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Dear Readers,

I would like to extend a very warm welcome to the readership of the Montenegrin Journal of Sports Science and Medicine (MJSSM). I take this opportunity to thank our authors, journal board members and anonymous reviewers, all of whom have volunteered to contribute to the success of the journal. I am also grateful to my close colleagues, Dr. Stevo Popović from University of Montenegro, Dr. Selçuk Akpınar from Nevşehir University and the staff at Montenegrin Sports Academy (MSA) for making the Journal a reality.

I would also repeat something I said many times that we could not envisage starting this journal without the support and professionalism of scientists interested in sport science and sport medicine including physiology and sports medicine; social sciences and humanities; biomechanics and neuromuscular and wishing to make this journal a success.

After three 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 research article and scientific reviews, notes, preliminary communications and conference papers from authors around the world, as well as editorials, a "letter to the editor" section, abstracts from international and national congresses, panel meetings, conferences and symposia, and be able to continue functioning as an open discussion forum on significant issues of current interest.

Finally, we 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 and we hope you will find the Journal informative enough,

Editor-in-Chief
Prof. Duško Bjelica, PhD

Dragi čitaoci,

prije svega bih želio da izrazim toplu dobrodošlicu svim čitaocima „Montenegrin Journal of Sports Science and Medicine (MJSSM)“. Koristim ovu priliku da se zahvalim našim autorima, članovima naših naučnih odbora, kao i anonimnim recenzentima, koji su se dobrovoljno prihvatili posla sa ciljem da doprinesu uspjehu časopisa. Takođe bih se zahvalio svojim bliskim saradnicima, dr Stevu Popoviću sa Univerzitet Crne Gore, i dr Selçuku Akpinaru sa Nevşehir Univerziteta, kao i osoblju u Crnogorskoj sportskoj akademiji koji su najzaslužniji što je časopis postao realna stvarnost.

Takođe bih ponovio nešto što sam rekao mnogo puta do sada, da nismo mogli ni zamisliti da u ovaj projekat stvaranja kvalitetnog časopisa bez podrške i profesionalnosti naučnika zainteresiranih za sportske nauke i medicinu, uključujući fiziologiju i sportsku medicinu; društvenu i humanističke nauke; biomehanici i neuromuskularnim bolijestima, a koji su najiskrenije željeli da časopis postigne uspjeh.

Nakon tri uspješno izdata broja časopisa, slobodno mogu istaći uvjerljive razloge za pokretanje novog naučnog časopisa sa otvorenim pristupom u jednom veoma rastućem području istraživanja kao što su sportske nauke i medicina, kao i istaći naše aspiracije i viziju kada je budućnost u pitanju. Moram naglasiti da je više nego korisno imati časopis koji nudi besplatan pristup svom sadržaju i promoviše istraživanja visokog kvaliteta i intelektualne proizvode koji su bili ograničeni u prošlosti. Stoga, naš cilj je da prevazidemo postojeći jaz i omogućimo autorima da predstave svoje visoko kvalitetne pronalaskes što širem auditorijumu. Takođe, iskreno vjerujem da ćemo u narednim brojevima povećati broj autora sa svih strana svijeta koji će nam slati visoko kvalitetne originalne i pregledne članke, bilješke, preliminarne saopštenja i konferencijske radove iz oblasti sportskih nauka i medicine, ali i „pisma uredniku“, izvode sa međunarodnih i nacionalnih kongresa, panele sa sastanaka, konferencija i simpozijuma, kao i da ćemo nastaviti da funkcionišemo kao otvorena tribina o bitnim pitanjima od savremenog značaja.

Na kraju, želio bih da podstaknem učešće naučne zajednice i praktičara iz industrije sporta bez koji je nezamislivo obezbijediti kontinuirani uspjeh našeg časopisa. Autori, recenzenti i gostujući urednici su uvijek dobrodošli. Takođe, želio bih da pozdravim sve vrste upućenih komentara i sugestija koji imaju za cilj da poboljšaju kvalitet časopisa.

Uz neizmjernu zahvalnost, nadamo se da će časopis biti dovoljno informativan za Vas ukus,

Glavni urednik
Prof. dr Duško Bjelica

Theoretical Issues and Methodological Implications in Researching Visual Search Behaviours: A Preliminary Study Comparing the Cognitive and Ecologic Paradigms

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ABSTRACT

A number of research papers have been devoted to understanding the mechanisms underpinning successful decision-making in sports, and analysis of eye movements has deserved special attention in this concern. A thorough reading of existing literature denotes that research on ocular fixations requires at least 100 milliseconds within the same location. For average eye-tracking systems, this means using at least three frames for each fixation. However, ecological psychology has claimed that as low as 16.67 milliseconds might suffice to capture relevant information, implying using merely one frame to consider that a fixation has been made. The goal of this experiment was to directly compare two systems (one frame-one fixation versus three frames-one fixation) for coding information concerning eye movements in a representative volleyball task in an in situ condition. Specifically, it was intended to analyse emerging differences and their meaning. Results exhibited statistically significant differences with regard to search rate (number of fixations, number of fixation locations, and mean fixation duration). Analysing fixation locations it was apparent that the ecological paradigm for considering visual fixations afforded supplementary information. Furthermore, the additional emerging cues appeared to be meaningful, and the level of noise introduced was very low. It is suggested that future research in eye movements considers using the one frame-one fixation approach, instead of the traditional three frames-one fixation set.

Key words: decision-making, visual search behaviours, methodology of investigation.

Introduction

Visual search behaviours represent a mainstream line of research within the study of decision-making, specifically in sports^{1,2}. However as different scientific paradigms have emerged when approaching decision-making, with a highlight towards the 'cognitive'^{3,4} and 'ecological'^{5,6} perspectives, we contend that these paradigms are expected to impact upon designing research methods.

The cognitive paradigm states the brain requires some amount of time to process information, and usually a time interval of around 100 milliseconds is considered minimum for the practitioner to retrieve meaningful information pertaining the situation at hand⁷. Since most head-mounted displays used in eye-tracking studies present a 30Hz-sampling rate (e.g. ASL® 3000), one frame will equal around 33.3 milliseconds. Therefore, research following the guidelines of the cognitive paradigm requires that a gaze upon any location must last at least three frames (≈ 100 milliseconds). The fixations that lasting less than three frames are not considered, mostly due to the reason, it provides insufficient time to retrieve and process meaningful information.

However, proponents of the ecologic paradigm have suggested that information retrieval is continuous⁸, hence changing the nature of concepts such as reaction time and information processing. More specifically, claims have been made supporting that fixation as quick as around 16 milliseconds may suffice to capture relevant information from the environment⁹. Despite considerable disparities between the two theoretical propositions, practical approaches have exclusively applied the cognitive

paradigm¹⁰⁻¹⁴, while no study to our knowledge has applied the ecologic paradigm.

The purpose of this study is therefore to compare two systems for coding eye movement data. Using a representative design for a defensive task in volleyball, in an in situ condition, both systems will be used for coding the ocular fixations. We intend to unfold whether there are relevant differences emerging from the two cataloguing systems, and their implications for research and practice alike.

Materials and Methods

Participants

Twelve adult women volleyball players (the oldest with 31 years of age and the youngest with 19) were recruited from a 1st division team. Participants signed an informed consent form and reported normal or corrected to normal levels of visual function. They were free to withdraw from testing at any stage. The study followed the lead institution's ethics guidelines.

Material and apparatus

We applied a representative task design previously developed to evaluate the participants' eye-movement behaviours in volleyball¹⁰. Participants played in 6 vs. 6 simulated matches during a training session, while acting as defenders in centre backcourt position (zone 6, see Figure 1). The players moved and tried intercepting the ball, as they would normally do. The starting point was common to all the participants.

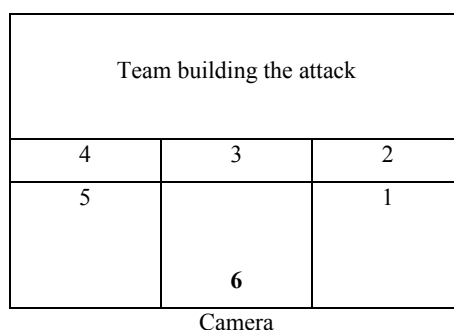


FIGURE 1
EXPERIMENTAL SET-UP. THE PARTICIPANT IN ZONE 6 IS USING THE EYE-TRACKER

The team could play without restrictions and the participants would take turns in the backcourt defensive tasks. The participant momentarily using the eye-tracking system would play in zone 6. Each time the participants made a defence or an attempt to defend in their area of responsibility a trial was attributed to them. Six trials per participant were collected, totalizing 72 trials overall. All trials lasted around five seconds, starting with a serve from the participant's team, followed by an attack sequence by the opposing team, and the endpoint was established as soon as the ball crossed the block. Action took place on a standard size volleyball court.

During the trials, participants' gaze behaviours were registered using the Applied Science Laboratories (ASL) 3000 MobileEye™ registration system (Bedford, MA, USA). This is a video-based, monocular corneal reflection system that registers eye point-of-gaze with respect to a head-mounted colour scene camera. It allows measuring the relative position of the pupil and corneal reflection in relation to each other using an infrared source, which is then used to compute point-of-gaze. The sampling frequency is of 30Hz (30 frames per second), meaning that a cognitive coding system will require a minimum of three frames for a fixation to be considered. System accuracy was $\pm 0.5^\circ$ visual angle, with a precision of 0.5° in the horizontal and vertical fields alike. The resultant superimposed videos were analysed frame-by-frame using Avidemux® 2.5.4. for Mac.

Procedure

The participants were first introduced to the purposes of the investigation and were familiarized with the experimental setting. They were instructed to play at will and to assume their usual ready defensive position. Participants should try to intercept the ball, despite some limitations imposed by wearing of the eye-tracking system (e.g., players should avoid quick falls in order to avoid damaging the device). Before starting the trials, the system was fitted to the participants, ensuring maximum comfort during performance. Calibration was conducted using five non-linear points in the visual space, to ensure that the recorded indication of point-of-gaze would be accurate. Participants were then positioned in backcourt zone 6 and played until six trials were achieved.

Data analysis

Search rate comprised the number of fixation locations, mean fixation duration and number of fixation locations per trial, measured in milliseconds. A fixation was defined as the eye remaining stationary within 3° of movement tolerance during a period of time ≥ 100 ms (three video frames) for the cognitive coding system, and ≤ 40 ms (one video frame) for the ecologic coding system.

The between-group differences were analysed using a Mann-Whitney U with coding system (cognitive vs. ecologic) as the between-participants factor. Effect size measures were calculated through the formula $r = Z / \sqrt{N}$. The level of significance was fixed at .05. Data was analysed using SPSS version 20.0 for Mac.

Percentage viewing time characterizes the percentage of time spent gazing upon each area of the display, which was divided into nine locations, following similar the protocol of Afonso et al.¹⁰: ball flight paths (reception trajectory, setting trajectory); players performing with the ball (receiver, setter, attacker, blocker); players performing without the ball (potential attacker); visual pivot (VP - between a potential attacker and the setter; between the attacker and the blockers). There was also an unclassified category, included to account for fixations falling outside the scope of the previous categories, and did not exceed 1.65% of total viewing time for the ecologic system and was absent in the cognitive system. Descriptive statistics were applied to highlight the categories that emerged in the ecologic system in addition to those already present using the cognitive system of coding.

Reliability of the observation

One randomly selected trial per participant was reanalysed for reliability purposes, in a total of twelve out 72 trials, representing 16.7% of the sample, above the value suggested by Tabachnick and Fidell¹⁵. Cronbach's Alpha ranged from 0.760-0.994 for inter-observer testing.

Results

Search rate

As shown in Table 1, there were significant system-based differences in the number of fixations, mean fixation duration, and number of fixation locations. Namely, there was a superior number of fixations and of fixation locations when using the ecologic system for coding gaze behaviour. Conversely, mean fixation duration was lower using the ecologic system.

Percentage viewing time

Regarding percentage viewing time, the ecologic system of classification promoted the emergence of more cues (see Table 2). These additional visual cues appear in supplement to those also observed when using the cognitive system for coding the gaze, but fall within the same categories.

Overall, coding the visual search behaviour using the ecologic system reveals 74 additional visual fixations into ten different locations. Altogether, around 15% of the visual cues emer-

ged only when applying the ecologic framework. Unclassified fixations represent less than 2% of the total percentage viewing

time, but have emerged only when using the ecologic coding paradigm.

TABLE 1
DIFFERENCES IN SEARCH RATE PER TRIAL ACROSS PARADIGMS

	Ecologic Mean rank	Cognitive Mean rank	U	z	p	r
Number of fixations	6.72±2.65 80.72	5.67±1.68 64.50	2,000.00	-2.42	0.016*	0.29
Mean fixation duration (ms)	420.86±123.90 64.50	466.54±107.12 80.50	2,016.00	-2.30	0.021*	0.27
Number of locations	5.75±1.37 82.25	5.14±1.12 62.75	1,890.00	-2.93	0.003*	0.35

Legend: * Significant for the 0.05 level

TABLE 2
VISUAL CUES EMERGING WHEN USING THE DIFFERENT CODING PARADIGMS

	Ecologic (n)	Cognitive (n)	Ecologic only	
			n	% within total
Attacker	72	66	6	1.24
Blocker	18	10	8	1.65
Potential attacker	30	26	4	0.83
Receiver	46	44	3	0.41
Reception trajectory	72	66	6	1.24
Setter	80	76	4	0.83
Setting trajectory	48	30	18	3.72
VP attacker-blocker	48	40	8	1.65
VP setter-middle-attacker	62	52	10	2.07
Unclassified	8	0	8	1.65
Total	484	410	74	15.29

Legend: VP – visual pivot

Discussion and Conclusion

Decision-making has elicited considerable research and, within it, visual search behaviours have been deeply scrutinized^{1,2}. Nonetheless, a thorough analysis of the existing literature reveals that a cognitive perspective not only dominates, but is actually exclusive. Even when the authors advocate the need to move towards a more ecological framework, they still apply the notion of information processing in a discrete manner, requiring that a gaze last at least 100 milliseconds for a fixation to be considered, catalogued, and analysed. Notwithstanding, the logic behind ecologic psychology states that perception is continuous, changing the nature of each event, since it cannot be analysed as a series of discrete actions; instead, each action is part of a meaningful whole. In consequence, it has been suggested that a time interval under 17 milliseconds can allow the person to retrieve meaningful information⁹. Our purpose was therefore to compare these two systems for cataloguing eye movements' data during a representative task in volleyball.

Results showed that the ecologic coding (minimum one frame for a fixation to be considered) presented a signifi-

cantly greater number of fixations and fixation locations when compared to the traditional cognitive coding (minimum three frames for a fixation to be considered). Additionally, mean fixation duration was inferior in the ecologic coding system. These results are naturally expected, as they derive from the constraints of each coding system itself. As such, these differences merely confirm that using two different systems of coding will produce distinct sets of results. Such results should, however, translate into meaningful information if one is to make a statement concerning the merits and gaps of each coding system.

Indeed, data concerning percentage-viewing time reveals that the visual cues emerging when using the ecologic system of coding are coherent with those emerging also in the cognitive system. Thus, using the one frame-one fixation coding process does seem to add relevant information concerning the visual search strategies of the players, while at the same time not producing significant noise (a mere 1.65% of unclassified fixations). It is therefore proposed that research in visual search behaviours should move towards adopting a new practical procedure, considering single-frame fixations as providing relevant information. Admittedly, this research was exploratory and more detailed studies should be conducted.

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TEORIJSKA PITANJA I METODOLOŠKE IMPLIKACIJE U ISTRAŽIVANJU VIZUELNOG PONAŠANJA: PRELIMINARNA STUDIJA KOJA POREDI KOGNITIVNE I EKOLOŠKE PARADIGME

SAŽETAK

Određen broj naučnih radova bio je posvećen razumijevanju mehanizama na kojima se zasniva uspješno donošenje odluka u sportu, a analiza očnih pokreta zaslužila je posebnu pažnju kada govorimo o ovom problemu. Temeljnim isčitavanjem postojeće literature dolazimo do saznanja da istraživanje očne fiksacije zahtijeva najmanje 100 milisekundi u istoj lokaciji. Za prosječne sisteme praćenja oka ovo podrazumijeva korišćenje najmanje tri okvira za svaku fiksaciju. Ipak, ekološka psihologija pokazuje da je s obzirom na to da je svega 16.76 milisekundi dovoljno da se uoči relevantna informacija, dovoljan samo jedan okvir kako bi se fiksacija obavila. Cilj ovog eksperimenta bio je da se direktno uporede dva sistema (jedan okvir-jedna fiksacija naspram tri okvira-jedna fiksacija), kako bi se kodirala informacija koja se tiče očnih pokreta u reprezentativnom odbojkaškom zadatku u spremnom stanju. Naime, cilj je bio analiziranje razlika koje se javljaju u njihovog značenja. Rezultati su pokazali statistički značajne razlike u odnosu na stopu istraživanja (broj fiksacija, broj lokacija za fiksiranje, srednja vrijednost trajanja fiksacije). Analizirajući lokacije za fiksiranje bilo je očigledno da je ekološka paradigma za razmatranje vizuelne fiksacije pružila dodatne informacije. Pored toga, dodatni znaci koji su se pojavili, pokazali su se kao značajni, a nivo predstavljene buke bio je veoma mali. Predlaže se da se ubuduće u istraživanjima očnih pokreta koristi pristup jedan okvir-jedna fiksacija, umjesto tradicionalnog pristupa tri okvira-jedna fiksacija.

Ključne riječi: donošenje odluka, istraživanje vizuelnog ponašanja, metodologija istraživanja.

Plasma Growth Hormone and Prolactin Levels in Healthy Sedentary Young Men after Short-Term Endurance Training under Hot Environment

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ABSTRACT

Pituitary hormones play an important role energy expenditure and body temperature regulation during exercise. The aim of the study was to investigate the effect of two different endurance training in ambient temperature ($30.76 \pm 1.71^\circ\text{C}$ and $57.92 \pm 5.80\%$ r.h.) on plasma growth hormone (GH) and prolactin (PRL) levels in non-trained healthy subjects. Twenty-four untrained healthy men participated in an 8-wk progressive two different endurance-training program. Subjects were divided into two groups: an interval running group (IR), and continuous running group (CR). Both groups were performed 3 days/wk. Growth hormone, PRL and $\text{VO}_{2\text{max}}$ levels were assessed at the beginning and the end of the training period. Body temperature (T_B) was also measured at the beginning and immediately after each training. The exercise type affected plasma PRL (8.52 vs. 6.50 ng/ml IR and CR groups, $P < 0.02$) but did not alter plasma GH levels (0.95 vs. 0.63 ng/ml IR and CR groups, $P > 0.38$). Plasma GH level at the end of training program increased from 0.42 to 1.48 ng/ml and 0.58 to 0.67 ng/ml for IR and CR groups. Expectedly, both training types increased T_B , at a greater rate for IR group than CR group. In conclusion, an 8-wk regular exercise result in an increase in plasma PRL level, without altering plasma GH level, which accompanied by elevated body temperature, regardless of the individual's sporting routine. These suggest that untrained individuals could benefit from a regular exercise program as much as those doing the routine sport.

Key words: GH, PRL, hot temperature, endurance training.

Introduction

Humans are homeothermic, which means that internal body temperature is physiologically regulated to keep it nearly constant even when environmental temperature changes¹. Physical exercise and elevations in environmental temperature are each strong stimuli that can affect both the sympathetic nervous system and the hypothalamic-pituitary-adrenocortical axis^{2,3}. Growth hormone, which is a potent anabolic, influences all systems of the body and has an important role in the development of muscles. Anterior pituitary hormone, prolactin, is used as an indirect indicator of central fatigue when exposed to heat actively⁴. During exercise, the organism is exposed to overload compared to what is encountered during the daily life⁵. Body temperature rises during these overloads. The capacity for prolonged exercise is diminished in hot environments relative to normothermic conditions^{6,7}. Humans have evolved to tolerate a wide range of environmental temperatures while keeping the body's core temperature within rather narrow limits⁸. Most hormones released during exercise are increased in plasma also during the heat exposure^{9,10}.

It has been generally known that heavy resistance exercise has a potent effect in promoting increases in size and strength of skeletal muscle. The effect of training on the GH response to acute exercise is uncertain with different results being reported. Possible reasons for these discrepancies are: (i) differences in exercise duration and severity (ii) individual nutritional and

hormonal status; (iii) technical differences in assay protocols (iv) adaptation to training¹¹. At rest, GH secretion is pulsatile and is influenced by age, gender, nutrition, sleep, body composition, fitness, and sex steroid hormones¹². During a 24-h period, spontaneous GH secretion is maximal at night in close association with slow wave sleep^{13,14}.

Few studies have assessed the effect of period of the day on the GH and cortisol responses to exercise. Two studies reported no effect of period of the day on the GH response to exercise¹². The pituitary hormone response to such exercise is often described as a 'stress response' and, as such, implies a common mechanism for stimulating the release of several different hormones. Most hormones released during exercise are also increased as the result of passive heat exposure¹⁵ and the idea of a role for body temperature in the control of hormone release during exercise has been supported by a number of studies^{16,17}. Prolactin release from the anterior pituitary gland occurs in response to raised core body temperature both as a result of exercise and passive heating¹⁸. Growth hormone concentrations increase as a result of exercise and the extent is governed by exercise intensity¹⁹ and has been reported to be linearly related to core temperature during exercise²⁰. Prolactin release during exercise²¹, has shown differences in the relationship between prolactin concentration and rectal temperature in hot and cool conditions. The aim of the study was to investigate the effect of two different endurance training in ambient temperature ($30.76 \pm 1.71^\circ\text{C}$ and $57.92 \pm 5.80\%$ r.h.) on plasma growth hormone

(GH) and prolactin (PRL) levels in non-trained healthy subjects.

Materials and Methods

General design

Subjects performed two exercise training period to investigate the effect of different endurance training methods on plasma GH and PRL levels at ambient temperatures of 30 °C and 60% r.h. Blood samples were collected pre and post training periods and T_B were measured before and immediately after each training.

Subjects

Twenty-four ($n=12$ IR, $n=12$ CR) untrained healthy university student participated in the study. Their physical characteristics (mean \pm SD) were: IR; age, 24.27 ± 2.71 yr; ht, 1.75 ± 0.06 cm; body mass, 74.5 ± 3.4 kg; VO_{2max} ; 32.45 ± 6.4 ml kg^{-1} min^{-1} and for CR; age, 22.73 ± 3.51 yr; ht, 1.73 ± 0.06 cm; body mass, 71.9 ± 2.7 kg; VO_{2max} ; 31.93 ± 4.7 ml kg^{-1} min^{-1} .

Experimental design

IR group was performed interval running. First 2 wk one set that included 250 m, 400 m, 650m and 900 m running 1min jog between each running distance, from 3rd wk till 7th wk two set and last two wk three set at the intensity of 60 - 80 % target heart rate. CR group performed running exercise from 25 to 60 minutes for 3 days a wk, at the intensity of 50-70% target heart rate that was calculated by Karvenon method for each subject.

Before the exercise-training program: On the day of a test, subjects arrived at the test area at 08.00 h having fasted from midnight. Each subject participated in two randomized experiments separated by interval or continuously running group. Blood samples were taken for determination of pre-exercise values of hormones than shuttle-running test began to measure of the VO_{2max} .

Body temperature (T_B) measurements: Before and immediately after each training session, the T_B was measured with BRAUN IRT-4520 Thermoscan and recorded. Subjects did not drink water during exercise training.

After the exercise training program: Finally the last measurements were performed and blood samples withdrawn for determination of post-exercise values of hormones than shuttle running test was made to measure of the last VO_{2max} .

Blood analysis

Blood samples were taken from all subjects at rest at the start of the study. Samples were again taken at eight wk at maximal exercise performance. The blood was collected from the antecubital vein into sterile test tubes. The tubes were centrifuged at 4500 rpm for 10 min at 4 °C for separation of the serum, which was frozen to -80 °C until needed for analysis. Growth hormone and PRL concentrations were measured by using IMMULITE 2000 analyzer with chemiluminescence method (Skybio Ltd, UK).

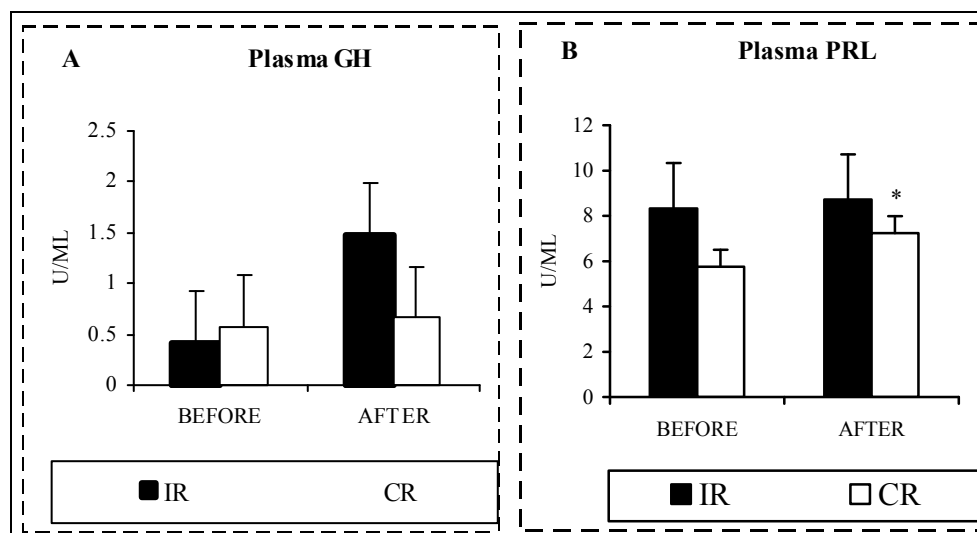
Statistical Analysis

The effect of endurance trainings on GH, PRL, T_B and VO_{2max} were tested before and after training by 2-way ANOVA using the GLM Procedure (SPSS, ver. 11.5.0, Chicago, IL, USA). The linear model included the effect of training and time relative to training and their interaction. Statistical significance was declared at $p < 0.05$.

Results

In an environment in which the average temperature and humidity ratio are respectively $30.76 \pm 1.71^\circ\text{C}$ and $57.92 \pm 5.80\%$ r.h., the effects of exercise on the parameters are as follows.

Interval Running Group (IR): The interval endurance training-induced increase of body temperature was higher after training periods and this was significant ($P < 0.05$).



Legend: GH= Growth Hormone, PRL=Prolactin, IR = Interval Running Group, CR= Continuous Running Group.

FIGURE 1

PLASMA GH AND PRL LEVELS 8 WK TRAINING PERIOD UNDER HOT ENVIRONMENTS (30.76°C AND 57.92% R.H.). SIGNIFICANT DIFFERENCE IS BEFORE AND AFTER FOR PRL (* $P < 0.02$).

TABLE 1
COMPARISON TWO DIFFERENT RUNNING PROGRAM

Variable	Exercise type				SEM	Effects, P <		
	Interval		Continuous			E	T	ExT
	Before	After	Before	After				
GH, ng/ml	0.42	1.48	0.58	0.67	0.368	0.38	0.13	0.19
PRL, ng/ml	8.33	8.72	5.75	7.24	0.85	0.02	0.28	0.52
TB °C	36.05	36.47	35.85	36.47	0.03	0.0001	0.0001	0.0001
VO2max	32.45	45.93	31.93	45.63		0.0001	0.75	0.93

Legend: GH=Growth Hormone, PRL=Prolactin, T_B= Body Temperature, E= Exercise,
T= Time, ExT= Exercise and time of the test.

Continuous Running Group (CR): The continuous endurance training-induced increase of T_B was higher after training periods and this was significant (P<0,05).

Discussion

The stresses of physical exertion often are complicated by environmental thermal condition¹. In the following discussion, we focus on the endocrinology responses to short- term training period in hot environments.

The aim of this investigation was to compare the GH, PRL and cardiovascular responses during different endurance training methods. The present study showed that both endurance training method (interval and continuous) cause an increase at VO₂max. Endurance training was chosen as a model of exercise to observe the developing of VO₂max. Because common goal of this type training method is to increase of VO₂max. This goal was achieved with both methods after the training period.

Growth Hormonu: The effects of exercises performed in different environments have been the subject of many researches from past to present. If we take a look at the results of previous studies; Buckler²² observed that GH increased due to the rise in temperature as a result of 20 minutes of exhaustive exercise that is performed at 4°C and 21°C; Christensen with his collaborators²³ observed that GH decreased and GH increased at 22°C, though there was a rise in the body temperature during an exercise of intermediate level that was performed at 4°C. Cross-with his collaborators²⁴ demonstrated that, in a 40 minutes of exercise performed with 65% VO₂max, increase in both body temperature and GH was observed at 23°C, however, this increase was observed as 2 times more at 39°C.

Hot environment and exercise result in changes by effecting the hormone regulation of the organism through central nervous system. If the adaptation mechanisms of a person exposed to this situation can demonstrate the necessary concordance. Otherwise, many healths related problems arise. For example, Frewin with his collaborators²⁵ showed that, the rising body temperature at 10°C during a treadmill exercise of 20 min. did not change the GH level; however, the same exercise resulted in an increase of 426% in GH at 40°C.

Exercise intensities effect these changes to a large extent. Raynaud with his collaborators²⁶, performed bicycle ergometry exercise at 24°C and 33°C at different intensities (47-59-70%). As a result, increase in GH and T_B was recorded in all exercises with increasing intensity except for the one performed at an intensity of 47%.

The new observations are that while GH release during the first 30–40 min of exercise shows a close relationship with rising rectal temperature, unlike prolactin, this relationship was similar in hot and cool conditions²⁷. Wee with his collaborators²⁸ stated that exercise increased GH release, however Vigas

with his collaborators²⁹, suggested that the rise in plasma GH levels were not due to exercise, contrarily it might be due to the increased T_B, and Armstrong and Hatfield³⁰ stated that GH levels might increase due to stress that forms with the increase at the temperature of the environment.

Performed studies are rather related to the reactions given to the acute exercises performed in hot environment. Wheldon³¹ stated that swimming exercise at room temperature increased GH level. However, the hormonal response that the body gives due to thermoregulation after a short and long period of exercise is important. In the presented study, a significant rise in GH as a result of stamina exercises at increased pace for 8 wk was not observed. In this case, if GH does not increase though average environmental temperatures and humidity rate's being 30.76 ± 1.71°C and 57.92 ± 5.80% r.h, respectively, increase in T_B, and increase in exercise intensity, then the most important reason for this is acclimatization. Acclimatization only occurs with regular exercise. With regular exercises performed in hot environment, our body adapts physiologically and decreases the negative effects of temperature

Secretion of plasma GH depends on different reasons like type of exercise, body temperature and age. In present study, increment in GH level was higher in IR group than that of CR group who trained at same environmental temperature. Ftaiti³² indicated that exercise done in hot environment was much more effective to increase of GH level. Although Vigas with his collaborators¹⁶ reported that increment in body temperature during exercise triggered GH secretion, in present study, increased body temperature did not did not significantly effect GH level, also the results of the study done by Tamer³³ supported our results.

Prolactin: Previous observations concerning the release of prolactin when exercising in hot and cool environments, indicating that ambient temperature has a major effect in modulating the response³⁴.

As in GH, PRL also changes due to various reasons. Some of them are the water level and temperature of the body. After exercise with different levels of water given to sportsmen/sportswomen, plasma PRL levels were determined to be at higher values at the 40th and 60th minutes of the exercise. The reason for this increase was attributed to increased body temperature.

Paez with his collaborators³⁵ found a significant increase in PRL level after a 100 m. free style swimming exercise. Meeusen with his collaborators³⁶ detected that there was a 14% increase in PRL levels in cyclers who had performed excessive exercise. In another exercise, according to the results of exercise performed in environments of different temperatures, body temperature may be a stimulus for the GH and PRL release³⁷. In healthy people kept inside the water at 38-39°C for 25 minutes without exercise, a slight increase in body temperature and GH and decrease in PRL were observed³⁸.

The core temperature and PRL responses between the pre and post interval and continues training period were not correlated. Much investigation has shown that increases in PRL at exhaustion are significantly related to core temperature and ratings of perceived exertion at exhaustion during prolonged exercise in hot conditions^{39,40}.

Within the program, sportsmen performing continuous running were observed to be more exhausted. Our results indicate that release of prolactin plays a role to show exhaustion in the sportsmen.

The level of plasma PRL hormone significantly increased in CR group. As Low with his collaborators⁴¹ claimed that, the reason of increment in PRL hormone level during endurance exercise that is used as a sign in central fatigue could be continuous stimulations sent by central nervous system. Though Burk with his collaborators⁴² reported that the maxVO₂ accepted as the other increase PRL hormone level, we can not say same thing for this study because there was no significant difference among maxVO₂ level of both group. Consequently, continuous running can be assumed as the reason of increase in PRL hormone level.

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Conclusion

In conclusion, an 8-wk regular exercise result in an increase in plasma PRL level, without altering plasma GH level, which accompanied by elevated body temperature, regardless of the individual's sporting routine.

Our results show that 8 wk endurance training under hot environment was not the stimulus for growth hormone release. On the other hand, continuously running at same environment was stimulus for prolactin hormone release.

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NIVOI PLAZMINOG HORMONA RASTA I PROKLATINA KOD ZDRAVIH SEDENTARNIH MLADIH LJUDI NAKON KRATKOTRAJNOG TRENINGA U TOPLOM OKRUŽENJU

SAŽETAK

Hipofizini hormoni imaju važnu ulogu u potrošnji energije i regulaciji tjelesne temperature tokom vježbanja. Cilj istraživanja bio je da se ispita uticaj dva različita treninga izdržljivosti u sobnoj temperaturi ($30.76 \pm 1.71^{\circ}\text{C}$ i $57.92 \pm 5.80\%$ r.h.) na nivo plazminog hormona rasta (GH) i proklatina (PRL) kod neobučanih zdravih ispitanika. Dvadesetčetvorica neobučanih zdravih muškaraca učestvovali su u dva različita osmonedjeljna progresivna programa treninga izdržljivosti. Učesnici su bili podijeljeni u dvije grupe: grupu koja je povremeno trčala (IR), i grupu koja je neprestano trčala (CR). Obje grupe su izvodile vježbe 3 dana nedjeljno. Nivo hormona rasta, PRL-a i $\text{VO}_{2\text{max}}$ procenjivan je na početku i na kraju perioda treniranja. Tjelesna temperatura (TB), takođe je mjerena na početku svakog treninga i odmah nakon istih. Ovaj tip vježbe uticao je na plazmin PRL (8.52 naspram 6.50 ng/ml IR i CT grupe, $P < 0.02$) ali nije mijenjao nivo plazminog GH (0.95 naspram 0.63 ng/ml IR i CT grupe, $P > 0.38$). Nivo plazminog GH na kraju programa treniranja povećao se od 0.42 do 1.48 ng/ml i od 0.58 do 0.67 ng/ml za IR i CR grupe. Kao što je očekivano, oba tipa treninga povećala su TB, pri čemu je rast bio veći kod IR grupe nego kod CR grupe. Zaključeno je da je osmonedjeljno redovno vježbanje rezultiralo porastom nivoa plazminog proklatina, ne mijenjajući nivo plazminog hormona rasta, što dalje prati povišena tjelesna temperatura, bez obzira na sportske rutine pojedinca. Ovo nagovještava da neobučeni individualci mogu imati koristi od redovnog programa treniranja u istoj mjeri koliko i oni koji rutinski treniraju.

Ključne riječi: hormon rasta, proklatin, visoka temperatura, trening izdržljivosti.

Comparison of training and competition opportunities in leisure time among people with intellectual disabilities in selected European countries

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ABSTRACT

Leisure time activities are important for individuals with an intellectual disability (ID). Table tennis (TT) seems to be the most suitable and accessible activity in relation to motor skills and low financial requirements. The aim of the project was to investigate the opportunities for the TT training and competition among individuals with ID in the following European countries: Austria, the Czech Republic, England, and Hungary. Those countries regularly participate in international TT events organized by Inas. The coaches of the mentioned countries were questioned about the TT training process of persons with ID during their leisure time. The survey was completed by 4 coaches (3 male and 1 female), who work at various levels (from the lowest level in sports clubs to the top level in national teams) in each country. The research findings showed that all of the surveyed coaches practiced trainings frequency two times per week. In addition to national games, all the countries organize competitions at regional levels and participate in international events. The data reveal that training camps lasting from 5 to 14 days per year are organized in all the surveyed countries. The survey found certain training options, which correspond more to the standard of the recreational sport than to the standard of the top-level sport. A positive finding was the possibility of training with the intact population, which may be considered as an important phenomenon of social inclusion.

Key words: intellectual disability, table tennis, training process, competition, training camps.

Introduction

Physical activity as the instrument of positive intervention on persons with disabilities has been assessed and documented in several research studies. Various beneficial aspects have been declared: a) evolution aspect: loco-motor development, eyes-hand coordination, walking-running, keeping-catching, basic motor skills like swimming, cycling etc.; b) social development aspect: self-efficacy, self-awareness, communication, cooperation-competition; c) aspect of health related fitness: fitness, BMI and obesity regulation^{1,18,23,26}. Aquatic activities, especially swimming, have been recommended as a leisure time activity improving gross motor skills of people with cerebral palsy². Regular recreational activities practised two times per week were found as more important than the loading intensity of exercise in Dutch study of children between 7–13 years of age²⁸. The assessment of the aerobic and anaerobic capacity among children and adolescents with cerebral palsy (further CP) showed, beside positive influence on the anaerobic capacity, also several secondary outcomes, such as: improved agility, muscle strength, self-competence, social participation, and health-related quality of life²⁹. Similar findings have been documented in the literature regarding children and youngsters with intellectual disability^{3,4,20,21}.

The relationship between motor competence and physical inactivity among persons with intellectual disabilities (further

ID) has been investigated. The results proved that deficiencies in motor competence might predispose individuals to engage themselves in lesser amount of physical activity¹⁰. Persons with ID are typically less physically proficient than their standard developing peers. Similarly, physical inactivity among persons with ID may lead to potential health risks. Results indicated that individuals with ID experienced deficiencies in physical fitness⁸. The significant physical inactivity among persons with ID predisposed them to greater health risks (related to overweight and obesity) in contrast with their peers²¹. It is estimated that individuals with disabilities compared to their peers are less involved in appropriate physical activities and games¹⁶. Children with ID were found to be engaged in significantly less physical activity than their peers from the intact population⁶. It concerned the school, after school, and weekend activities. The research project concerning the assessment of various types of daily leisure activities of 266 residents in the Czech Republic documented that male adults (No 174) spent only 4 % of total hours per week (7 days) by monitored physical exercises and sport, whereas female adults (No 92) only 3.5 % in the same period. The age of participants was from 18 to 42 years. The leisure time was defined as the time devoted to relaxation and personal interests related to self-decision, thus, it did not involve sleeping, self care, education and work²⁵. Several studies^{5,7,22} have shown that the improvement of skills and social competences among children with autistic spectrum disorders is

closely related to physical activities in leisure time and to kindergarten motor programs. The influence of leisure time activities on the self-awareness of adolescents with behaviour problems was confirmed¹⁴.

The participation in leisure activities is an important part of life for children with disabilities and their development. "Active engagement in meaningful activities of one's own choosing is essential for promoting health and personal autonomy, skill development and productivity, community integration, and life satisfaction"¹⁷.

What are the special issues causing lack of participation in leisure time activities among individuals with ID? The question still awaits its full answer. Some recommendations, how to develop and improve movement skills of children of all abilities (including children with ID), have already been found¹⁸. Typically, they have to face the following issues: [1] the problem with selection of the activity due to the lack of decision-making. The decision-making has to be supported, motivated, and formatted. It is an exhausting and long-term process; [2] the involvement of accompanying persons like parents, care-givers and/or educators as the support on different levels (intermittent, limited, extensive or pervasive²⁷) is needed; [3] parents are afraid of barriers and negative influence of potential injuries due to the lack of skills and problematic mobility and/or community rejection¹⁷.

The lack of opportunities in community programs appears on both the recreational level and the level of a regular systematic program. Therefore, it is recommended to municipalities or sport organizations to provide programs in the following three approaches¹¹: [1] adapted program: a modified program of movement activities that maximizes the potential of children with disabilities using an individualized intervention or education program; [2] remedial program: specific exercises and activities for correcting errors in body mechanics and perceptual motor functioning; [3] developmental program: an individualized program of movement activities based on personal needs and designed to enhance movement, fitness, physical activity, and social/emotional skills.

Organisations offerings activities for people with ID, for instance the Special Olympics and the International Sports Federation for Persons with Intellectual Disability (Inas) have

begun to offer sports not only within the intact population, but also among individuals with disabilities¹⁵.

The basic question of the presented pilot project was: "Are there opportunities for involvement of persons with ID as far as physical activities are concerned"? Unfortunately, persons with ID may engage themselves in recreational and competitive sport levels only within the range of leisure time activities.¹. Table tennis (further TT) seems to be the most appropriate and accessible activity considering the limited skills and abilities of persons with ID and low financial and spatial requirements. TT is a frequent activity in all age groups on both recreational and competitive levels in many countries all over Europe. The aim of the project was to investigate the possibilities for the TT training and competition of individuals with ID in selected European countries, to compare findings and to formulate basic recommendations.

Methods

Participants

Four countries willing to participate in our questionnaire were researched within the study. We were dealing with TT coaches - specialists in training students or graduates from special schools for children with ID. Their training lessons are designed for children aged 10 years or more, national team members are usually between 20 and 35 years old. In many cases the participants of trainings are older than 35. As the groups are often of mixed age, the survey has not been limited by the age.

The European countries regularly participating in international championships organized by the Inas (International Federation for Sport for Para-athletes with an Intellectual Disability) become involved in the comparative study. Head coaches and representatives of TT from Great Britain, Hungary, Austria, France, Portugal, and Spain had been addressed. Nevertheless, France, Spain and Portugal remained silent and did not answer. Thus, the study was performed in four countries (Table 1), which had agreed to participate. In order to acquire more accurate image of the situation, the sex and years of practice have been included in the (Table 1).

TABLE 1
THE COUNTRIES INVOLVED IN THE RESEARCH

Country	Gender (M, F)	Years of TT coaches' experience
Austria	M	23
Czech Republic	F	15
England	M	25
Hungary	M	20

Legend: M - male, F - female

Data acquisition methods

The questionnaire, especially created for the purposes of the study, is an inseparable part of the dissertation of Francová (2012). Each question in the questionnaire is aimed at the identification of sport opportunities. First two questions reflect general status of sport among people with ID in the given country, the questions 3 – 6 deal with specific training and competitive opportunities, and the last question inquire about the possibilities of special sport activities. The questionnaires were sent via the e-mail. The following questions were included: [1] how many athletes are registered in your local association? What is the number of registered athletes out of the total number of people

with ID in each country?; [2] how many table tennis clubs offer training for athletes with intellectual disabilities?; [3] do your athletes have the opportunity to train regularly?; [4] does your organization organize national games?; [5] how many players participated in the national games in the past?; [6] does your organization organize any other competitions?; and [7] does your organization organize any sports or training camps? How often and to what extent?

Organization of research

The aim of the study was to inquire about the given area. The whole project was divided into two stages. In the first stage

the representatives or head coaches of TT were addressed. Simultaneously, the questionnaire was created and sent to the representatives willing to participate in the study. Followingly, data collection, comparison of results and data evaluation was performed in the second stage.

Data analysis

Obtained data from the questionnaires were processed and individual countries compared; the results were processed into the Table 2.

The main interpretation and evaluation of the results was based on an analysis of available materials, in accordance with the information obtained from the questionnaires.

Limitations

This survey was conducted on a limited sample of TT co-

aches of athletes with ID. Organized sport under the auspices of Inas has its own rules, and from practice, we have learnt that not all sections or individuals are interested to join this structure, even when engaged in sports regularly, either on the local level or top competitive level.

Demarcation

The condition for the realization of the project was to focus the research only on individuals with intellectual disabilities regularly involved in sports training.

Results

This section describes the results obtained on the basis of research questions. (Table 2).

TABLE 2
QUESTIONNAIRE FOR IDENTIFICATION OF TRAINING OPPORTUNITIES OF TRAINING OPPORTUNITIES
FOR TABLE TENNIS PLAYERS

Questions asked in the questionnaire	Austria	Czech	England	Hungary
1. How many athletes are registered in your national TT association for athletes with ID?	900ath.	3000ath.	500ath.	5000ath.
- the number of registered athletes out of the total number of people with ID? (in %)	1,6	4,3	0,1	7,6
2. How many TT clubs offer training for athletes with ID? (in %)	6	75	100	12
3. Do your athletes with ID have the opportunity to train regularly?	Yes	Yes	Yes	Yes
- how often (per week)	2	2	2	5
4. Is any national game presented by our organization?	Yes	Yes	Yes	Yes
5. How many TT players with ID participated in national games in the past?	22	70-80	100	80
6. Does your organization organize any other competitions?	Yes	Yes	Yes	Yes
7. Does your organization have any sports camps?	Yes	Yes	Yes	Yes
- how many days (summary)?	5	10	14	14
- how often per year?	1	3	6	1-2

Legend: ath – athletes

The number of registered athletes in the involved countries is from 500 to 5000. England has the lowest number of athletes (just 0.1 % of athletes with ID out of the total number of people with ID), whereas Hungary has the highest number, which is (7.6 % of athletes with ID out of the total number of people with ID).

England has the best opportunities for training and organization of leisure time for athletes with ID, where there it is possible to practise in every table tennis club. On the other hand, Austria has the lowest opportunity of leisure time activities, with only 4-6 table tennis clubs offering training for athletes with ID.

All the surveyed countries offer regular trainings, usually twice or five times a week, to athletes with ID. The best situation is in Hungary, where the ID athletes can practise five times a week.

All participating countries organize national games.

A number of 20 – 100 athletes participate in these national games. The lowest number of athletes is in Austria and the highest number of players is in England.

All participating countries also organize other competitions.

Training camps in the surveyed countries are organized in the length of 5 to 14 days a year (with 5 days a year practice in Austria and 14 days practice in England).

Discussion

This paragraph is divided into subsections according to the level sports concept. Being the participant in a TT organization in the Czech Republic and having participated in international

events in a position of a national coach, we obtained the data.

This survey provides some current information about sport opportunities for individuals with disabilities. As a part of this study we described and compared various levels of preparation of athletes who practise and compete in the selected European countries: Austria, the Czech Republic, England, and Hungary. The target group were individuals with ID. This comparison could be enlightening for educators and trainers who work with individuals with ID.

The lowest level of an imaginary pyramid is presented by athletes practising in sports clubs, thus creating the broadest base of people who are interested in sports activities in their leisure time. Therefore, this recreational level symbolizes a very important position²⁸. It is followed by a regional or national level. The highest levels are occupied by the national team events.

The individual subsections illustrate different approaches to the preparation of athletes with ID. The total number of athletes within each national association indicates the current status of development of organized sports for individuals with ID. The number of athletes supports the statement that people with ID were found to be engaged in any physical activity less than the intact population^{9, 16}. It should be noted that we are talking only about registered athletes within an organization. The total number of registered and nonregistered athletes is hard to estimate. This number along with the size of the country can be used to estimate the limited chance of discovering a talent that could achieve success at the national or supranational level. The

situation in the participating countries showed some similarities as well as significant differences.

1. General situation

The number of people with ID is based on the epidemiological studies, this paper suggests that “the overall prevalence of severe intellectual disabilities (approximating to $IQ < 50$) is between 3 and 4 people of all ages per 1000 total population, implying that in the 15 countries of the European Union (total population 380 million) between 1.1 and 1.5 million people have severe intellectual disabilities. The equivalent figure for mild intellectual disabilities (approximating to $IQ 50-70$) is 2.3 to 2.7 million people, but many of these individuals will not need special help in adult life¹⁹”.

2. Training opportunities in sports clubs

Sections are organized by schools or homes for persons with ID. The aim is to provide regular trainings for athletes with ID in cooperation with the intact population and to create a range of activities in leisure time for all the children. We agree with the statement that participation in leisure activities is an important part of life of children with disabilities and their development¹⁷. At present, the situation has been changing significantly due to the fact that more and more athletes have the opportunity to participate in training clubs with the intact population. The recommended training activities on recreational level are one to three times per week, along with participating in occasional tournaments.

The study results showed maximum responsiveness from the public in England, where the athletes have the opportunity to train in all the clubs of the intact population. Training activities in regular sports clubs create a situation which enables a wider range of athletes with disabilities to do regular physical activities. Austria and Hungary show less integrated training opportunities. The trainings in those countries are focused on a specific group and not on the broader spectrum of athletes. In this case only successful athletes are in the centre of attention.

Training is an essential part of the training process leading to the desirable physical fitness²⁴. The research shows that a long-term and systematic training has an effect on operating performance changes⁷. At the same time, it is also a directing factor of irregular and sudden changes in motor performance. This is particularly the reason why the sport of individuals with ID is very important.

A training process on a professional basis is a daily and biphasic issue¹². Even individuals with ID are able to compose a national team. The process of preparing high-quality training for players with disabilities is very complicated and difficult. The biggest problem is the lack of professional coaches and professional training methods. There are very often volunteers working in clubs. Enlisting or hiring of qualified coaches is complicated due to economic costs of the training process. The survey data show that individuals in most countries practise twice a week, which is more consistent with the recreational sport. The best possibilities of training processes are available to athletes from Hungary; they can practice five days a week.

3. Competitive opportunities

Local competitions offer a chance to participate to the widest range of athletes. The competition involves athletes of various levels and even players on a lower-level have a chance to play with the best ones. In this case it can be a good motivational factor. Another important point is that these

contests create space for the talent search. All the surveyed countries organize competitions at local levels. The Czech Republic organizes local competitions of eight counties from which the best players nominate to the country's top national competition.

The national championship is an opportunity for athletes to present their year-long training efforts and to measure their strength with the corresponding performance athletes from different clubs. It should be the top level in each country. The success of players influences the creation of each national team.

Our data show that the organization of national games or championships is a part of every sports concept in all the surveyed countries.

The number of participants at the highest national level connected with the number of athletes of each association may indicate how tough the nomination system is. In the Czech Republic, Hungary and Austria, there are about 1-3 % of athletes who have a chance to be nominated to the national games. This is different to England, where the opportunity to compete with players at the highest level exists for 20 % of all players. This result indicates that the selection is different and in the case of the three mentioned countries also very selective.

4. Special opportunities in national team

The best players in each country create a national team that participates in the international events. This team may participate in:

a) Sports camps

Sports camps prepare athletes for international events¹³. The sports camps are becoming also popular for athletes with lower performance or even as active sports holiday. According to the frequency, quality and intensity of sports camps, individuals can determine the success of individual players in competitions and tournaments. In the case of athletes with ID, their performances are often unstable, but regular and high quality training and camps have significant impact on the overall level of their motor skills. The sports camps should be included, similarly to the intact population, within the overall framework of the preparation of athletes. Unfortunately, a frequent problem with financing occurs in the category of individuals with disabilities. Sponsors, grants and in some countries (such as England) athletes themselves or their families are often involved in the organization of such events. As mentioned in the chapter on training sessions, the economic situation is a significant problem in the overall preparations of athletes.

The obtained data show that the surveyed countries organize camps from 5 to 14 days per year. The frequency of organizing camps in all countries during the year is comparable, but England and Hungary organize longer sports camps (approximately 14 days), the Czech Republic and Austria have camps of a lesser extent (up to 10 days).

The sports camps in the Czech Republic are conceived as a 3-6 day stays and they are focused on the overall condition of maximum development (of all physical abilities) and game skills. The frequency of one-week camp is two to three-phase training. The main goal of the training is to improve individual strokes and game combination. An important part of the training is a friendly match with a sparring partner.

b) Friendly international matches / sports tournaments

These are the competitions, which can be organized by individual clubs of a specific country in agreement with other countries. In the past, mutual friendly matches took place

between the Czech Republic, Hungary and Poland. Another example is the international tournament held in the Czech Republic with the participation of France, Austria and England. These competitions can have several goals: [1] preparation of athletes for competition officially organized by Inas; [2] creation of opportunities for mutual matches between athletes from different countries; [3] creation of opportunities for athletes with lower performance; [4] creation of possibilities for sport's self-fulfilment of athletes with ID; [5] chance for interesting meetings, new adventures and experiences; [6] support of development of sports among individuals with ID.

Currently this opportunity is available also to players who were excluded from the official national teams because of very strict conditions. These players used to be registered, but they are in the border IQ zone and they cannot participate in official competitions organized by Inas, but they do not have a chance to participate in competitions along with the intact population.

c) Championship organized by Inas

Based on the success of national games, camps and friendly matches, a national team is formed. It represents the country at the official competitions organized by Inas.

The European Championship is held every two years. The World Cup is held alternately with European Championships, also every two years. Every four years Inas organises Global Games – 10 days celebration of sport for elite athletes with ID that include World Championships in 7 sports. The Paralympics, similarly to the Olympics, are held every four years. Last year's Paralympics in London 2012 restored again categories for athletes with ID. The athletes registered in the Inas have been continually tested and based on actual results and achievements they were nominated for the start in the Paralympics 2012 in London.

The condition for participation in international events is not only the success in national competitions and other events currently organized, but equally important is the handling of international registration. For this registration, all the athletes must be tested by psychological tests and evaluated at a sociable level and adaptability. Based on these tests and meeting of all conditions of registration they may represent their country.

The obtained data show that all the surveyed countries participate in international events.

Conclusion

We found out that the countries participating in the survey all have certain opportunities for organization of the training program for persons with ID. Nevertheless, the possibilities for leisure time activities are lower than the possibilities of the intact population. The success of the training program depends on many circumstances and frequency of practising. The success of the concept of individual countries can be assessed according to achievements of athletes on the international scene. Athletes from the Czech Republic, Austria and England are in all categories in the middle range of international rankings. Following the results of national team members we can assess a high success rate of players from Hungary, who at the time of the research were among the world's best players in this category. The leisure time activities are oriented on the top TT players training and these players have also the best possibilities for training (in comparison 80 players of the national games with 5,000 registered players).

A significant progress has recently been seen among the players from England, who have the greatest opportunities to train with the intact population and may attend the highest frequency of training camps.

When comparing with the general public, the leisure time opportunities for athletes with ID were relevant to the training process, on the other hand the participation in different competitions was quite limited. The competitions for this category are organized less frequently than for the intact population. The involvement of athletes with ID in the same competition with the intact population has appeared on more regular basis, however, the chance of a success for athletes with ID is very limited. This is further connected with the motivation for another activity.

Two issues can be recommended for practise in leisure time: [1] in spite of the fact that the outdoor or swimming activities are mostly recommended for individuals with ID, table tennis has been confirmed as an available sport for both the recreational level and for the international competitive level; [2] to create more training and competition opportunities from the local to international level. The authors emphasize the need for continuous management of physical activities, because the positive effect of training and opportunity to compete is confirmed by the studies. The individuals with ID are not able to continue independently in the activity or exercise, they need regular leadership. Another very important help would be the government's support and bigger public understanding.

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UPOREĐIVANJE MOGUĆNOSTI TRENIRANJA I TAKMIČENJA U TOKU SLOBODNOG VREMENA KOD LJUDI SA INTELEKTUALNIM SMETNJAMA U ODREĐENIM EVROPSKIM ZEMLJAMA

S A Ž E T A K

Aktivnosti koje se izvode u toku slobodnog vremena važne su za individualce sa intelektualnom invaliditetom (ID). Stoni tenis (TT) izgleda kao najprikkladnija i najpristupačnija aktivnost u odnosu na motorne sposobnosti i niske finansijske zahtjeve. Cilj ovog projekta bio je da se ispituju mogućnosti treniranja i takmičenja u stonom tenisu kod individualaca sa intelektualnim invaliditetom u sljedećim evropskim zemljama: Austrija, Češka Republika, Engleska i Mađarska. Ove zemlje redovno učestvuju u međunarodnim događajima stonog tenisa koje organizuje Inas. Treneri iz pomenutih zemalja ispitivani su o procesu treniranja stonog tenisa tokom slobodnog vremena kod osoba sa intelektualnim invaliditetom. Istraživanje je završeno sa četiri trenera (3 muškarca i jedna žena), koji rade na različitim nivoima (od najnižeg nivoa u sportskim klubovima do najvišeg nivoa u nacionalnim timovima) u svakoj od zemalja. Istraživanje je pokazalo da su svi od ispitivanih trenera održavali treninge dva puta nedjeljno. Uz nacionalne igre, svaka od navedenih zemalja organizuje takmičenja na regionalnom nivou i učestvuje u međunarodnim događajima. Podaci pokazuju da su kampovi za obuku, koji traju od 5 do 14 dana u toku godine, organizovani u svim zemljama koje su učestvovala u istraživanju. Istraživanje je pokazalo određene mogućnosti obuke, koje više odgovaraju standardu rekreativnog sporta nego standardu vrhunskog sporta. Pozitivno otkriće predstavljala je mogućnost treniranja sa zdravom populacijom, što se može smatrati bitnim fenomenom socijalne inkluzije.

Ključne riječi: intelektualni invaliditet, stoni tenis, proces treniranja, takmičenje, kampovi za obuku.

Qualitative and Hierarchical Analysis of Protective Factors against Illicit Use of Doping Substances in Athletes Calling a National Anti-Doping Phone-Help Service

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ABSTRACT

Evidence of a sport-specific hierarchy of protective factors against doping would thus be a powerful aid in adapting information and prevention campaigns to target the characteristics of specific athlete groups, and especially those athletes most vulnerable for doping control. The contents of phone calls to a free and anonymous national anti-doping service called 'écoute dopage' were analysed (192 bodybuilders, 124 cyclists and 44 footballers). The results showed that the protective factors that emerged from analysis could be categorised into two groups. The first comprised 'Health concerns', 'Respect for the law' and 'Doping controls from the environment' and the second comprised 'Doubts about the effectiveness of illicit products', 'Thinking skills' and 'Doubts about doctors'. The ranking of the factors for the cyclists differed from that of the other athletes. The ordering of factors was 1) respect for the law, 2) doping controls from the environment, 3) health concerns 4) doubts about doctors, and 5) doubts about the effectiveness illicit products. The results are analysed in terms of the ranking in each athlete group and the consequences on the athletes' experience and relationship to doping. Specific prevention campaigns are proposed to limit doping behaviour in general and for each sport.

Key words: anti-doping, phone-help service, anti-doping campaigns, recreational drugs, performance enhancement drugs, personal factors, environmental factors.

Introduction

Doping among athletes has become a major public health problem. Given the proven health dangers of certain products, the frequency of poly-drug use¹, the risks of addiction² and doping-related injury³, we find ourselves facing a serious health risk in total contradiction with the expected effects and benefits of sport. The battle against doping is today as much a challenge for public health authorities as it is for those involved in sports. According to the WADA, this battle depends mainly on doping controls, sanctions for doping offenses, and educational campaigns that train and inform on how to prevent abuse. Research psychologists are also heavily involved in this fight, with the principal objective being to improve the strategies to prevent doping and promote healthy behaviours by identifying the factors that put athletes at risk.

According to Mangham and colleagues, protective factors are the skills, personality factors and environmental support systems that contribute to an individual's health and welfare and the avoidance of risky behaviour⁴. They act as shock absorbers and reservoirs of resources for coping with stressors effectively. Protective factors and risk factors are often associated as pairs of opposites which, when examined closely, provide evidence of a range of quite detailed factors. These may be organized into personal and environmental or social factors, each with multiple dimensions.

Among the personal protective factors against doping, the general dimension of health protection has been highlighted, given the emphasis that athletes place on both health in general and their own health in particular^{5,6} and their individual perceptions of the dangers of doping products^{7,8}. The motivational orientation in sport is another dimension. Donahue and colleagues demonstrated that intrinsic motivation is negatively correlated with the use of doping products⁹. Turblin and colleagues showed that ego orientation is a risk factor⁵. Another dimension concerns the mental representations of success factors in sport. Individuals who represent athletic success as tied to a gift or an innate ability tend to declare themselves as 'pro-doping' as a means to 'fix the inequalities of nature', and vice versa⁸. A fourth dimension is related to the representations and attitudes about drug effects. Athletes who represent drugs as ineffective or unable to improve their sports careers are protected by the development of negative attitudes toward these practices and their endorsement of anti-doping efforts⁷. This protection vis-à-vis illegal substance is also reflected in the use of legal substances. For example, individuals who do not use tobacco, alcohol or recreational drugs are protected against doping in sport^{11,12}. Personality factors such as self-esteem have also been identified^{1,6}. A strong personality that resists social and group pressure and media images has a protective effect on the temptation to use illicit substances^{1,13}. Last, sports rules and ethics have also been identified as protective factors¹⁴.

The environmental or social factors that protect against doping include an athlete's relations with family and friends, the network of social contacts, activities like academic studies and the influence exerted by the particular sport culture on protection against doping, as it has been shown that doping practices differ significantly depending on the sport¹⁵. The anti-doping position of the entourage and authorities¹⁶ and an unfavourable attitude of the coach and the team are powerful protective factors⁷. The patterns of substance use by significant others is another dimension: when one's peers and family do not regularly use products like alcohol and tobacco, this absence in the environment also functions as a protective factor¹⁶. The quality of family ties and relationships has also emerged as important factor¹⁷. Membership in a religious group may also play a protective role^{18,19}. Protection against doping can also be considered as a variable depending on the sport and its 'culture' [Donati's report was clear in showing that anabolic steroid use developed in social groups where a culture of building muscular strength and a 'cult of the body' could be anchored (i.e. army, police, pornographic and fantastic movies, and sports)], such as cycling²⁰, so-called 'masculine' sports, or essentially fun sports⁶. In addition, the level and number of years in competition have also been identified as protective factors^{5,14}. Finally, socioeconomic characteristics will affect the athlete's doping practices, as the temptation to dope is lower and attitudes about drugs are more negative in individuals with high socioeconomic status¹⁷ and high education^{14, 21}.

Despite these many findings leading to various models^{22,23}, however, we still do not know how to rank protective factors according to the characteristics of a particular sport. Yet this issue appears to be essential, as recent research has indicated the specificity of doping patterns for different types of sports groups. For example, cyclists do not display the same doping dynamics as other athletes^{24,25}. In addition, the reasons given for using banned substances are not the same for footballers, cyclists, and bodybuilders¹⁵. Evidence of a sport-specific hierarchy of protective factors would thus be a powerful aid in adapting information and prevention campaigns to target the characteristics of specific athlete groups, and especially those athletes most vulnerable for doping control. Prevention strategies would be more effective by targeting forms of support in the environment or by prescribing adapted protective behaviours.

Most of the data on protective factors has been obtained from descriptive epidemiological surveys, which have a number of well-identified methodological limitations¹⁵. New research methodologies have thus been developed using quantitative indirect methods²⁶, indirect qualitative and subjective approaches²⁷, group interviews²⁸, or thorough and repeated cross-talk investigations²⁵, all of which have yielded new results. In one of these new approaches, Bilard and colleagues analyzed athletes' calls to a free and anonymous call-in service: 'ecoute dopage'. The data were used as an interesting means to explore the organization of doping behaviour. The setting allowed for anonymous conversations with a doping specialist, and the athletes were therefore assumed more likely to express their true motivations for doping, as well as the reasons for resisting drug use.

The purpose of the present study was to examine the ranking of protective factors in a variety of sports using a methodology to analyze interviews with callers to the French hotline, 'ecoute dopage'. It was expected that the protective factors identified would be consistent with those characterized in the scientific literature but differentiated in their relative ranking according to the sport. It was also expected that the analysis of a corpus of athletes calling a free and anonymous call-in service

would provide insight into the meaning of their doping behaviour so that support elements could be developed for adapted policies against doping.

Methods

Study design

This study analyzed the contents of phone calls to a free and anonymous national anti-doping service called 'ecoute dopage' (France). This hotline was created in 1998 to assist and guide athletes and anyone else involved in doping and has been approved by the French Ministry of Sports¹⁵. Sports psychologists, specialists in doping and substance abuse, and a sports physician staff the telephone service. Creating a climate of trust is a priority so that callers feel safe in speaking freely. Each call is the opportunity for a non-directional interview in which the caller is encouraged to describe his or her feelings, representations, associations, and behaviours, with the psychologist providing support and timely prompts to go deeper. All calls are saved in a database according to specific criteria (age, sex, sport, level and intensity of training, and substance used in the case of an athlete's call) along with a transcription note. The five call receivers are psychologists experienced in research interviews and trained for the protocol.

Data selection

A set of 2745 clinical records of athlete-callers was available for this study. The transcription sheets for those athletes taking banned substances, whether intentionally or not, were eliminated on the basis of the World Anti-Doping Agency list, and only the sheets of those athletes claiming not to use prohibited products were retained. The records of adult male bodybuilders (390), cyclists (235), and footballers (103) were then selected, as athletes in these sports are among the most frequent callers and the female and adolescent samples were too small. A review of each sheet by two independent experts confirmed that 412 callers did not use banned substances, and these interviews were thus analyzed to determine the protective factors: 222 for bodybuilding, 144 for cycling and 46 for football.

Data analysis

Each transcription sheet was analyzed to identify the protective factors corresponding to the caller following four steps deductive procedure: (a) for each transcription sheet quotation or paraphrased quotations corresponding to the motives for not using substances was noted, (b) these quotations were grouped together to form organized raw data themes for each sport, (c) raw data themes were sorted into different levels of category characterizing by protective factors and (d) raw data themes which did not fit any of the underlying categories of protective factors were labeled according to the meaning of data. The first author carried out primary analysis. Then the second author verified this by independently checking each raw data theme for each level of category characterizing protective factors. When the interpretations of the researchers were not concordant, a discussion with the third researcher was set until a consensus was reached. When the validity of the data processing appeared fragile (e.g., equivocal nature of the motives set, missing data, limited duration of the call to provide sufficient information) the records were excluded from the protocol. The final sample was composed of 360 sheets (i.e. 192 for bodybuilding, 124 for cycling, and 44 for football). The athletes in each sport then calculated the total score for each protective factor, as well as the number of mentions. Chi Square analysis was used to compare

these distributions. The relative prevalence of each level of protective factor category depending on the total number of factors identified for each sport was also assessed.

Results

Four hundred and forty-six mentions of protective factors were identified: 255 by bodybuilders, 146 by cyclists, and 45

by footballers. Table 1 shows that personal factors showed the highest frequency, 85.4% of all factors mentioned in general (93% for bodybuilding, 74% for cycling and 80% for football). The environmental factors were significantly cited more frequently by cyclists ($\chi^2=4.01$, $df=1$, $p<0.05$). Table 2 shows the distribution with more details. The set of protective factors cited most frequently consisted of 'Health concerns', 'Respect for the law' and 'Doping controls from the environment'.

TABLE 1
RANKING OF PERSONAL AND ENVIRONMENTAL PROTECTIVE FACTORS CITED

Factors	General	Body-builders	Cyclists	Football Players
Personal Protective Factors	85.4%	93%	74%	80%
Environmental Protective Factors	14.6%	7%	26%	20%

'Doubts about the effectiveness of illicit products,' 'Thinking skills' and 'Doubts about doctors' formed a second group with lower frequencies of mention. There is a significant differences in the distribution of the factors by sports ($\chi^2=101.36$, $df=10$, $P<0.001$). The ranking of factors by cyclists

differed from the rankings in the other sports. The ordering of factors according to their frequency was 'Respect for the law', 'Doping controls from the environment', 'Health concerns', 'Doubts about doctors' and finally 'Doubts about the effectiveness of illicit products'.

TABLE 2
RANKING OF THE CATEGORIES OF PROTECTIVE FACTORS CITED

Rank	General	(n=446)	Body-builders	(n=255)	Cyclists	(n=146)	Footballers	(n=45)
1	Health concerns	48 % (214)	Health concerns	63.1% (161)	Respect for the law	42.5% (62)	Health concerns	48.9% (22)
2	Respect for the law	29.4% (131)	Respect for the law	21.6% (55)	Doping controls from the environment	26% (38)	Respect for the law	31.1% (14)
3	Doping controls from the environment	14.6% (65)	Doping controls from the environment	7% (18)	Health concerns	21.2% (31)	Doping controls from the environment	20% (9)
4	Doubts about the effectiveness of illicit products	3.8% (17)	Doubts about the effectiveness of illicit products	4.7% (12)	Doubts about doctors	6.8% (10)		
5	Doubts about doctors	2.2% (10)	Thinking skills	3.5% (9)	Doubts about the effectiveness of illicit products	3.4% (5)		
6	Thinking skills	2% (9)						

Discussion

Despite the important number of factors of protection found in the literature, only a three principal factors was mentioned and underlined by the athletes (i.e. 'Health concerns', 'Respect for the law' and 'Doping controls from the environment'). Personal factors were also much more prevalent than environmental and social factors. 'Health concerns' made up 48% of the identified mentions. These results are consistent with those of Turblin and colleagues and Moore and Werch, who showed that when athletes place a high value on health, they are less tempted to become involved in doping^{5,6}. They also confirm the studies showing that the more dangerous a product is perceived to be, the less temptation there will be to use it^{7,8}. The second most prevalent factor was 'Respect for the law', which represented more than 29% of all mentions. Consistent with these results, Michel and colleagues argued that individuals who use doping substances have a greater tendency towards transgression and living outside of social norms¹³. This result shows that sports ethics, social rules and legal concerns remain at the

centre of sport. The third factor of 'Doping controls from the environment' (drug testing) accounted for 14.6% of the mentions. According to Kuehn and Mikulovic, the 'detestability of products' is one of the most powerful determinants of the intention to dope⁷. This result is noteworthy because it contradicts the belief that controls are useless or not numerous or reliable enough or that competitive athletes know how to get around them. Even if the effectiveness of drug testing can be discussed²⁹, this result supports the view that it is a strong deterrent. This is all the more noteworthy in that our sample was mainly composed of regional-level athletes, for whom the likelihood of drug testing was extremely low, if not inexistent.

The result also showed two profiles of specific sport (i.e., bodybuilders and football players vs. cyclists). For the bodybuilders and football players, 'Health concerns' was most prevalent (63.1% and 48.9 %). These results indicated that many bodybuilders do not seem ready to sculpt a 'perfect' body at any price. They were consistent with the findings of Boos and Wulff, who showed in a survey of bodybuilders that 85% of those who do not use doping products give 'adverse effects on

health' as the reason¹⁴. For the football players, these results revealed new elements, as the literature on doping in this sport is extremely poor. For many of these callers, all amateur players competing at a basic level, we can assume that football was primarily a way to have fun and that health concerns outweighed concerns about performance⁵. These results contradict Simon's conceptions, which claimed that the more performance is dependent on predominantly physical capacities, the more frequently the corresponding product will be taken³⁰.

The second factor for the bodybuilders and football players was 'Respect for the law'. This result was confirmed by Boos and Wulff, who showed that 52% of the explanations given by 'non-doped' bodybuilders for their non-consumption were ethics and respect of sporting rules¹⁴. In contrast, this result contradicts those of Kanayama and colleagues, who identified many antisocial traits among bodybuilding practitioners^{30,31}. This difference could be explained by the fact that the individuals of our study were mostly amateurs who did not compete. They did not differ from the normal population and appeared to be in accordance with the law. This result is important because it shows that respect for the law remains a protective factor against doping and substance use, even in the absence of any outside control, or criminal or sports liability. For Football players, this result confirmed that the practice was primarily considered as a way to have fun and this contributed to the emergence of a certain sporting ethic. According to Donahue and colleagues, intrinsic motivation for sports participation causes the individual to adopt sporting ethics, which negatively predicts the use of doping substances⁹.

The third factor for football players (negligible for bodybuilders) was 'Doping controls from the environment'. Despite the low frequency of controls, we can argue that the deterrent here was merely the possibility of being controlled, with all the accompanying fantasies of exposure and shame, dishonor and punishment.

For the cyclists represented a specific population for our results. The first protective factor was 'Respect for the law', that seems to correspond to a new ethic era after the 1998 Tour de France.

The second factor for most cyclists was 'Doping controls from the environment', which was no surprise in light of the previous result. The doping controls could cover two different meanings in the minds of cyclists. For some, doping control could be associated with a discredited and shattered career. For others, it might reflect a possible comeback to honor the sport, a new equality among participants.

'Health concerns' was in third position for the cyclists. The finding that this factor was ranked after 'Respect for the law' and 'Doping controls from the environment' is important. Indeed, it would be rash to think that cyclists have little regard for their health. But, the reality may well be the opposite in that we

suspect that cyclists begin doping when they in fact begin treating health problems by self-medicating: in response to pain, fatigue, injury and disease, there is always a substance to take^{24,33}.

Few limitations can be underline: this retrospective study analyzed psychologists' notes on interviews collected from an anti-doping phone service. Our results should be first examined and validated in the light of the analysis of the risks factors¹⁵. However, a statistic examination with a comparison with a control group of doping athletes in each of the sport would ensure the validity of these results. In addition, even if service is a fruitful observatory for gaining insight into the individual experience and behaviours related to substance use, the phone callers were perhaps not fully representative of the population of non-doped athletes. Direct and longitudinal interviews in which the athletes question their own behaviours more closely are now needed to better understand the complex system of substance use for performance improvement and appearance improvement; the psychological reasons, group effects, and cultural models that are operative; and the best treatment strategies, depending on the sport²⁵.

Conclusion

The results showed that prevention campaigns should be approached in accordance with the specific concerns of the populations. For example, an emphasis on the dangers of certain products and the reduction of risk has every chance of success for bodybuilders and football players. In contrast, for cycling the campaigns should start by showing that cyclists do not really need medication, complementation, or supplementation. Injury or 'disease' that they experience should be considered as part of the commitment to sport and treated differently but effectively.

The second factor 'Respect for the law' suggests that all governments and institutions should openly and resolutely stand against doping by implementing effective means of control and repression. This appears to be particularly true for cyclists.

Despite the various ranking, the third factor "doping controls from the environment" consisted a safeguard for those inevitable failures in sports ethics. They awaken the fear of losing everything, being discredited, ruining one's career. For campaigns targeting non-competitors, others means to recall the legal aspects and doping dangers will be needed.

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KVALITATIVNE I HIJERARHIJSKE ANALIZE ZAŠTITNIH FAKTORA PROTIV NEZAKONITE UPOTEBE DOPING SREDSTAVA KOD SPORTISTA KOJI POZIVAJU NACIONALNI ANTI-DOPING „PHONE-HELP” SERVIS

S A Ž E T A K

Postojanje određene sportske hijerarhije zaštitnih faktora protiv dopinga na ovaj način će predstavljati veliku pomoć u adaptiranju informacija i preventivnih kampanja kako bi se otkrile karakteristike određenih sportskih grupa, a naročito karakteristike onih sportista koji su najosjetljiviji na doping kontrolu. Sadržaji telefonskih poziva ka besplatnom i anonimnom nacionalnom anti-doping servisu, zvanom 'écoute dopage', analizirani su (192 bodibildera, 124 biciklista i 44 fudbalera). Rezultati su pokazali da se zaštitni faktori, koji su se pojavili iz analiza, mogu svrstati u dvije grupe. Prva sadrži 'zdravstvene probleme', 'poštovanje zakona' i 'doping kontrole iz okruženja' a druga se sastoji iz 'sumnji u efikasnost nelegalnih proizvoda', 'sposobnosti razmišljanja' i 'sumnji o ljekarima'. Rangiranje faktora kod biciklista se razlikovalo od rangiranja kod ostalih sportista. Redosljed faktora bio je sljedeći: 1) poštovanje zakona, 2) doping kontrole iz okruženja, 3) zdravstveni problem 4) sumnje o ljekarima, i 5) sumnje u efikasnost nelegalnih proizvoda. Rezultati su analizirani prema rangiranju u svakoj sportskoj grupi i posljedicama na sportsko iskustvo kao i na osnovu odnosa prema doping. Predlažu se specifične preventivne kampanje kako bi ograničile doping ponašanje uopšte kao i za svaki sport ponaosob.

Ključne riječi: anti-doping, phone-help servis, anti-doping kampanje, lijekovi za rekreaciju, lijekovi za poboljšanje performansi, lični faktori, faktori sredine.

Report of the 10th International Scientific Conference on Transformation Processes in Sport “Sports Performance”

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ABSTRACT

The article discusses the highlights of the 10th International Scientific Conference on Transformation Processes in Sport “Sports Performance”, which was held in Podgorica, Montenegro. The event comprised three sessions, namely Actual Topics “A” and Actual Topics “B”, as well as General Topics. Professor Predrag Miranović, Rector of University of Montenegro, gave one of the opening speeches.

Key words: Sports -- Congresses, Conferences & Conventions, School Sports -- Congresses.

On behalf of the Montenegrin Sports Academy, it is our great pleasure, to present to you the report of the 10th International Scientific Conference on Transformation Processes in Sport “Sports Performance”, which was held in Podgorica, Montenegro from April 4-7, 2013, in the Rectorate building at University of Montenegro. These series of conferences represent a milestone in the discussion on the transformation

processes in sport and present the impact of the research on sports performance. It was once again organized by the Montenegrin Sports Academy, in cooperation with the Faculty of Sport and Physical Education, University of Montenegro and Montenegrin Olympic Committee as well as under the traditional patronage of the Ministry of Education and the Ministry of Science.



PICTURE 1
THE OPENING CEREMONY

The conference comprised three sessions: Actual Topics “A”, Actual Topics “B”, and General Topics. More than 200 people from 26 Universities and 39 University Units, 10

Academies as well as 31 other Institutions from 15 European countries participated in the work of the conference, which treat sport from the various interdisciplinary and multidisciplinary

aspects. Within the plenary speeches and three mentioned sessions 109 full text contributions, written by 143 authors, were presented during the three workdays. Most of contributions were also printed in the national journal with the international contribution “Sport Mont”, while the best of them were directed

to the peer review process and possible publishing in the Montenegrin Journal of Sports Science and Medicine. The Scientific Committee consisted of 15 members from nine countries and two continents. Five invited lecturers from three countries presented plenary speeches.



PICTURE 2
MONTENEGRIN SPORTS ACADEMY AWARDS HANDED OUT

The conference officially started on April 4, 2013, at 6:00 p.m. with the Registration of the Participants held on the Desk in front of the Reception in the Rectorate of University of Montenegro in Podgorica. The Opening Ceremony started on April 5, 2013, at 4:00 p.m. with the opening speeches that were given by Prof. Predrag Miranović, the Rector of University of Montenegro, and Prof. Duško Bjelica, the Dean of the Faculty for Sport and Physical Education held in the Congress Hall of the Rectorate building. Traditionally, the opening speeches were followed by handing out Montenegrin Sports Academy Awards to Prof. Spasoje Bjelica and prof. Pavel Opavsky for the ten-year contribution to Montenegrin Sports Academy and its scientific conferences, as well as to Prof. Izet Rado, Prof. Milan Žvan and Slavoljub Stijepović, the Minister of Education and Sports in Montenegrin Government as distinguished members. Then five plenary lectures were given by several distinguish lecturers. Prof. Pavel Opavsky from Faculty of Sport and Physical Education, University of Belgrade, Serbia, opened with the vivid presentation entitled “Executive Management Team in Sport” and Prof. Mustafa Levent Ince from the Department of Physical Education and Sports, Faculty of education, Middle East Technical University, Turkey followed up with the very interesting lecture entitled “Professional development of coaches and teachers: trends and challenges” as well as Prof. Čoh from the Faculty of Sport, University of Ljubljana, Slovenia with also the interesting lecture entitled “Biomonitoring of elastic strength in elite triple jumpers”. In chronological order of their appearance at the conference one more plenary lecture were presented by Prof. Tomaž Pavlin from the Faculty of Sport, Uni-

versity of Ljubljana, Slovenia, with the very interesting topics “Formation of PE study and professional school in Slovenia, nowadays”. Right after these respective speeches given by the invited speakers, Stevo Popović, moderator of the plenary session, opened the floor for discussion, which was made use of extensively.

SESSION I: Actual Topics “A”

The first session addressed the most important issues in contemporary sports science. It was chaired by Prof. Pavel Opavsky, the legendary professor from the Faculty of Sport and Physical Education at University of Belgrade, Serbia who earn the first PhD degree in the Former Yugoslavia. This session succeeded in attracting more than 30 presenters in two working days who had contributed as the first authors to the session. At the beginning of the programme Dejan Gojković, assistant professor from Faculty of Physical Education and Sport at University of east Sarajevo, Bosnia and Herzegovina introduced the incidence of scoliosis deformities and flat feet among the third, fifth and seventh grade students of the elementary school. After that, researchers from various scientific institutions presented serious of diverse topics related to the field of sport and exercise medicine, while Stevo Popović, Lecturer from Faculty for Sport and Physical Education at University of Montenegro has completed this session with the introducing the relationship of sport and national identity in Montenegro. Following a brief, but stimulating discussion, the session was closed.

SESSION II: Actual Topics “B”

The second session addressed the next level of important issues in contemporary sports science was held on Saturday, 5th April, and Sunday, 6th April, in the morning conference. It was chaired by Prof. Georgi Georgiev from the Faculty of Physical Education, Ss Cyril and Methodius University from Skopje, Macedonia. The introductory lecture, entitled “Canonical discriminative analysis and its effects in determining differences in motor skills of adolescents”, was given by Veroljub Stanković, associate professor from the Faculty of Sport and Physical Education, University of Prishtina in Leposavić, Kosovo. Work in the section continued with 34 more lectures, accepted for oral presentation by the review committee. Within this section, more than 80 authors presented their current researches and published more than 30 papers accordingly. All the papers had been internationally peer reviewed by recognized reviewers and will be placed in the national journal with the international contribution “Sport Mont”. After the last lecture, a short discussion took place.

SESSION III: General Topics

As was the case at previous conferences, the third session with more than 50 presenters was the biggest session and welcomed papers regarding all scientific activities in the numerous sports disciplines. It was chaired by Professor Spasoje Bjelica

from the Faculty for Sport and Physical Education, University of Novi Sad, Serbia and Assist. Prof. Jovica Petković from the Faculty for Sport and Physical Education, University of Montenegro and 52 papers were received. All the papers had been also internationally peer reviewed by recognized reviewers. Due to the large number of papers, the work and papers in this session were separated also into two parts; Part One was being the morning session started on April 5, 2013, at 9:30 a.m., while Part Two was being the morning sessions started on April 6, 2013, also at 9:30 a.m. All the presentations provoked a number of questions from the public so the discussion was very interesting and productive. We wish to thank all the authors for their participation in the work of this session.

On Sunday, April 7, 2013 was the last day of the conference that established itself as a major event in discussing the link between the academic activities and the actual practice of sports science delivery. Prof. Duško Bjelica, the president of the Montenegrin Sports Academy and the Dean of the Faculty for Sport and Physical Education, University of Montenegro had the task of summarizing the meeting. He noted that the conference had not only focused on measuring the impact of science, but also wanted to address whether there was a positive impact of science. He thanked all the authors for their participation in the work of the sessions, invited speakers and special guests. He has also introduced the plans of Montenegrin Sports Academy and welcomed all participants to the following 2014 Conference that will be held at the same place during the first week of April 2014.

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IZVJEŠTAJ SA 10. MEĐUNARODNE NAUČNE KONFERENCIJE O TRANSFORMACIJSKIM PROCESIMA U SPORTU "SPORTSKA DOSTIGNUĆA"

S A Ž E T A K

U članku se raspravlja o 10. Međunarodnom naučnom skupu o transformacijskim procesima u sportu "Sportska dostignuća", koji je održan u Podgorici, Crna Gora. Manifestacija se sastojala od tri sesije, prije svega aktuelna pitanja „A” i aktuelna pitanja „B”, kao i generalna pitanja u oblasti sportskih nauka i sportske medicine. Jedan od uvodnih govora je pripao profesoru Predragu Miranoviću, rektoru Univerziteta Crne Gore.

Ključne riječi: sport -- kongresi, konferencije i konvencije, školski sport -- kongresi.

People Involved in Peer Reviewing in 2013

Antonino Bianco

Faculty of Sports Science
University of Palermo

Beat Knechtle

Institute of General Practice and Health
University of Zurich

Bojan Jošt

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Selcuk Akpinar

Physical Education and Sport Department
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Guidelines for authors*

When preparing the final version of the manuscript, either NEW or REVISED authors should strictly follow these guidelines. Manuscripts departing substantially from the guidelines will be returned to the authors for revision.

For more detailed information on the uniform requirements of the manuscript elements please visit the web site of the International Committee of the Medical Journal Editors.

1. Manuscript layout

1.1. General remarks

Authors should submit their manuscript as one Microsoft Word (.doc) file strictly following specified layout of manuscript structural elements. Main manuscript file should be carefully checked to contain all needed structural elements. Do not add any additional elements or data in your main manuscript file except the ones specified in guidelines! Do not break your main manuscript file in more files!

In text, avoid “one sentence – one paragraph” writing. Integrate your sentences in continuous text and sensible paragraphs.

Type the whole manuscript double-spaced!

Apart from chapter titles and subtitles avoid any kind of formatting (bold, underline) in the main text of the manuscript or table contents.

1.1.1. Length of the manuscript

The manuscript should not exceed the maximum length of 8 pages as printed in Montenegrin Journal of Sports Science and Medicine, which are roughly 30 A4 pages of double-spaced text. Additional pages are extra charged (See **Costs and payments**)

1.1.2. Printing in color

If your manuscript contains pictures in color note that printing in color is extra charged. For prices see **Costs and Payments**.

1.2. Overview and position of structural elements of the main manuscript file

First or title page contains: 1. title, 2. type of publication, 3. running head, 4. authors, and 5. affiliations.

Second page contains: 6. abstract, and 7. key words.

Starting on a third page follow: 8. chapters of the manuscript, 9. references 10. corresponding author's address, and 11. corresponding author's e-mail.

A separate page, following corresponding author's address, contains: 12. naslov na crnogorskom jeziku (title in Montenegrin, only for Montenegrin authors), and 13. sažetak na crnogorskom jeziku (abstract in Montenegrin, only for Montenegrin authors).

Tables (14. Tables) with headings and footnotes should be put each on a separate page.

As for 15. Figures, **ONLY** graphs and other Microsoft Office graphics should be included in the main manuscript file, each on a separate page with appropriate heading below. All other graphic material should be submitted separately, in

* Modified from guidelines for authors of the Collegium Antropologicum

properly named files to avoid any confusion. The last, separate page of the manuscript should contain 16. Figure headings of figures submitted **separately**.

You can download a **Short overview of the main manuscript file structure** (MS Word .doc file).

Following are two examples of the first (or title) page:

Example 1:

Transfer of learning on a spatial memory task between the blind and sighted people

Spatial Memory among Blind and Sighted

Selcuk Akpınar¹, Stevo Popović^{1,2} and Sadettin Kirazci¹

¹Physical Education and Sports Department, Middle East Technical University, Ankara, Turkey

²Faculty for Sport and Physical Education, University of Montenegro, Niksic, Montenegro

Example 2:

Comparison of instep kicking between preferred and non-preferred leg in young football players

Instep kicking between preferred and non-preferred leg

Dusko Bjelica, Stevo Popovic

Faculty for Sport and Physical Education, University of Montenegro, Niksic, Montenegro

1.3. Title

Authors should include all information in the title that will make electronic retrieval of the article both sensitive and specific.

Check spelling and language of your title. The title should be in Titlecase, written in uppercase and lowercase letters (initial uppercase for all words except articles, conjunctions, short prepositions no longer than four letters etc.) so that first letters of the words in the title are in caps. Exceptions are words like: articles, and, or, between etc. The word following a colon (:) or a hyphen (-) in the title is always capitalized.

Example:

Effects of Socio-Economic and Behavioral Characteristics in Explaining Central Obesity – A Study of Adult Asian Americans in San Diego, USA

1.4. Type of publication

Authors should suggest the type of their submission. Montenegrin Journal of Sports Science and Medicine publishes original scientific papers, notes, preliminary communications, reviews and conference papers.

Original scientific papers – report hitherto unpublished results of original research. The acceptance of the paper obliges the author not to publish the same material elsewhere without the permission of the Editorial Board.

Notes (short communications) – reports on shorter but completed research.

Preliminary communications – include preliminary results of greater importance requiring rapid publication.

Reviews – original, concise and critical surveys of a current research area in which the author himself (authors themselves are) is active. In the review the role of the author's contribution in this field in relation to other published reports, as well as original views should be given.

Conference papers – previously reported at congress, symposium or summer school, etc., should be submitted by the Organizing Committee in the form of a complete manuscript of the Proceedings

1.5. Running head

Short running title should not exceed 50 characters including spaces.

Example:

Attitudes toward advertising through sport

(Title: Attitudes toward advertising through sport among the frequency of watching sports events)

1.6. Authors

In one line list all authors with full names separated by a comma (and space). Last author should be separated with the word "and". Only the first name, initial of a middle and family name of authors should be given. **Avoid any abbreviations of academic or professional titles.** If authors belong to different institutions, following a family name of the author there should be a number in superscript designating affiliation (see the next section 1.7. Affiliations).

Example:

Selcuk Akpınar¹, Stevo Popović^{1,2} and Sadettin Kirazci¹

1.7. Affiliations

Affiliation consists of the name of a department(s) and institution(s), city and country to which the author(s) belong and to which the presented / submitted work should be attributed.

List all affiliations (each in a separate line) in the order corresponding to the list of authors. Affiliations must be written in English, so carefully check the official English translation of the names of institutions and departments. Do not translate yourself – check the information since Editorial Board does not have any way of checking these.

Affiliations should be written as follows:

name of institution(s), name of department(s), town, state

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

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

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

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

Example:

Selcuk Akpınar¹, Stevo Popovic^{1,2} and Sadettin Kirazci¹

¹Middle East Technical University, Physical Education and Sports Department, Ankara, Turkey

²University of Montenegro, Faculty for Sport and Physical Education, Niksic, Montenegro

1.8. Abstract

The abstract should provide the context or background for the study and should state the study's purposes, basic procedures (selection of study subjects or laboratory animals, observational and analytical methods), main findings (giving specific effect sizes and their statistical significance, if possible), and principal conclusions. It should emphasize new and important aspects of the study or observations.

It is recommended that abstract should not exceed one typed double-spaced page, written in English. It should be placed, **in italics**, on second page of your document after the standard title written in caps (**abstract**).

Since abstract is independent part of your paper, all **abbreviations** used in the abstract should also be **explained** in it. If an abbreviation is used, the term should always be first written in full with the abbreviation in parentheses immediately after it.

Abstract **should not** have any special headings (Aim, Results...). Abstract should be written as a continuous text and consists of **one paragraph only**!

Citing literature in abstract is done in the same way as in the rest of the text.

1.9. Key words

Authors should provide 3 to 10 key words or short phrases that capture the main topics of the article. These will assist indexers in cross-indexing the article and may be published with the abstract. Terms from the **Medical Subject Headings (MeSH)** list of **Index Medicus** should be used. There are other subject headings lists available on the Internet like **Sociology and Anthropology Subject Headings**.

Key words should be placed on the second page of the manuscript right below the abstract in English, written in italic as shown in the following example.

Example:

ABSTRACT

Results of the analysis of.....

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

1.10. Chapters of the manuscript

Style of the journal prescribes only 2 types of titles:

Main chapter titles – written **in bold** and **in titlecase** (initial uppercase for all word except articles, conjunctions, short prepositions etc.). The word following a colon (:) or a hyphen (-) in the title is always capitalized.

Example:

Methods of Analysis – An Overview

Subtitles – all other titles within one chapter. They are written **in italic** and in normal **sentence case** (only the starting word of a title begins with first letter in caps).

Example:

Table position of the research football team

Note that titles but NOT the subtitles are written in titlecase.

Do not put a full stop or any other sign at the end of the title.

Depending on the type of publication main manuscript chapters may vary. The general outline is: Introduction, Materials, Methods, Results, Discussion, Conclusion, Acknowledgements. If not needed, acknowledgements may be omitted. Conclusion can be part of Discussion. Materials and Methods can be (if authors want to) united in one chapter and titled “Materials and Methods”. Results and Discussion can be united in one chapter and titled accordingly. Subjects and Methods or Patients and Methods can also be used as a chapter title. For example, a case report might have the following titles: Introduction – Case Report – Discussion – Conclusion – Acknowledgements.

However, this scheme may not be suitable for reviews or publications from some areas and authors should then adjust their chapters accordingly but use the general outline as much as possible.

1.10.1. Introduction

Introduction provides a context or background for the study (i.e. the nature of the problem and its significance). It states the specific purpose or research objective of, or hypothesis tested by the study or observation; e.g. keep in mind that the research objective is often more sharply focused when stated as a question. Both the main and secondary objectives should be made clear, and any pre-specified subgroup analyses should be described. Only strictly pertinent references should be given without data or conclusions from the work being reported.

1.10.2. Materials (subjects, patients etc.) and Methods

The Materials and Methods section should include only information that was available at the time the plan or protocol for the study was written. All information obtained during the conduct of the study belongs to the Results section.

Statistics

Describe statistical methods with enough detail to enable a knowledgeable reader with access to the original data to verify the reported results. When possible, quantify findings and present them with appropriate indicators of measurement error or uncertainty (such as confidence intervals). Avoid relying solely on statistical hypothesis testing, such as the use of p-values, which fails to convey important information about effective size. References for the design of the study and statistical methods should comply with standard works when possible (with pages stated). Define statistical terms, abbreviations, and most particularly symbols. Specify the computer software used.

1.10.3. Results

Present your results in logical sequence in the text, tables, and illustrations, giving the main or most important findings first. Do not repeat in the text all the data in the tables or illustrations; emphasize or summarize only important observations. Restrict tables and figures to those needed to explain the argument of the paper and to assess its support. Use graphs as an alternative to tables with many entries; do not duplicate data in graphs and tables. Avoid non-technical uses of technical terms in statistics, such as “random” (which implies a randomizing device), “normal”, “significant”, “correlations”, and “sample”.

1.10.4. Discussion and Conclusion

Emphasize the new and important aspects of the study and the conclusions that follow from them. Do not repeat in detail data or other material given in the Introduction or the Results section. For experimental studies it is useful to begin the discussion by summarizing briefly the main findings, then explore possible mechanisms or explanations for these findings, compare and contrast the results with other relevant studies, state the limitations of the study, and explore the implications of the findings for future research and for clinical practice.

Link the conclusions with the goals of the study but avoid unqualified statements and conclusions not adequately supported by the data. In particular, authors should avoid making statements on economic costs and benefits unless their manuscript includes appropriate economic data and analyses. Avoid claiming priority and alluding to work that has not been completed. State new hypotheses when warranted, but clearly label them as such.

Authors can also separate Conclusion chapter from Discussion.

1.10.5. Acknowledgements

Authors should acknowledge help and support (financial, advisory etc.) from an institution, organization, group or an individual who have contributed to the production of the article.

1.11. References

References should be numbered consecutively in the order in which they are **first mentioned** in the text.

All information needed for each type of reference (journal article, book, book chapter, internet source etc.) **MUST** be present as specified in guidelines. If you omit any of the specified data you will surely be contacted to rectify it.

Authors are responsible for accuracy of each reference. Use authoritative source for information such as databases Current contents, Web of Science, Medline or PubMed (see **Links**) to check the validity of journal article citation.

1.11.1. Reference list

Reference list is a highly structured part of the text where each comma, space, colon, etc. counts. Authors are kindly asked to be very careful and strict when editing this part of the text. Following are some general rules and examples that should help authors.

In the reference list, references should be listed one after another (**without line break**) separated with a **dash** (see an example of a reference list).

All authors of the cited source should be quoted (*et. al.* cannot be used in the reference list). Accuracy and content of the references are **author's responsibility**, so make sure you provide correct references.

The following conventions are used for references:

Journal article

2. BARAK O, JAKOVLJEVIC DJ, POPADIC-GACESA J, OVCIN Z, BRODIE D, GRUJIC N, J. Heart rate variability before and after cycle exercise in relation to different body positions. Journal of Sports Science and Medicine, 9 (2010) 176. –

Book

5. FRANCE RC, Introduction to sports medicine and athletic training (Thomson Delmar Learning, Clifton Park, 2004). -

Book chapter

11. Stotlar DK, Facility management. In: Parks JB, Zanger BK (Eds) Sport and fitness management: career strategies and professional content (Human Kinetics Books, Champaign, 1990). –

Congress report

13. POPOVIC S, RADOVANOVIC R, Primary school pupils' views on extra-curricular Sport and recreational activities. In: Proceedings (Theoretical, methodology and methodical aspects of physical education, Faculty of Sport and Physical Education, Belgrade, 2008). -

M.S., PhD Thesis, etc.

16. Pyun DY, The proposed model of attitude toward advertising through sport. PhD Thesis. In Engl. (The Florida State University, Tallahassee, 2006). -

Reference to an internet source

17. HABIBZADEH N, The effect of short-term weight-bearing exercise on bone mass density in obese and thin young girls, Sport scientific and practical aspects, accessed 2.1.2011. Available from: URL: www.sportspa.com.ba/html/dec2010/rad2.html. -

Personal communication - avoid citing a "personal communication" unless it provides essential information not available from a public source, in which **case the name of the person and date of communication** should be cited in parentheses in the text. For scientific articles, authors should obtain written permission and confirmation of accuracy from the source of a personal communication.

Example for the reference list:

(please note how references are separated with a dash and NOT a line break)

REFERENCES

1. Pyun DY, The proposed model of attitude toward advertising through sport. PhD Thesis. In Engl. (The Florida State University, Tallahassee, 2006). – 2. HABIBZADEH N, The effect of short-term weight-bearing exercise on bone mass density in obese and thin young girls, Sport scientific and practical aspects, accessed 2.1.2011. Available from: URL: www.sportspa.com.ba/html/dec2010/rad2.html. – 3. POPOVIC S, RADOVANOVIC R, Primary school pupils' views on extra-curricular Sport and recreational activities. In: Proceedings (Theoretical, methodology and methodical aspects of physical education, Faculty of Sport and Physical Education, Belgrade, 2008). – 4. Stotlar DK, Facility management. In: Parks JB, Zanger BK (Eds) Sport and fitness management: career strategies and professional content (Human Kinetics Books, Champaign, 1990). – 5. FRANCE RC, Introduction to sports medicine and athletic training (Thomson Delmar Learning, Clifton Park, 2004). 6. BARAK O, JAKOVLJEVIC DJ, POPADIC-GACESA J, OVCIN Z, BRODIE D, GRUJIC N, J. Heart rate variability before and after cycle exercise in relation to different body positions. *Journal of Sports Science and Medicine*, 9 (2010) 176. –

Additional comments and examples:

Initials of authors' names should NOT be followed by a full stop:

BARAK O, JAKOVLJEVIC DJ, POPADIC-GACESA J, OVCIN Z, BRODIE D, GRUJIC N, J. Heart rate variability before and after cycle exercise in relation to different body positions. *Journal of Sports Science and Medicine*, 9 (2010) 176.

but not:

BARAK, O., JAKOVLJEVIC, DJ., POPADIC-GACESA, J., OVCIN, Z., BRODIE, D., GRUJIC, N. Heart rate variability before and after cycle exercise in relation to different body positions. *Journal of Sports Science and Medicine*, 9 (2010), 176.

Initials of authors' first and middle names should NOT be separated with a space:

Pyun DY, The proposed model of attitude toward advertising through sport. PhD Thesis. In Engl. (The Florida State University, Tallahassee, 2006).

but not:

Pyun D Y, The proposed model of attitude toward advertising through sport. PhD Thesis. In Engl. (The Florida State University, Tallahassee, 2006).

There should be a comma after a journal name:

BARAK O, JAKOVLJEVIC DJ, POPADIC-GACESA J, OVCIN Z, BRODIE D, GRUJIC N, J. Heart rate variability before and after cycle exercise in relation to different body positions. *Journal of Sports Science and Medicine*, 9 (2010) 176.

but not:

BARAK O, JAKOVLJEVIC DJ, POPADIC-GACESA J, OVCIN Z, BRODIE D, GRUJIC N, J. Heart rate variability before and after cycle exercise in relation to different body positions. *Journal of Sports Science and Medicine* 9 (2010) 176.

All parts of authors' names should be written in uppercase:

BARAK O, JAKOVLJEVIC DJ, POPADIC-GACESA J, OVCIN Z, BRODIE D, GRUJIC N, J. Heart rate variability before and after cycle exercise in relation to different body positions. *Journal of Sports Science and Medicine*, 9 (2010) 176.

but not:

Barak O, Jakovljevic DJ, Popadic-Gacesa J, Ovcin Z, Brodie D, Grujic N, J. Heart rate variability before and after cycle exercise in relation to different body positions. *Journal of Sports Science and Medicine*, 9 (2010) 176.

There should be a space after a reference number and before the first author's surname.

When citing journal articles, ONLY the first page of the article in the journal should be given.

1.11.2. Reference citation

References should be numbered in the order in which they appear in the text. **Number** of the reference should be written in **superscript** after the text **without spacing and without brackets**. If the reference number is at the end of a line/sentence, put full stop **after** the reference. More than two references are not to be spaced. If more than two consecutive references are encountered, please separate them with a **dash**.

Examples for references in the text:

...learn places of body parts are among the topics that spatial memory covers^{4,9}.....

...bandwidth KR feedback on movement performance in retention¹⁸⁻²¹. Therefore.....

...among young football player in Montenegro^{2,8-11}.

There should be no space between numbers in superscript:

SHOULD BE:of each person¹¹. They have.....

NOT:of each person.¹¹ They have.....

1.12. Corresponding author's address

Corresponding author's name with **full postal address in English** and, if possible, **e-mail** address should be placed, *in italics*, at the end of the manuscript between reference list and abstract in Montenegrin. It is preferred that submitted **address is institutional** and not private.

Author's name should include only initials of the first and middle names separated by a full stop (and a space) and the full surname. Postal address should be written in the following line in sentence case. Parts of the address should be separated by a comma instead of a line break.

Example:

J. Petkovic

University of Montenegro, Faculty for Sport and Physical Education, Narodne omladine bb, 84000 Niksic, Podgorica

e-mail: jpetkovic@ac.me

1.13. Corresponding author's e-mail

E-mail (if possible) should be placed in the line following the postal address.

Author should clearly state whether or not his e-mail should be published.

1.14. Title in Montenegrin (only for Montenegrin authors)

Title in Montenegrin, together with an abstract in Montenegrin should be placed on a separate page following the author's address and e-mail.

Title in Montenegrin should be written in bold capital letters.

1.15. Abstract in Montenegrin (only for Montenegrin authors)

Only Montenegrin authors should provide the **title of the paper** and **abstract** in the Montenegrin language, which must correspond to the title and abstract in English. They should be placed at the end of the manuscript, after the author's corresponding address.

There should be no subtitles in Montenegrin abstract (Aim, Results etc.). Abstract in Montenegrin just as in English should be written as in one paragraph.

Montenegrin authors should check the language and do the spell-check for Montenegrin.

Key words in Montenegrin are not needed.

Example:

RAZLIKE U MORFOLOSKOM STATUS MLADIH FUDBALERA I NESPORTISTA

SAŽETAK

Prikazani su rezultati.....

1.16. Tables

All tables should be included in the main manuscript file, each on a separate page right after the abstract in Montenegrin. Number tables consecutively in the order of their first citation in the text and supply a brief title for each.

Tables and table headings should be completely intelligible without reference to the text. Give each column a short or abbreviated heading. Authors should place explanatory matter in footnotes, not in the heading. All abbreviations appearing in a table and not considered standard MUST be explained in a footnote of that table (see **Abbreviations**).

Tables should be presented as standard MS Word tables, NOT as pictures or other graphic material. Do not use simple text editing to create a table, but the table option instead. If you are not familiar with using MS Word please find a colleague to help you.

All text appearing in tables should be written beginning only with first letter of the first word in caps (only the initial word of all text should be capitalized), i.e. all words for variable names, column headings etc. in tables should start with the first letter in caps.

Avoid any formatting (bold, italic, underline) in your tables and their headings. Avoid any shading or coloring in your tables. Avoid any border formatting in your tables. Put plain borders, no additional graphic editing is necessary.

Be sure that each table is cited in the text.

If you use data from another published or unpublished source, obtain permission and acknowledge them fully.

The format of tables should not exceed A4. Only exceptionally the format A3 will be accepted.

Example:

TABLE 5
PRESENTATION OF INSTEP FOOTBALL KICK
BETWEEN PREFERRED AND NON-PREFERRED
LEG IN YOUNG FOOTBALL PLAYER

INTENSITY	STATE	t	p
OPT	SR	21	.04
	SF	22	.03
MAX	SR	44	.55
	SF	55	1.22

OPT – optimal intensity, MAX – maximal intensity,
SR – resting state, SF – state of fatigue

Example for table citation:

....exhibit greater variance than three years before (Table 6). Therefore....

1.16.1. Table heading

Table heading should be written above the table, in caps and without a full stop at the end of the heading.

Example:

TABLE 5
PRESENTATION OF INSTEP FOOTBALL KICK
BETWEEN PREFERRED AND NON-PREFERRED
LEG IN YOUNG FOOTBALL PLAYER

1.16.2. Table footnote

Footnotes should be written below the table.

Examples:

* $p > 0.01$, ** $p > 0.05$, OPT – optimal intensity, MAX – maximal intensity, SR – resting state, SF – state of fatigue

SHOULD BE: OPT – optimal intensity, MAX – maximal intensity

NOT: OPT = optimal intensity, MAX = maximal intensity

1.16.3. Table citation

In the text, tables should be cited as full words. Some examples are given below:

Examples:

SHOULD BE: Table 1

NOT: table 1 (first letter in caps)

SHOULD BE: Table 1

NOT: Table 1. (no full stop)

SHOULD BE: ...($p < 0.05$, Table 1).

NOT: ...($p < 0.05$). (Table 1)

SHOULD BE: ...as shown in Tables 1 and 3. (citing more tables at once)

SHOULD BE: ...result has shown (Tables 1-3) that... (citing more tables at once)

SHOULD BE: ...in our results (Tables 1, 2 and 5)... (citing more tables at once)

1.16.4. Subtables

Use this only if there is no other solution. It is preferred that you break subtables in two independent tables or merge them into one.

Examples:

heading for a subtable: TABLE 1a

citation of a subtable:(Table 1a)

1.17. Figures

The only figures allowed in the main manuscript file are graphs and other Microsoft Office graphics. All other graphic material (pictures, photographs, drawings etc.) should be submitted separately in digitalized form. When submitting separate figure files make sure that they are named properly to avoid any loss or confusion (See **Naming files**). On the last separate page of the main manuscript file, authors should place the headings of all the figures submitted separately.

All graphic material should be digitalized first. Avoid sending photographs or similar. All graphic materials should be of sufficient quality for print (300 dpi, or more if necessary).

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Figures and figure headings should be completely intelligible without reference to the text. All abbreviations appearing in a figure or its heading not considered standard **MUST** be explained in a figure heading (see **Abbreviations**).

The format of figures should not exceed A4. Only exceptionally the format A3 will be accepted.

Avoid using any formatting (bold, underline) in figures or figure headings.

Be sure that each figure is cited in the text.

1.17.1. Graphs

All graphs and other Microsoft Office material should be placed in the main manuscript file each on a separate page and are accompanied by a corresponding figure heading.

All words for variable names should be capitalized.

All abbreviations are to be explained in the footing of the figure. If you have “Number of...” then put the whole word NOT “No. of.....”.

Axis titles in your figures should have no formatting (bold, italic etc.). After the title of the axis there should be a unit of measure in parentheses for example Age (years). While the first letter of the axis title is capitalized, unit of measure is not. Whenever possible, all axis titles should be put below the middle of the axis.

Take care about the **colors** on your graphs. The graphs shall be printed in gray unless otherwise specified in the new submission form and paid for accordingly.

Decimal numbers on your axis should have a decimal full stop, NOT a comma.

1.17.2. Figure heading

Figures should not contain footnotes. All information, including explanations of abbreviations must be present in figure heading. Headings of the figures like graphs and other MS Office material submitted in the main manuscript file should be presented together with their corresponding figures. Headings of the figures submitted separately should be presented on the last separate page of the main manuscript file.

Figure heading should be written below the figure, in caps and without a full stop at the end of the heading.

Examples for figure heading:

FIGURE 1
CHANGES IN ACCURACY OF INSTEP FOOTBALL KICK MEASURED BEFORE AND AFTER FATIGUED.
SR – resting state, SF – state of fatigue, * $p < 0.01$, ** $p > 0.05$.

FIGURE 7
ATTITUDES TOWARD ADVERTISING THROUGH SPORT. X – mean, SD – standard deviation.

1.17.3. Figure citation

All graphic material (graphs, pictures, drawings etc.) should be referred to as Figures in the text. Figures are cited in the text as full words.

Examples for figure citation:

...exhibit greater variance than the year before (Figure 2). Therefore...

SHOULD BE: Figure 1

NOT: figure 1 (first letter in caps)

SHOULD BE: Figure 1

NOT: Figure 1. (no full stop)

SHOULD BE:($p < 0.05$, Figure 1).

NOT: ...(p<0.05). (Figure 1)

SHOULD BE: ...as shown in Figures 1 and 3. (citing more figures at once)

SHOULD BE: ...result has shown (Figures 1-3) that... (citing more figures at once)

SHOULD BE: ...in our results (Figures 1, 2 and 5)... (citing more figures at once)

1.17.4. Subfigures

If there is a figure divided in several subfigures, each subfigure should be marked with a small letter followed by parenthesis, starting with a), b), c) etc. The letter and parenthesis should be marked for each subfigure in a logical and consistent way.

If a figure consists of several subfigures, all of them should be referred to in the main figure heading (see example).

Example:

Fig. 1. a) Morphologic characteristics of the..... b) Sources of the.... c) The last segment...

Subfigures should be cited in the text as follows:

Examples:

SHOULD BE: Figure 1c

NOT: Fig. 1 C

SHOULD BE: ...in Figures 1a and b we can...

SHOULD BE: ...data represent (Figures 1a-d)...

2. Additional requirements

2.1. Language

Language quality is author's responsibility. Therefore authors should let a native speaker or fluent English speaker check their manuscript. There are professional lectors who can help with that. Please make spell and language check before sending back your manuscript or find a competent person to do that. Montenegrin authors should also do spell check for additional summary in the Montenegrin language.

2.2. Numbers, units of measurement, variables and values

In Montenegrin Journal of Sports Science and Medicine all units of measures should conform to the International System of Units (SI).

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

Temperatures should be expressed in degrees Celsius. Blood pressures should be expressed in millimeters of mercury, unless other units are specifically required by the journal.

Examples:

Percentages and degrees:

SHOULD BE: 10%

NOT: 10 % (NO space in between)

SHOULD BE: 10°

NOT: 10 ° (NO space in between)

All other units of measure:

SHOULD BE: 10 kg

NOT: 10kg (a space in between)

Ratios:

SHOULD BE: 12:2

NOT: 12 : 2 (NO space in between)

Decimal numbers:

SHOULD BE: 0.056

NOT: .056 (there should be a zero in front of decimal full stop)

SHOULD BE: SD=3.5

NOT: SD = 3.5 (NO space in between)

SHOULD BE: X=45±3.4

NOT: X=45 ± 3.4 (NO space in between)

SHOULD BE: 45±3.4

NOT: 45 ± 3.4 (NO space in between)

SHOULD BE: X±SD (use standard abbreviation)

NOT: Mean±SD

SHOULD BE: p<0.005

NOT: p < 0.005 (NO space in between)

SHOULD BE: 0.001<P

NOT: 0.001 < p < 0.005 (NO space in between)

SHOULD BE: χ^2

NOT: chi square or X2 or X² (use the Greek letter)

SHOULD BE: $\chi^2=2345$

NOT: $\chi^2 = 2345$ (no space between)

SHOULD BE: p

NOT: P (not capitalized)

2.3. Abbreviations

Use only standard abbreviations; the use of non-standard abbreviations can be extremely confusing to readers. Avoid abbreviations in the title. The full term for which an abbreviation stands should precede its first use in the text unless it is a standard unit of measurement.

All abbreviations should be explained ONLY the first time they appear in text in the following way:

Example:

.... following the main sample (MS). Therefore.....

Note that **abstract, each figure and table** is considered a separate and independent part of the text and all abbreviations should be also explained there despite the fact that you may have already explained it text. If you have abbreviations that are repeated through tables and figures they should be explained in each figure and in each table (in heading or in footnote).

2.4. Latin names

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

Example:

First time appearing: *musculus biceps brachii*

Abbreviated: *m. biceps brachii*

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Name your files according to the family name of the first author (see example). Authors submitting revised versions of the manuscript can use the identification number of their manuscript as provided by the Journal Office.

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Jordan-manuscript.doc – (main manuscript file)

Jordan-fig3.jpg – (Figure 3)

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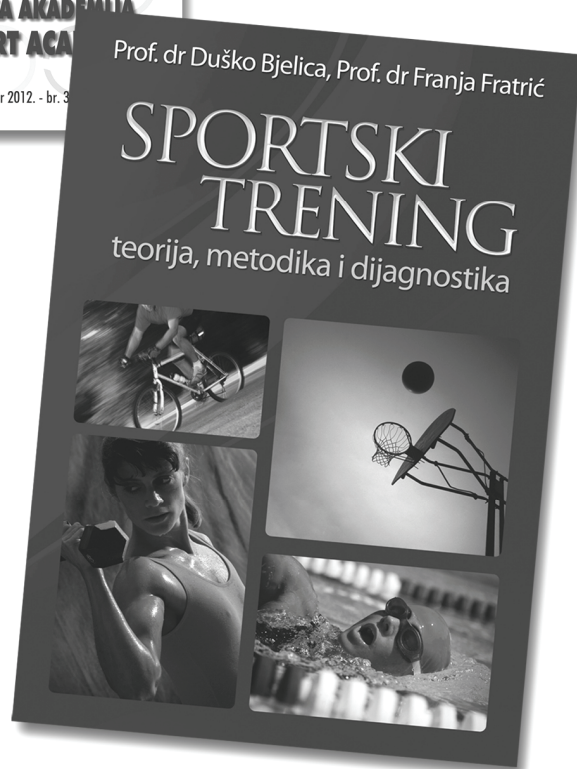
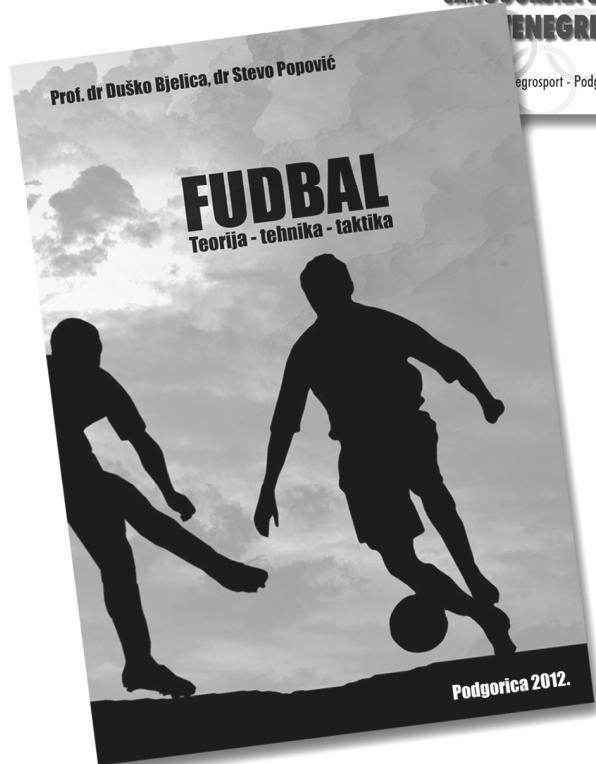
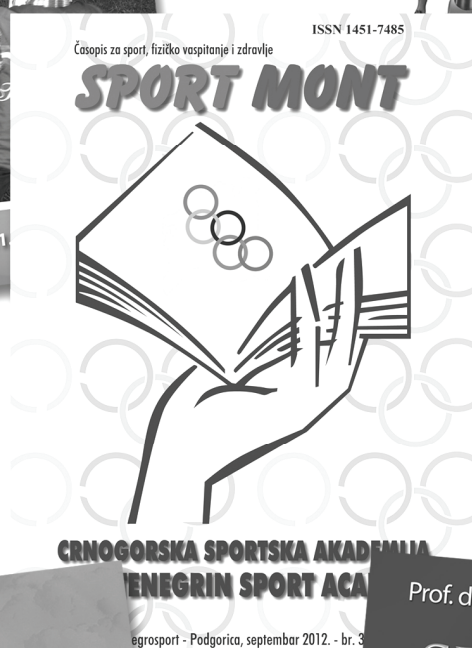
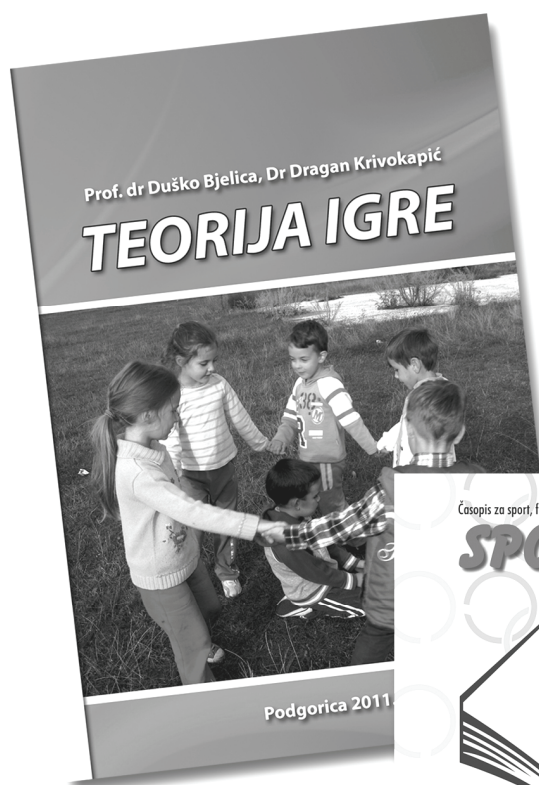


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“Vijesti”, 5. april 2013.

SPORT I NAUKA: Fakultet za sport i fizičko vaspitanje i Crnogorska sportska akademija organizuju X Međunarodnu naučnu konferenciju

Sveobuhvatna analiza sporta

Foto: Z. ĐURIĆ



I naučnici iz inostranstva u Podgorici: Bjelica i Miranović

Jubilarna X Međunarodna naučna konferencija, “Transformacioni procesi u sportu – sportska dostignuća”, počće danas u devet sati u zgradi Rektorata Univerziteta Crne Gore. Svečano otvaranje zakazano je za 16 sati, uvodnom riječju rektora **Predraga Miranovića**, dok će ministar prosvjete i sporta **Slavoljub Stijepović** otvoriti konferenciju.

Organizatori Fakultet za sport iz Nikšića i Crnogorska sportska akademija (CSA), obezbijedili su uslove za prezentaciju 123 naučna rada, na kojima su potpisali 213 autora i koautora iz 16 zemalja, sa 26 univerziteta, 39 fakulteta, 10 akademija, 31 ustanove.

Uoporedo sa konferencijom održaće se i IX Kongres Crnogorske sportske akademije, koji će se okončati u subotu, 6. aprila u 13.30 sati.

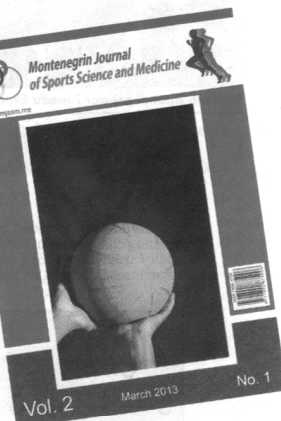
Svi radovi će biti publikovani u časopisu “Sport Mont”, dok će pet najboljih radova biti objavljeni i u međunarodnom časopisu na engleskom jeziku, “Montenegrin jour-

nal of sports science and medicine”. Na taj način radove ćemo izložiti javnoj kritici domaće i inostrane stručne javnosti – kazao je dekan nikšićkog Fakulteta za sport i predsjednik CSA, **Duško Bjelica**.

Na konferenciji će biti riječi o tri tematske cjeline, aktuelne tematike sporta koju će voditi prof. dr **Pavle Opavski**, prof. dr **Georgij Georgijev** će voditi aktuelnu problematiku, a prof. dr **Spasoje Bjelica** će biti moderator opšte problematike u sportu.

Urednički odbor X Međunarodne naučne konferencije već je uradio siže prispjelih radova sa raznovrsnim temama za razvoj olimpijskog i paraolimpijskog sporta, medicine u sportu, sportskog menadžementa, sportske rekreacije i turizma, razvoja fizičke kulture i fizičkog obrazovanja, odnosa sporta i nacionalnog identiteta...

Ovo je prva naučna konferencija koju organizujemo u Podgorici, nakon što su crnogorski primorski gradovi bili domaćini



prethodnih devet. Zahvalni smo na podršci Univerzitetu Crne Gore i Ministarstvu prosvjete i sporta u organizovanju ovog naučnog skupa – zaključio je Bjelica.

Na naučnoj konferenciji će se održati i sastanak dekana fakulteta za sport, na kojem će se razgovarati o mogućnostima saradnje na doktorskim studijama, gostovanjima predavača, ali i razmjeni studenata.

S.Ž.

“Dan”, 2. april 2013.

IZ ŠTAMPE IZAŠAO PRVI BROJ DRUGOG VOLUMENA, MEĐUNARODNOG NAUČNOG ČASOPISA

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