative analysis consists in the observation of human movement. At this stage we tried to know what the coaches watch in a football game and which key aspects they should focus on (Figure 2).

In this sense, we tried to know which aspects are observed before and during the game by the coaches that constitute our sample, and we conclude that they most often refer to the need to observe the overall dynamics of the teams, the individual players' characteristics, the set pieces, the random/unpredictable aspects and the four moments of the game: offensive organization, defensive organization, offensive transition and defensive transition.

> "Essentially I observe dynamics and ways. Basically what I do is try to find solutions to any problems that the adversary creates for us, to find solutions to find ourselves, give clues for players to have a better performance." (Coach 5)
>
> "The set pieces, as we all know are very important (...) Then we have to find what is the randomness and unpredictability, i.e., how the team reacts in completely different, random and transient situations" (Coach 6)
>
> "…basically we try to divide the game into four moments, to be easier to evaluate." (Coach 7)

The observation and identification of regular actions in the game (patterns of play) the behavior of the opponent coach and situational variables (e.g., audience type, state of the grass, etc.) are also priorities about which coaches refer focus its observation.

During the course of the game, while leading their teams, coaches are concerned primarily in observing the fulfillment of the outlined game plan, and mainly focus their observation on their team. We highlight the fact that coaches often state that their eyes are not directed to where the ball is but to spaces away from the typical visual focus of action around the ball in order to decipher the dynamics that occur there.

> "We have a game plan based on our characteristics that is adjusted to the characteristics of the opposing teams. I primarily center my observation on the correct implementation of the plan that we make for the game. My observation is focused mainly on my team…" (Coach 7)

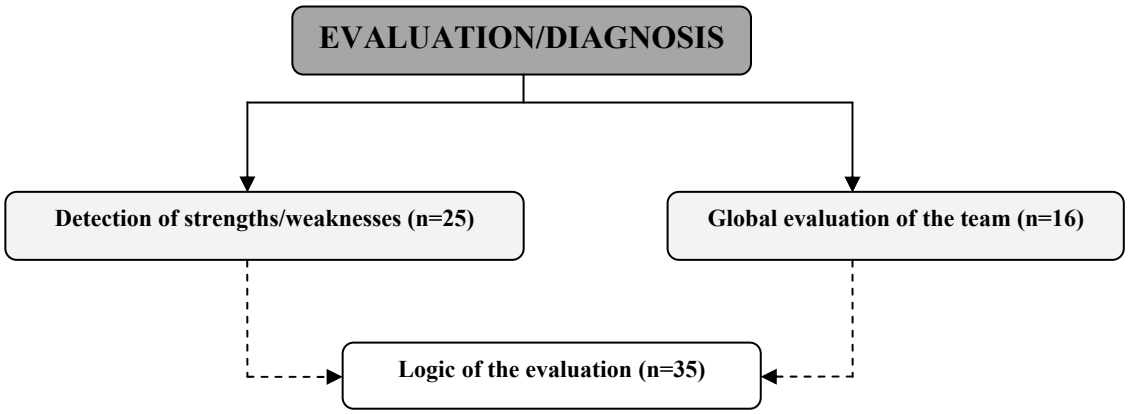

FIGURE 3
Graphical representation of the categories and sub-categories for the task "Observation"

They consider that the main factors that affect their observation are the psycho-emotional aspects, the expectations, the position on the bench and the referees' errors. However, they acknowledge that the observation and analysis that they perform has evolved over the years, leading them to make more effective observations or to value aspects in the game that they did not previously value. The factors responsible for the evolution of this observation are the accumulation of experience and a better knowledge of the game, academic training and technical training.

> "There is also a certain level of emotion that makes us often change the meaning of what we observe" (Coach 6)
> "Many of the times the expectations affect and limit our observation, or give another dimension to the observation" (Coach 7)

Evaluation/Diagnosis

The third task consists of the evaluation that was observed in order to produce a diagnosis that provides the development of an appropriate intervention plan to enhance performance (Figure 3).

When evaluating the opposing teams' coaches conduct an overall evaluation of the teams that enables them to identify strengths/weaknesses, to allow them to "explore" these weaknesses, or in order to avoid any difficulties that the opposing team can place on the basis of its more positive aspects.

> "…try to understand where are the similarities, differences, which we can exploit, and what the opposing team can explore in our game, the more/less positive, stronger/weaker factors (...) what can create more imbalance in our team, and what we can do to imbalance the opposing team, according to what we see." (coach 6)

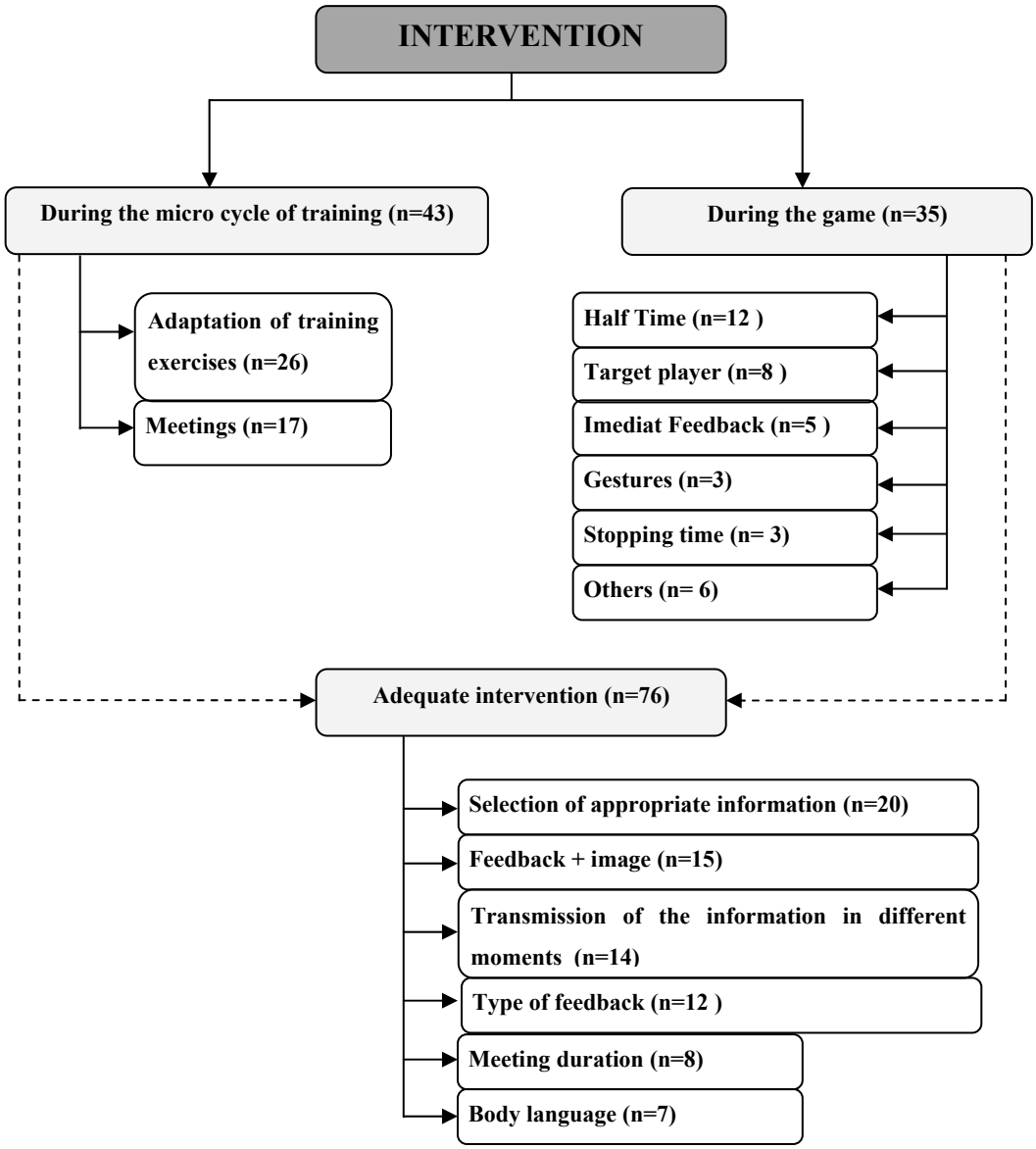

FIGURE 4
Graphical representation of the categories and sub-categories for the task "Intervention"

The assessment and diagnosis that coaches perform are based on certain logic, which means, a framework of ideals behind this process of evaluation/diagnosis, that we call logic of evaluation. This logic that coaches follow in order to evaluate their own team or opposing teams is sustained on the one hand, on a relation of antagonism between the teams against, and on the other hand, on a referential that every coach has relative to his own game model.

> "When I'm evaluating an opposing team, I have to know who my team is, to get a sense of what is important and more crucial in this vision of two antagonistic processes." (Coach 8)

Intervention

The last task of qualitative analysis is the intervention planned by these coaches, based on their interpretation of the data observed. The intervention is understood not only as the organization of training process, but also as a set of resources or techniques the coach uses to effectively transmit the information to his players (Figure 4).

The intervention of coaches is performed during the micro cycle training or during the game. During the micro cycle training, the intervention is sustained primarily on the adaptation/ modification of training exercises depending on the diagnosis done based on the performance of own and opposing teams. However, this intervention is also done through meetings which are collective, individual or in small groups.

> "…during the week we adapt the training exercises depending on the characteristics of the opposing team (...) I try, especially with the players who are opposition during the training sessions to create some similarities to what we might find in the opponent team." (Coach 1)

Throughout the game, the coaches reported that half time is the most appropriate moment to perform their intervention. However, they make use of other techniques such as the fact that they have a target player who they often use to transmit information so that it can get to their colleagues, the use of immediate feedback and the use of gestures.

> "Normally I produce my intervention at half time (...) because the player is mentally a bit more available, calmer, more serene and hears better." (Coach 1)
>
> "There are aspects that occur during the game that if not corrected immediately, will be repeated. In these situations the best is to give immediate feedback" (Coach 2)

The coaches interviewed showed a great concern for making an appropriate intervention. To do this, they carefully select the information they wish to convey to players, resort to using images to enhance their feedbacks, perform various meetings throughout the week with a short duration, and attach particular importance to their body language.

"…much of this information we transmit to players; there is other that we do not as they do not need to know everything. They just need to focus on what is essential, as we have all the information to understand some things that may have happened in the game." (Coach 3)

Discussion and Conclusion

The objective of this study was to understand how the professional football coaches prepare, observe and analyse the game and how they carry out their intervention before the information is collected.

The previously presented four tasks of observation, analysis, evaluation / diagnosis and intervention were edified based on the specialists (coaches) statement, who are daily involved in the training process of high performance football teams, exceeding the traditional reductionism characteristic of some current models available in the literature, developed mainly based on theoretical conceptualizations. These four tasks systematize much of the work of a football coach.

In relation to the task of "preparation of the observation" all the interviewed coaches were unanimous in considering that the knowledge that each one has of the game is crucial in order to be able to extract from this activity the aspects that are really important.

At this stage, the coaches consider the development/utilization of media technology as a valuable aid for the observation and analysis of the game. The potential of using technologies like video, or sophisticated software (e.g., Amisco, ProZone) to facilitate the observation and analysis of the game are well described in the literature[1,11,12].

Although these coaches know the currently available software for analyzing performance and while some of them use this type of software in their clubs, they refer that they do not use it very often. This fact is due to the gap between the data generated by this software, and the data that coaches aims to analyze in the game, which are mainly of tactical and strategic nature. In this context, the use of video is the fundamental tool used for performance analysis, since it represents a powerful tool to obtain, evaluate and present information about the performance in sport[1].

The implementation of the observational strategy involves the observation of a certain number of games depending on not only the ideals of the coach, but also on the economic resources of the clubs. However, the coaches consider that the observation of just one game is not enough since this may not transmit with the necessary precision, the information about the opponent team and may even contain some risks for decision makers. As far as possible the coaches based their analysis on at least two games paying attention to specific situational aspects (e.g., games away vs home games). Teodorescu[13] considers that at least three games of the opponent teams should be observed, in order to make the detection of match regularities possible. This finding is consistent with the intentions of the interviewed coaches who reported that they would like to have the possibility of analyzing a larger number of games.

Usually the coaches assign the task of observing the opposing teams to an assistant coach (analyst/observer). This analyst is carefully selected because he needs to have a similar understanding of the game to what the main coach has. These coaches refer that the analyst should have a continuous presence in training sessions of their own team, in order to better know the specificities of the game and players.

However, the observation of opposing teams is not restricted to the observation produced by the observers/analysts. Whenever possible the coaches go to the stadiums to watch "in loco" the opponent teams because they consider that only the direct observation allows a global analysis of the game dynamics. Through this process they can observe a set of events that, in most cases, are not captured by the television, because, in general, they happen in areas away from the center of the game. Another reason is related to the veracity of the collected information, since, according to these coaches, watching games on TV is sometimes misleading. In this way, the coaches apply different techniques to observe, record and analyze the data in order to overcome the natural limitations of human memory[3], and moving away from the traditional chain that states that an experienced coach can capture all the important events of a game[14].

After the "preparation of the observation" emerges the second task called "observation of the game". The coaches refer more often, the need to observe the global dynamics of teams. In general, they want to observe the collective movements and be-

haviors presented by the teams but also place great importance on the individual players' characteristics. This analysis is based mainly on the tactical and technical details that might cause perturbations or imbalances in opposing defensive structure, but also for the detection of psychological aspects characteristic of players who can be "exploited" as a function of an appropriate strategy. The importance of observing these aspects are highlighted by the specialized literature[3]. These authors reported that although it is not an easy task to directly access the mental factors, these can be inferred through the analysis of player behavior.

It is natural that coaches focus much of their work on the analysis of tactical schemes and regularities of the game of the opposing teams. In order to more easily observe the game, they split its organization into 4 moments, called: i) defensive organization; ii) transition defense-attack; iii) offensive organization; iv) transition attack defense. Thus, they seek existing regularities inside the game of each team. In this way they can prepare their teams more efficiently for the games against these opponents.

The relevance of the detection of these regular structures of behaviors or patterns of play has been highlighted by several authors[15,16,17], attesting congruence between what are the needs of coaches and scientific research on this aspect.

There is a set of aspects which may be observed and that are related essentially to the conditions that characterize the involvement of the game (e.g., weather conditions, state of the grass, type of audience, alongside the goal that the opposing team prefers to attack, the end result, the quality of the opponent, etc.) and allow a deeper understanding about the reality in which the activity will develop. The knowledge of these aspects is considered important because it can influence the behavior of the players and will of course affect their competitive performance[3,18].

The interviewed coaches can describe the performed observation based on a qualitative/quantitative dichotomy. Contrary to the one suggested by Carling et al. (2005), who consider that coaches should make use of simple statistical data during the game (e.g., number of passes failed, number of times the team achieves the offensive third, etc..) to support their interventions, none of the interviewed coaches mentioned making use of this type of data.

A substantial amount of research recently developed, using various technologies that allow quantifying, for example, the distances covered by players at different intensities[19-20] does not seem to satisfy the need of coaches. However, the literature[15] also states that a strictly quantitative analysis may not provide all the important information of the football game.

The observation of any phenomenon is a dynamic process that is being influenced over the years by the personal experiences and also by a framework of doubts itself, uncertainties and expectations[5,19]. The football game is developed in scenarios where there is a large number of the factors that influence the quality of the observation (e.g., public, referees errors, momentary results).

The interviewed coaches have the perception of the influence that these factors have on the way they observe and analyze a game and, consequently, how they make decisions from that analysis. Previous researches confirm the influence of spectator behavior[20], the referees errors[21], the expectations and the position on the bench[3] affect both coaches and players. But they also mention some factors like the inadequate behavior of the opponent players and coaches, the error of their own players and unexpected situations in the game as factors that have direct influence in the quality of the observation.

After observing the performance of the athletes and teams, the coaches must identify desirable and undesirable aspects of that performance. The large amount of information resulting from this process must be processed in the analyst's mind[5], in order to evaluate the main points of performance and to diagnose the adequate intervention. This may be the most difficult task in the context of this qualitative analysis.

The coaches who participated in this study reported that they initially perform an overall evaluation of teams and then analyze more specifically the strengths and weaknesses. The overall assessment allows them to have a general idea about the characteristics of their opponents, but also, to acquire an idea of how the process that they idealized for their own team and players evolves.

As stated by the literature[3], these coaches focus their evaluation mainly on the detection of the more and less positive aspects of the opposing team structure in order to "explore" these weaknesses or avoid any difficulties that the opposing team can create according to their most positive aspects. This analysis is performed not only at the organizational level of the teams, but also at the individual level, looking for characteristics that may be relevant in certain players.

The evaluation and diagnosis that the coaches performed are based on a specific logic (i.e., a framework of ideals behind this process of evaluation/diagnosis) that we name logic evaluation. This logic is established, on the one hand, in a relationship of antagonism between the teams in opposition, and on the other hand, in a self-referential that each coach has in relation to his game model.

Once the observation has been conducted and the strengths and weaknesses of the movement have been evaluated and diagnosed, the last task of this process is the intervention, in order to improve the performance. Improper intervention can result in decreased performance.

There seems to be a congruence between what is seen by the coaches (both in their team as well as in the opposing teams), their model of play, and the adaptation and implementation of training exercises. A coach is between the triad: game model, training model and model of analysis[8]. Given this assumption, the interviewed coaches in accordance with some authors[3,5,8], reported that when provided with the information resulting from the games analysis they made changes in the training exercises, which are programmed not only in relation to their own game model, but also in relation to the opponent characteristics, looking somehow to recreate similar scenarios to those that will occur in the game.

Although the training exercises are considered the best solution for transmitting information to the players, the coaches also used other strategies such as: meetings, the use of written reports and video images. The potential of the use of video technology is well known[3,8,19], however many coaches also resort to the use of photography, because the frozen image can highlight all aspects without losing information.

The appropriate intervention is also of great concern to these coaches. In this sense, and according to previous studies, they were greatly concern with the type of provided feedback[3,22], the duration of meetings[8] and body language[23].

In summary, the qualitative methodology used has led to a conceptualization of expert football coaches' knowledge. In fact, focusing on what Knudson and Morrison[5] defined as the integrated model of qualitative analysis, the present study has adapted and systematized the different components and their links which appear to be central to the coaching process in football. The proposed model consists of 4 main tasks (preparation, observation, evaluation/diagnosis, intervention).

However, the construction of this model is supported not only in a theoretical approach as some of the models that are presented in the literature[3,8]. On the contrary, it results from the analysis of the reports of high performance coaches in this sport that daily face the reality of the practical application of their knowledge. Thus, it was possible to systematize in a detailed way the different tasks included in the process of qualitative analysis in football.

From this analysis we emphasize the rigor and systematization that characterizes the preparation phase of the observation, beyond the fact that these coaches demonstrate similar concerns in respect to aspects to watch in a game, which are mainly characterized by the detection of regularities/patterns of behavior that emerge from the activity, thereof on a qualitative perspective, rather than a data analysis of quantitative nature, which they consider to be less relevant in this context. The observed aspects are then evaluated taking as reference the specific game model of each coach who, based on that observation, carefully planned his intervention.

The underlying model of the process used by expert coaches to improve sport performance in football was an important basis for formalizing coaching knowledge. Indeed, a deeper understanding of each of the underlying tasks appears to be necessary for obtaining a true understanding of coaching at any level of competition in football.

R E F E R E N C E S

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TRENAŽNI PROCES U FUDBALU – KVALITATIVNA PERSPEKTIVA

S A Ž E T A K

Ova studija je imala za cilj da otkrije šta je to što treneri posmatraju tokom igre, kako oni ocjenjuju zapažanja i kako intervenišu na osnovu svojih zapažanja. U studiji je učestvovalo osam iskusnih fudbalskih trenera iz prve portugalske lige. Polu-strukturisani intervjui su primijenjeni i podaci su analizirani tehnikom analize sadržaja. Korišćen je softver QSR NVivo 9 sa ciljem da se kodiraju transkripti intervjua. Ono što su ispitanici istakli kao je od ključnog značaja da treneri efikasno posmatraju i analiziraju igru, te da imaju detaljno poznaju fudbalsku igru i individualne karakteristike svojih igrača. Takođe, oni ističu da su najvažniji aspekti posmatranja igre sljedeći parametri: 1) određeni trenuci igre; 2) prekidi; 3) individualne karakteristike igrača; i 4) slučajni aspekti igre. Odabrani treneri za ovo istraživanje, takođe vjeruju da su tokom godina postali efikasniji i da sada vrednuju različite aspekte u igri, dok ističu sljedeće faktori koji su odgovorni za njihovu evoluciju: 1) akumulirano iskustvo; 2) bolje poznavanje igre; 3) akademsko formiranje. Oni procjenjuju svoje timove tako što se uglavnom fokusiraju na njihove prednosti i slabosti, a primjenjuju određenu logiku prioriteta za procjenu ovih aspekata koji se zasnivaju uglavnom već određenim modelima igre. Intervencija se vrši uglavnom preko adaptacije trenažnog procesa, ali i kroz vizuelne strategije (filmovi, fotografije, itd.) i sastanaka (pojedinačnih, sektorskih ili grupnih).

Ključne riječi: Fudbal, analiza mečeva, taktika, trener.

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Effect of Half Time Cooling on Thermoregulatory Responses and Soccer-Specific Performance Tests

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A B S T R A C T

This study examined two active coolings (forearm and hand cooling, and neck cooling) during a simulated half-time recovery on thermoregulatory responses and subsequent soccer-specific exercise performance. Following a 45-min treadmill run in the heat, participants (N=7) undertook 15-min recovery with either passive cooling, forearm and hand cooling, or neck cooling in a simulated cooled locker room environment. After the recovery, participants performed a 6×15-m sprint test and Yo-Yo Intermittent Recovery Level 1 test (YYIR1) in a temperate environment. During the 15-min recovery, rectal temperature fell significantly ($p<0.05$). Neither active coolings induced further reduction in rectal temperature compared to passive cooling. No effect of active coolings was found in repeated sprint test. However, neck cooling reduced ($p<0.05$) the thermal sensation (TS) compared to passive cooling during the 15-min recovery. Active coolings attenuated ($p<0.05$) the sweat rate compared to passive cooling: 1.2±0.3 $l \bullet h^{-1}$ vs. 0.8±0.1 $l \bullet h^{-1}$ vs. 0.8±0.3 $l \bullet h^{-1}$, for passive cooling, forearm and hand cooling, and neck cooling, respectively. For passive cooling, elevated sweat rate resulted in higher ($p<0.05$) dehydration (2.1±0.3%) compared to neck cooling (1.5±0.3%) and forearm and hand cooling (1.4±0.3%). YYIR1 was improved ($p<0.05$) following forearm and hand cooling (869±320 m) and neck cooling (814±328 m) compared to passive cooling (654±311 m). Neck cooling (4.6±0.6) reduced ($p=0.03$) the session TS compared to passive cooling (5.3±0.5). These results suggest that active coolings effectively improved comfort and sweating response, which delayed exercise-heat induced performance diminish during a second bout of exercise.

Key words: *football, body temperature, ice, immersion, sweating, fatigue.*

Introduction

Soccer is characterized by high-intensity intermittent exercise[1]. The high rate of energy expenditure generates considerable amount of body heat which severely elevates the body temperature and sweating response, especially if match play is held in the heat[2]. It has been well documented that elevated heat storage and dehydration would reduce both aerobic[3] and repeated, intermittent sprint performance[4]. Nevertheless, major soccer championship events or pre-season training sessions are often scheduled during the summer time. The heat strain from the environment along with the high metabolic heat production of soccer activities can pose great challenges to players' health, performance and consequently, match results.

In order to optimize performance and ensure safe health practice, many cooling interventions have been studied and it is well accepted that active cooling could offset exercise-heat stress[5,6]. Sports such as soccer, rugby, and tennis, which have one or multiple short periods of recovery between exercise, employing cooling during those short recovery periods may represent the most practical situations for cooling and provide beneficial effects for subsequent exercise periods.

Finding a simple yet effective cooling strategy is difficult, especially for administration in team sports such as soccer. Forearm and hand cold water immersion is easy to perform and provides proven physiological benefits for hyperthermic individuals[5]. Alternatively, neck cooling could be another ideal choice for field application since it is quick and convenient for mass distribution to multiple players[7]. To date, neither of these methods have been evaluated in a soccer match setting. Therefore, this study assessed the efficacy of two active coolings (forearm and hand cooling, and neck cooling) on thermoregulatory responses and soccer-specific exercise performance after a simulated 45-min soccer running in the heat. We hypothesized that active coolings during a simulated 15-min half-time recovery could attenuate heat strain and enhance subsequent soccer-specific performance tests.

Materials and Metods

Seven physically active, heat acclimatized university students (6 male, 1 female) participated in this study. They were informed of the nature of the study, signed the informed consent, and performed a graded treadmill exercise (for assessing maximal oxygen uptake) and familiarization session first. They were asked to refrain from caffeine, alcohol, and strenuous exercise at least 24 hours before each trial. Participants were also instructed to log their food intake the day before the first experimental trial and keep the same food intake before the subsequent trials. In addition, they were instructed to keep euhydrated the day before the experimental trials and ingest ~500

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ml beverage 2 hours before reporting to the lab. While in general there is no gender difference in sweating and core temperature responses to heat stress[8], for the one female participant, all trials were conducted in the same phase of the menstrual cycle to avoid temperature variation. This study was approved by the University's Medical Ethics Committee for protection of human participants.

This study required participants performing three trials in a counterbalanced order. All trails were separated by a week, and performed at the same time of the day (±1 h) with participants wearing soccer uniform. Each trial consisted of a 45-min simulated half of soccer running in a controlled heat chamber, followed by a simulated 15-min half-time recovery consisting of one of the following treatments: a control condition with only passive cooling, which simulates the conditions in an air conditioned locker room, active forearm and hand cooling, or active neck cooling in the same temperate environment as passive cooling, followed by soccer-specific performance tests. The soccer-specific performance tests consisted of 6×15-m sprint test and Yo-Yo intermittent recovery level 1 test (YYIR1). The 6×15-m sprint test was used to measure repeated sprint ability, which is an important physical ability in modern soccer[9]. The YYIR1 has been significantly correlated to maximal oxygen uptake, the amount of high-intensity running, and total distance covered during a soccer match[10,11], thus it provides a valid measurement of a player's endurance ability. These two performance tests were conducted in a temperate environment on a wooden surface area at an indoor facility.

Simulated 45-min soccer specific treadmill run

The 45-min simulated soccer match half was conducted in a heat chamber with wet bulb globe temperature (WBGT) 30.5°C (36°C dry bulb, 28°C wet bulb, 36°C black globe; 50% relative humidity). Participants were weighed (wearing soccer uniform), and then self-inserted a rectal thermocouple (Physitemp, Clifton, USA). The rectal temperature (T_{re}) was monitored with a portable system (Physitemp Thermalert model TH-8, Clifton, USA). A heart rate (HR) monitor (Polar Electro Inc., Lake Success, USA) was worn throughout the trial. T_{re} and HR were recorded every 5 min. Participants were asked to numerically identify their ratings of thermal sensation[12] (TS) during the trials. After instrumentation, participants entered the heat chamber and started to run on a motor-driven treadmill (Q55xt, Series 90, Quinton Instrument Co, Seattle, USA). A 45-min treadmill intermittent running protocol was used to simulate a soccer match running and the activity pattern of this protocol was similar to that observed from time-motion analysis of competitive match play[1,13]. Each locomotor activity and duration was categorized as stand (0 $km \cdot h^{-1}$, 60 sec), walk (5 $km \cdot h^{-1}$, 60 sec), jog (8 $km \cdot h^{-1}$, 30 sec), low-intensity run (10 $km \cdot h^{-1}$, 30 sec), moderate-intensity run (12 $km \cdot h^{-1}$, 30 sec), high-intensity run (14 $km \cdot h^{-1}$, 30 sec), and sprint (16 $km \cdot h^{-1}$, 10 sec). The order of these activities was designed to replicate the intermittent nature of soccer match play. Fluid (tap water) was available during the 45-min period.

15-min cooling/recovery period

Immediately following the treadmill run, participants exited the heat chamber and sat in a room with an ambient temperature 20.7±0.5°C and 45±4% relative humidity for 15 min. Participants sat either with passive cooling, forearm and hand cooling, or neck cooling. For the forearm and hand cooling, participants immersed their left forearm and hand in 12°C cold water and this water temperature was continuously monitored and maintained. The other arm was not immersed in the cold water so that participants could ingest fluid during this period. For the neck cooling, participants put a cold and wet towel around their neck, and every 3 min, a replacement towel was provided. All towels were placed in 5°C ice water for 10 min before the cooling period started. Fluid was available during this period. T_{re}, HR, and TS were recorded every 5 min.

6×15-m sprint test

After the simulated 15-min half-time recovery period, participants moved to a room with an ambient temperature 20.7±0.5°C and 45±4% relative humidity. Relocating from the laboratory to the room required approximately 30 sec of light intensity walking. Then participants completed a 6×15-m sprint test, with 30 sec of rest between each sprint. Participants were instructed to approach the line with 10 sec left before the next sprint and were provided a 5 sec countdown before the start of each sprint. Infra-red timing lights (Speed Trap II Wireless Timing System, Power-Systems, Inc., Knoxville, USA) were used to record the time of each sprint. Sprint time and HR were recorded after each sprint. T_{re} and TS were recorded at the end of the entire 6 × 15-m sprint test.

Yo-Yo intermittent recovery level 1 test

Approximately 4 min (brief rest while listening to the audio play of test instruction) after the 6×15-m sprint test, participants completed a YYIR1[10] at the same location. HR was recorded after finishing each stage of YYIR1. T_{re} and TS were also recorded at the end. Upon completion of the YYIR1, participants returned to the laboratory and were weighed again with the same clothes. Total fluid ingestion was measured, and change in fluid balance was calculated from pre- and post- body weight adjusted by fluid ingestion. Twenty minutes after the trial, participants reported their session TS.

A two-way Analysis of Variance (ANOVA) was used to determine differences for T_{re}, HR, TS, and sprint time. When a significant *F* ratio was found, Fisher's LSD *post hoc* test was performed to identify the individual differences. A one-way ANOVA was used to compare any differences among treatments for sweat rate, fluid balance, and session TS with Fisher's LSD *post hoc* procedure. A paired *t*-test was used to determine the difference of YYIR1 score with Bonferroni correction of the alpha value. Using a one-tailed alpha of $p<0.05$ at a power of 90% and a sample size of 7 and the mean observed standard deviation of change in YYIR1, individual data were analyzed to determine the responders to the cooling treatment. All statistical analyses were performed using SPSS version 21 (IBM, Armonk, USA). Statistical significance was accepted as $p\leq0.05$. Values are presented as mean±standard deviation.

Results

Participants' age, height, weight, body fat percentage, and maximal oxygen uptake were 25±4 yr, 175±8 cm, 73.3±10.4 kg, 9±4% body fat, and 57.0±6.7 $ml \cdot kg^{-1} \cdot min^{-1}$, respectively. Of the total 21 trials, only one trial was terminated due to muscle cramp during YYIR1, and for this participant the distance covered before stopping was recorded as the total distance covered for YYIR1.

Responses to 45-min intermittent running

Physiological and thermal responses over the experiment are given in Table 1. T_{re}, HR, and TS at the end was no different among the trials ($p>0.05$) (Table 1).

Responses to 15-min cooling/rest period

After 15-min recovery, T_{re} fell significantly ($p<0.05$, Table 1) with all three conditions in the fairly comfortable environment, equals to -0.7±0.1°C vs. -0.7±0.3°C vs. -0.8±0.3°C relative to the start of the recovery, for passive cooling, forearm and hand cooling, and neck cooling, respectively. However, active coolings did not induce further reduction in T_{re}. Recovery HR was no different at any time point among the three trials (Table 1). TS decreased over the time period (Table 1). A significant main effect for trial revealed that, after 5 min rest TS was significantly lower during neck cooling than passive cooling ($p<0.05$); and TS for neck cooling was also significantly lower compared to forearm and hand cooling at 10 and 15 min ($p<0.05$).

TABLE 1
PHYSIOLOGICAL AND THERMAL RESPONESES
(MEAN±STANDARD DEVIATION, N=7)

	Start of 45-min run	End of 45-min run	Recovery at 0-min	Recovery at 5-min	Recovery at 10-min	Recovery at 15-min	End of sprint test	End of YYIR1
Heart rate (beats·min^{-1})								
Passive cooling	94±18	169±18	123±12	104±15	92±11	87±11	156±22	194±8
Forearm and hand cooling	88±10	161±26	117±11	96±12	87±10	87±12	162±20	192±7
Neck cooling	94±11	162±20	113±8	95±15	87±12	88±12	152±21	194±8
Rectal temperature (°C)								
Passive cooling	37.8±0.4	39.0±0.5	39.0±0.5	38.8±0.5	38.6±0.5	38.3±0.5*	38.4±0.5	38.9±0.4
Forearm and hand cooling	37.5±0.2	38.9±0.4	39.0±0.4	38.5±0.5	38.2±0.4*	38.0±0.4*	38.3±0.3	38.8±0.4
Neck cooling	37.5±0.3	38.9±0.4	39.0±0.5	38.8±0.4	38.5±0.4*	38.2±0.3*	38.4±0.3	38.8±0.4
Thermal sensation								
Passive cooling	4.0±1.2	6.4±0.4	4.9±1.1	4.4±1.0	4.1±0.9	3.6±0.7†	4.4±0.8	5.3±0.9
Forearm and hand cooling	4.4±0.7	5.9±0.3	5.1±0.9	3.9±1.1†	3.6±0.9†	3.4±0.6†	4.1±0.5	5.3±0.8
Neck cooling	3.9±0.6	5.9±0.5	4.7±1.0	3.0±0.7†‡	2.5±0.8†‡§	2.2±0.6†‡§	3.9±0.4	4.6±1.0

Legend: YYIR1 – Yo-Yo intermittent recovery level 1 test. For the ratings of thermal sensation, each number represents the following: 8–"Unbearably Hot", 7–"Very Hot", 6–"Hot", 5–"Warm", 4–"Comfortable", 3–"Cool", 2–"Cold", 1–"Very Cold", 0–"Unbearably Cold". *(rectal temperature) significantly different from start of the 15-min recovery, $p<0.05$; †(thermal sensation) significantly different from start of the 15-min recovery, $p<0.05$; ‡(thermal sensation) neck cooling significantly different from passive cooling, $p<0.05$; §(thermal sensation) neck cooling significantly different from forearm and hand cooling, $p<0.05$

Performance of 6×15-m sprint test

The effects of cooling on multiple sprint performance are presented in Figure 1a. Average times for the six sprints were 2.86±0.16 sec vs. 2.81±0.17 sec vs. 2.83±0.17 sec, for passive cooling, forearm and hand cooling, and neck cooling, respectively. Relative to passive cooling, neither forearm and hand cooling nor neck cooling enhanced the sprint performance. HR was no different at any time point among the trials. At the end of the sprint, no difference of T_{re}, HR, and TS was found among the trials (Table 1).

Performance of YYIR1

Both forearm and hand cooling and neck cooling significantly improved the total distance covered (Figure 1b). The distances covered were 654±311 m (passive cooling), 869±320 m (forearm and hand cooling), and 814±328 m (neck cooling). Five out of the seven participants responded to the cooling treatment (Figure 1b). Rectal temperatures increased rapidly to the level of pre-cooling condition (Table 1). At the end TS were not different among the trials ($p>0.05$, Table 1).

TABLE 2
SWEATING RESPONSE AND FLUID BALANCE
(MEAN±STANDARD DEVIATION, N=7)

	Passive cooling	Forearm and hand cooling	Neck cooling
Fluid ingestion (ml)	968±359	679±292	692±420
Weight loss (kg)	1.5±0.4	1.0±0.2*	1.1±0.3*
Dehydration (%)	2.1±0.3	1.4±0.3*	1.5±0.3*
Sweat rate (($l \cdot h^{-1}$)	1.2±0.3	0.8±0.1*	0.8±0.3*

*significantly different from passive cooling, $p<0.05$

Sweating response, fluid balance, and overall thermal discomfort

Impact of active coolings on sweating response and fluid balance is given in Table 2. Sweat rate was significantly higher ($p<0.05$) in passive cooling over the trial period when compared to the active coolings. Active coolings significantly attenuated the dehydration ($p<0.05$). Neck cooling (4.6±0.6) attenuated the session TS compared to passive cooling (5.3±0.5) ($p=0.03$), with no difference for forearm and hand cooling (4.9±0.5) ($p>0.05$).

Discusion

This study was designed to examine the impact of half-time cooling on recovery and a second bout of exercise performance. This test protocol, including the 45-min intermittent running,

repeated sprint test, and YYIR1, was chosen to simulate the high-intensity, intermittent nature of soccer running activities, to evaluate the external environmental heat load on players when matches are held in high ambient temperatures. The results from this study demonstrate that active coolings during a simulated half-time recovery enhanced thermoregulatory ability by decreasing whole body sweating despite the absence of further reductions in body core temperature. Most importantly, these simple active coolings successfully yielded 42% (forearm and hand cooling) and 31% (neck cooling) improvements in soccer-specific intermittent running performance even in a temperate environment. This increase in exercise capacity could be attributed to the lower sweat rate, dehydration status, and improved thermal comfort.

Water immersion has been suggested to be effective mean to extract the heat from the circulating blood and cool the body core[14]. Using methodology similar to ours (20-min recovery at a room temperature of 15°C), Carter et al.[15] reported a 0.8°C reduction of core temperature (we saw about a 0.7°C drop in 15 min) when participants were cooled via forearm and hand immersion at 10°C of cold water. The current results found all three cooling conditions significantly reduced the body core temperature in 15-min recovery period. However, neither active coolings further enhanced body temperature control during the recovery period and the subsequent bout of exercise compared to passive cooling. The substantially comfortable temperature and humidity in the comfortable laboratory field may have prevented further advantages from active coolings. However, practically from a cooling core temperature standpoint, passive cooling provided enough drive for recovery (body core temperature regulation), where the environment here can be typically found in many locker room settings during the half-time break.

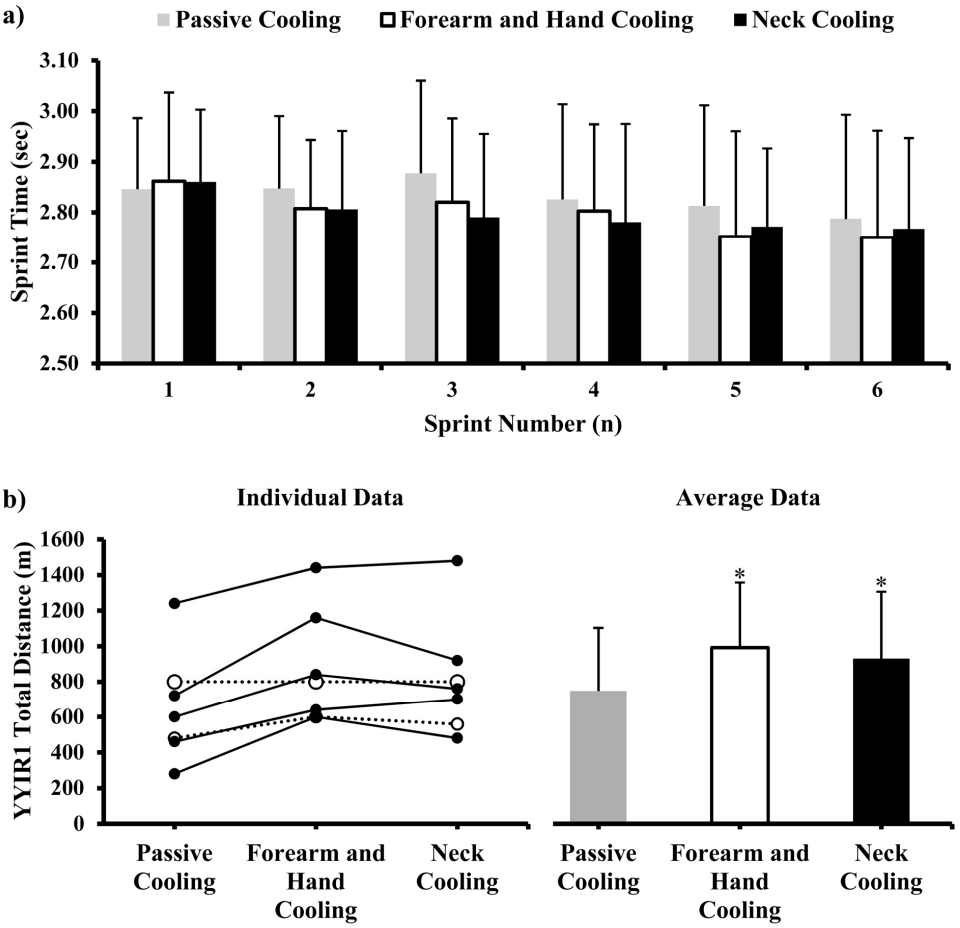

FIGURE 1
ACTIVE COOLINGS ON SOCCER-SPECIFIC PERFORMANCE TESTS: a) 6×15-m repeated sprint test b) Yo-Yo intermittent recovery level 1 test (YYYIR1) (left panel: individual data [● – responder, ○ – non-responder]; right panel: average data) (mean±standard deviation, N=7). *significantly different from passive cooling, $p<0.05$

Any cooling intervention acting as a "heat-sink" can be expected to improve exercise performance in the heat. From our results, there was no beneficial effect of cooling on high intensity sprint ability. Lack of an apparent beneficial effect of cooling on repeated sprint ability has also been reported elsewhere[6,16]. It is possible that, the ative coolings did not differentiate the body core temperature during the recovery period in the simulated locker room environment and therefore did not elicit an improvement in the subsequent sprint performance. In addition, we chose 15-m for the sprint test as an indicator of anaerobic capacity following the earlier fatiguing exercise, since this distance typically reflects the soccer players' running pattern (~14 m) during competitive matches[9]. The current test protocol emphasizing soccer-specific sprint distance and relative adequate recovery may allow sufficient recovery and pose inadequate challenge for the body's thermoregulation system and thus, mitigated beneficial effect of the active coolings.

A single physiological parameter such as a reduction in core temperature may not well reflect the global view of whole body thermoregulation. Crawshaw et al.[17] have shown that local skin cooling can reduce sweating response in the heat even in the absence of an apparent reduction in body core temperature. A recent review[18] concluded that high skin temperature and hypohydration, not high core temperature, are the primary factor impairing aerobic exercise performance. Compared to passive cooling, active coolings reduced the sweat rate by 0.4 $l \cdot h^{-1}$ or ~33% advantage (Table 2) and attenuated dehydration process at the end of the trial. This is similar to the finding using a neck cooling device in which the sweat rate was reduced by 6.4%[7]. The reduced sweat rate could be resulted from enhanced conduction and convection heat loss via cold water and concomitantly, reduced the reliance of body heat dissipation via sweat production and evaporative cooling. Meanwhile, active coolings also improved the perception of comfort during recovery and subsequent exercise. Using cold water immersion or even simple intervention, replacing multiple cold and wet towel of neck cooling, achieved desired physiological benefit. Effect of cooling on comfort and sweating response resulted in significant improvement in distance covered during YYIR1 for forearm and hand cooling (42±37% over no cooling) and neck cooling (31±24% over no cooling) (Figure 1b). It is apparent that even a moderate dehydration (~2.0% for passive cooling) could considerably impact on the submaximal exercise capacity, and such negative effect would be evident if both the environmental temperature and the relative humidity (reduced efficacy for evaporative cooling) are high, and/or in many sport-specific situations, where chances for fluid replenish are restricted.

Based on the current results, there are several points of interests regarding the development of fatigue in soccer. First, a critical high core temperature from strenuous exercise and environmental heat threatens the performance and health of players. As evidenced during the subsequent performance tests (~20-25 min of total time for the sprint test and YYIR1), the core temperature increased rapidly back to the level immediately after the 45-min run (Table 1). This was as a result of the sprint and submaximal run in a temperate environment, and not in the heat, during which it would be expected to observe an even higher core temperature. This would be a great concern, especially if major competitions (e.g., Olympics soccer tournament) or pre-season camps are held in high ambient temperatures in the summer time. The intermittent nature of soccer match play clearly poses evident thermal strain on the body. Furthermore, from the current study, ~2% moderate dehydration (~80 min of total trial time including recovery) was associated with a decline in high-intensity running performance and may play a major role in the development of fatigue. It should be noted that, in our study, fluid (tap water) was freely available and participants were encouraged to drink at all times. During soccer match play, the chances for fluid replenishment would be largely limited, and appropriate rehydration does not always occur.

Due to the nature of the soccer match play, researchers often face problems with in-depth and accurate lab controlled conditions for experimental investigation. A major drawback of the current study design therefore, is that we did not test the subsequent soccer-specific performance in a hot and humid environment. In our study, participants exercised in the heat to simulate soccer match half, and indeed simulated a recovery environment that typically can be found in the field. However, the readers need to acknowledge that the performance protocol was conducted in a moderate/comfortable condition following the pre-load of ~30˚C WBGT. The soccer-specific tests requirement does not allow us to simulate the same heat condition, nor in the summer time as of which are even challenging due to inability to control environmental conditions in multiple summer days. Therefore, readers and researchers need to be aware that in addition to the small sample size in this study, the current study design may lead to an underestimation of the effectiveness of cooling, and doesn't strictly allow to make accurate conclusions about performance changes in the heat.

Conclusion

The present study has demonstrated the practical field benefits (i.e., YYIR1, sweating response) of forearm and hand cooling and neck cooling in delaying the development of dehydration, providing thermal comfort, and improving high-intensity sport performance under exercise-heat stress. For sports such as soccer, tennis, rugby, baseball, and American football that have breaks active coolings before warm-up and during any breaks could aid recovery from heat strain and help in delaying fatigue and enhance subsequent sport performance. Taken together, the current simple effective active coolings are recommended for large field implementation in team sports during hot conditions.

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UTICAJ HLAĐENJA TOKOM POLUVREMENA NA TERMOREGULACIJU I SPECIFIČNE PERFORMASE FUDBALERA

S A Ž E T A K

Ova studija ispituje dvije intervencije hlađenja (aktivnu nasuprot pasivnoj) tokom simulirananog oporavka u poluvremenu na termoregulaciju i kasniji učinak vježbanja. Nakon 45-minutne aktivnosti na pokretnoj traci, ispitanici (N=7) su tretirani 15-minutnim oporavkom, pasivnim hlađenjem podlaktice i šake ili vrata u određenoj prostoriji za ovakve namjene. Nakon oporavka, ispitanici su tretirani 6×15-m sprint testom i Yo-Yo Intermittent Recovery Level 1 testom (YYIR1) u umjereno zagrijanom okruženju. Ni aktivno hlađenje nije izazvalo dalje smanjenje rektalne temperature, niti pasivno. Nije pronađen uticaj aktivnog hlađenja u ponovljenom testu sa sprintovima. Međutim, aktivno hlađenje je izazvalo smanjenje znojenja, toplotni osjećaj (TS) u poređenju sa pasivnim hlađenjem ($p<0.05$). Kod pasivnog hlađenja, povišeno znojenje je rezultirano na nivou 2.1±0.3% dehidratacije u poređenju sa hlađenjem vrata (1.5±0.3%), podlaktice i šake (1.4±0.3%) ($p<0.05$). YYIR1 je značajno unaprijeđen ($p<0.05$) kada je u pitanju hlađenje podlaktice i ruke (869±320m) i hlađenja vrata (814±328m), u poređenju sa pasivnim hlađenjem (654±311m). Navedeni rezultati sugerišu na činjenicu da aktivne intervencije hlađenja efikasno poboljšavaju udobnost i začetak znojenja, koje je bilo usporeno tokom drugog seta vježbi.

Ključne riječi: fudbal, tjelesna temperatura, let, potapanje, znojenje, zamor.

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Two Aspects of Bias in Multivariate Studies: Mixing Specific with General Concepts and "Comparing Apples and Oranges"

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A B S T R A C T

This paper presents two types of bias that occur relatively often when using multivariate analysis. For both types of bias, it is characteristic that the number and choice of different types of variables are not balanced by application of clear methodological rules. Following the interpretation of broader theoretical positions, which include "confirmation bias" (of initial hypothesis) and "misspecification bias", a description of two types of bias characteristic of multivariate analysis are given: "mixed-level bias" (in terms of specificity - generality) and "mixed-constructs bias" . Both types of bias further enhance the disparity in the number and ratio of different types of variables in the same multivariate analysis. Details of situations, when these two types of bias appear, are presented and displayed in four different examples. Several strategies are proposed as to how these types of bias can try to be avoided, during the preparation of studies, during the statistical analyses and their interpretation.

Key words: *Mixed-constructs bias, Mixed-level bias, Multivariate analysis.*

Introduction

This article is about two not so sporadic events in scientific publications, which have the same consequence: using multivariate statistical methods for getting (consciously or unconsciously) biased final findings. For both types of events, it is characteristic that the number and choice of different types of variables in research is not balanced by applying clear methodological rules.

In these cases, the 'usual' mistakes during performing research process, such as 'seven statistical deadly sins' are not done: (1) the use of parametric analysis of ordinal data; (2) the inappropriate use of parametric analysis in general; (3) the failure to consider the possibility of committing type II statistical error; (4) the use of unmodified t-tests for multiple comparisons; (5) the failure to employ analysis of covariance, multivariate regression, nonlinear regression, and logistical regression when indicated; (6) the habit of reporting standard error instead of standard deviation; (7) the underuse or overuse of statistical consultation[1]. These types of bias also do not appear because of the use of invalid statistical methods, or invalid grouping of cases, or invalid grouping of indicators. For example, if more than one factor is related to the outcome and factors are even interdependent, more complex statistical tests like regression analyses are required. Also, the grouping of too many different cases sets an undeterminable bias and is therefore not acceptable. Finally, indicators which are too simple can miss the main point of the construct that has to be represented[2]. Frequently, practitioners seek to use categorical data in the course of model building using simple and multiple linear regression analysis[3]. However, it is incorrect to recode such variables using numeric values to be included in regression analysis[3], while the 'dummy' variables are exceptions from this rule. However, all these mistakes can be avoided through correct use of multivariate and univariate statistics[4].

When analyzing the sources of two events, mixing specific with general concepts and "comparing apples and oranges", the first step is considering the consequences of these specific mistakes while performing multivariate analyses. This leads us to the concepts of confirmation bias and misspecification bias.

Confirmation Bias

Confirmation bias (confirmatory bias, myside bias) is an inclination of people to favor information that confirms their beliefs or hypotheses. People tend to gather or remember information selectively, or interpret it in a biased way[5]: the effect is stronger at emotionally charged issues and for deeply entrenched beliefs. Confirmation biased researchers also tend to interpret ambiguous evidence as supporting their existing position, in few aspects: hypothesis-determined information seeking and interpretation, restriction of attention to a favored hypothesis, preferential treatment of evidence supporting existing beliefs, looking only or primarily for positive cases, overweighting positive confirmatory instances, seeing what one is looking for[5]. The confirmation bias in real-world contexts leads to the explanations of the confirmation bias, with the following motives: the desire to believe, information-processing bases for confirmation bias, positive-test strategy or positivity bias, conditional reference frames, pragmatism and error avoidance, and educational effects[5]. There are numerous examples of confirmation bias in many fields of scientific research[6]. For example, when making questions in some questionnaire, certain positive dimensions could be weighted more heavily in choosing than in rejecting, while negative dimensions might be weighted more heavily in rejecting than in choosing: the enriched option tends to be chosen and rejected relatively more often than the impoverished option, what

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could be extended to nonbinary decision problems[7]. The second example describes field listing of housing units, as an expensive and time-consuming stage of the survey process. Using an experimental repeated listing design to demonstrate the presence of confirmation bias in dependent listing, the evidence is found that when provided with an initial listing to update in the field, listers can become too trusting of the list: they tend not to add missing units or delete inappropriate units[8]. Third research is about auditors, who have confirmatory bias towards the findings of the prior year audit opinion and the consequences for consistency in auditor reporting behaviour. There is a lack of consistency in audit reporting behaviour, particularly with regard to the liquidity position of the firms. The lack of consistency is associated with firms that switched auditors after receiving a first time going concern modification[9]. Fourth, academic psychologists show a tendency to rate the quality and appropriateness of scientific studies more favorably when results and conclusions are 'in line' with their own prior beliefs. Psychologists tended to evaluate results significantly higher when they conformed to their own prior expectations, for example, when astrological hypotheses were disconfirmed[10]. Fifth, thought processes of people can have a significant impact on software quality: on the way software is designed, developed and tested by people. Patterned deviations of human thought from the laws of logic and mathematics (cognitive biases) are a likely cause of software defects[11].

Misspecification bias

So-called 'misspecification bias' can be met in numerous contexts of multivariate analyses. Most of the examples come from multiple regression analyses, factor analyses and structural equations modeling. Here are presented some of these examples, together with recommendations for avoiding this type of bias.

Researchers in a number of disciplines have argued that much of past research may have incorrectly specified the relationship between latent variables and indicators as reflective when an understanding of a construct and its measures indicates that a formative specification would have been warranted[12]. Also, the posited severe biasing effects of construct misspecification on structural parameters in ***structural equations modelling***, lead to concluding that an important portion of the literature is largely invalid: but construct misspecification, in general does not lead to severely biased estimates[12]. The other opinion is the belief that regardless of the extent of the bias, it is critically important for researchers to achieve correspondence between the measurement specification and the conceptual meaning of the construct so as to not alter the theoretical meaning of the construct at the operational layer of the model[13]. This alignment between theory and measurement will safeguard against threats to construct and statistical conclusion validity[13]. A proper model is fully supported by the data and has enough parameters to avoid bias, but not too many that precision is lost: it is the Principle of Parsimony[14]. Classical model selection has been based on goodness-of-fit tests, which test only against general alternative hypotheses. The alternative is between-model tests, a likelihood ratio test with a specific alternative hypothesis[14]. Model selection based on classical hypothesis testing can be very difficult and has unknown properties: Akaike's Information Criterion (AIC), likelihood, quasilikelihood, and data resampling, provide modern methods to achieve valid inference[14].

Model misspecification in regression has long been a well-recognized research problem and the estimation biases resulting from a misspecified model can be very serious[15]. In one numerical example, a classic simple or ***multiple linear regression*** can achieve with 0.99 probability a near perfect fit to a random sample of any size but due to the omission of an independent variable the signs of the estimated coefficients are all wrong, thus distinguishing prediction from causation[15]. Multiple regression with $R^2 \approx 1$ is a criterion for correct model specification, but even a multiple regression with the best inferential statistics is no guarantee for being a correct model[15]. The bias induced by these "unobserved" variables in linear regression equations is called the unobserved variables bias[16].

The appropriate measure of ***inflation uncertainty*** is relative measure to the gross expected rate of inflation[17]. Empirical studies of the effects of inflation uncertainty have misspecified their models by not using the relative measure: the bias is equivalent to omitting a relevant variable. It is necessary to use the relative measure in future studies of this issue[17].

The debate about ***propensity score*** is concerned with the number of pre-treatment variables that should be included in the propensity score. The standard practice when estimating a treatment effect is to include all available pre-treatment variables, but this approach is not always optimal, when the goal is bias reduction[18]. Including an additional relevant variable in the propensity score can increase or decrease the bias on the effect of interest. However, the balance tests and sensitivity analysis provide limited protection against overadjustment.[18]

Factor analysis is a technique which is designed to reveal whether or not the pattern of responses on a number of tests can be explained by a smaller number of underlying traits or factors. Similarly, there are many ways it can be abused and misinterpreted[19]. The posterior probabilities ***in latent class analysis*** (LCA) are generated using a non-inclusive LCA that includes manifest indicators, but not other variables of interest that are included in the analysis model[20]. When the analysis model is more general than the classification model, it is expected that the estimated relations between latent class membership and the other variables are attenuated: the use of an inclusive LCA, in which all variables included in the analysis model are also included in the classification model, is proposed[20].

Mixed Levels Bias and Mixed Types Bias

Selection of an appropriate model as the basis for data analysis is critical for valid inference: the data will only 'support' limited inference[14]. A model should have enough structure and parameters to account adequately for the significant variability in the data, but in the cases when the model has too much structure or too many parameters, precision is unnecessarily lost and 'effects' may be inferred that are not justified by the data[14]. The absence of a clear rule as to which extent data analysis has to be leaded by data or theoretical model, could be addressed as a source of two types of bias, suggested by the author of this article.

Namely, researcher's choice determines the decision regarding which different **types** of variables will be included in multivariate research, as well as a **number** of variables which are included in multivariate research design.

First type of events, mixing general (latent variable) concepts with specific (manifest) variables in the same multivariate analysis could be called *'mixed levels bias'*. While choosing variables, whether based on the previous findings or sponta-

neously, researcher could analyse simultaneously the variables with different levels of the specificity. For example, factor scores for the sets of variables that represent, say, instrumental aggressiveness (which comprise 50 manifest variables), together with numerous sets of single manifest variables which represent a variety of individual's behaviours in specific life situations. Both types of variables could be used in the same analysis (for example, linear multiple regression, canonical discrimination or factor analysis)

Second type of events, called 'comparing apples and oranges', describe the situation when in the same multivariate analysis (especially in the situation when 'mixed levels bias' is not controlled) different types of variables are used: biological, psychological, kinesiological, economical, etc.). This source of bias could be called '***mixed constructs bias'***. For example, the researcher could choose just three variables which represent some psychological constructs in kinesiology and, say, 25 indicators of health status, performing some method of multivariate analysis: psychological variables would have a small chance appearing statistically significant, or to form strong founded latent variable, as compared with variables which describe the space of health status.

Examples of two types of bias

In one simple study about the attitudes of swimming coaches in Croatia, both of the abovementioned types of bias are illustrated. The study included 71 swimming coach, 44 of which were male and 27 female, from the majority of Croatian swimming clubs (23 in total), from Zagreb, Varaždin, Tuhelj, Sisak, Osijek, Pula, Poreč, Rovinj, Rijeka, Šibenik, Split, Dubrovnik and Korčula. The study was conducted on a sample of swimming coaches, with different age, length of service, qualifications and age categories of swimmers with which he/she works.

Among standardized psychological instruments, Croatian version of Burn's Perfectionism Scale is used, which measures one-dimensional perfectionism, which describes generalized but negative perfectionism[21]. It contains 10 items, to which the subjects reply on a Likert type 5-point scale, the greater estimate meaning greater agreement with content of the statement. In the study of perfectionism in basketball players, two types of 'unidimensional' perfectionism revealed: manifest (obvious in behavior) and experiential perfectionism[22]. Motive of achievement is measured on the scale MOP2002[23]: this scale of achievement motives was Likert's type of 5 degrees, with 55 items. Four factors of the scale MOP2002 (four dimensions of achievement) are comprised in this research in only one general score.

A few sets of variables are derived from the items of the **Questionnaire for swimming coaches**. The first set of variables were **general** (mostly demographical) variables, defined as follows: gender, age, education level, marital status (all nominal variables except age). Second set considered variables ***directly related to swimming***: work experience as a coach, duration of swimming experience, chronological age in which the swimmer stopped swimming, number of swimmers with whom he/she works as a coach (all the ratio variables), previous engagement in competitive swimming, holding medals from national championships, membership in some of the national selections in swimming (cadet, junior and senior), reasons for the cessation of active engagement in swimming (own will, sports injuries or disease, disagreeing with the club, disagreements with other coaches, critical life events, greater ambitions than the possibility of the club), a permanent working contract in the club, age category of swimmers with whom he/she works (swimming school – young children, cadets, juniors and seniors) (all the binary variables). The third set of variables that indicate ***attitudes towards job and coaching in the club***: job satisfaction, satisfaction with monthly income at the club, satisfaction with the schedule of activities at the club, potential to make a better schedule of activities at the club, the maintenance of professional meetings, the flow of information, stimulating relationships, board members are working for the good of the swimming, swimmers appreciate coach's work, the exploitation of the government and swimmers (three-point estimation scale for all the variables). Variables that indicate ***attitudes toward coaching swimmers***: the existence of non-perspective swimmers, preference to work with a decent swimmer who is not perspective, whether it is working with unpromising swimmer demotivating, involvement in working with unpromising swimmers, willingness to invest the efforts in unprofitable swimmers, preference to work with a swimmer inappropriate behavior but promising, whether seniors quit swimming if they do not win medals at state championships (three-point estimation scale for all the variables). Variables that indicate ***attitudes toward coaching their own child*** as a future swimmer: the inclusion of their own child in swimming, personal training of the child. Respondents who have children did not respond to these two questions (both binary variables). Variables that indicate ***the perceptions of the 'high quality' coach***: can someone be a good coach who is not engaged in swimming, can someone be a good coach without proper school (both three-point estimation scales). One variable is about ***self-assessment of their own work***: how good I am doing my job as a coach (three-point estimation scale). The last set consists of variables that indicate ***attitudes toward fellow coaches and competition system***: his/her colleagues are doing their job well, the system of competition is stimulating for the development of swimmers (three-level estimation scale).

Example 1: Mixed levels bias in canonical discrimination analysis

In the first two examples, the main goal is to determine the factors of differences for attitudes about swimming coaching, together with two psychological characteristics, with different choices of variables.

In the first example, three latent variables are chosen (two types of perfectionism and composite score in achievement motivation), together with a few single (manifest) variables (all other variables about swimming coaching) (Table 1). In spite of the fact that in general the discrimination function does not show the difference between female and male coaches, in one single variable (whether someone without proper education can be a good coach) the difference is found (higher mean value for female coaches). However, it has to be mentioned that experimental and manifest perfectionism comprise the data from 10 single items, while the score in achievement motivation comprises the data from 55 items in total. Simple consideration leads to a hypothesis that more general and complex latent psychological variables are in the same range with single manifest variables in discriminant analysis. On the other hand, the number of complex vartiables is less than the number of manifest variables, which can have higher likelihood to appear statistically significant.

TABLE 1
DISCRIMINATION ANAYLSIS AMONG THE COACHES THAT BELONG TO DIFFERENT GENDER IN A SET OF VARIABLES ABOUT SWIMMING COACHING

Discrimination Function	**Eignevalue**	**Wilks's λ**	***Canonical correlation***	χ^2-test (degrees of freedom)
	0.177	0.850	0.388	10.597

Variables	Wilks's λ	Correlation with discriminational factor	F-test (1,69)	**Mean** males	**Mean** females	**σ** males	**σ** females
experiental perfectionism	1.000	0.001	0.001	10.614	10.667	4.088	9.348
manifest perfectionism	0.999	-0.068	0.056	16.250	16.111	2.441	2.326
achievement motivation	0.995	0.168	0.345	242.409	246.296	29.120	23.294
can be a good coach someone who is not engaged in swimming	1.000	-0.033	0.013	2.500	2.481	0.629	0.700
can be a good coach someone without proper school	0.913	0.734	**6.587***	1.864	2.296	0.734	0.609
I prefer to work with a decent swimmer who is not perspective	0.963	0.465	2.643	1.432	1.630	0.501	0.492
whether it is working with unpromising swimmer demotivating	0.996	0.009	0.275	1.432	1.519	0.695	0.643
job satisfaction	0.959	-0.491	2.947	2.750	2.519	0.488	0.643
		Centroids		-0.325	0.530		

Legend: * test significant at p< .05 level; Bold – names of complex (more general) variables

TABLE 2
DISCRIMINATION ANAYLSIS AMONG THE COACHES THAT BELONG TO DIFFERENT GENDER IN A SET OF VARIABLES ABOUT SWIMMING COACHING

Discrimination Function	**Eignevalue**	Wilks's λ	***Canonical correlation***	χ^2-test (degrees of freedom)
	0.341	0.746	0.504	**18.786***

Variables	Wilks's λ	Correlation with discriminational factor	F-test (1,69)	**Mean** males	**Mean** females	**σ** males	**σ** females
achievement motivation	0.995	-0.121	0.345	242.409	246.296	29.120	23.294
unidimensional perfectionism	1.000	0.010	0.002	26.864	26.778	5.192	10.237
job satisfaction	0.959	0.354	2.947	2.750	2.519	0.488	0.643
satisfaction with income	0.997	0.096	0.217	1.977	1.889	0.821	0.698
satisfaction with the assignment of tasks in the club	0.841	0.744	**13.034****	2.409	1.778	0.757	0.641
board members are working for the benefit of swimming	0.940	0.432	4.393	2.250	1.852	0.781	0.770
swimmers appreciate my work	0.985	-0.209	1.027	2.750	2.852	0.438	0.362
exploitation by management and swimmers	0.999	-0.053	0.066	1.477	1.519	0.698	0.580
stimulating relationships	0.846	0.729	**12.515****	2.432	1.778	0.695	0.847
the flow of vocational information	0.922	0.499	**5.859***	2.068	1.519	0.974	0.849
		Centroids		0.451	-0.735		

Legend: *significant at p< .05 level; **significant at p< .01 level; Bold – names of psychological complex variables

Example 2: Mixed constructs bias in canonical discrimination analysis

In the second example, two latent variables are chosen (unidimensional perfectionism and composite score in achievement motivation), together with a few single (manifest) variables (all other variables about swimming coaching) (Table 2). In this case the discrimination function shows statistically significant difference among female and male coaches, as well as in three single variables (satisfaction with the assignment of tasks in the club; stimulating relationships in the club; the flow of vocational information) the difference is found (in all tree cases, higher mean values are found for male coaches). In this case also it has to be mentioned that unidimensional perfectionism comprises the data from 10 single items, while the score in achievement motivation comprises the data from 55 items in total (this can be also the example for mixed levels bias, too), while the other variables are single manifest ones. Specific consideration here is directed to the fact that all variables in this function comprise very different number of variables that belong to different concepts: psychological characteristics, attitudes towards job and coaching in the club, perceptions of the 'high quality' coach, attitudes toward fellow coaches and competition system. The hypothesis about *mixed constructs bias* appears from the fact that different number of variables from different thematic issues (and/or constructs) of the questionnaire is included in the same discriminant analysis. Hence, variables from more numerous represented thematic issues (and/or constructs) can have a higher likelihood of appearing statistically significant.

Example 3: Two types of bias in principal components analysis (PCA)

In the third example, the main goal is to determine the latent structure of attitudes about swimming coaching, together with two psychological characteristics. Principal Component Analysis (PCA) with Varimax rotation was performed (Table 3). In this case, a different number of variables from different thematic issues (and/or constructs) of the questionnaire is included in the same PCA. The fact that three latent variables are chosen (two types of perfectionism and composite score in achievement motivation), together with a few single (manifest) variables (all other variables about swimming coaching) in the same PCA, indicate previously described *mixed level bias*. The hypothesis about *mixed constructs bias* ('comparing apples and oranges') appears from the fact that a different number of variables from different thematic issues issues (and/or constructs) of the questionnaire is included in the same PCA. Hence, variables from more numerous represented thematic issues (and/or constructs) can have higher likelihood of satisfactorily saturating the principal components (PC). PCA of these mixed constructs with different level of the specificity, produced relatively 'explainable' PCs, but only psychological characteristics form one clear PC, while the other two are suspect. In case when we omit some variables in the second iteration of PCA, to remove variables with suspect interpretability, it will lower the reliability of the PC.

TABLE 3
PRINCIPAL COMPONENTS ANALYSIS WITH VARIMAX ROTATION FOR THE COACHES IN A SET OF VARIABLES ABOUT SWIMMING COACHING

Items	Experience	Job characteristics	Psychological characteristics
years of work experience	**0.880**		
age	**0.825**		
personal coaching own child	**-0.688**		
can be a good coach someone without proper school	**0.502**		
can be a good coach someone who wasn't swimmer		**-0.694**	
job satisfaction		**0.689**	
years of engagement in swimming		**0.687**	
satisfaction with the assignment of tasks in the club	0.335	**0.554**	
satisfaction with income		**0.488**	0.423
achievement motivation			**0.863**
manifest perfectionism		-0.320	**0.748**
experiential perfectionism			**0.627**
Eigenvalue	**2.375**	**2.157**	**2.032**
Variance Explained (%)	**19.79**	**17.97**	**54.70**
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.494	**Bartlett's Test**	107.992**

Legend: *significant at p< .05 level; **significant at p< .01 level; Bold – names of psychological complex variables, together with satisfactory saturations for principal components

Example 4: Two types of bias in linear multiple regression analysis

In the fourth example, the main goal is to use a set of variables (attitudes about swimming coaching, together with one psychological characteristic) to predict self-perceived quality of coach's work. This example deals with linear multiple regression analysis (MRA) (Table 4). In this case, a different number of variables from different thematic issues issues (and/or constructs) of the questionnaire is included in the same MRA. The fact that three latent variables are chosen again (two types of perfectionism and composite score in achievement motivation), together with a few single (manifest) variables (all other variables about swimming coaching) in the same MRA, indicate previously described *mixed level bias*. The *mixed constructs bias* appears from an uncontrollably different number of variables from different thematic issues (and/or constructs), included in the same MRA. Hence, variables from more numerous represented thematic issues (and/or constructs) can have a higher likelihood of appearing as statistically significant predictors in MRA. MRA that use these mixed constructs with a different level of the specificity, produced statistically insignificant R-coefficient, but with some significant single predictors: age, achievement motivation and the existence of nonperspective swimmers.

TABLE 4
MULTIPLE REGRESSION ANALYSIS: FORECASTING THE PERCEIVED QUALITY OF COACHING JOB ON THE BASE OF PREDICTORS - SET OF VARIABLES ABOUT SWIMMING COACHING

Predictors	Beta	t	p (t)
job satisfaction	-0.068	-0.388	0.701
satisfaction with income	-0.084	-0.505	0.616
age	0.329	2.127	**0.040**
achievement motivation	0.407	2.059	**0.047**
the existence of nonperspective swimmers	0.329	2.185	**0.035**
disagreement with coaches	-0.093	-0.625	0.536
experiential perfectionism	-0.226	-1.403	0.169
manifest perfectionism	-0.183	-1.032	0.309
swimmers appreciate my work	-0.103	-0.681	0.500
whether it is working with unpromising swimmer demotivating	-0.163	-0.972	0.338
Criterion - how good I'm doing my job as a coach	**R=0.550** R^2=0.303; F (10,36)=1.562		

Legend: *significant at p< .05 level; **significant at p< .01 level; Bold - psychological complex variables

Conclusion and recommendations

While describing misspecification bias, many strategies how to reduce specific types of misspecification bias in specific types of data analyses, were suggested. For these simple types of bias *(mixed level bias* and *mixed constructs bias),* two general strategies could be suggested. Firstly, to avoid *mixed level bias,* the researcher has to decide if he/she wants to analyze latent (complex) variables or manifest (single) variables: separate analyses have to be done for latent variables and separate analyses for manifest variables. Secondly, to avoid *mixed constructs bias,* the researcher first has to analyze one set of the variables (manifest or latent) separately (which describe some specific thematic issue), while after performing data analyses in that step, the same levels of variables (manifest or latent) in these thematic issues can be directly analyzed in the next step of multivariate analyses. However, the bias induced by 'unobserved' variables (not only in the linear regression equations) or unobserved variables bias[16, 24], cannot be avoided, except through the continuous progression of the scientific knowledge in certain scientific fields (which can enable including new relevant variables in studies), together with honesty and high ethics of the researchers.

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DVIJE VRSTE PRISTRASNOSTI U MULTIVARIJATNIM STUDIJAMA: „PRISTRASNOST POMIJEŠANIH NIVOA“ I „PRISTRASNOST POMIJEŠANIH KONSTRUKATA“

S A Ž E T A K

U članku su predstavljene dvije vrste pristrasnosti koje razmjerno često nastaju pri korišćenju multivarijatnih analiza. Za obije vrste pristrasnosti, karakteristično je da broj i odabir različitih tipova varijabli nisu uravnoteženi primjenom jasnih metodoloških pravila. Nakon tumačenja širih teorijskih polazišta, koja obuhvataju “pristrasnost potvrđivanja” (inicijalnih hipoteza) i “pristrasnost nedostatka specifikacije”, dat je opis dvije vrste pristrasnosti karakterističnih za multivarijatne analize: “pristrasnost pomiješanih nivoa”(specifičnosti-uopštenost), te “pristrasnost pomiješanih konstrukata”. Obije vrste pristrasnosti dodatno pojačava nesrazmjernost u broju i omjeru različitih tipova varijabli u istoj multivarijatnoj analizi. Pojedinosti o situacijama pojavljivanja dvije predstavljene vrste pristrasnosti su prikazane na četiri različita primjera. Predložene su strategije kako se navedene vrste pristranosti mogu pokušati izbjeći, tokom pripreme istraživanja, ali i tokom statističkih analiza i njihove interpretacije.

Ključne riječi: pristrasnost pomiješanih konstrukata, pristrasnost pomiješanih nivoa, multivarijatna analiza.

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Do Significant Achievements of National Football Team Can Strengthen National Identity in Montenegro?

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A B S T R A C T

Although most of Montenegro's population adore football and support national football team, strong ethnic bigotry still exists. It is interesting to compare the results of 1981 and 2011 census. There were 44.98% of ethic Montenegrins in 2011, 28.73% of Serbs, and 8.65% of Bosnians; while the population living in same area in 1981 numbered 68.54% of ethnic Montenegrins and 3.32% Serbs, while 'Bosnians' did not exist as a category at that time; they were referred to according to their religion, i.e. "Muslims". Obviously, these differences were not caused by some great migrations, as it might seem at first sight, but it is the result of the ideological sentiments of a number of citizens of Montenegro, who changed beliefs during the difficult and turbulent time of the 1990s. The variations of their ethnicities are the outcome of the ideological concepts and their religious affiliations, mostly due to the reason that most of them experienced the collapse of the Yugoslav national identity and still looking for their self. Hence, a main goal of this study is to recommend that significant achievements of national football team can strengthen national identity and enhance peaceful coexistence between various ethnic groups in multi-cultural society such as Montenegro.

Key words: *Soccer, Ethnicity, Nationality, Nationalism.*

Introduction

The Republic of Montenegro covers an area of 13,812 sq. kilometers and borders Albania, Kosovo (as defined under UNSCR 1244/99), Serbia, Bosnia and Herzegovina, Croatia, and the Adriatic Sea in the south-west of the Balkan Peninsula. According to the 2011 census[1], the population of this area numbered 620,029 inhabitants: 50.61% are women, and 49.39% are men. The main features of the ethnic structure of the population of Montenegro areas follows: 44.98% of the population is ethnic Montenegrins, 28.73% are Serbs, 8.65% are Bosnians, and 4.91% are Albanians, etc. It is interesting to compare the results of the most numerous ethnic groups to the results of the 1981 census. The population living in the same area in 1981 numbered 68.54% of ethnic Montenegrins and 3.32% Serbs, while "Bosnians" did not exist as a category at that time; they were referred to according to their religion, i.e. "Muslims". Obviously, these differences were not caused by some great migrations, as it might seem at first sight. It is the result of the ideological sentiments of a number of citizens of Montenegro, who changed beliefs during the difficult and turbulent time of the 1990s. Thus, it is important for this study to underline that the variations of their ethnicities are the outcome of the ideological concepts and their religious affiliations, mostly due to the reason that most of them experienced the collapse of the Yugoslav national identity. From this reason, it is very important to meet some historical perspectives of the political and demographic controversies in Montenegrin society through last century and half to understand better how to use that significant achievement of national football team to strengthen national identity and enhance peaceful coexistence between various ethnic groups in multi-cultural society such as Montenegro.

Historical perspectives of Montenegrin nation

It is very important to start from the fact that a tradition of independent statehood in the area of what is now modern Montenegro dates back to the 11th Century. Although Montenegro had been a sovereign principality for centuries, the most important moment occurred in 1878, when the Congress of Berlin recognized Montenegro as the 27th independent state in the World. However, the history of Montenegrin independence ended in 1918, when Montenegro unconditionally joined Serbia in a controversial decision of the Podgorica Assembly. Soon afterwards Montenegro became a part of the Kingdom of Serbs, Croats and Slovenes, the country that is renamed Yugoslavia soon afterwards. From 1918 to 1941 Montenegro was a part of this union, while it was a part of the Socialist Federal Republic of Yugoslavia from 1946 to 1992. After the collapse of the named federation, Montenegro was the only republic of former Yugoslavia that preferred to remain part of a joint state with Serbia in the early 1990s. This policy was not only pleaded by the post-communist political leaders, but it also was supported by a majority of Montenegrin citizens who wished to preserve the existing federation, due to the closely association with the idea of Yugoslavia. However, this idea was not viable and Montenegro and Serbia established a Federal Republic of Yugoslavia (FRY) to succeed the Socialist Federal Republic of Yugoslavia in 1992. While the constitution of the Federal Republic of Yugoslavia envisaged parity between the state members in federal institutions, the common state was obviously dominated by Serbia, both economically and politically. Hence, leaded by the reform socialist politician, Milo Đukanović, Montenegro was slowly moving away from the federation and walking toward its independence. On 21 May 2006, the referendum was held and more than 55% of Montenegrin citizens voted for independence. Following its declaration of independence,

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Montenegro joined the United Nations, the Organization for Security and Cooperation in Europe, the Council of Europe, the Partnership for Peace and a number of other international bodies as a sovereign country. The referendum on independence greatly reduced the divisions in Montenegrin society. The political leadership managed to expand consensus across dividing lines, primarily based on a key strategic goal of European integration, a goal supported by two-thirds of the population. Its European perspective was reaffirmed in June 2006 after the recognition of the country's independence by EU member states. In October 2007, Montenegro signed the Stabilization and Association Agreement and an Interim Agreement on trade and trade-related issues. Montenegro submitted its application for EU membership in December 2008. In December 2010, the European Union granted candidate status to Montenegro and accession negotiations had started in June 2012. Once entry negotiations have taken place, Montenegro has to negotiate on 35 chapters of the acquits, which will create a strategic agenda for years to come. Although Montenegro needs to take few steps to open the European doors, strong ethnic bigotry still exists within Montenegrin society, mostly due to the reason the issues of Montenegrin national identity are highly political in nature. Unfortunately, some opposition parties abused it while the authors believe that the government has unclear concept of nation, nationalism and national identity.

Nationalism: look into the past literature

From this reason, it was a compelling time to look into the national identity issue and its ideological counterpart, nationalism from the past literature. The study of nationalism is highly problematized by the use of various terms by different authors to describe similar or identical concepts. In such way, Kellas[2] categorizes the study of nationalism into two main paradigms, which he describes as "instinctive" and "contextual", the former relating to human nature and the latter to specific cultural, historical and economic factors. Further Cronin[3] breaks the paradigms into primordialists, statists, political mythologists and modernists. Smith[4] divides them in relation to perennialism, primordialism, ethno-symbolism and modernism. Each of these paradigms can be broadly categorized as either "ethnic" or "modernist". According to Hastings[5], the ethnic and modernist views of nationalism differ mainly as to "the date of commencement" with ethnic nationalists believing nations to have been present since before the late 18th century and modernists seeing nationalism as having commenced in the 18th and 19th centuries. Hence, it is already noted that the strong ethnic bigotry is the result of the ideological sentiments of a number of citizens of Montenegro. The authors have the solution to this issue, to switch a strong ethnic identity to the modernist approach that exists all around the western European countries and wider. They also believe, it would be reasonable to investigate how significant achievement of national football team can strengthen national identity as well as enhance peaceful coexistence between various ethnic groups in multi-cultural society such as Montenegro and bring citizens of Montenegro closer to European citizenship.

National team achievements and national identity

This main hypothesis lies in the fact that sport and national identity have been strongly connected through entire history, mostly due to the reason that an individual sportsmen or a national sport team may represent an entire nation and foster a sense of national pride amongst members of a given nation[6]. Hence, sport is well placed for the development of both national identity and national pride[7], mostly because there is evidence in the scientific literature that national team success as well as hosting major events in the world of sport such as world and continental cups et cetera, could contribute to increased self-esteem and national pride[8,9,10]. On the other hand, it is wrong to conclude that all members of a certain society exploit sport to construct their national identity as well as that, all members within a same society would derive pride from associating themselves with sporting success. Hence, it is more than clear that sport is probably just one of numerous factors that may influence national identity and as such, it is important to be explored.

A characteristic of the previous studies pertaining to sport and national identity is its non-empirical nature, and this relationship has been documented mostly from anthropological and sociological positions[11,12,13]. Serious of novels have emphasized the link between sport and a strong sense of collective identity[14]. There have been also many investigations regarding the connection between sport and national identity, but not too many from the position: how significant achievement of national football team or any other national sport team can strengthen national identity as well as enhance peaceful coexistence between various ethnic groups[15], mostly due to the reason that sport scientists have been disinterested in researching this relationship in the past. According to Heere and James[16], the investigation of a connection between national football team or any other national sport team and surrounding societies is still extensively unexplored.

In an era of increased globalization, it is clear that sport and major sporting events provide a site for national identities to be expressed. However, some sports disciplines are more suitable than other disciplines to become medium for the development and expression of national identities. These facts vary from nation to nation[17] and the authors of this study chose football as a sports discipline he would like to explore, mostly due to the reason that football is "most important secondary thing in the world" in the most countries all around the World, as well as due to the reason that national football team is favorite national sport team that people would mostly identify with in the country that investigation is planning to be conducted.

Conclusion

Hence, the potential scientific project would analyze the relationship between sport and national identity within Montenegro, focusing on the significant achievement of national football team and its impact on national identity and improvement of peaceful coexistence between various ethnic groups in Montenegro, all in order to come closer to European citizenship. It examines the complexity of defining a sporting national identity, as well as suggests the opportunity of competing definitions of national identity existing in Montenegro within and across the most favorite sport (football) and its significant achievements in post-2006 Montenegro. Consequently, the authors use this publication to invite all interested parties to join the consortium of the potential project proposal that would critically investigate existing hypotheses surrounding sporting nationalism and national pride in Montenegro, to situate the striking absence of recent research findings within the

literature, and to locate contemporary sporting nationalism in the period after Montenegro formally rehabilitate its independence after almost century.

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DA LI ZNAČAJNI USPJESI NACIONALNOG FUDBALSKOG TIMA MOGU OJAČATI NACIONALNI IDENTITET U CRNOJ GORI?

S A Ž E T A K

Iako većina Crnogoraca obožava fudbal i podržava nacionalni fudbalski tim, veoma izražena etnička netrpeljivost i dalje postoji. Kada je ovo pitanje u fokusu pažnje, Interesantno je uporediti rezultate popisa iz 1981. godine i popisa iz 2011. godine. Na popisu 2011. godine etnička struktura stanovništva u Crnoj Gori se ogledala u 44,98% koji su se izjasnili kao etnički Crnogorci, zatim 28,73% kao etnički Srbi, 8,65% kao etnički Bošnjaci, dok su populaciju koja je življela na području Crne Gore sačinjavale sljedeće etničke grupe, prije svega etnički Crnogorci sa 68,54%, zatim etnički Srbi sa 3,32%, dok „Bošnjaci“ kao etnička grupa nisu postoji u to vrijeme, već je značajan dio populacije iz ove etničke grupe odabirao svoju etničku pripadnost u skladu sa religijom, npr. „Muslimani“. Očigledno je da ove razlike nisu uzrokovane značajnijim migracijama, kako bi se dalo zaključiti na prvi pogled, već su rezultat ideološke naklonosti značajnog broja stanovništva u Crnoj Gori, koji su mijenjali svoja uvjerenja tokom turbulentnog period tokom 90-ih. Varijacija njihove etničke pripadnosti predstavlja ishod ideoloških koncepata i religioznih osjećanja, najviše iz razloga što je slom jugoslovenskog nacionalnog identiteta doveo do toga da većina njih još uvijek trača za svojim identitetom. Stoga, cilj ove studije je da preporuči da značajni uspjesi nacionalnog fudbalskog tima mogu ojačati nacionalni identitet i unaprijediti miroljubivu koegzistenciju među različitim etničkim grupama u multikulturalnom društvu kao što je crnogorsko.

Ključne riječi: Fudbal, etnička pripadnost, nacionalnost, nacionalizam.

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Transfer of Learning on a Spatial Memory Task between the Blind and Sighted People Spatial Memory among Blind and Sighted

Original Scientific Paper

Transfer of learning on a spatial memory task

Selcuk Akpinar[1], Stevo Popović[1,2], Sadettin Kirazci[1]

[1]Middle East Technical University, Physical Education and Sports Department, Ankara, Turkey
[2]University of Montenegro, Faculty for Sport and Physical Education, Niksic, Montenegro

Corresponding author:
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University of Montenegro
Faculty for Sport and Physical Education
Narodne omladine bb, 84000 Niksic, Montenegro
E-mail:

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Abstract word count: 236

Number of Tables: 3

Number of Figures: 3

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Abstract

Results of the analysis of…

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

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- ✓ *Table position of the research football team*

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One work by one author

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

Works by two authors

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

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- ✓ Subséquent citation: Bangsbo et al. (2008) stated that…

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

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

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

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

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Bangsbo, J., Iaia, F. M., & Krustrup, P. (2008). The Yo-Yo intermittent recovery test: a useful tool for evaluation of physical performance in intermittent sports. *Sports Medicine, 38*(1), 37-51.

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

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

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

Shaw, A. (1999). The planning and development of New Bombay [Electronic version]. *Modern Asian Studies, 33*(4), 951-988.

Journal article (online; electronic only):

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

Conference paper:

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

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

Encyclopedia entry (online, no author):
Ethnology. (2005, July). In *The Columbia encyclopedia* (6th ed.). New York: Columbia University Press. Retrieved November 21, 2005, from http://www.bartleby.com/65/et/ethnolog.html

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

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

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

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

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

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

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Table footnotes should be written below the table.

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

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

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

- ✓ [a]One participant was diagnosed with heat illness and n = 19.[b]n =20.

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- ✓ *P<0.05,†p<0.01.

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

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

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- ✓ **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.

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- × figure 1
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- ✓ ….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)

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- ✓ …in Figures 1a and b we can…
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- ✓ First time appearing: *musculus biceps brachii*

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Sportska dostignuća Bjelice u Podgorici

»Organizacioni odbor 11. medunarodne konferencije o transformacionim procesima u sportu "Sportska dostignuća" i 10. Kongresa Crnogorske sportske akademije trenutno vrijedno radi na pripremi programa akademskih i socijalnih aktivnosti koje će se održati u Podgorici od 3. do 6.aprila.

- Pored najavljenih plenarnih izlaganja, akademski dio konferencije će se odvijati u nekoliko multidisciplinarnih sekcija, koje će obuhvatiti prirodne, društveno-humanističke i medicinske aspekte savremenog sporta - kazao je predsjednik priredivačkog odbora prof. dr Duško Bjelica.

Prema njegovim riječima, organizacioni odbor se potrudio i da će svi od medunarodnih recenzenata prihvaćeni radovi biti štampani u Zborniku sažetaka sa ISNB brojem, dok će adekvatno izloženi radovi steći pravo da se nađu u renomiranom crnogorskom časopisu

Duško Bjelica

"Sport Mont" koji izlazi na crnogorskom jeziku uz sažetak na engleskom jeziku, a isti je indeksiran u EBSCO citatnoj bazi. S druge strane, najbolji radovi će biti predloženi za objavljivanje u časopisu "Montenegrin Journal of Sports Science and Medicine" koji takode izdaje Crnogorska sportska akademija, a koji se pored EBSCO citatne bace, nalazi još u sedam medunarodnih citatnih baza, dok je kod SCOPUSa i THOMSON REUTERS-a u toku evaluacija istog. ■

SPORT

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NAUKA: KONGRES CSA U APRILU

Prihvaćena 102 rada iz 25 država

U Podgorici će se od 3. do 6. aprila 2014. godine održati 11. međunarodna konferencija o transformacionim procesima u sportu "Sportska dostignuća" i 10. kongres Crnogorske sportske akademije (CSA). Konferencija će se odvijati u nekoliko sek-

Prijava završena 15. januara. Najviše radova iz Turske i Irana - po 17

cija, koje će obuhvatiti prirodne, društveno-humanističke i medicinske aspekte savremenog sporta.

- Prijava radova završena je još 15. januara, a recenzenti su od velikog broja pristiglih prihvatili 102 naučna rada. čiii autori su ispunili precizno formulisane propozicije. Prihvaćeni su radovi iz 25 zemalja, a najviše ih je iz Turske i Irana, koji su zastupljeni sa po 17 autora. Osim ličnog izlaganja i prezentacije radova, neki od autora odlučili su se za „poster prezenztacije", što je Crnogorska sportska akademija prvi put ponudila - kazao je predsjednik CSA, prof. dr **Duško Bjelica**.

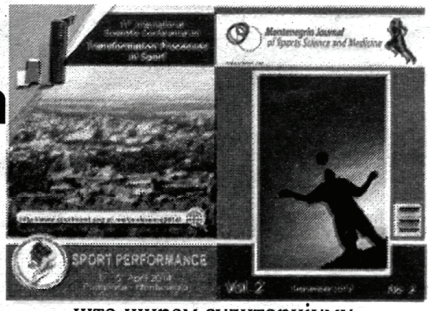
Bjelica

Poput prethodnih, i radovi prezentirani ove godine će biti štampani u Zborniku, kao i u renomiranom crnogorskom časopisu "Sport Mont", na našem i engleskom jeziku.

- Najbolji radovi će biti predloženi za objavljivanje u časopisu "Montenegrin Journal of Sports Science and Medicine", u izdanju Crnogorske sportske akademije, a koji je svoje mjesto našao u brojnim međunarodnim naučnim indeksnim bazama, a u toku je prijem čak i u prestižnima „SCOPUS" i „THOMSON REUTERS" - zaključio je Bjelica. **S.Ž.**

ИЗАШАО НОВИ БРОЈ МЕЂУНАРОДНОГ ЧАСОПИСА „MONTENEGRIN JOURNAL OF SPORTS SCIENCE AND MEDICINE"

У шест међународних база



Из штампе је изашао други број другог волумена међународног часописа „Montenegrin Journal of Sports Science and Medicine" који издаје Црногорска спортска академија, у сарадњи са Факултетом за спорт и физичко васпитање из Никшића. Главни уредник овог престижног часописа, **проф. др Душко Бјелица** истакао је захвалност ауторима, члановима научних одбора, као и анонимним рецензентима, који су се добровољно прихватили посла са циљем да допринесу успјеху часописа. Такође се захвалио својим најближим сарадницима, др Стеву Поповићу са Универзитет Црне Горе, и др Селчуку Акпинару са Невшехир Универзитета у Турској, као и свима у Црногорској спортској академији „који су најзаслужнији што је часопис постао реална стварност":

– **Након три успјешно издата броја часописа, слободно могу истаћи увјерљиви разлози за покретање новог научног часописа са отвореним приступом у једном веома растућем подручју истраживања као што су спортске науке и медицина, као и истаћи аспирације и визију када је будућност у питању. Више је него корисно имати часопис који нуди бесплатан приступ свом садржају и промовише истраживања високог квалитета и интелектуалне производе који су били ограничени у прошлости**, рекао је проф. Бјелица, који истиче да је циљ менаџмента часописа да превазиђе постојећи јаз и омогући ауторима да представе своје високо квалитетне проналаске што ширем аудиторијуму.

Такође, проф. Бјелица искрено вјерује да ће у наредним бројевима повећати број аутора са свих страна свијета који ће слати високо квалитетне оригиналне и прегледне чланке, биљешке, прелиминарна саопштења и конференцијске радове из области спортских наука и медицине, али и „писма уреднику", изводе са међународних и националних конгреса, панеле са састанака, конференција и симпозијума, као и да ће часопис наставити да функционише као отворена трибина о битним питањима од савременог значаја. Т.Б.

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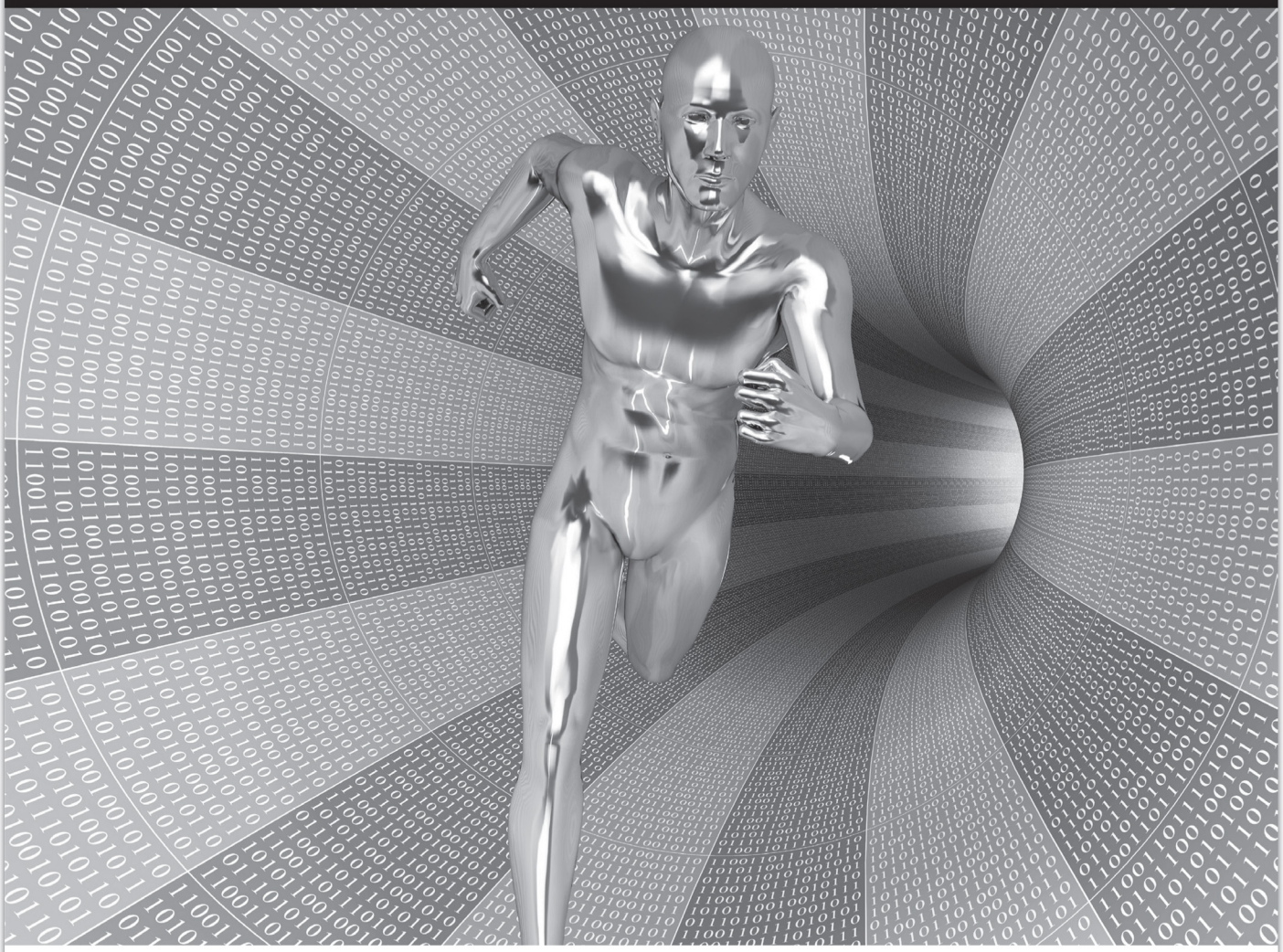

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