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ORIGINAL SCIENTIFIC PAPER

Stress among Talents in a Football Academy

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Abstract

This article studies Norwegian football academy players who have been part of a professional club at level 2 in Norwegian elite football. The purpose of the article is to report the stress levels of selected players in 2013 and 2016. In addition, the study compares the reported stress level of players who were part of the academy in both 2013 and 2016, with that of the players who were new to the academy in 2016. The selection consists of two groups of players between 12 and 16 years: group 1 consists of 57 players (age 12.8 years) from 2013 and group 2 consists of 51 players (age 15.0 years) from 2016. The results show that the 2013 players reported a significantly higher evaluation and development stress and significantly lower academic stress. The youngest age group reported a significantly higher evaluation stress compared to both the 14-year-olds and the 15–16-year-olds. Compared to the oldest players, the 12–13-year-olds reported a significantly higher development stress and a significantly lower academic stress. Furthermore, the results showed that the players who had been part of the academy for a long time reported significantly less stress on both dimensions – evaluation and development stress. The results would indicate that coaches should be aware of newly recruited players because of their potential lack of safety in the role as an academy player. Further studies should be conducted to see to what extent these results can be confirmed in other academies or other similar performance groups.

Key words: *stress, football, youth*

Introduction

The development of young football players has become an important task for both professional and non-professional clubs in Norway. Internationally, the pursuit of the greatest talents, especially among the professional clubs, is still increasing both in the process of identifying and developing them (Roderick, 2006), as has also been seen in Norway (Sæther, 2017). In recent years, new development arenas have evolved for motivated young football players for a high number of weekly training sessions at an early age, and several of these offers include a collaboration with schools or the establishment of football academies (Sæther, 2017). The main function of these football academies is to contribute to the development of the greatest talents in the region, by making more use of professional coaches. However, the creation of football academies is somewhat relatively new in the Norwegian context, and much of the international research is conducted in countries where these academies have been present for a longer period of time, such as England (Reeves, Nicholls, & McKenna,

2009). The players selected for these academies are given a unique opportunity to be part of a good development environment, with access to some of the best resources and facilities in the region (Ashworth, & Heyndels, 2007). On the other hand, players are also part of a competitive learning environment that places high demands on performance development in the short and long term (Nerland, & Sæther, 2016). Such development environments with clear demands and expectations can be challenging to relate to for young players, where pressure and expectations can often lead to stress and insecurity, especially if the player does not feel capable to handle the situation. Although it is reasonable to assume that players who may be part of such development environments also have the best prerequisites for success and end up as professional players, a recent study of Norwegian age-spesific national team players indicates that this is not necessarily the case. A study that followed all selected national team players in the 1991 age cohort with annual cross-sectional surveys in the period 2005–2015, showed that only 16% of players who were in the age-spesific

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national teams ended up as elite players at the elite level in Norwegian football or abroad (Sæther, 2017).

There are several explanations as to why the most talented football players did not succeed despite being perceived as some of the greatest talent within their age cohort. Some explanations lie outside the football field, such as motivation and attitudes, while others may be explained by lack of progression and skill development on the football pitch. An important premise for development is about the players' experience of coping and this is where the players' experience of stress may be crucial. Lazarus & Folkman, (1984) refer to stress as an imbalance between a situation and an individual's resources. This imbalance is a lot about being in a situation that you basically do not have the resources to handle. It is therefore natural to assume that young players who are part of a challenging development environment with high expectations both from their surroundings (coaches, team-mates, parents) may experience pressure and stress related to their own performance and own development (Finn, & McKenna, 2010; Sæther, & Aspvik, 2016).

Theoretical Framework

Fletcher, Hanton and Mellalieu (2006) claimed stress is a comprehensive process consisting of: stressor, assessment, negative response (strain) and handling (coping) responses. Stress is an ongoing process that involves the individual's relative relationship (transacting) to the environment, their assessment of the situation they are in, and their efforts/attempts to handle the challenges that may arise. They further pointed out that a stressor is the environmental requirement or stimulus that an individual experiences, while negative strain is defined as the individual's negative response to stressors (such as burnout). According to Lazarus and Folkman (1984), stress must be understood on the basis of both primary and secondary assessments in a dynamic process. They point out, however, that the primary assessment must in no way be perceived as more important than the secondary one. The primary assessment deals with the individual's evaluation of the importance of a situation, such as stressful, positive or irrelevant. A situation is perceived as stressful if the individual is affected by being in a situation and struggling to handle the situation, positive if they experience that their satisfaction is maintained or improved, whereas if the environmental impact has no implication for their satisfaction, the situation is described as irrelevant.

These primary assessments can be perceived as a threat (expected as potentially harmful), a challenge (difficult but with potential gain), damaging (destruction or loss that has already occurred) or a destructive factor for well-being (Lazarus, 2000). An important distinction between injury and threat is that you can learn to predict and plan better handling of the threat, compared to the damage that has already occurred. The challenge has many similarities to the threat because they both demand a mobilization of ways to deal with the situation and are not necessarily mutually exclusive. But a distinction between these is that the challenge focuses on the potential benefits of the situations, which can be characterized by emotions like enthusiasm, while the threat centred more around the potential damage and is more often centred around negative feelings such as fear and anxiety. Carver and Connor-Smith (2010), similar to Lazarus and Folkman (1984), also emphasized that pressure and coping with a threat or obstacle will be

stressful. The secondary assessment deals with the individual's evaluation of their personal resources to master the stress as a result of the primary assessment, which is the basis of the mastering process. This assessment is essential in any potential stressor because the outcome depends on what can be done and what is at stake in the situation. The assessment takes into account the choices available and the assessment of whether the way in which the situation is handled will lead to the desired outcome and whether the strategy will work.

Studies have further shown that boys compared to girls experience fewer interpersonal events like stressors (Rudolph, 2002; Rudolph, & Hammen, 1999). Reeves and colleagues (2009) found that English football academy players reported mistakes and team performance as key stressors. The youngest players (12–14 years) also reported coaches and selection as the main stressors, while the older teenagers (15–18 years) cited their families as being the greatest stressors (such as pressure and criticism from parents). Players must learn to cope with these stressors if they have a chance to achieve a potential professional sports career (Holt, & Dunn, 2004), as a lack of coping may potentially lead to reduced well-being (Ivarsson, Stenling, Fallby, Johnson, & Borg, 2015), hope (Gustafsson, Skoog, Podlog, Lundqvist, & Wagnsson, 2013), and increase the risk of burnout (Gustafsson, & Skoog, 2012; Raedeke, & Smith, 2004).

A previous study of junior players in three Norwegian top clubs showed that players who had the least play time reported significantly more stress performance and evaluation stress to the players who had more play than them (Sæther, & Aspvik, 2016). Another study of academics from two Norwegian top clubs showed that players who considered themselves as less skilled compared to their teammates reported significantly more performance stress (Sæther, Aspvik, & Høigaard, 2017). The same study also showed a strong correlation between playing time and the players' assessment of their own skills, where those players who considered themselves as more skilled than their teammates also got the most playing time. A third study of junior players in three level 2 clubs and three elite level clubs showed that level 2 players reported significantly more evaluation stress, performance stress and development stress, compared to the players in the elite level clubs (Engan, & Sæther, Submitted).

This article investigates football academy players from a level 2 club in Norwegian top football, consisting of players between the ages of 12 and 16. The main purpose of the article is to report the stress levels of a selection of players in 2013 and 2016. The second purpose is to compare the reported stress levels between three age groups in the selection (12–13, 14 and 15–16 years), while the final aim was to compare players who were part of the academy in both 2013 and 2016 with those players who were new to the academy in 2016.

Method

This survey has two samples: sample one consists of 57 (average age 12.80, std.78) male players who were part of a soccer academy in a level 2 club in the Norwegian top football club in 2013, while sample two consists of 51 (average age 15.02 years old, std.83) male players who were part of the same football academy as in sample one in 2016. This academy has been part of a project called the Football Academy which has been following several academies over several years.

Procedure

The survey was conducted following a training session by the academy in December 2013 (N57) and March 2016 (N51). Of the 51 players in sample two, almost half (23) were part of sample one, while the remaining half were new players in the academy. Before the players answered the questionnaire, all players were informed about the purpose of the study and that it was voluntary and anonymous, and that the information would be treated confidentially. The study is approved by the Norwegian Centre for Research data.

Instrument

Stress. The measuring instrument used in this survey is developed based on the Adolescent Stress Questionnaire (16 questions), designed to measure stress among adolescents (Byrne, Davenport, & Maznov, 2007; Moksnes, Byrne, Mazanov, & Espnes, 2010). The instrument intends to measure stress among athletes and contains 12 questions (for further elaboration see previous publications where the instrument is used) (Sæther, & Aspvik, 2016; Sæther et al., 2017). The introduction to these questions was: *Here are some statements about things and situations that you may experience as stressful. Please tell us how stressful each of these things and the situations have been in the last year.* Players were asked to respond to a Likert-designed scale from 1–5; 1 (not stressful at all/not relevant); 2 (a little stressful); 3 (moderately stressful); 4 (pretty stressful); and 5 (very stressful); These 12 questions were further analysed via a factor analysis to find the data material's suitability for further analyses using SPSS version 21.0.

The analysis of the correlation matrix showed many coefficients above .03 and higher. Thekaiser–Meyer–Olkin value was .83 for the entire sample, and is above the recommended value of .6, and Bartlett's test of sphericity achieved statistical significance (p <.00), and supports factor charge in the correlation matrix (Tabachnick, & Fidell, 2001). The factor analysis showed the presence of four components with eigen values above 1, explaining 38.2%, 10.4%, 8.6%, and 8.4%, respectively, of the variance in the sample. All four components were included in the analyses, explaining 65.8% of the variance in the sample. The four factor combinations were defined as:'evaluation stress', which indicates stress caused by being evaluated by coaches or co-workers (i.e.being evaluated by your coach); 'performance stress', which refers to stress in terms of exercise and matches (i.e.exercise performance); 'developmental stress', which indicates stress regarding development both from

teammates and the coach (i.e.coaches who expect a lot); and 'academic stress', which deals with stress regarding the school situation and the lack of time for other recreational activities (i.e.engaging in some school subjects) . This dimension has been referred to as 'future stress' in a previous study (Sæther, & Aspvik, 2016).

An internal consistency test was conducted on all four components (subscales). This test is a Cronbach's alpha value, which generally increases when the correlation between questions increases. The most traditional threshold for a 'good' internal consistency is set to a Cronbach's alpha>0.7. Cronbach's alpha values for each subscale were .64 for evaluation stress, .63 for performance stress, .71 for development stress, and .60 for academic stress. Thus three of the four subscales in the sample were below the 0.7 threshold. In spite of this, all four indices were kept for further analyses. Correlation analyses for the weakest index, academic stress, were from, .162– .569. It is however important to acknowledge that an alpha value is dependent not only on the importance of the correlation between items but also the number of questions (items) in the scale. For example, a subscale (index) may look like more homogeneous simply by doubling the number of items, even though the average correlation is the same. Since the questions related to the different subscales theoretically fit each other in this study, and the number of questions in each subscale is low (3 questions), all subscales were merged as an index even though three of the four alpha values were below 0.7.

Analysis

All the analyses were conducted in SPSS version 21.0. Average and standard deviations were calculated for the four stress components. Because the dimensions of the stress instrument were not normalized, parametric statistics were conducted in the form of chi-square tests where the significance level was set to (p<.05), to identify differences between the 2013 and 2016 selections between the three age groups (12–13 years , 14 years, 15–16 years), and between the two groups that had been part of the academy both in 2013 and 2016.

Results

The results show that 2013 players reported a significantly higher evaluation stress and development stress, and a significantly lower academic stress compared to 2016 (Table 1).

Table 1. Descriptive data for the sample, in 2013 (N57) and 2016 (N51), respectively, mean, SD and chi-square test

Dimensions	2013 Mean (SD)	2016 Mean (SD)	x2(df)	Total Mean (SD)
Evaluation stress	2.13 (0.7)	1.74 (0.6)[a]	76.64 (17)*	1.91 (0.7)
Performance stress	2.05 (0.9)	2.04 (1.3)	19.17 (13)	2.04 (1.1)
Development stress	2.13 (0.8)	1.99 (0.6)[a]	93.16 (18)*	2.05 (0.7)
Academic stress	1.95 (0.7.)	2.44 (0.9)[a]	90.26 (22)*	2.18 (0.8)

Legend: Categories: 1= not stressful at all or irrelevant, 5= very stressful.; * Statistical significance, P<0.05.; a = Significant difference (P <0.05) from 2013.

Comparing the different age groups, the results showed that the youngest age group (12–13 years old) showed a significantly higher evaluation stress compared to both 14-year-olds and 15–16-year-olds (Table 2). Furthermore, the results also showed that 15–16-year-olds reported significantly less devel-

opmental stress and significantly more academic stress. The results also showed that 12–13-year olds reported a non-significant (P=.09) trend of less developmental stress, and that 15–16-year-olds reported a non-significant (P=.07) trend of more evaluation stress.

Table 2. Descriptive data for the sample, according to age and chi-square test between the three age groups

Dimensions	12–13 yrs Mean (SD)	14 yrs Mean (SD)	15–16 yrs Mean (SD)	Total Mean (SD)
%	49.5	30.0	20.5	100
Evaluation stress	2.18 (0.7)	1.74 (0.6)[a]	1.80 (0.6)a	1.91 (0.7)
Performance stress	2.02 (0.9)	1.91 (0.7)	2.37 (1.6)	2.04 (1.1)
Development stress	2.13 (0.8)	2.02 (0.7)	2.07 (0.6)a	2.05 (0.7)
Academic stress	2.05 (0.1)	2.06 (0.9)	2.53 (0.9)a	2.18 (0.8)

Legend: Categories: 1= not stressful at all or irrelevant, 5= very stressful. ; * Statistical significance, P<0.05.; [a]Significantdifference (P <0.05) compared to 12–13-year-olds.

When comparing the players who were part of the academy both in 2013 and 2016 (Table 3) with those same-age players who were only part of the academy in 2016, the results show that the previously selected players reported significantly lower stress levels regarding the evaluation and development.

Table 3. Descriptive data for sample two, according to earlier selected (N28) and newly selected (N23) players, mean, SD and chi-square test

Dimensions	Earlier selected players (2013) Mean (SD)	Newly selected players (2016) Mean (SD)	x2(df)
Evaluation stress	1.51 (0.5)	1.93 (0.5)[a]	18.26 (6)*
Performance stress	1.84 (0.9)	2.20 (1.5)	7.57 (8)
Development stress	1.77 (0.5)	2.17 (0.6)[a]	17.22 (8)*
Academic stress	2.29 (0.7)	2.57 (1.1)	10.09 (12)

Legend: Categories: 1= not stressful at all or irrelevant, 5= very stressful.; * Statistical significance, P<0.05.; [a]Significantdifference (P < 0.05) from earlier selected players.

Discussion

Talented footballers who are part of a football academy must relate to expectations of both short- and long-term performance (Reeves et al., 2009). Being part of a football academy can therefore be a stressor for many players and may be a stress if they cannot handle the situation (Finn, & McKenna, 2010), where their fear of failure in terms of achievement and development is central (Sager, Busch, & Jowett, 2010). The purpose of this article is: 1) to describe the degree of stress experienced by academy players aged 12–16 years in 2013 and 2016 respectively, and collected for both groups and divided into three age groups (12–13, 14, and 15–16 years); 2) to compare the degree of experience stress among players selected for the academy in both 2013 and 2016, with that of the players who were new to the academy in 2016.

The results showed that 2016 players reported significantly less evaluation stress and development stress and significantly more academic stress compared to 2013. As a group, players have thus had a positive development in view of a reduced evaluation stress, which in previous studies has proved challenging for junior players with little playtime (Sæther, & Aspvik, 2016; Sæther et al., 2017). This indicates that players to a lesser extent feel their existence in the football academy as a threat but are able to handle the stressors. As academic stress increases, this may indicate that players are less able to handle relationships outside the football field, thus perceiving the situation as a challenge to a greater extent. On the other hand, it is natural that as they grow older (in selection 2, the players are over 2 years older), the players then the situation outside the course and especially the school situation will be more demanding and to a greater extent perceived as a stressor, and may be perceived by some as a threat because they do not get the opportunity to concentrate mainly on their existence as a football player.

When comparing the different age groups, the results show that the youngest players (12–13-year-olds) report a significantly higher evaluation stress compared to the other two age groups. These results may indicate that the youngest players experience being evaluated by coaches, but also by fellow players, as a challenge. This can be attributed to the fact that these players are the youngest age group in the academy which means that the players have less experience of being evaluated by the coaches, which can be perceived as a stressor. This assumption is also supported by the non-significant (P=.07) trend that the oldest players (15–16-year-olds) reported less evaluation stress compared to 14-year-olds. This may be because nearly half of the players in 2016 were part of the academy in 2013, or because the players have been selected for the academy at a higher age, which could increase the chances of being part of the academy even towards the end of their teens. On the other hand, there are other types of stress that are more challenging as the players get older, which is confirmed by the fact that the oldest players reported significantly more academic stress compared to the 12–13-year-olds, indicating some of the challenges in transition from junior to senior (Sæther, 2017). When the players grow older, it is natural to expect them to experience the situation as more challenging (Holt, & Dunn, 2004).

As already stated, this can be related to the expectations of managing the school situation and future thinking in addition to their own chances of becoming a professional football player. Reeves and colleagues (2009) found that the oldest players (15–18 years) in several English academies raised families (such as pressure and criticism from parents) as greater stressors compared to the youngest (12–14 years). As football academies can be perceived as a very competitive environment

(Arnold, & Fletcher, 2012; Hanton, Fletcher, & Coughlan, 2005; Mellalieu, Neil, Hanton, & Fletcher, 2009), lack of stress and pressure management could lead to reduced performance (Lazarus, 2000). The players' experience of the situation will depend on the demands made in the environment and the individual's resources to accommodate these, to avoid the imbalance that increases the experience of stress (Lazarus, & Folkman, 1984).

The ability of the players to handle this potential stress situation over time, such as the 3-year period covered by this study, can therefore be regarded as crucial. The results showed that those players who have been part of the academy throughout the period reported both significantly lower evaluation and development stress. Since the dimension evaluation mainly involves coaches' and co-players' evaluation of player performance, it is not unnatural that the players who have been part of the academy for a longtime express the academic side of their life to be less of a stressor. That the players who have been part of the academy also report a significantly lower developmental stress may indicate that players selected later experience that they have more to prove to the coaches, compared with the established players. Perhaps surprisingly, there were no significant differences in performance stress, as shown in a previous study by Norwegian academics in which performance pressure was significantly lower among the players who considered themselves among the best in the academy (Nerland, & Sæther, 2016).

In pursuit of the many factors that may be crucial to the development of young talented soccer players (Williams, & Reilly, 2000), it is argued that players'also have to master the academic side of their life. The existence of football talents in a football academy is naturally challenging, as most players will experience adversity on their way to a potential football career. An important dimension in the understanding of stress and its influence in this context is the individual dimension where a stressor for one player is not necessarily experienced as a stressor for another (Lazarus, & Folkman, 1984).

This survey has weaknesses that should be pointed out. One of these weaknesses is that data collections were conducted at different parts of the year or the season, where the first data collection was conducted in December after the season, while the second data collection was conducted in March ahead of a new season. This may have affected players' answers, especially those players who had received indications that they may not be part of the academy in the coming season.

Another weakness of the survey is the factor charges, where three of the dimensions, with the exception of development stress, were 0.6, and somewhat below the desired 0.7. This weakens the results of these indices and means careful consideration should be used in the interpretation of them. Due to the small sample size, the result showing that evaluation stress was significantly different between the players who were part of the academy in 2013 and 2016, and the players who were new in 2016, should be confirmed by other studies before attaching too much value to this finding. A third challenge with this study is the use of the measuring instrument. Although earlier studies found similar results, the instrument is still under development (Sæther, & Aspvik, 2016; Sæther et al., 2017).

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ORIGINAL SCIENTIFIC PAPER

Impact Differences among the Landing Phases of a Drop Vertical Jump in Soccer Players

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Abstract

The aim of this study was to examine the differences of landing phase biomechanics between the players who had anterior cruciate ligament (ACL) reconstruction and healthy participants during single leg drop vertical jump. In this study, 11 soccer players who had anterior cruciate ligament reconstruction (aged 23.0±3.6 years, height 177±5.0 cm, weight 83.8±11.7 kg) and 9 healthy soccer players(aged 22.2±2.4 years, height 178±3.0 cm, weight 74.3±6.1 kg) participated voluntarily. During the data collection phase three high speed cameras synchronized to each other and force plate were used. Visual analysis programme and MATLAB were used to calculate kinetic and kinematic variables. Landing techniques of the subjects' were examined by flexion angle of knee, ground reaction force and moment parameters. The statistical analyses of the measured results were performed by t-test and Pearson Correlation analysis. According to the results, it was determined that peak vertical ground reaction force exhibited significant phase differences (p=0.00, and p=0.00, respectively) between the groups. Obtained results can be explained with "quadriceps avoidance" motion pattern which is characterized by decreased quadriceps activity and lower external knee flexion moment in an effort to control anterior translation of the tibia in subjects with ACL reconstruction. A better understanding of the different phases during single-leg landings can shed a light on mechanism of non-contact anterior crucaite ligament injuries therefore future researches should assess how phase differences affect drop vertical jump performance.

Key words: anterior cruciate ligament-ground reaction force-flexion angle-drop jump

Introduction

In recent years, technological developments have allowed the easy and accurate assessment of knee motion during athletic (Bates, Myer, Shearn, & Hewett, 2015; Pujol, Blanchi, & Chambat, 2007; Peng, 2011; Robınson, Donnelly, Tsao, & Vanrenterghem, 2014; Weihmann, Karner, Full, & Blickhan, 2010). Many studies have been published that greatly improved our understanding of the aetiology, surgical reconstruction techniques and prevention of anterior cruciate ligament (ACL) injuries (Boden, Sheehan, Torg, & Hewett, 2010; Carcia, & Martin, 2007; Gao, Cordova, & Zheng, 2011; Myer, Ford, Brent, & Hewett, 2007; Pollard, Sigward, & Powers, 2007; Pujol, Blanchi, & Chambat, 2007; Reichl, Auzinger, Schmiedmayer, & Weinmüller, 2010; Shin, Chaudhari, & Andriacchi, 2009; Wang, 2011). Single- and double-leg drop

jump techniques are frequently executed in many sports. Yu and Garret (2007) studied that the landing phase of stop-jump tasks presents a significant risk of injury to the lower extremities in general and to the ACL in particular.

A number of reports have shown that sports-related ACL injuries generally occur during non-contact situations that are characterized by landing, rapid deceleration, and sudden changes of direction and most of them occur during single-leg landings (Boden et al., 2010) which are common tasks performed from varying vertical heights and horizontal distances during sporting events such as volleyball, basketball and soccer (Pappas, Zampeli, Xergia, & Georgoulis, 2013). Soccer players sustain the greatest number of ACL injuries (53% of the total) with skiers and gymnasts also at high risk (Hewett, Myer, & Ford, 2005). Landing tasks have provided measures

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related to ACL injury risk factors, including vertical ground reaction force (VGRF), joint angles and moment contribute to knee instability and are a primary loading mechanism of the knee joint and ACL (Hewett et. al., 2005; Schroeder, Krishnan, & Dhaher, 2015; Siegmund, Huxel, & Swanik, 2009). Greater GRF upon landing increases the probability of ACL injury, prior to injury, participants who sustain ruptures exhibit 20% larger peak vGRFs during landing than participants who remain healthy. Moreover, the knee angle was significantly more extended in the injured athletes when the foot was completely flat at the initial foot contact kl So far many studies have been focused on initial contact phase of landing tasks (Čoh, Berić, & Bratić, 2013; Zahradnik, Uchytil, Farana, & Jandacka, 2014). But the other phases such as moment of jump and last contact with the ground can have an impact on biomechanical factors that present a risk for the occurrence of ACL injuries.

The purpose of this study was to determine how ground reaction forces, moments and knee flexion angles differ between healthy controls and reconstructed subjects during single leg landing phases. We suggested two hypotheses respectively: (1) the knee flexion angle correlated with the kinematics at the landing phases in both groups; and (2) force, moment and angle values will differ between each phase and also between the groups.

Methods

Participants

The participant population consisted of two groups—ACL reconstructed group (n=11 patellar tendon autograft) and an uninjured control group (n=9). All participants were soccer players performing at amateur soccer clubs and matched for age, height, weight, sports age as shown in Table 1.

Table 1. The means and standard deviations of descriptive statistics of all subjects

	Age (year)	Height (m)	Weight (kg)	Sport Age (year)
Reconstructed	23.09±3.62	1.77±0.05	83.89±11.76	13.36±2.29
Uninjured	22.22±2.48	1.78±0.03	74.35±6.10	9.88±3.62

ACL-reconstructed palyers were included who had an isolated ACL rupture and a subsequent surgical reconstruction using either a hamstring tendon (HT) or patellar tendon (PT) autograft at least 6 months and up to 15 months prior to the study sessions and also only the subjects whose dominant leg were right to the study. Exclusion criterias were; history of significant knee pain prior to the injury and/or at time of testing, contralateral knee injury/ surgery, or prior injury/surgery to the reconstructed knee. The dominant leg was determined as the leg used by the participant to kick a ball. All experimental procedures were approved by The Ethic Comittee and complied with the principles of the Declaration of Helsinki. Informed consent was obtained from all subjects prior to participation in the research study.

Landing task

Players were instructed to warm up for 5min. and instructed to perform drop jump from a custom made takeoff platform from 20cm vertical height that were placed next to the edge of a force plate (Ali, Robertson, & Rouhi, 2014). The command of 'ready' was given to the participants before the

start of each landing task. For each landing task all participants began with a standard take-off position by standing on a take-off platform with hands placed on the hips, legs shoulder width apart, and the toes of both feet aligned with the edge of the take-off platform. Participants were then instructed to stand on their dominant leg, drop off, and land as naturally as possible with their dominant foot only centered on the force plate and jump vertically as soon as possible. The participants were asked to keep their hands on their hips when landing to reduce any variability from swinging arms. Each subject was asked to perform three successful trials, and the best result was used for further analysis.

All participants wore their own sports shoes throughout data collection. Motion analysis was performed on all subjects using a-camera motion capture (SIMI Reality Motion Systems GmbH, GER) system with three cameras (Basler A602f-HDR GmbH, GER) which were set at 100 frames per second as shown in Figure 1. For digitization, 7 retroreflective markers attached to right side of the body; trochanter major, spina iliaca anterior superior, patella, condylus lateralis, tuberositas tibia, condylus lateralis tibialis, malleollus lateralis.

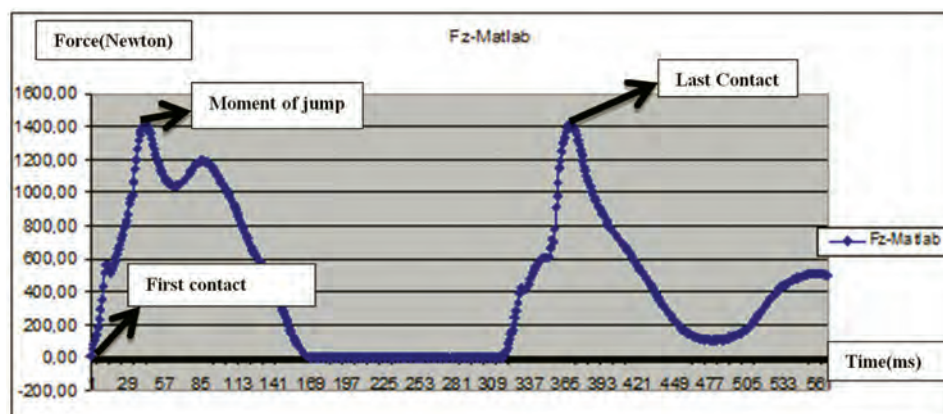**Figure 1.** One participant's jump performance force data

Cameras were placed at different angles in the plane of motion and the force plate as shown in Picture 1.The plane of motion was calibrated vertically and horizontally by using

a rigid pole visible markings.Three-dimensional marker position coordinates of all markers were computed using the direct linear transformation(DLT) method(Abdel-Aziz, YI& Karara

Picture 1. Location points of the cameras in the experimantal setups

HM; 1971) by means of motion analysis software.

A force plate (FP4060-10, BERTEC, USA) measured ground reaction forces (GRFs) at a sampling rate of 1000 Hz. Videographic and force plate data were time synchronized. The vertical ground reaction force (VGRF) was defined as the reaction to the force the body exerts on the ground in the vertical direction.

Data reduction and Analysis:

One trial was selected from the best of three trials for data analysis. The best trial was determined as the one in which the participant did not remove their hands from the hip during landing, did not allow their non-dominant leg to impact the force plate during landing, or did not lose a marker during impact with the ground. Joint kinematics and kinetics were determined for the dominant leg. Joint kinematic data were calculated using a SIMI Motion Analysis System and analog data was imported into MATLAB (Version 5.3 , The Mathworks Inc., Natick, MA). Maximum vertical ground reaction force was calculated after initial contact with the force plate during the task which was divided into three phases. *Initial contact* (IC) phase was defined as the instant where the force plate reported values greater than 20 N VGRF, *Moment of Jump phase* (MoJ) phase defined as peak VGRF and *last contact* (LC) phase

was defined as the greatest force value after moment of jump. According to Ford, Myer and Hewett (2014) study, marker trajectories were filtered using a low-pass 2nd-order Butterworth filter with a cut-off frequency of 12Hz, chosen after conducting a residual analysis. Ground reaction forces were normalized to each subject's body weight and moments normalized by the product of body mass and body height. The knee flexion angle was defined as the angle between the thigh and leg segment. Kinetic raw data was collected at 1000Hz and kinematic raw data was collected at 100Hz. Therefore sampling frequency of both data equated at 250Hz. Kinematic data were low-pass filtered using a second-order Butterworth filter at 100Hz and analog data were filtered at 25Hz.

Statistical analysis

Groups were tested for normal distribution by means of the Kolmogorov–Smirnov test. Homogeneity of the variances was ascertained by Levene's F test. The Independent Samples t-test and Pearson correlation analysis were used for variables depending on the normality of distribution. The level of significance was set at $p < 0.05$.

Results

The overall means and standard deviations of the vertical

Table 2. The means and standard deviations of each dependent variable among all subjects, t-test coefficients of peak VGRF with knee flexion angle

		Groups	x̄±Sd	t	p
IC	VGRF (N/kg)	Reconstructed	3.98±0.19	-13.11	0.00*
		Uninjured	5.11±0.18		
	KA(deg)	Reconstructed	15.18±13.4	-0.21	0.83
		Uninjured	13.62±17.8		
MoJ	VGRF (N/kg)	Reconstructed	14.29±2.79	-4.20	0.00*
		Uninjured	19.24±2.35		
	KA(deg)	Reconstructed	23.9±9.44	0.11	0.91
		Uninjured	14.62±18.21		
LC	VGRF (N/kg)	Reconstructed	6.93±0.35	0.44	0.66
		Uninjured	6.69±0.98		
	KA(deg)	Reconstructed	19.9±15.40	1.71	0.10
		Uninjured	35.5±24.23		

Legend: IC: Initial Contact; LC: Last Contact; VGRF: Vertical Ground Reaction Force; MoJ: Moment of Jump; KA: Knee Flexion Angle; *Significant difference (p<0.05)between the groups.

ground reaction force and knee flexion angle for the vertical height test among all subjects and t-test coefficients of peak VGRF with knee flexion angle and moments are provided in Table 2. The findings from the t-test conducted, revealed for the single landing test that VGRF was significantly higher in uninjured group at the initial contact (p=0.00) and at the moment of jump (p=0.00) but there was no significant difference at the moment of last contact between the groups.

Table 3. Pearson correlation coefficients of peak VGRF with knee flexion angle and moment values at the moment of jump

				My	Knee Flexion Angle(degree)
IC	reconstructed	VGRF(N/kg)	r	0.571	-0.569
			p	0.009*	0.009*
		My(N/kg .m)	r		-0.181
			p		0.444
	uninjured	VGRF(N/kg)	r	0.761	-0.594
			p	0.17	0.092
		My(N/kg .m)	r		-0.198
			p		0.61
MoJ	reconstructed	VGRF(N/kg)	r	0.132	0.35
			p	0.58	0.13
		My(N/kg.m)	r		0.372
			p		0.106
	uninjured	VGRF(N/kg)	r	0.384	0.56
			p	0.308	0.117
		My(N/kg .m)	r		0.573
			p		0.107
LC	reconstructed group	VGRF(N/kg)	r	0.011	-0.175
			p	0.965	0.461
		My(N/kg .m)	r		-0.14
			p		0.556
	uninjured	VGRF(N/kg)	r	0.42	-0.488
			p	0.261	0.182
		My(N/kg .m)	r		-0.171
			p		0.66

Legend: *Significant relationship (p<0.05) between the variables of the groups.

As Shown in Table 3, peak VGRF was significantly and negatively correlated knee flexion angle (r=−0,569 p=0.009) in reconstructed group at the moment of initial contact. It is also worth noting from Table 3 that peak VGRF was unsignificantly and negatively correlated to knee flexion at the last contact in both groups, too. But VGRF was unsignificantly and positively correlated to knee flexion angle at the moment of jump. There was no significant correlation amongst VGRF, knee flexion angle and y component of moment.

Discussion

The purpose of this study was to investigate how VGRF, moments and knee flexion angles differ between healthy controls and reconstructed subjects during single leg landing phases. It was found that though knee flexion angles and moment values are equivalent between the groups, differences in VGRF indicate that each phase has its own biomechanical mechanisms.

Previous research has suggested that a relationship exist between demographics which supported by Robinson et al. (2014) stated that females to exhibit greater hip internal rotation and hip adduction moment than males (Abdel-Aziz, & Karara, 1971; Pollard. et. al., 2007; Ford et al., 2014).

Additionally, stronger support for the "quadriceps dominance" theory as a potential mechanism for the sex disparity in ACL epidemiology is provided by studies that found females to demonstrate preferential quadriceps activation compared to males (Ford et al., 2014). Therefore, only male subjects were included in our study (Table 1).

Our results showed that there is a significant difference in VGRFs at IC and MoJ phases but there is no significant difference in VGFR at LC between the groups (Table 2). This can be explained with "quadriceps avoidance" motion pattern.

Early biomechanical researches that investigated kinetic and kinematic differences between healty subjects and reconstructed subjects indicated that many of the subjects perform the tasks with a "quadriceps avoidance" which is characterized by decreased quadriceps activity and lower external knee flexion moment in an effort to control anterior translation of the tibia (Ali et al., 2014). We found no significant difference neither in knee flexion angle nor in moment values between the groups (Table 2). Podraza and White (2010) found similar results; given that ground reaction forces are more likely to be greatest and knee extensor moments smallest when landing in an extended knee position; it is possible that ACL strain from noncontact deceleration may be related to rapid trans-

lational joint forces that propagate up the kinetic chain rather than resulting from quadriceps overload induced anterior tibial translation. Boden et al. (2010) also proposed that a lack of absorption of ground reaction forces who were injured, landed with a mean knee flexion angle of 17.6° compared to uninjured controls that landed with a more plantar flexed ankle and had a knee flexion angle of 39.3°.Previous studies indicated that the impact on the lower extremities increases as the peak vertical ground reaction force increases (Ali et al., 2013; Pappas et al., 2013; Podraza et. al., 2010; Wang, 2011). Pappas et al. (2013) compared the ground reaction force between single-leg drop landings and double-leg drop landings. Pappas et al. (2013) found that single-leg drop landings from a height of 0.4 m produced a higher peak vertical ground reaction force than stop jump. The results from the work of Boden et al. (2010) suggested that the propagation of reaction forces when landing with the knee near full extension could be an important component of non-contact ACL injuries. Support moment is the net summation of ankle plantar flexion, knee extension and hip extension moment. Hewett et al. (2005) measured landing biomechanics at baseline for female athletes participating in high school basketball and soccer and followed them for one to two seasons. They found that high knee valgus angle and moment and high side-to-side differences in knee valgus angle and moment during landing from a jump were strong predictors of future ACL injury. Since landing from a rebound is the task most commonly associated with ACL rupture in basketball (Sugimoto et al., 2015),it is possible that the first drop landing task does not sufficiently simulate all the biomechanical mechanisms enacted when landing from a maximal jump. Greater fall heights prior to landing incrementally increase perturbations and, consequently, vGRFs on the lower extremity (Peng, 2011; Abdel-Aziz, & Karara, 1971).

Within the findings and limitations of this study, we observed that VGRF s and knee angles differ among the phases. Additionally, other potential limitation to the current study includes that all participiants performed single leg drop vertical jump, future researches may include double leg drop vertical jump task and add different heights to their studies. A better understanding of the different phases during single-leg landings can shed a light on mechanism of non-contact ACL injuries.

As a conclusion, there are differences between the landing phase kinetics and kinematics of single leg drop veritical jumps. We suggest that a higher risk of ACL injury could result from the fact that the single-leg drop jumps exhibites greater peak forces and moments during the landing than the moment of jump and initial contact phases. This indicates that non-contact injuries occur during landing phase of jump tasks.

Future research is necessary to evaluate the injury-specific influences of landing phases. Researchers should attempt to extrapolate these findings to more dynamic and challenging tasks that are more representative of scenarios during which ACL injury occurs and to the populations at heightened risk of ACL injury and also hip, trunk, core, and upper body mechanics are associated with lower extremity biomechanical and neuromuscular factors of each landing phase should be better to be examined for futher information.

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Relationship between Sitting Height Measurements and Standing Height: A Prospective Regional Study among Adolescents in Eastern Region of Kosovo

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Abstract

The purpose of this research is to examine standing height in both Kosovan genders in the Eastern Region as well as its association with sitting height, as an alternative to estimating standing height. A total of 364 individuals (185 male and 179 female) participated in this research. The anthropometric measurements were taken according to the protocol of ISAK. The relationships between body height and sitting height were determined using simple correlation coefficients at a ninety-five percent confidence interval. A comparison of means of standing height and sitting height between genders was performed using a t-test. After that a linear regression analysis were carried out to examine extent to which sitting height can reliably predict standing height. Results displayed that Eastern Kosovan male are 178.79±6.07cm tall and have a sitting height of 96.07±3.51cm, while Eastern Kosovan female are 164.60±4.72cm tall and have a sitting height of 90.70±2.92cm. The results have shown that both genders made Eastern-Kosovans a tall group, but a little bit shorter than general Kosovan population. Moreover, the sitting height reliably predicts standing height in both genders; but, not reliably enough as arm span. This study also confirms the necessity for developing separate height models for each region in Kosovo as the results from Eastern-Kosovans don't correspond to the general values.

Key words: prediction, measurement, stature, sitting height, Kosovan

Introduction

According to Komunat e Kosovës (2013), Kosovo is a democratic, multi-ethnic and secular republic which administratively is subdivided into seven districts (Ferizaj, Gjakova, Gjilan, Mitrovica, Peja, Pristina and Prizren) and five regions (Eastern, Western, Northern, Southern and Central). This study analyzes the standing height and its estimation utilizing sitting height measurements in adolescents in eastern region which contains two districts (Ferizajand Gjilan) and eleven municipalities (Ferizaj, Hani iElezit, Kaçanik, Štimlje/Shtime, Štrpce/Shtërpcë, Gjilan, Kamenica, Klokot, Partesh, Ranilug and Vitina). This region (Figure 1) covers the area of 2,236 square kilometers and has population of 366,589 inhabitants, while average density per square kilometer is 255 inhabitants

(Komunat e Kosovës, 2013). Although Kosovo doesn't have too big territory, it has a very varied relief that mostly belongs to Dinarides range and the author assumed this fact might influence the main objective of this study, because of the type of the soil as well as other socio-economical and geographical characteristics as a potential influencing factors (Arifi, 2017; Arifi, Sermaxhaj, Zejnullahu-Raçi, Alaj, &Metaj, 2017b).

There are lots of scientific findings which confirms that the measurement of standing height is a vitally important variable when assessing nutritional status (cited in Arifi et al., 2017a; Datta'Banik, 2011; Popovic, & Bjelica, 2016), as well as when assessing the growth of children, evaluating the basic energy requirements, adjusting the measures of physical capacity and predicting the drug dosage and setting standards of physiologi-

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Figure 1. Geographical Location of Eastern Region in Kosovo

cal variables such as muscle strength, metabolic rate, lung volumes and glomerular filtration (Golshan, Amra, & Hoghogi, 2003; M. Golshan, Crapo, Amra, Jensen, & R. Golshan, 2007; Mohanty, Babu, & Nair, 2001; Ter Goon, Toriola, Musa, & Akusu, 2011). However, according to Quanjer and his collaborators (2014), the exact standing height cannot always be identified and resolved in the usual way (e.g. paralysis, fractures, amputation, scoliosis and pain). Because of these factors, an estimate of standing height has to be acquired from other reliable anthropometric indicators such as sitting height, hand and foot lengths, knee height, length of the forearm, length of the sternum, vertebral column length, length of scapula, arm span as well as cranial sutures, skull, facial measurements et cetera (cited in Gardasevic, Rasidagic, Krivokapic, Corluka, & Bjelica, 2017; Popovic, 2017; Masanovic, 2017; Masanovic, Gardasevic, & Arifi, 2018a; Masanovic, Gardasevic, & Arifi, 2018b). Therefore, all these anthropometric indicators, which are used as an alternative to estimate standing height, are very important in predicting loss in standing height connected with aging. Also, to diagnose individuals with disproportionate growth abnormalities and skeletal dysplasia or standing height loss during surgical procedures on the spine (Mohanty et al., 2001), as well as to anticipate standing height in many older people as it is very difficult to measure it precisely, and sometimes impossible because of mobility problems and kyphosis (Hickson, & Frost, 2003). Lastly, it is important to state that this knowledge finds its importance in sport science the standing height represents a significant factor which influences the success in various sport disciplines (Popovic, 2017).

Several researches have reported the benefit of using various body parameters in predicting standing height, and arm span happened to be one of the most reliable ones in adults (Hickson, & Frost, 2003; Jalzem, & Gledhill, 1993; Mohanty et al., 2001; Ter Goon et al., 2011), while foot length measurement is the most reliable predictor during adolescent age, due to the fact that ossification and maturation occurs earlier in the foot than the long bones and standing height could be more accurately predicted from foot measurement as compared to long bones during

adolescent age (cited in Singh, Kumar, Chavali, & Harish, 2012). In addition, the relationship of long bones and standing height was found to vary in different ethnic and racial groups (Bjelica, Popovic, Kezunovic, Petkovic, Jurak, & Grasgruber, 2012; Brown, Feng, & Knapp, 2002; Popovic, Bjelica, Georgiev, Krivokapic, & Milasinovic, 2016; Popovic, Bjelica, Molnar, Jaksic, & Akpinar, 2013; Popovic, Bjelica, Tanase, & Milasinovic, 2015; Reeves, Varakamin, & Henry, 1996; Steele, & Chenier, 1990) as well as various regions (Arifi, 2017; Arifi et al., 2017b; Milasinovic, Popovic, Matic, Gardasevic, & Bjelica, 2016; Milasinovic, Popovic, Jaksic, Vasiljevic, & Bjelica, 2016; Masanovic, Gardasevic, & Arifi, 2018c; Masanovic, Gardasevic, & Arifi, 2018d). Hence, researchers have derived a specific formula for calculating standing height from long bones for each ethnic/race group. The mentioned variations might be the case with sitting height predictions too, mostly due to the fact that the Dinaric Alps population has specific body composition than national as well as regional point of view (Popovic, 2017). Even though many studies with this essence are available on neighboring countries as well as worldwide population, only narrow data is available on Kosovan subjects, just one conducted by Popovic and his collaborators (Popovic, Arifi, & Bjelica, 2017a; Popovic, & Bjelica, 2017) that has covered whole Kosovan population, and one regional analyses that confirmed Western-Kosovans have specific standing height/sitting height ratio, comparing to general population in Kosovo (Popovic, Gardasevic, Masanovic, Arifi, & Bjelica, 2017). Considering rather sparse recent scientific literature, the purpose of this research was to examine the standing height in both Eastern-Kosovan genders and its association with sitting height.

Methods

The nature of this research gave extension to the 364 high-school students last year (185 male and 179 female) from Eastern Region of Kosovo to be subjects. Two reasons which qualified the selected individuals are: the first is related to the fact that the growth of an individual ceases by this age, while the second is related to the fact that there is no age-related loss in standing height at this age. The average age of the male subject was 18.20±0.40 years old (range 18-19 years), while the average age of the female subject was 18.15±0.36 years old (range 18-19 years). It is important to underline that the researchers have excluded from the data analysis of the individuals with physical deformities as well as those without informed consent. The exclusion criterion was also being non-Eastern Kosovan.

The anthropometric measurements, including standing height and sitting height, were taken according to the protocol of the International Society for the Advancement of Kinanthropometry (Marfell-Jones, Olds, Stew, & Carter, 2006). The trained measurers have measured selected anthropometric indicators (same measurer for each indicator), while the quality of their performance was evaluated against the prescribed "ISAK Manual". Lastly, the age of the each subject was reached directly from the birthdays.

The analysis were performed by using the Statistical Package for Social Sciences (SPSS) version 20.0. Means and standard deviations (SD) were obtained for both anthropometric variables. A comparison of means of standing height and sitting height between genders was performed using a t-test. The relationships between standing height and sitting height were determined using simple correlation coefficients at ninety-five percent confidence interval. Then a linear regression

analysis were carried out to examine the extent to which the sitting height can reliably predict standing height. Statistical significance was set at p<0.05.

Results

A summary of the anthropometric measurements in both genders is shown in Table 1. The mean of the standing height for male was 178.79±6.07 centimeters and sitting height was 96.07±3.51 centimeters, while for female the standing height was 164.60±4.72 centimeters and sitting height was 90.70±2.92 centimeters. The sex difference between standing height and sitting heighmeasurements was statistically significant (standing height: t=24.849; p<.000, and sitting height: t=16.180; p<.000).

Table 1. Anthropometric Measurements of the Study Subjects

Subjects	Standing Height Range (Mean±SD)	Sitting Height Range (Mean±SD)
Male	161.40-193.80 (178.79±6.07)	88.00-105.00 (96.07±3.51)
Female	153.30-177.50 (164.60±4.72)	80.50-99.40 (90.70±2.92)

In Table 2, the simple correlation coefficients and their ninety-five percent confidence interval analysis between the anthropometric measurements are displayed. The associations between standing height and sitting height were significant (p<0.000) and high in this sample, regardless of gender (male: 0.743; female: 0.705).

Table 2. Correlation between Standing Height and Sitting Height of the Study Subjects

Subjects	Correlation Coefficient	95% confidence interval	Significance p-value
Male	0.743	0.646-0.841	<0.000
Female	0.705	0.699-0.810	<0.000

The results of the linear regression analysis are shown in Table 3. The first of all models were extracted by including age as a covariate. However, it was found that the contribution of age was insignificant and therefore the age was dropped and estimations were derived as a univariate analysis. The high values of the regression coefficient (male: 0.743 female: 0.705) signify sitting height notably predicts standing height in both Eastern-Kosovan genders (male: t=15.027, p<0.000; female: t=13.214, p<0.000), which confirms the R-square (%) for the male (55.2) as well as for the female (49.7).

Table 3. Results of Linear Regression Analysis Where the Sitting Height Predicts the Standing Height

Subjects	Regression Coefficient	Standard Error (SE)	R-square (%)	t-value	p-value
Male	0.743	4.071	55.2	15.027	0.000
Female	0.705	3.358	49.7	13.214	0.000

The associations between sitting height measurements and standing height among the above models is sketched as a scatter diagrams (Figure 2).
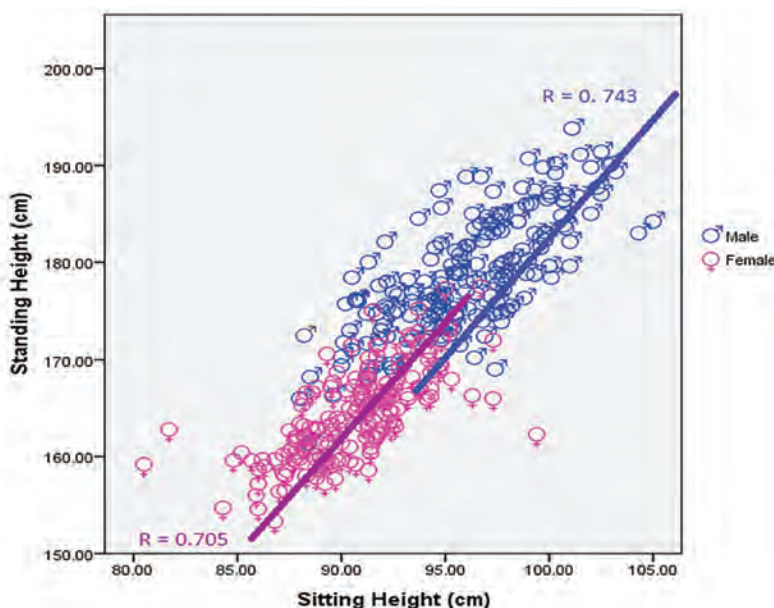

Figure 2. Scatter Diagram and Relationship between Sitting Height Measurements and Standing Height among Both Genders

Discussion

The assessment of standing height using various anthropometric measures is very typical from the past centuries and it has been attempted to be studied by many researchers. However, it is important to underline that the arm span has been obtained as the most reliable body indicator for predicting the standing height of an individual (Mohanty et al., 2001; Ter Goon et al., 2011), while sitting heightis was very close (Arriba Munoz et al., 2014). In parallel, it is important to emphasize that the individual and ethnic variations referring to standing height and its association with sitting heightmight vary from ethnic group to ethnic group as well as race to race, because the racial and ethnic differences are affective on these measures and reduce the possibility of generalizing (cited in Bjelica et al., 2012). This fact confirms the study conducted by authors (Frederiks et al., 2005; Arriba Munoz et al., 2014) who confirmed a very high linear correlation between standing height and sitting height in both genders, while the research study conducted by Fatmah and her collaborators (2010) shows significant correlation between standing height and sitting height in both genders of Indonesian population. The highest correlation coefficient in this population was found for sitting heightin males (r=0.743) as well as in females (r=0.705).

All above-mentioned have confirmed the necessity for developing separate standing height models for each population on account of ethnic differences and the recent study conducted by Popovic and his collaborators (Popovic et al., 2017a; Popovic, & Bjelica, 2017) who have analyzed the entire Kosovan population and have found specific correlation coefficient in Kosovan male (r=0.691) and female (r=0.629) population; however, some recent studies have also confirmed the regional differences between the same ethnic groups too (Arifi, 2017; Arifi et al., 2017b; Popovic et al., 2017b; Milasinovic et al., 2016a; 2016b), which caused the need for additional caution, mostly due to the reason one of them was sampled by Western-Kosovans. Therefore, the main goal of this research was to test the hypothesis if above-mentioned facts are true for the Eastern-Kosovans, that is, for the one of five Kosovan regions. Hence, in the present research it was remarked that the sitting height/standing height ratio in Eastern-Kosovan male is bigger (male: 55.2%; female: 49.7%) comparing to entire Kosovan (male: 47.7%; female: 39.6%) and Western-Kosovans (male: 43.7%; female: 37.7%)as well as smaller comparing to other available population that estimate over 70% each and more in male population, while female population is much more in parallel to previously measured populations. As the correlation between sitting heightand standing height was significant in both Eastern-Kosovan genders, the sitting heightmeasure therefore seems to be a reliable indirect anthropometric indicator for estimating standing height in both genders of Eastern-Kosovan population. Even though these relations are similar, the estimation equations, which are obtained in the Eastern-Kosovans, considerably differ from entire Kosovan, Western-Kosovans and other available populations.

The results of the study conducted by Popovic and his collaborators (Popovic et al., 2017a; Popovic, & Bjelica, 2017) confirm the necessity for developing separate standing height models for both genders in Kosovo but the authors of the same study have recommended that further studies should consider dividing the population of this country to regional subsamples and analyze it separately, just to be sure there are no geographical differences (such as type of the soil) influencing the average standing height in both Kosovan genders as well as its association with sitting height. This concern was based on the fact that entire Kosovo doesn't fall into Dinaric Alps racial classification. In parallel, this study confirms the assumption mentioned above and also confirms that it is necessary to develop separate standing height models for each population on account of regional variations in Kosovo.

Next to highlighted issue, the obvious constraint of this research might also be the composition of the measured sample that consisted of high school students. This limitation is based on the fact there are some studies which assumed the growth of an individual doesn't cease by this age (Grasgruber, P., personal communication, 2016; Jurak, G., personal communication, 2017). This assumption might be supported by the fact that university-educated individuals have been founded to be taller than the high school population in Bosnia and Herzegovina (Grasgruber et al., 2017; Gardasevic et al., 2017), Poland (Wronka, &Pawlinska-Chmara, 2009) and Hungary (Szollosi, 1998). On the other hand, this wasn't the truth in Montenegro (Popovic, 2017) and comparing the average standing height measures of this study to the results of some study sampled by university students might give the science much precise conclusions. One more obvious limitation of this study is also the fact that both genders of Kosovo did not reach their full genetic potential yet, since various environmental factors controlled their development. Further continuous monitoring is necessary, mostly due to the reason it is expected the secular changes influencing standing height will ascend in the following two or three decades.

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ORIGINAL SCIENTIFIC PAPER

Examination of Age-related Core Stability and Dynamic Balance in Hockey Players

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Abstract

The purpose of the study was to assess core stability and to determine age-related differences in the unilaterality of limb movements in hockey players. The sample included 152 hockey players aged 12 to 35 years. Every player performed the upper quarter and the lower quarter Y-balance tests. Performances of players showed high degree of individuality, which was expressed as the composite score. The difference greater than 4 cm in movements performed by a left or right limb indicates imbalance and higher risk of injury. Of 152 players, 27 and 26 players showed a difference higher than 4 cm for the lower quarter and the upper quarter, respectively. Of all age categories, 61% of senior players showed muscle imbalance. This may have been caused by factors present at school age because 52% of U13 players showed imbalance. We conducted statistical analysis to determine differences for each of the directions in relation to limb length. The cross-sectional data have shown non significant differences between age categories studied. For the development of ice hockey players, it is important to eliminate movement imbalance. The results have shown that the category at risk includes the U13 players, who may suffer from movement imbalance in the senior category.

Key words: *injury, muscle and movement imbalance, core, Y balance test, lower quarter, upper quarter*

Introduction

The trunk, which is located at the middle of the kinetic chain, is an essential region for coordination during sports performance and for preventing injuries (Imai, Kaneoka, Okubo, & Shiraki, 2014). Athletic performance depends on the creation and transfer of forces between segments of the body. For example, during the windup motion, a ground reaction force is generated between the mound and the pitcher's (the ice and hockey players) dominant lower extremity, with the force subsequently transferred through the body to the upper extremity (Brumitt, Matheson, & Meira, 2013). Hockey is a fast-paced sport with frequent changes of directions and collisions, which are determined by both trunk stability and strength. The strengthened trunk is the basis for segmental skills (skating, shooting, weaving) that require strength and coordination (Skahan, 2016). Stability provided by the muscles of the trunk is also identified as critical for whole-body

dynamic balance. To maintain whole-body stability while sustaining and/or generating external forces, athletes require both strength and endurance in these muscles (Gamble, 2007). Core stability is described in the sports medicine literature as "the product of motor control and muscular capacity of the lumbo-pelvic-hip complex". Core muscles can be divided into local and global stabilizers, which determines their ability to stabilize the spine by protecting it from the effects of load and to produce muscle force (Hibbs, Thompson, French, Wrigley, & Spears, 2008). Core stability determines the dynamic process of strengthening and maintaining the skating stance and balance. Feedback processes are regulated by the vestibular apparatus in the middle ear and muscle and joint proprioceptors through Golgi muscle spindles (Stamm, 2010).Stance stability is maintained by the trunk position while maintaining the physiological curvature of the spine (Jesenský, & Kokinda, 2017). The primary role of the local stabilizing muscles is to maintain seg-

mental stability. Global stabilizers fulfil their stabilizing function when athletes engage in activities that require more energy and strength. The function and characteristics of these muscles is to generate torque to produce range of movement, shock absorption of load, activity is direction dependent and phasic in nature. Muscle contractions are generally concentric in nature therefore produce movement through concentric activity rather than the eccentric control displayed by the global stabilizer muscles. McLean (2006) suggested that the global mobility muscles work eccentrically to decelerate high loads and would adopt a stabilizing function when under load or when subjected to high-speed movements. Core muscles provide internal and segmental stabilization of the neutral and basic position of the spine (McGill, Andersen, & Cannon, 2015). From a skating performance perspective, core muscles play an important role in the transfer of forces between the lower body, which is in contact with the ice, and the upper body, and vice versa. Core stability determines the strengthening and maintenance of the skating stance and balance (Willardson, 2007). Bompa and Carrera (2015) consider trunk muscles the "center of movement" and an important link between the upper body and the lower body, which determines the ability of the arm muscles and lower-body muscles to generate greater force. Muscle imbalance is a state of imbalance between shortened and weakened muscles (Barcalová et al., 2017). As for ice hockey players, muscle imbalance does not affect a single muscle only because hockey performance is determined by muscle groups that work as a functional unit. Thus muscle imbalance causes poor body posture and coordination when performing the movement stereotypes, which increases susceptibility to injury.

The purpose of the study was to assess core stability and to determine age-related differences in the unilaterality of limb movements in hockey players.

Methods

Cross-sectional data were collected from 152 ice hockey players aged 12 to 35 years. Hockey players performed tests of dynamic balance, stability and mobility of particular segments of the musculoskeletal system. Using the Y Balance test protocol, we tested ice hockey players of various age categories. The test is performed on a specific Y-shaped device (Figure 1). The device consists of the center platform and distance reach indicators. By pushing the reach indicators, participants have to keep either their leg or arm at a standard height above the surface.

Testing protocol

When administering the Lower quarter Y Balance test, we focused on dynamic balance, ankle instability, and the anterior cruciate ligament injury. The tested person performed three trials with the right stance leg in the anterior direction, followed by the left leg in the same direction. This procedure was followed in other directions. The specific testing order is: right anterior, left anterior, right posteromedial, left posteromedial, right posterolateral, and left posterolateral. We recorded the maximum distance reached in each direction. The tested person was not allowed to kick the reach indicator or to use the reach indicator for support. Upper quarter Y Balance test assesses upper-body stability and mobility. During each reach component, core stability, thoracic mobility, and scapular stability are evaluated. The tested person places one of their hands on the center platform and the other hand is directed medially. The test begins in a pushup position with hands directly under the shoulders and with feet shoulder-width apart in the posterior direction. The goal of this test is to maintain a basic pushup position while on the center platform and to push the reach indicator with one hand in the designated direction. After lifting the free arm, the tested person pushes the reach indicator in direction A: medial, B: inferolateral, C: superolateral, without stopping the movement or touching the ground. After reaching in all directions, the tested person must return to the starting position without losing balance or touching the ground. The tested person has two practice trials and, subsequently, two practice trials to perform the test. A break between trials is recommended. The trial is considered valid if the tested person assumes again the starting position without losing balance or touching the ground. If there were failed attempts, a maximum of six trials were performed for any stance arm in one direction. If the tested person had more than four failed attempts, we recorded a zero for that trial. The distance reached was read to the nearest half centimeter and the maximal reach in each direction was included in the analysis. The level of dynamic balance was expressed as composite score. Length of the lower limb was determined by measuring the distance from the Anterior Superior Iliac Spine to the most distal aspect of the medial malleolus. Arm length was determined by measuring the distance from the C7 spinous process to the distal tip of the third digit of the longest finger.

Figure 1. Y Balance test kit

Data analysis

The descriptive statistical characteristics include the arithmetic mean and standard deviation for basic anthropometric parameters: body height, body weight, and limb lengths across all age categories. The levels of dynamic balance were expressed as the so-called composite score. The composite score is the sum of three reach directions divided by three times limb length, then multiplied by 100. A greater than four-centimeter right and left reach distance difference indicates imbalance and increased risk of injury. As reach distance is associated with limb length, reach distance was normalized to limb length in order to allow for comparison between players. To express reach distance as a percentage of limb length, the normalized value was calculated by using the formula: reach distance divided by limb length, multi-plied by 100 according to Gonell, Romero and Soler (2015). We conducted statistical analysis to determine differences for each of the directions in relation to limb length. To assess significant differences between samples, we used the Kruskal-Wallis test.

This study was approved in advance by the Ethics Committee of the University of Presov. The procedures presented were in accordance with the ethical standards on human experimentation and in compliance with the Helsinki Declaration. Each participant voluntarily provided written informed consent before participating.

Results

Table 1 shows detailed characteristics of ice hockey players who participated in the study.

Table 1. Sample characteristics

	Senior (n=18)		U20 (n=15)		U18 (n=22)		U15 (n=41)		U14 (n=37)		U13 (n=19)	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Age	24	4.5	18.6	0.7	16	0.8	14.6	0.4	13.7	0.4	12.6	0.3
BH (cm)	182.2	5.7	179.9	4.5	180.8	6.7	173.8	6.9	168.8	6.9	157.6	7.7
BW (kg)	88.4	7.6	80.7	4.3	74.9	11.9	66.1	9.7	58.3	7.2	48.7	11.8
LL (cm)	98.1	3.9	94.2	3.5	100	4.8	95.5	4.5	89.5	4.8	85.9	4.9
UL (cm)	95.7	8.2	91.1	3.1	93.9	3.5	90.9	4.2	85.1	4.4	79.9	5.1

Legend: BH: body height; BW: body weight; LL: lower limb; UL: upper limb.

The difference greater than 4 cm in movements performed by a left or right limb indicates imbalance and higher risk of injury. Of 152 players, 53 players showed a difference higher than 4 cm. Figure 2 shows numbers of players who achieved a composite score higher than four for both the upper quarter and the lower quarter Y balance test.
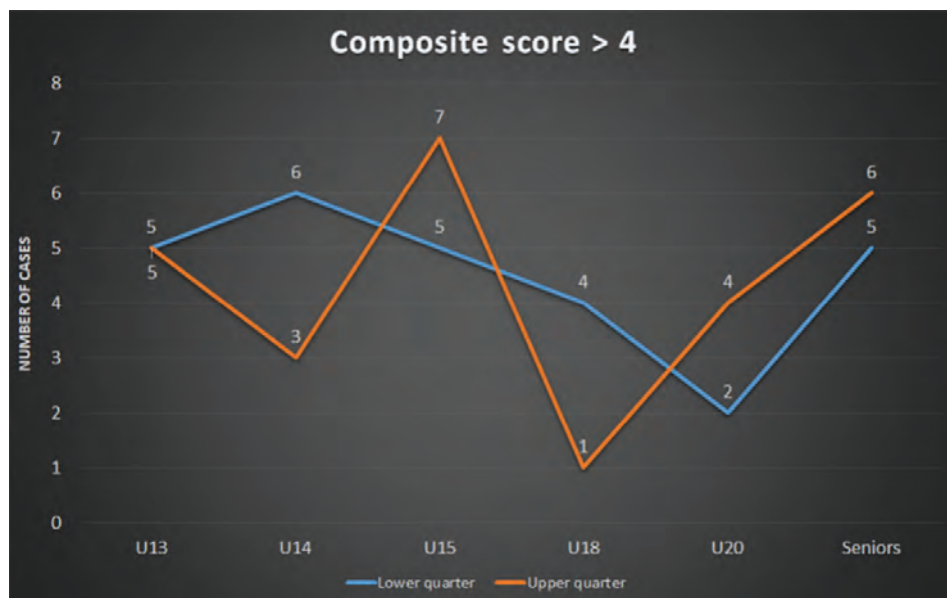
Figure 2. Composite score

Of all tested hockey players, 61% of senior players suffered from an increased risk of muscle imbalance in relation to unilateral loading. The second category in which 52% of players showed risk of injury, decreased levels of dynamic balance, and mild muscle imbalance was the U13 category. The percentages in U14 to U18 ice hockey players showed higher degree of stability that ranged from 24% to 23%. Unilaterality of loading starts to manifest itself again in U20 hockey players of whom 40% showed muscle imbalance.

The cross-sectional data show no statistically significant relationship between distances reached and limb length. Differences in the composite scores between age categories tested were statistically insignificant as well (Figure 3). The results show that one-sided loading is sustained by U13 players already,
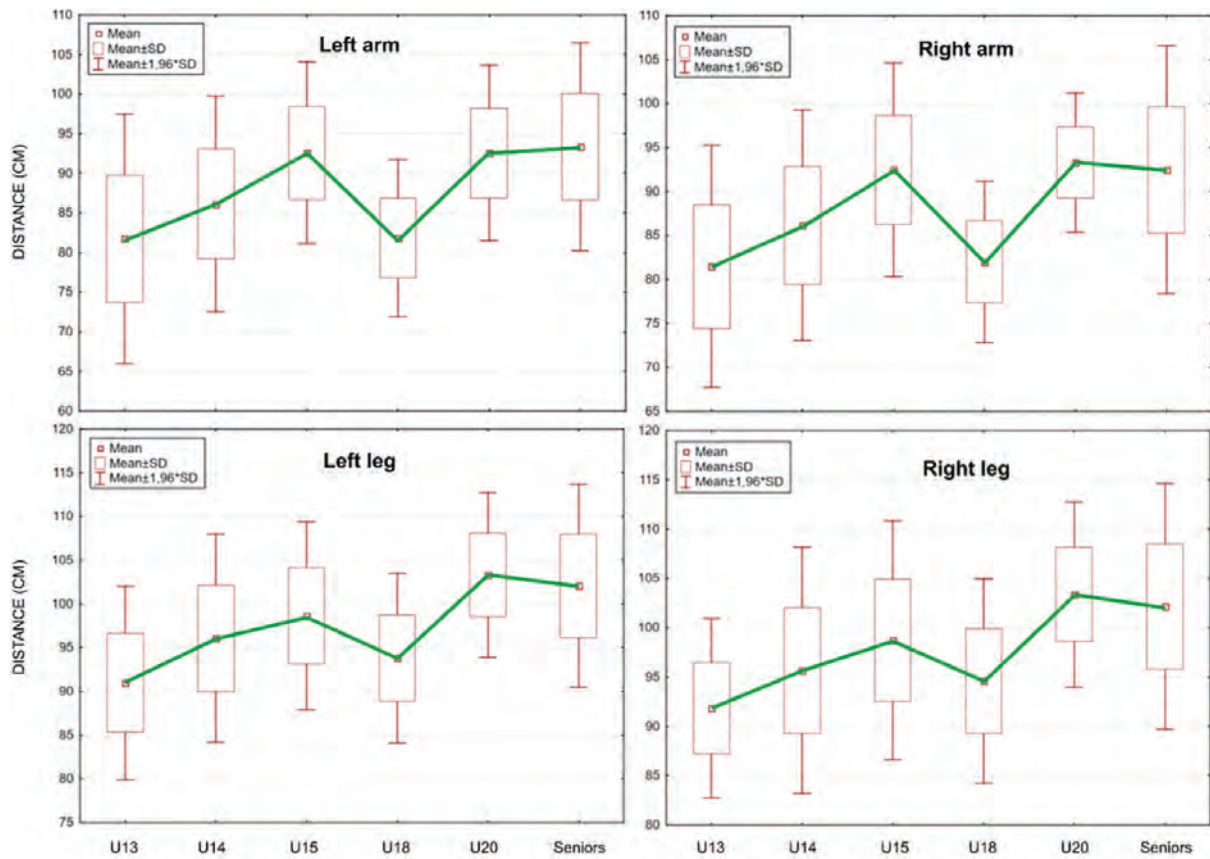
Figure 3. Comparison of examined categories – composite score

and the volume of one-sided loading increases with age. The U18 player category showed the lowest difference between the right and left limb in the distance reached, especially between the upper limbs. This may be attributed to the fact that U18 players participated twice weekly in a special training program aimed to develop core strength. To compare the levels of dynamic balance and core stability, players' test scores were normalized to limb length according to Gonell, Romero and Soler (2015). Figures 4 and 5 show differences in distances reached for each of the directions for both the right and left limb.
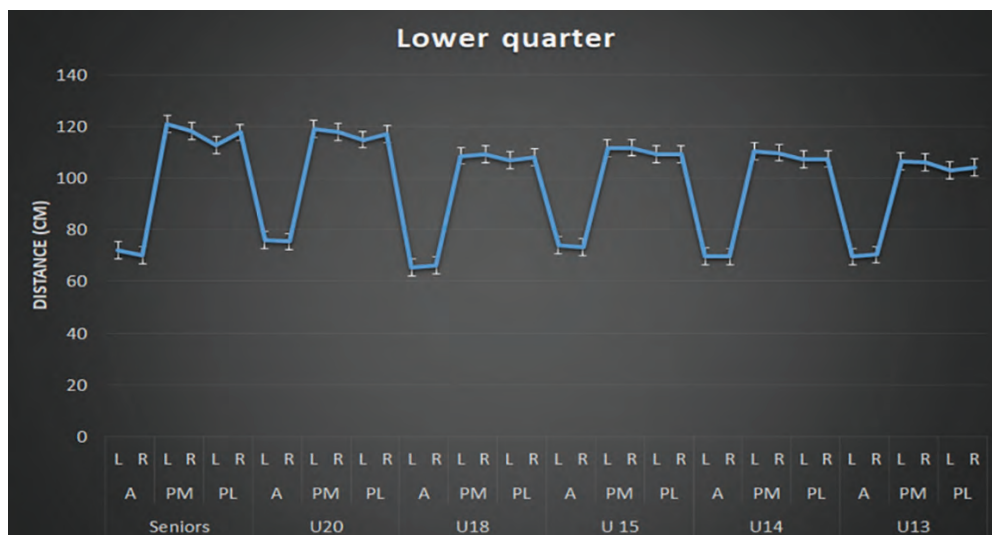
Legend: L – left leg, R – right leg, A – anterior reach,
PM – posteromedial reach, PL – posterolateral reach.

Figure 4. Normalized reach distance-lower quarter

Ice hockey as a sport that requires a high level of skating skills demands lower-body movements in the posteromedial and posterolateral directions. The anterior reach appears to be problematic in terms of dynamic balance.

Legend: L – left arm, R – right arm, M – medial reach, I – inferolateral reach,
S – superolateral reach.
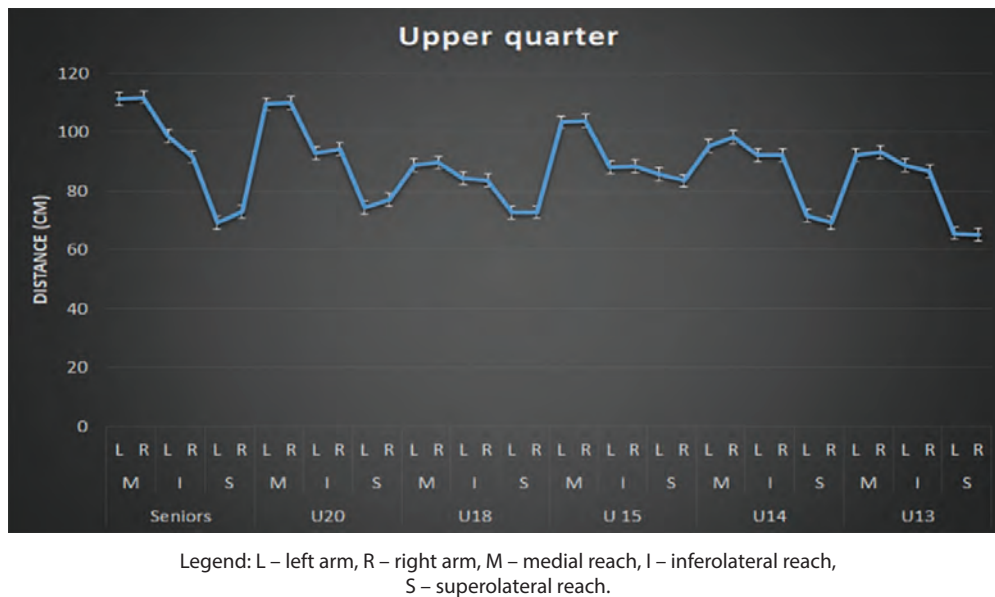
Figure 5. Normalized reach distance-upper quarter

From the viewpoint of mobility and upper-body stability, we may conclude that one-sided loading sustained by hockey players shows specifics caused by holding the stick. The superolateral reach appears to be problematic.

Discussion

Balance is one of the main elements of most physical activities and it is an important factor in the performance of sports skills (Abbasi, Tabrizi, Sarvestani, & Rahmanpourmoghaddam, 2012). Dynamic stabilization is ability to maintain equilibrium during the transition from motion to a stationary position, such as a landing movement (Myer, Ford, Brent, & Hewett, 2006). Dynamic balance is the capacity to maintain the center of mass over a fixed base of support under a movement challenge. For example, motion of other limbs and body segments (Di Stefano et al., 2011). Players use dynamic balance during tight turns and crossovers, shooting, and body contacts. Shifting the center of gravity is important when a player stands on a single leg or suddenly changes direction (Twist, 2007). The fastest natural development of dynamic balance occurs at the age between 9 and 11 years. The most critical period is the age between 11 and 13 years after which dynamic balance remains stable without targeted training stimuli (Bompa, & Carrera, 2015). Dynamic movement testing during the preparticipation examination is gaining popularity as a component of musculoskeletal screening with the goal of identifying increased injury risk (Gorman, Butler, Plisky, & Kiesel, 2012). The Lower Quarter Y Balance test (LQYBT) is a screen of dynamic balance requiring stance leg balance while the contralateral led reaches in anterior, posteromedial and posterolateral directions (Smith, Chimera, & Warren, 2015). The upper quarter Y-balance test (UQYBT) has been proposed as a closed kinetic chain assessment of upper quarter mobility and stability using a functional testing device (Westrick, Miller, Carow, & Gerber, 2012). Motion programs and exercises aimed at musculoskeletal system aim to prevent a reduction of the functional ability not only of the spine, but also muscles to the range of mobility and eliminate pain (Bendíková, Uvinha, & Marko, 2016). Otherwise deformation caused by a high degree of sports specialization and unilaterality of load occurs. Tyler,

Nicholas, Campbelland and McHugh (2001), who studied the relationship between lower body and skating, found that players with weaker adductor muscles were more likely to experience an adductor strain during the season. Furthermore, players whose adductors were markedly weaker than their abductors were more likely to experience an adductor strain. By contrast, adductor flexibility was not associated with adductor strains. As reported by Tyler et al. (2001), preseason hip strength testing of professional ice hockey players can identify players at risk of developing adductor strains. Hip adduction strength was 18% lower in players who subsequently sustained an adductor strain compared with that of uninjured players. Moreover, a player was 17 times more likely to sustain an adductor strain if his adductor strength was less than 80% of his abductor strength. Of methods applied to assess muscle imbalance, the Functional Movement Screen is considered reliable. Functional Movement Screen is a reliable test for young elite hockey players. This study demonstrates that the FMS is a reliable test for young elite hockey players. Physiotherapists as well as other health professionals involved with young hockey players could integrate the FMS into their clinical exam in order to suggest interventions that focus on movement pattern deficits observed during the sub-tests. It appears that pain can be an issue for the clearing exam scoring. Pain can also have an effect on whether or not a score of 0 should be attributed to the performance of the other sub-tests. This impact could be lessened by adding standardized questions which require clear yes or no answers. Interesting research avenues remain to be explored. The predictive validity of the FMS test within this population could be assessed. Moreover, further studies could investigate psychometric properties of the FMS in other populations vulnerable to overuse injuries due to a movement pattern deficit like workers performing physically demanding duties. This could promote the FMS test as an evaluation tool for physical therapy practice among various populations.

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ORIGINAL SCIENTIFIC PAPER

Relationship between Foot Length Measurements and Standing Height: a Prospective Regional Study among Adolescents in Southern Region of Kosovo

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Abstract

The purpose of this research is to examine standing height in both Kosovan genders in the Southern Region as well as its association with foot length, as an alternative to estimating standing height. A total of 225 individuals (120 male and 105 female) participated in this research. The anthropometric measurements were taken according to the protocol of ISAK. The relationships between standing height and foot length were determined using simple correlation coefficients at a ninety-five percent confidence interval. A comparison of means of standing height and foot length between genders was performed using a t-test. After that a linear regression analysis were carried out to examine extent to which foot length can reliably predict standing height. Results displayed that Southern Kosovan male are 178.61±5.73 cm tall and have a foot length of 26.31±1.17 cm, while Southern Kosovan female are 165.33±4.46 cm tall and have a foot length of 23.42±0.91 cm. The results have shown that both genders made Southern-Kosovans a tall group, but shorter than general Kosovan population. Moreover, the foot length reliably predicts standing height in both genders; but, not reliably enough as arm span. This study also confirms the necessity for developing separate height models for each region in Kosovo as the results from Southern-Kosovans don't correspond to the general values.

Key words: prediction, measurement, stature, foot length, Kosovan

Introduction

According to Komunat e Kosovës (2013), Kosovo is a democratic, multi-ethnic and secular republic which administratively is subdivided into seven districts (Ferizaj, Gjakova, Gjilan, Mitrovica, Peja, Pristina and Prizren) and five regions (Eastern, Western, Northern, Southern and Central). This study analyzes the standing height and its estimation utilizing foot length measurements in adolescents in southern region which contains five municipalities (Dragas, Malisheva, Mamusha, Prizren and Suva Reka/Suharekë). This region (Figure 1) covers the area of 1,397 square kilometers and has population of 331,670 inhabitants, while average density per square kilometer is 240 inhabitants (Komunat e Kosovës, 2013). Although Kosovo doesn't have too big territory, it has a very varied relief that mostly belongs to Dinarides range and the author assumed this fact might influence the main objective of this study, because of the type of the soil as well as other socio-economical and geographical characteristics as a potential influencing factors (Arifi, 2017; Arifi, Sermaxhaj, Zejnullahu-Raçi, Alaj, & Metaj, 2017b).

There are lots of scientific findings which confirms that the measurement of standing height is a vitally important variable when assessing nutritional status (cited in Arifi et al., 2017a; Datta Banik, 2011; Popovic, & Bjelica, 2016), as well as when

Figure 1. Geographical Location of Southern Region in Kosovo

assessing the growth of children, evaluating the basic energy requirements, adjusting the measures of physical capacity and predicting the drug dosage and setting standards of physiological variables such as muscle strength, metabolic rate, lung volumes and glomerular filtration (Golshan, Amra, & Hoghogi, 2003; M. Golshan, Crapo, Amra, Jensen, & R. Golshan, 2007; Mohanty, Babu, & Nair, 2001; Ter Goon, Toriola, Musa, & Akusu, 2011). However, according to Quanjer and his collaborators (2014), the exact standing height cannot always be identified and resolved in the usual way (e.g. paralysis, fractures, amputation, scoliosis and pain). Because of these factors, an estimate of standing height has to be acquired from other reliable anthropometric indicators such as hand and foot lengths, knee height, length of the forearm, length of the sternum, vertebral column length, sitting height, length of scapula, arm span as well as cranial sutures, skull, facial measurements et cetera (cited in Gardasevic, Rasidagic, Krivokapic, Corluka, & Bjelica, 2017; Popovic, 2017; Masanovic, 2017; Masanovic, Gardasevic, & Arifi, 2018a; Masanovic, Gardasevic, & Arifi, 2018b). Therefore, all these anthropometric indicators, which are used as an alternative to estimate standing height, are very important in predicting loss in standing height connected with aging. Also, to diagnose individuals with disproportionate growth abnormalities and skeletal dysplasia or standing height loss during surgical procedures on the spine (Mohanty et al., 2001), as well as to anticipate standing height in many older people as it is very difficult to measure it precisely, and sometimes impossible because of mobility problems and kyphosis (Hickson, & Frost, 2003). Lastly, it is important to state that this knowledge finds its importance in sport science the standing height represents a significant factor which influences the success in various sport disciplines (Popovic, 2017).

Several researches have reported the benefit of using various body parameters in predicting standing height, and arm span happened to be one of the most reliable ones in adults (Hickson, & Frost, 2003; Jalzem, & Gledhill, 1993; Mohanty et al., 2001; Ter Goon et al., 2011), while foot length measurement is the most reliable predictor during adolescent age, due to the

fact that ossification and maturation occurs earlier in the foot than the long bones and standing height could be more accurately predicted from foot measurement as compared to long bones during adolescent age (cited in Singh, Kumar, Chavali, & Harish, 2012). In addition, the relationship of long bones and standing height was found to vary in different ethnic and racial groups (Bjelica, Popovic, Kezunovic, Petkovic, Jurak, & Grasgruber, 2012; Brown, Feng, & Knapp, 2002; Popovic, Bjelica, Georgiev, Krivokapic, & Milasinovic, 2016; Popovic, Bjelica, Molnar, Jaksic, & Akpinar, 2013; Popovic, Bjelica, Tanase, & Milasinovic, 2015; Reeves, Varakamin, & Henry, 1996; Steele, & Chenier, 1990) as well as various regions (Arifi, 2017; Arifi et al., 2017b; Milasinovic, Popovic, Matic, Gardasevic, & Bjelica, 2016; Milasinovic, Popovic, Jaksic, Vasiljevic, & Bjelica, 2016; Masanovic, Gardasevic, & Arifi, 2018c). Hence, researchers have derived a specific formula for calculating standing height from long bones for each ethnic/race group. The mentioned variations might be the case with foot length predictions too, mostly due to the fact that the Dinaric Alps population has specific body composition than national as well as regional point of view (Popovic, 2017). Even though many studies with this essence are available on neighboring countries as well as worldwide population, only narrow data is available on Kosovan subjects, just one conducted by Popovic and his collaborators (Popovic, Arifi, & Bjelica, 2017a; Popovic, & Bjelica, 2017) that has covered whole Kosovan population, and one regional analyses that confirmed Western-Kosovans have specific standing height/foot length ratio, comparing to general population in Kosovo (Popovic, Gardasevic, Masanovic, Arifi, & Bjelica, 2017b). Considering rather sparse recent scientific literature, the purpose of this research was to examine the standing height in both Southern-Kosovan genders and its association with foot length.

Methods

The nature of this research gave extension to the 225 high-school students last year (120 male and 105 female) from Southern Region of Kosovo to be subjects. Two reasons which qualified the selected individuals are: the first is related to the fact that the growth of an individual ceases by this age, while the second is related to the fact that there is no age-related loss in standing height at this age. The average age of the male subject was 18.40±0.56 years old (range 18-20 years), while the average age of the female subject was 18.36±0.50 years old (range 18-20 years). It is important to underline that the researchers have excluded from the data analysis of the individuals with physical deformities as well as those without informed consent. The exclusion criterion was also being non-Southern Kosovan.

The anthropometric measurements, including standing height and foot length, were taken according to the protocol of the International Society for the Advancement of Kinanthropometry (Marfell-Jones, Olds, Stew, & Carter, 2006). The trained measurers have measured selected anthropometric indicators (same measurer for each indicator), while the quality of their performance was evaluated against the prescribed "ISAK Manual". Lastly, the age of the each subject was reached directly from the birthdays.

The analysis were performed by using the Statistical Package for Social Sciences (SPSS) version 23.0. Means and standard deviations (SD) were obtained for both anthropometric variables. A comparison of means of standing height and foot length between genders was performed using a t-test. The relationships between standing height and foot length

were determined using simple correlation coefficients at nine-ty-five percent confidence interval. Then a linear regression analysis were carried out to examine the extent to which the foot length can reliably predict standing height. Statistical significance was set at p<0.05.

Results

A summary of the anthropometric measurements in both genders is shown in Table 1. The mean of the standing height for male was 178.61±5.73 centimeters and foot length was 26.31±1.17 centimeters, while for female the standing height was 165.33±4.46 centimeters and foot length was 23.42±0.91 centimeters. The sex difference between standing height and foot length measurements was statistically significant (standing height: t=19.183; p<.000, and foot length: t=20.530; p<.000).

Table 1. Anthropometric Measurements of the Study Subjects

Subjects	Standing Height Range (Mean±SD)	Foot Length Range (Mean±SD)
Male	164.6-192.3 (178.61±5.73)	23.30-31.00 (26.31±1.17)
Female	158.0-184.0 (165.33±4.46)	21.20-27.00 (23.42±0.91)

In Table 2, the simple correlation coefficients and their ninety-five percent confidence interval analysis between the anthropometric measurements are displayed. The associations between standing height and foot length were significant (p<0.000) and high in this sample, regardless of gender (male: 0.704; female: 0.502).

Table 2. Correlation between Standing Height and Foot Length of the Study Subjects

Subjects	Correlation Coefficient	95% confidence interval	Significance p-value
Male	0.704	0.599–0.869	<0.000
Female	0.502	0.350–0.704	<0.000

The results of the linear regression analysis are shown in Table 3. The first of all models were extracted by including age as a covariate. However, it was found that the contribution of age was insignificant and therefore the age was dropped and estimations were derived as a univariate analysis. The high values of the regression coefficient (male: 0.704; female: 0.502) signify that foot length notably predicts standing height in both Southern-Kosovan genders (male: t=10.78, p<0.000; female: t=5.90, p<0.000), which confirms the R-square (%) for the male (49.6) as well as for the female (25.2).

Table 3. Results of Linear Regression Analysis Where the Foot Length Predicts the Standing Height

Subjects	Regression Coefficient	Standard Error (SE)	R-square (%)	t-value	p-value
Male	0.704	4.088	49.6	10.78	0.000
Female	0.502	3.871	25.2	5.90	0.000

The associations between foot length measurements and standing height among the above models is sketched as a scatter diagrams (Figure 2).
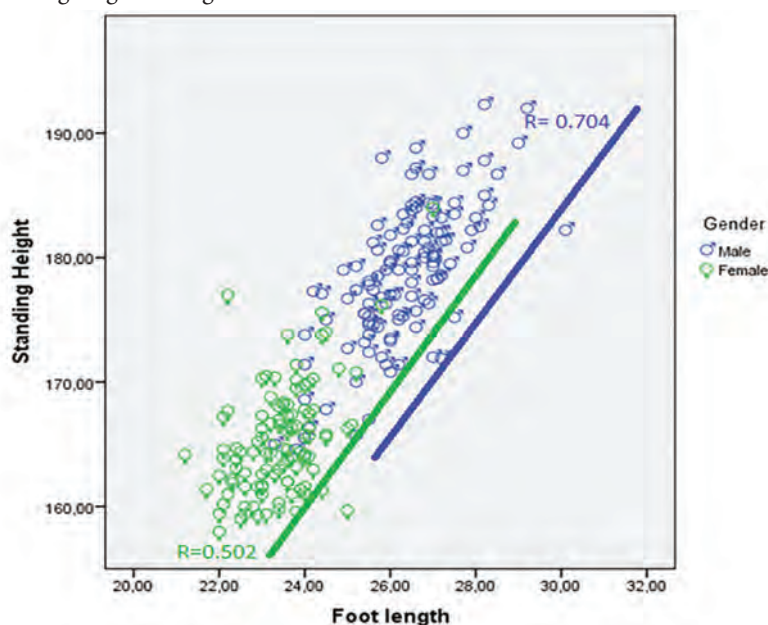

Figure 2. Scatter Diagram and Relationship between Foot Length Measurements and Standing Height among Both Genders

Discussion

The assessment of standing height using various anthropometric measures is very typical from the past centuries and it has been attempted to be studied by many researchers. However, it is important to underline that the arm span has been obtained as the most reliable body indicator for predicting the standing height of an individual (Mohanty et al., 2001; Ter Goon et al., 2011), while foot length is was very close (Kanchan et al., 2008; Singh et al., 2012; Uhrova et al., 2015). In parallel, it is important to emphasize that the individual and ethnic variations referring to standing height and its association with foot length might vary from ethnic group to ethnic group as well as race to race, because the racial and ethnic differences are affective on these measures and reduce the possibility of generalizing (cited in Bjelica et al., 2012). This fact confirms the study conducted by Chinese authors (Cheng et al., 1998) who confirmed a very high linear correlation between standing height and foot length in both genders, as well as in another study which confirmed that foot length can explain up to 77% variations in standing height (cited in Uhrova et al., 2015), while the research study conducted by Uhrova and her collaborators (Uhrova et al., 2015) shows significant correlation between standing height and all measure anthropometric parameters in both genders of Slovak population. The highest correlation coefficient in this population was found for foot length in males (r=0.71) as well as in females (r=0.63).

All above-mentioned have confirmed the necessity for developing separate standing height models for each population on account of ethnic differences and the recent study conducted by Popovic and his collaborators (Popovic et al., 2017a; Popovic, & Bjelica, 2017) who have analyzed the entire Kosovan population and have found specific correlation coefficient in Kosovan male (r=0.669) and female (r=0.625) population; however, some recent studies have also confirmed the regional differences between the same ethnic groups too (Arifi, 2017; Arifi et al., 2017b; Popovic et al., 2017b; Milasinovic et al., 2016a; 2016b), which caused the need for additional caution, mostly due to the reason one of them was sampled by Western-Kosovans. Therefore, the main goal of this research was to test the hypothesis if above-mentioned facts are true for the Southern-Kosovans, that is, for the one of five Kosovan regions. Hence, in the present research it was remarked that the foot length/standing height ratio in Southern-Kosovan is quite bigger in male and quite lesser in female gender (male: 49.6%; female: 25.2%) comparing to entire Kosovan (male: 44.3%; female: 38.6%) and Western-Kosovans (male: 40.2%; female: 39.4%)as well as other available population that estimate over 70% each and more in male population, while female population is much more in parallel to previously measured populations.. As the correlation between foot length and standing height was significant in both Southern-Kosovan genders, the foot length measure therefore seems to be a reliable indirect anthropometric indicator for estimating standing height in both genders of Southern-Kosovan population. Even though these relations are similar, the estimation equations, which are obtained in the Southern-Kosovans, considerably differ from entire Kosovan, Western-Kosovans and other available populations.

The results of the study conducted by Popovic and his collaborators (Popovic et al., 2017a; Popovic, & Bjelica, 2017) confirm the necessity for developing separate standing height models for both genders in Kosovo but the authors of the same study have recommended that further studies should consider dividing the population of this country to regional subsamples and analyze it separately, just to be sure there are no geographical differences (such as type of the soil) influencing the average standing height in both Kosovan genders as well as its association with foot length. This concern was based on the fact that entire Kosovo doesn't fall into Dinaric Alps racial classification. In parallel, this study confirms the assumption mentioned above and also confirms that it is necessary to develop separate standing height models for each population on account of regional variations in Kosovo.

Next to highlighted issue, the obvious constraint of this research might also be the composition of the measured sample that consisted of high school students. This limitation is based on the fact there are some studies which assumed the growth of an individual doesn't cease by this age (Grasgruber, P., personal communication, 2016; Jurak, G., personal communication, 2017). This assumption might be supported by the fact that university-educated individuals have been founded to be taller than the high school population in Bosnia and Herzegovina (Grasgruber et al., 2017; Gardasevic et al., 2017), Poland (Wronka, & Pawlinska-Chmara, 2009) and Hungary (Szollosi, 1998). On the other hand, this wasn't the truth in Montenegro (Popovic, 2016) and comparing the average standing height measures of this study to the results of some study sampled by university students might give the science much precise conclusions. One more obvious limitation of this study is also the fact that both genders of Kosovo did not reach their full genetic potential yet, since various environmental factors controlled their development. Further continuous monitoring is necessary, mostly due to the reason it is expected the secular changes influencing standing height will ascend in the following two or three decades.

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ORIGINAL SCIENTIFIC PAPER

Women's Well-Being, State and Trait Anxiety Regarding their Sport Activity

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Abstract

The aim of the paper is to identify the level of women's wellbeing regarding their sport activity, whereby we assume that athletes will have a higher level of wellbeing. The second aim is to determine the relationship between the individual dimensions of wellbeing and the level of state anxiety and trait anxiety. The research group consists of 107 women (20.03±1.47 years), divided into groups based on their sport activity (active 62, inactive 45). We used the standardized BDP questionnaire to determine the level of wellbeing. We used the standardized STAI questionnaire to determine the level of anxiety. We recorded a higher value of personal well-being in the sample of women actively participating in sport activities. In both the samples, we found an indirect relation between positive dimensions of personal well-being and state anxiety (in the case of the sample of women not participating in any sport activity even with trait anxiety). A direct relation between the negative dimensions of wellbeing and the level of state as well as trait anxiety was recorded only in the sample of women not participating in any sport activity. Our results correspond with other findings which suggest that regular sport activity increases the level of women´s personal well-being. In the same time, our results partially correlate with research according to which state anxiety and trait anxiety tends to influence subjective personal well-being negatively. Our findings indicate that sport activity can be a suitable instrument to increase women´s personal well-being.

Key words: well- being, anxiety state, anxiety trait, sport activity, women

Introduction

For a long time, the positive aspects of human life were not given adequate attention in psychology. Personal wellbeing has only come to the forefront of interest in psychological research in the last 20 years (Blatný et al., 2010). Personal wellbeing can be defined as a long-term emotional state that includes bodily, mental and social aspects, and makes a significant contribution to the overall quality of human life. The concept of personal wellbeing is applied in practice for states that last at least for weeks, rather than moments (Diener, & Biswas-Diener, 2008). In the literature on personal wellbeing its composition varies from author to author. The constructs used to represent personal wellbeing include long-lasting positive and negative emotional states, happiness, life satisfaction in major areas of life and self-evaluation or self-esteem (Sirgy, 2002 in Blatný et al., 2010).

A similar definition of personal wellbeing is used in Blatný et al. (2010), where it is described as a "long-lasting or persistent emotional state reflecting a person's overall satisfaction with their own life. A state of personal wellbeing can be expressed by varied emotional experience and cognitive content and therefore it is not considered a simple construct but rather a broad and diverse category of psychological variables." One of the aspects of personal wellbeing is physical fitness. This is the effect of sports activities on personal wellbeing and its dimensions. The term wellbeing is associated with both a holistic conception of health and a comprehensive understanding of lifestyle that includes multiple risks and protective factors. A high level of personal wellbeing can be taken as an indication of good prospects for handling long-term stress.

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Our work focuses on the relationship between personal wellbeing and sport, in particular the effect of participation in sports on aspects of personal wellbeing. For this reason, we adopt the definition of personal wellbeing used by Grob et al. (1991, in Džuka, 1995), where the construct includes both positive and negative dimensions. The positive dimensions include a positive attitude to life and a positive self-evaluation while the negative dimension includes depressive moods, physical problems and awareness of problems. With regard to differences between the sexes, Ryff (1989) claims that women score higher than men in the social component of personal wellbeing.

For the purposes of this research, it is necessary to clarify the distinction between state and trait anxiety. Slepička, Hošek and Hátlová (2011) describe anxiety as "an indistinct apprehension of danger that the subject is unable to describe or define precisely, but experiences as a very unpleasant sensation accompanied by rich somatic activation." Höschl, Libiger and Švestka (2004) also emphasise that anxiety is an "unpleasant emotional state whose cause cannot be precisely defined. It is a feeling that some threat is about to be realised but the person cannot formulate what it should be." The common factor in these definitions is that the cause of anxiety, the thing that evokes unpleasant subjective states in the individual, is not precisely defined. Expressions of anxiety are decidedly individual in character. Basic manifestations include going red in the face or extremely pale, changes in the voice, changes of posture, pain and pressure in the head, dizziness, tightness of the chest, trembling, overall weakness, disturbed sleep, sadness, decreased mental power, an overall bad mood and negative thoughts, feelings of hopelessness and helplessness. Praško, Vyskočilová and Prašková (2006) define the typical expressions of excessive anxiety based on its behavioural manifestations. The authors call them coping forms of behaviour. They divide them into avoidant behaviours (which lead only to a short-term reduction of anxiety and do not give the individual a chance to determine the difficulty of the stressful situation or the degree of stress that the situation causes the given individual), delaying (causing the accumulation of anxiety), seeking assistance and reassurance (directed mainly towards others- family, friends, loved ones), perfectionist behaviour (relating not only to a momentary experience of anxiety but also to anxiety as a character trait- striving to be perfect in all directions and fixation on details), neurotic phenomena that are revealed during the experience of anxiety- tapping feet or crossing legs, playing with random objects, biting nails, excessing eating, excessive smoking or alcohol use.

In contrast, trait anxiety is a longer-lasting aspect of personality that is mainly constitutional and causes the individual to experience frequent and excessive states of anxiety (Matějček, 2011). It can be described as a predisposition for the individual to experience anxiety and to react and behave anxiously.

Experiencing stress is one potential cause of anxiety (Lazarus, & Folkman, 2000). However, as the cited definition indicates, anxiety can present itself not only as a response to a stressful situation but also as an indistinct fear in advance of a difficult situation, or it can persist after a stressful situation has passed. Authors have linked such manifestations of anxiety to stress situations through the symptoms of post-traumatic stress disorder, which means that the experience of anxiety can last for a longer period (R.L. Atkinson, R.C. Atkinson, Smith, Bemd, & Nolen-Hoeksema, 1995). The present paper explores

the possibility of a correlation of both anxiety as an experienced state and anxiety as a personality trait with personal wellbeing. Multiple studies have shown that adolescents with low levels of state and trait anxiety achieve higher scores for quality of life and personal wellbeing (Babinčák, Kačmárová, & Mikulášková, 2015).

One of the factors influencing individuals' anxiety levels is age. On average, anxiety is highest between the ages of twenty and thirty and then decline. Nevertheless, the development of an individual's anxiety must always be understood in terms of its specific aspects and the individual's experiences (Říčan, 2010). Research has also shown that there are aggregate differences in anxiety levels between the sexes. Both older and more recent research indicates that women experience anxiety more than men (Maeng, & Milad, 2015; Stewart, Taylor, & Baker, 1997; Breslau, Schultz, & Peterson, 1995). A frequently studied topic is the question of the relationship between a person's sports activity and their subjective experience. Sports activity is seen as an important aspect of life from several points of view including health, regeneration, social relationships and as part of life style. This paper works with the definition of sports activity in Fuchs, Klaperski, Gerber and Seelig (2015) as physical activity with increased energy expenditure that people engage in for pleasure, socialisation or health reasons. Research has generally tended to confirm the positive effect of sport in terms of mental wellbeing, self-esteem, stress relief and reduced symptoms of depression (Donaldson, & Ronan, 2006; Penedo, & Dahn, 2005; Hassmén, Koivula, & Uutela, 2000). In our view, this is because sports, whatever the athlete's level or aim, provide many benefits including mental hygiene, relaxation and increased self-confidence.

Methods

The research population was 107 women (20.03±1.47 years) divided into groups based on sports activity (62 sports participants-athletes and 45 sports non-participants-non athletes). The condition for classification as an athlete was to participate in at least three sports training sessions per week continuously for one year, regardless of whether their purpose was recreation or performance improvement.

The level of personal wellbeing was assessed using the Berne Wellbeing Questionnaire (BFW) originally developed by Grob et al. (1991) and standardised for Slovakia by Džuka (1995). The standardised questionnaire consists of 28 questions covering separate aspects of an individual's subjective wellbeing. The questionnaire implicitly works with three basic components of subjective wellbeing: habitual mental wellbeing, current mental wellbeing and current physical wellbeing (Džuka, 1995). The responses to the questions and items use 6-point Likert scales. The questions in the questionnaire can be plotted on five scales or dimensions (Džuka, 1995):

Dimension 1- Positive attitude to life: questions on the respondent's attitude to life events and the belief that one is leading a meaningful life

Dimension 2- Problem awareness: questions on the respondent's recognition and awareness of problems in their personal and environment

Dimension 3- Physical problems and reactions: questions measuring the physical reactions and related problems

Dimension 4- Self-evaluation: questions on the respondent's self-acceptance and their belief in their own value and ability to achieve goals

Dimension 5- Depressive mood: questions where a high score indicates the absence of enjoyment and meaning in life

Levels of state and trait anxiety were measured using the STAI questionnaire developed by Spielberger, Gorsuch and Lushene (1970, Slovak standardisation by Ruisel et al., 1980). The standardised questionnaire is based on two scales: x-1 and x-2. Scale x-1 is designed to measure the current state, which means the respondent's conscious subjective feelings of stress, tension, worry and fear, which vary in intensity and change over time. Half the items in the scale relate to their presence and the other half relate to their absence. Scale x-2 is designed to measure trait anxiety as a characteristic or tendency while respecting "individual differences in the tendency to perceive the world, the disposition to respond in a specific and predictable manner, individual differences in the expression of special emotional states and the positive correlation between the strength of personality and the intensity of the corresponding emotional state." The result for both scales is a whole number obtained by totalling the scale values (taking account of reversal scoring). The higher the score, the higher the level of state (x-1) or trait (x-2) anxiety. Ruisel et al. (1980) note that "in our part of the world, several original studies have been conducted confirming the validity of the theoretical model measuring anxiety as a trait and state, and also the utility of the STAI diagnostic method" (Ruisel et al., 1980).

The data was statistically tested- the Kolmogorov-Smirnov test was used to test for normality of distribution; the Mann-Whitney U-test was used to test differences between samples; and the Pearson correlation coefficient was used to determine the strength of the relationship between variables. Effect size was calculated using the coefficient r (r≥0.9- very strong relationship; r=0.7-0.9- strong relationship; r=0.5-0.7- moderately strong relationship; r = 0.3-0.5- weak relationship; r≤0.3- very weak relationship) (Pett, 1997).

This study was approved in advance by Ethics committee of Faculty of physical education and sport, Comenius University. Each participant voluntarily provided written informed consent before participating."

Results

Data evaluation looked at the relationship between respondents' average scores in the positive (Positive attitude to life and Self-evaluation) and negative (Physical problems, Depressive mood and Problem awareness) dimensions of personal wellbeing and whether they participated in sports activities or not.

The dimension of Positive attitude to life is made up of items determining the individual's view of their future, their enjoyment of life, the pleasure in life and the like. Women who participate in sport (athletes) have higher average scores than those who do not participate (non-athletes). The sample of women who participate in sport at least three times a week achieved an average point score of 4.20±0.10 points. The average score for non-athletes was 3.49±0.13 points. The difference between the two samples was therefore 0.71±0.16 in favour of women who participate in sports. This difference was significant at the 1% significance level (U=674.5; p=0.00; r=0.48). Similar results were found in the Self-evaluation dimension. The average score for women athletes was 4.52±0.11 points, while women non-athletes scored 3.96±0.12 points. The difference between the average scores for the samples is 0.56±0.17 in favour of women athletes. This result was significant at the 1% significance level (U=876; p=0.00; r=0.32). In both positive dimensions of personal wellbeing, women athletes achieved significantly higher scores than non-athletes.

The groups' results in the negative dimensions of personal wellbeing were also analysed. The Problem awareness dimension includes items on respondents' concerns about people around them, their own interpersonal relationships, their work, their health, their aging, their partner and their finances. There was a higher average score among non-athletes (2.63±0.11 points) than among athletes (1.97±0.08 points). The difference between the two groups' average results is 0.66±0.13 points, which is significant at the 1% significance level (U=662.5; p=0.00; r=0.44). The dimension for Physical problems includes items on somatic problems such as levels of pain, fatigue, loss of appetite, presence of illness, dizziness or heart palpitations. In this dimension the women non-ath-
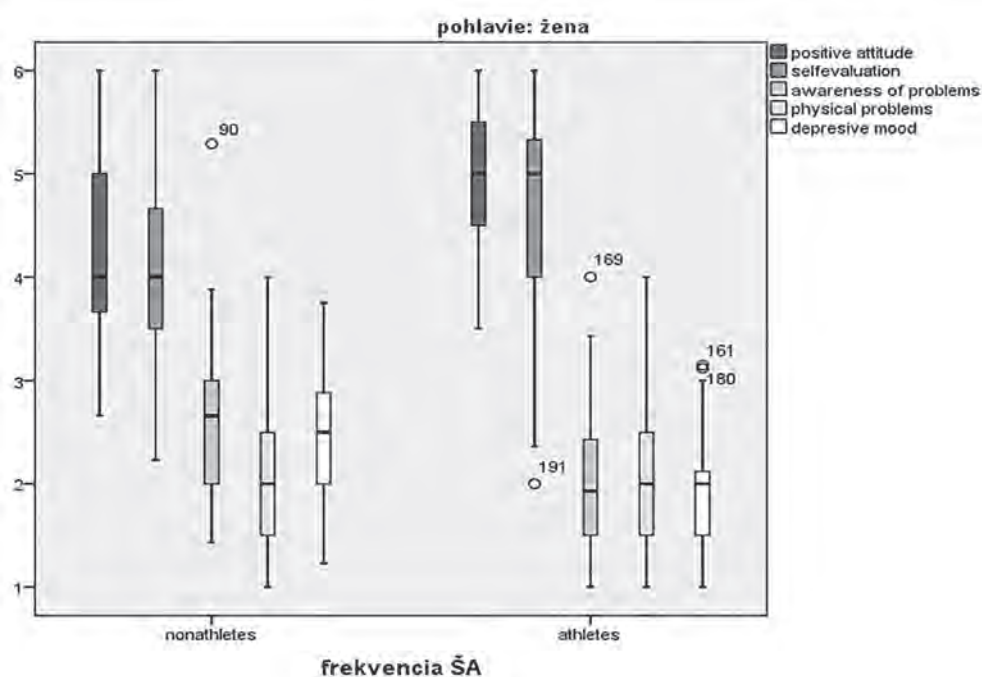

Figure 1. Average values for each dimension of the personal wellbeing of women athletes and non-athletes

letes had a higher average score (2.06±0.11 points). The average score for the group participating in sport was 1.94±0.09 points. The difference between the two groups' average results is 0.12±0.13 points, which is not statistically significant (U=1237.5; p=0.32; r=0.09).

The dimension Depressive mood is made up of items on activity levels, interest in other people, general interests and the like. Women non-athletes had the highest score in this dimension (2.47±0.84 points). The average score of women ath-

letes was 1.85±0.06 points. The difference between the average results of athletes and non-athletes was 0.62±0.10 points. This difference was significant at the 1% significance level (U=575; p=0.00; r=0.50) (Figure 1).

The results show that in all three negative dimensions of personal wellbeing non-athletes had a higher average score than athletes, but these results were statistically significant only for the dimensions Depressive mood and Problem awareness (Table 1).

Table 1. Average values for each dimension and the differences between women athletes and non-athletes

Dimension of wellbeing	Sport activity	Median	Mean	Mann- Whitney U	p- value
Positive attitude	athletes	4.38±0.86	4.5±0.09	393.5	0.00**
	nonathletes	3.73±0.84	3.66±0.14		
Self evaluation	athletes	4.83±0.86	4.77±0.12	466.0	0.00**
	nonathletes	3.94±1.0	3.95±0.17		
Awareness of problems	athletes	1.87±0.63	1.96±0.08	662.5	0.00**
	nonathletes	2.58±0.73	2.62±0.11		
Physical problems	athletes	1.91±0.68	1.94±0.09	1237.5	0.32
	nonathletes	2.13±0.68	2.06±0.01		
Depresive mood	athletes	1.92±0.51	1.85±0.06	575.0	0.00**
	nonathletes	2.47±0.56	2.47±0.08		

Another aim of the present research was to analyse the relationships between the dimensions of personal wellbeing and levels of state and trait anxiety in relation to sports activity. Among women athletes there was a negative correlation between scores for the positive dimension of personal wellbeing-positive attitude and levels of state and trait anxiety. This rela-

tionship is statistically significant at the 1% significance level in both cases. A positive correlation at the 5% significance level was found between scores in the dimension Problem awareness and levels of state and trait anxiety. There is also a significant positive correlation between respondent's physical problems and their level of depressive mood (Table 2).

Table 2. Relationship between dimensions of personal wellbeing and state and trait anxiety for women participating in sports

	Positive attitude	Self evaluation	Awareness of problems	Physical problems	Depresive mood	Anxiety state	Anxiety trait
Positive attitude	1.00	0.17 0.20	0.07 0.59	-0.16 0.21	-0.14 0.06	-0.35** 0.01	-0.38** 0.00
Self evaluation	0.17 0.20	1.00	0.18 0.16	-0.17 0.20	-0.11 0.42	-0.14 0.29	0.03 0.82
Awareness of problems	0.07 0.59	0.18 0.16	1.00	0.14 0.26	-0.02 0.86	0.26* 0.04	0.26* 0.04
Physical problems	-0.16 0.21	-0.17 0.20	0.14 0.26	1.00	0.32* 0.01	0.52** 0.00	0.32* 0.01
Depresive mood	-0.24 0.06	-0.11 0.42	-0.02 0.86	0.32* 0.01	1.00	0.18 0.15	-0.04 0.74
Anxiety state	-0.35** 0.01	-0.14 0.29	0.26* 0.04	0.52** 0.00	0.18 0.15	1.00	0.73** 0.00
Anxiety trait	-0.38** 0.00	0.03 0.82	0.26* 0.04	0.32* 0.01	-0.04 0.74	0.73** 0.00	1.00

In the sample of women non-athletes, there were several significant relationships between the dimensions of personal wellbeing and levels of state and trait anxiety. A positive correlation was found between the score for the negative dimension Problem awareness and levels of state anxiety (5% significance level) and trait anxiety (1% significance level). This was to be expected in view of the content of these variables. A significant positive correlation was found between the scores in all three negative dimensions of personal wellbeing and levels of state and trait anxiety, and a negative correlation was found

between the scores in the two positive dimensions of personal wellbeing and levels of state and trait anxiety.

There was also a significant correlation between the scores in each dimension of personal wellbeing. Between the positive dimensions of personal wellbeing- Positive attitude to life and self-evaluation there is a positive relationship at the 1% significance level and there is also a negative correlation at the 1% or 5% significance level between the scores in each negative dimension of personal wellbeing and each positive dimension of personal wellbeing (Table 3).

Table 3. Relationship between dimensions of personal wellbeing and state and trait anxiety for women not participating in sports

	Positive attitude	Self evaluation	Awareness of problems	Physical problems	Depresive mood	Anxiety state	Anxiety trait
Positive attitude	1.00	0.47** 0.00	-0.39** 0.01	-0.39** 0.00	-0.55** 0.00	-0.50** 0.00	-0.47** 0.00
Self evaluation	0.47** 0.00	1.00	-0.30* 0.05	-0.32* 0.03	-0.47** 0.00	-0.51** 0.00	-0.56** 0.00
Awareness of problems	-0.39** 0.01	-0.30* 0.05	1.00	0.22 0.14	0.38** 0.01	0.37** 0.01	0.55** 0.00
Physical problems	-0.39** 0.00	-0.32* 0.03	0.22 0.14	1.00	0.50** 0.00	0.51** 0.00	0.37* 0.01
Depresive mood	-0.55** 0.00	-0.47** 0.00	0.38** 0.01	0.50** 0.00	1.00	0.42** 0.00	0.55** 0.00
Anxiety state	-0.50** 0.00	-0.51** 0.00	0.37* 0.01	0.51** 0.00	0.42** 0.00	1.00	0.71** 0.00
Anxiety trait	-0.47** 0.00	-0.56** 0.00	0.55** 0.00	0.37* 0.01	0.55** 0.00	0.71** 0.00	1.00

Discussion

The results confirm the frequently discussed beneficial effects of sports on women's subjective experience of personal wellbeing. The findings also show that women who take part in sports have a stronger positive attitude to life and greater self-esteem than women who do not take part in sports. There was also a significantly greater level of Depressive mood and Awareness of problems among women non-athletes than athletes.

These findings are in line with previous research in this area. Cramer, Nieman and Lee (1991) studied the relationship between regular sports activity and personal wellbeing. The research sample comprised women from the USA. The results of the authors' research showed that sport increased respondents' personal wellbeing. Fox (1999) also demonstrated a positive effect of sports activity on the personal wellbeing of English women. Penedo and Dahn (2005) and McAuley and Rudolph (1995) demonstrated sport's positive effect on the positive aspects of women's personal wellbeing. Weyerer and Kupfer (1994) showed that physical activity increased the level of personal wellbeing and could even fulfil a preventative function. Our findings on the negative aspects of personal wellbeing are in line with the results of De la Cruz-Sanchez et al. (2011), who studied the relationship between sports leisure activities and personal wellbeing in a sample of 29,000 men and women living in Spain. The authors concluded that sports leisure activity was associated with a lower incidence of negative mental health indicators such as depressive mood, depression and anxiety.

Looking more in depth, the findings of the present research demonstrated a significant difference between women who do and do not participate in sport in the dimension of depressive mood at the 1% significance level. Research by Ensel and Lin (2004) with American respondents found that the more an individual takes part in sport, the less they manifest negative mental and somatic symptoms, which supports our findings regarding negative aspects of personal wellbeing. The results of the present research support a general recommendation for women to engage in at least three sports training sessions per week to strengthen the positive aspects of their personal wellbeing- in particular their positive attitude to life and their level of self-evaluation (self-esteem).

Our research also found a significant link between the level of personal wellbeing and certain aspects- positive attitude, awareness of problems and physical problems- with the levels of state and trait anxiety in women who participated in sport and a significant relationship between all aspects of personal wellbeing and levels of state and trait anxiety among women who did not take part in sports. The research showed that for women who participated in sport, increasing levels of anxiety were associated with increasing awareness of problems and physical problems, and a decreasing positive attitude to life. As regards trait anxiety, it can be said that the higher its level, the greater the awareness of problems and the level of physical problems, and the lower the respondent's positive attitude to life. In the case of women not participating in sport, increasing levels of state and trait anxiety were associated with increases in all three negative dimensions of personal wellbeing and lower levels of both positive dimensions of personal wellbeing. These findings are additional evidence of the frequently discussed benefits of sports activity for human experience.

Our research also examined the question of the relationship between the different aspects of personal wellbeing and levels of state and trait anxiety. Domestic and foreign research has tended to map factors affecting quality of life in aggregate and the construct of personal wellbeing as a "subcategory" of quality of life has received relatively little attention. Our findings correspond to some extent with other findings that states of anxiety (Diener et al., 1999) and anxiety as a personality trait (De Neve, & Cooper, 1998) tend to have a negative effect on subjective personal wellbeing. Our research in this area was inspired by the finding of Babinčák, Kačmárová and Mikulášková (2015) that the level of anxiety as a personality trait contributed to variability in values for quality of life in several of its aspects. They conclude that a person's trait anxiety is the strongest predictor of subjective evaluation of quality of life in both the psycho-social and cognitive areas.

Knowledge of this area remains limited, however, and it deserves more detailed attention. Although there are strong indications of a connection between the mentioned variables, it is not necessarily clear how anxiety and the aspects of personal wellbeing determine each other. Further research would also help to identify ways to work with the experience of stress to increase women's personal wellbeing.

The results of the present research demonstrate a higher level of personal wellbeing among women who participate in sports in the sense that there was a higher level of the positive aspects of personal wellbeing and also lower levels of the negative aspects. This means that our findings on the positive aspects of personal wellbeing are supported by the findings on negative aspects- the lower levels of negative aspects of personal wellbeing among women athletes can be seen as significant supporting information for findings on the level of positive aspects for women in relation to their participation in sports. The findings contribute to our overall understanding of the personal wellbeing of women who do and do not participate in sports.

Anxiety, whether as a temporary state or a personality trait, is a factor that can have a strong influence on a person's daily life. Women's predisposition to anxiety and their experience of anxiety are greater than men's, which is why the present study focuses on women. It would be interesting for future research to compare men's and women's levels of state and trait anxiety. As we see the quality of personal wellbeing is an important part of human life, it would be useful to pursue further research into the relationships between the aspects of personal wellbeing and the experience of state and trait anxiety among women because the results of the present work indicate several significant positive and negative relationships between these variables. Observing the increase in the experienced level of positive aspects and the corresponding decrease in negative aspects of personal wellbeing, it would be useful to detect how these variables determine and influence each other.

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

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ORIGINAL SCIENTIFIC PAPER

The Relationships between Professors' Super-Leadership, Self-Leadership, and Career Preparation Behavior in College Students

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Abstract

The present study investigated the structural relationship among professors' super-leadership, students' self-leadership, and students' career preparation behavior in students majoring in physical education in South Korea. The results of analysis of the final 232 responses using SPSS 23.0 and AMOS 23.0 statistical programs were as follows. The modeling, goal setting, and encouragement and guidance of super-leadership of university physical education professors improved the behavioral strategies of students' self-leadership. In addition, the modeling and goal setting were found to improve cognitive strategies. Other sub-factors were not statistically significant. Lastly, the behavioral and cognitive strategies of students' self-leadership increased their career preparation behavior. The results of the present study are expected to be useful not only for professors who guide students but also students in these days of a low youth employment rate.

Key words: *super-leadership, self-leadership, career preparation, college students*

Introduction

Need and purpose of research

The financial crisis triggered by the bankruptcy of the investment bank Lehman Brothers in 2008 drove the global economic situation into secular stagnation. The low economic growth rate has still not readily recovered and causes serious unemployment problems. According to the "employment trends report" published by Statistics Korea (2017), the unemployment rate of youth is almost 9.3% while the unemployment rate of the economically active population is only 3.6% with 1,003,000 unemployed out of 27,828,000. In particular, the increase in the number of unemployed people in the second half of their 20s (25–29 years) was the highest since 2000 when statistical indicators were formalized. It appears that first employment age is delayed due to students building up their qualifications or a phenomenon of rapid increase in the number of so-called "young job applicants" who are not successful in getting a job. Such a condition can be considered to reveal an aspect of the seriousness of unemployment problems among young people in present society.

College students must perform effective career preparation behaviors such as building up qualifications and having various experiences considering their abilities and aptitudes to successfully settle in society after graduation. The government is creating various policy programs to help them. Universities have also been making efforts to resolve serious employment problems by helping students to connect with corporations through opening courses and employment counseling centers or holding job fairs needed for employment. Considering such reality, not many people will raise objections to the fact that not only the help of the government or educational institutions but also one's own will or effort are more important than anything else to establish the first bridgehead for successful advancement in society.

College students must break away from the passive form of life in which they were instructed or modelled by others during their adolescence and have self-management behavior so they can control their own thoughts or behavior to accom-

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plish their goals (Shim, & Lee, 2011). At that time, professors' leadership behavior will greatly influence not only teaching students well but also students' active thinking and behavior (Seok, & Joo, 2016). Super-leadership among various leadership forms is a theory in which the team or leader emphasizes a horizontal hierarchical structure where followers are made to think and behave by themselves (Manz, & Sims, 2001). Most of all, self-leadership allows followers to establish efficient cognitive and behavioral strategies to increase their competence and quality by revealing the potential inherent in them (Manz, & Sims, 2001). The self-leadership strategies that allow one to behave based on "autonomous power" for efficient self-management have been reported to be helpful in producing high achievements (Manz, & Sims, 2001). Accordingly, previous studies have reported that self-leadership significantly influences career preparation behavior eventually (Bae, & Sung, 2016; Mayer, Salovey, & Caruso, 2004). For that reason, the importance of developing self-leadership for students is also emphasized constantly (Manz, 2015).

The scholars who started to analyze "common characteristics of successful leaders" in the early days of leadership research contended that leadership is an inherited trait based on trait theory (Chelladurai, 2006). Through consistent research, however, it was found that leadership can also be acquired by learning (Johns, & Moser, 2001). Furthermore, Manz and Sims (2001) argued that the best time to acquire self-leadership through super-leadership is during college when students become adults, and this was found to be applicable in education as well. Bae and Sung (2016), however, stated that more research on the efficiency of such leadership is needed since it is unduly insufficient in the field of education. Accordingly, the purpose of the present study was to investigate the influence of professors' super-leadership behavior on the formation of students' self-leadership and to empirically analyze the structural relationship between self-leadership and career preparation behavior.

Theoretical background and hypothesis setting

Super-leadership is defined as leaders making followers into self-leaders who think and behave by themselves rather than in response to others (Manz, & Sims, 1990). The theory emerged through the argument that traditional leadership that completely relies on the leader alone to lead an organization is inevitably limited in the rapidly changing structural environment of society (Manz, & Sims, 1991). Accordingly, the goal of super-leadership is that the leader of a group motivates followers in the process of achieving their goals and helps them to autonomously judge and behave (Manz, & Sims, 2001).

Super-leaders emphasize that followers act as the principal agent in the process of achieving a goal while traditional leaders want followers to conform to their orders by exerting direct influences on followers (Manz & Sims, 1990). When the behavior of super-leaders is strengthened, followers become the principal agents and develop into effective self-leaders rather than following orders due to pressure or by calculated behavior (Manz, & Sims, 1990). According to such context, previous studies have shown that the super-leadership behavior of leaders ultimately helps followers significantly in equipping them with self-leadership (Manz, & Sims, 1991). Considering the findings of previous studies, the present study focused on setting up and analyzing the following research hypothesis.

Self-leadership is a concept based on social cognitive psy-chology and intrinsic motivation theory, and many scholars agree that it is the behavioral adjustment of one's own thought patterns and behaviors to the desirable direction by establishing cognitive and behavioral strategies to achieve a goal based on "autonomy" (Houghton, & Neck, 2002; Manz, & Sims, 1990). From this perspective, self-leadership can be considered self-directed efforts to realize goals and raise one's competence. Self-leadership began to emerge when it was recognized that changes in leadership were needed to fit today's people since they are a new generation, and the possibility of decreasing their desire and efficiency in work is high if they are severely controlled in the atmosphere of a vertical organizational culture (Manz, & Sims, 1980). Accordingly, since self-leadership is based on autonomous control, it has been reported that the efficiency is bound to be higher than when taking orders or instructions by the authoritative behavior or coercion of other leaders (Neck, & Manz, 1996). The following hypothesis was established after reviewing these existing studies.

Hypothesis 1: The super-leadership of the professors in physical education will positively influence students' self-leadership.

Self-leadership strategies are largely divided into behavior-focused and cognitive strategies (Manz, 1986), and some scholars subdivide cognitive strategy into natural reward and constructive thought strategies (Houghton, & Neck, 2002). First, behavior-focused strategy refers to observing and evaluating one's own behavior and modifying that which interferes with achieving goals in the desirable direction (Manz, & Sims, 2001). Constructive thought is the conversion of ones' own thought into a positive direction in performing a given task (Manz, & Neck, 2004). Natural reward strategy is the logic in which rewards are received from the task one is performing, and it leads to motivation (Houghton, & Neck, 2002).

The self-leadership of professors in education sites maximizes learning flow and achievement through students' self-thinking and self-learning by guaranteeing autonomous learning and helping them to explore and choose the career that matches their competence and aptitude (Kim, Joo, & Park, 2016). In addition, Land and Greene (2000) contended that self-leadership also helps to develop self-directed learning. Even though self-leadership has been found to be helpful in preparation for one's career (Bae, & Sung, 2016) in this context, research analyzing theoretical relationships among these variables is in its infancy. Therefore, this study aimed to analyze the effect of the self-leadership on career preparation behavior.

Hypothesis 2: Students' self-leadership will positively influence career preparation behavior.

Since career preparation helps students to explore and find their occupation, it will allow them to take a successful first step into society after their graduation (Koivisto, Vinokur, & Vuori, 2011). Nonetheless, the framework of and research into career development have been continuing over the past half-century (Bartley, & Robitschek, 2000), and the term "career preparation" may be unfamiliar. Regarding the difference between career preparation and career exploratory behavior, the former is inclusive of not only exploring careers to choose one that matches one's competence and aptitude but also a series of preparation processes, and the former is a super ordinate concept that includes the latter.

Kim and Kim (1997) observed career preparation behavior from two perspectives in terms of career development and ca-

reer counseling theory. The first is exploring the areas of career appropriate for oneself through counseling with recruiting experts and aptitude tests. The second is carrying out specific actions actually needed for employment. The action includes, for example, preparation for certificates, employment tests, or job interviews. Accordingly, the present study investigated the structural relationships among super-leadership, self-leadership, and career preparation behavior based on previous studies discussed above.

Method
Participants
The participants in the present study were college students majoring in physical education in South Korean universities in 2017. The reason for using physical education majors was that their employment rate was even lower than the average of other majors with 61.6% according to the survey of the Korean Educational Development Institute (2016), which shows the seriousness of the issue. The survey was conducted among students in classrooms after their classes in three universities located in Gyeonggi-do for about one month after September of 2017, and participation was voluntary.

Measurement
A total of three instruments for professors' super-leadership, students' self-leadership, and students' career preparation behavior were used in the present study. The items in all questionnaires were on a scale from one point for "strongly disagree" to five points for "strongly agree," and higher scores indicated a high level of specific behavior. First, to measure the level of professors' super-leadership perceived by students, an instrument used by Kim (2013) based on the Self-Management Leader Questionnaire (SMLQ) developed by Manz and Sims (1987) was modified for the present study. The instrument is composed of a total of 16 items including modeling (four items), goal setting (four items), encouragement and guidance (four items), and rewards and reprimands (four items). Second, to measure students' self-leadership, a questionnaire developed by Manz (1998), the Self-Leadership Questionnaire

(SLQ), and translated by Kim (2007) was used. The questionnaire has a total of 10 items of self-leadership sub-factors including behavioral strategy (five items) and cognitive strategy (five items). Lastly, for career preparation behavior, an instrument used by Song (2013) and many researchers in Korea was modified for the present study. The instrument is composed of a total of six single-factor items asking about exploratory behavior and a series of preparation behaviors afterward to choose careers considering their competence and aptitude.

Data analysis
The data were analyzed using SPSS 23.0 and AMOS 23.0 programs. Frequency analysis was used to investigate the demographic characteristics of the respondents. Then, confirmatory factor analysis (CFA) was performed to determine how well the measured variables presented a unidimensional construct. Also, Cronbach's alpha was used to prove reliability. Additionally, after correlation analysis, structural equation modeling (SEM) was run to determine whether the research hypotheses were accepted or not. Goodness-of-fit indices in the study included the comparative fit index (CFI), Turker-Lewis index (TLI), root mean square residual (RMR), and root mean square error of approximation (RMSEA). Statistical significance was set at $p < .05$.

Results
Confirmatory factor analysis
CFA of the measurement factors is summarized in Table 1. The fit of the measurement model was as follows ($\chi2=580.258$, DF=384, $p=.000$, $\chi2/df=1.511$, CFI=.952, TLI=.945, RMR=.059 and RMSEA=.047). The Construct reliability (CR) values ranged from .824 to .914, and the average variance extracted (AVE) values ranged from .540 to .680, respectively. Thus, convergent validity was confirmed. Additionally, because the AVE values were smaller than the squared correlation coefficients, discriminant validity was confirmed. Cronbach's alpha values ranged from .866 to .912; thus, internal consistency among the items used in this study was considered excellent.

Table 1. The Confirmatory factor Analysis, Average Variance Extracted, and Construct Reliability of Independent Variables

Variable	Esti.	S.E.	C.R.	CR	AVE	α
Modeling 1	1					
Modeling 2	1.207	.098	12.279			
Modeling 3	1.017	.088	11.569	.833	.556	.870
Modeling 5	.993	.086	11.488			
Goal-setting 1	1					
Goal-setting 2	1.049	.080	13.077			
Goal-setting 3	1.051	.079	13.364	.851	.588	.878
Goal-setting 4	.939	.082	11.444			
Encouragement & guidance 1	1					
Encouragement & guidance 2	1.378	.126	10.973			
Encouragement & guidance 3	1.296	.121	10.711	.824	.540	.866
Encouragement & guidance 4	1.299	.123	10.526			
Rewards & reprimands 1	1					
Rewards & reprimands 2	.918	.069	13.236			
Rewards & reprimands 3	.954	.069	13.906	.855	.597	.884
Rewards & reprimands 4	.944	.067	14.158			

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Variable	Esti.	S.E.	C.R.	CR	AVE	α
Behavioral strategy 1	1					
Behavioral strategy 2	1.148	.068	16.945			
Behavioral strategy 3	1.075	.068	15.793	.914	.680	.912
Behavioral strategy 4	.996	.072	13.798			
Behavioral strategy 5	1.025	.078	13.085			
Cognitive strategy 1	1					
Cognitive strategy 2	1.106	.079	13.966			
Cognitive strategy 3	1.139	.075	15.153	.876	.639	.898
Cognitive strategy 4	1.007	.071	14.092			
Career preparation behavior 1	1					
Career preparation behavior 2	1.083	.065	16.664			
Career preparation behavior 3	.846	.076	11.189	.902	.651	.876
Career preparation behavior 5	.869	.073	11.829			
Career preparation behavior 6	.949	.079	12.030			

Correlation analysis and hypothesis testing

As shown in Table 2, the coefficients of correlation were smaller than .80; thus, there was no multicollinearity. The goodness-of-fit values for this study model were: $\chi2=586.919$, DF=389, $p=.000$, $\chi2/df=1.509$, CFI=.951, TLI=.946, RMR=.065, RMSEA=.047.

Table 2. The Correlations between Measuring Variables

Variable	1	2	3	4	5	6
1	1					
2	.160*	1				
3	-.008	.152*	1			
4	.008	.101	.126	1		
5	.221**	.311**	.425**	.099	1	
6	.204**	.321**	.073	.051	.257**	1
7	.174**	.236**	.094	.148*	.289**	.353**

Legend: 1=modeling, 2=goal-setting, 3=encouragement & guidance, 4=rewards & reprimands, 5=behavioral strategy, 6=Cognitive strategy, 7=career preparation behavior
*p<.05, **p<.01

The results of research hypothesis set up in the present study are shown in Table 3. First, the modeling (C.R.=3.310, $p<.001$), goal setting (C.R.=3.058, $p<.01$), and encouragement and guidance (C.R.=5.971, $p<.001$) of the super-leadership of the professors in physical education were found to positively influence students' behavioral strategy, which is a part of

Table 3. The Results of Hypothesis Testing

Hypothesis Testing			Esti.	S.E.	C.R.	P
Modeling	→	Behavioral strategy	.194	.059	3.310	***
Goal-setting	→	Behavioral strategy	.175	.057	3.058	**
Encouragement & guidance	→	Behavioral strategy	.459	.077	5.971	***
Rewards & reprimands	→	Behavioral strategy	.036	.051	.708	.479
Modeling	→	Cognitive strategy	.183	.072	2.544	*
Goal-setting	→	Cognitive strategy	.311	.073	4.237	***
Encouragement & guidance	→	Cognitive strategy	.021	.083	.258	.796
Rewards & reprimands	→	Cognitive strategy	.028	.063	.437	.655
Behavioral strategy	→	Career preparation	.181	.061	2.982	**
Cognitive strategy	→	Career preparation	.286	.056	5.056	***

Legend: *p<.05, **p<.01, ***p<.001

self-leadership. Rewards and reprimands, however, were statistically non-significant. In addition, the modeling (C.R.=2.544, $p<.05$), and goal setting (C.R.=4.237, $p<.001$) of super-leadership improved the cognitive strategy of self-leadership. On the other hand, other factors were statistically non-significant. Accordingly, hypothesis 1 was partially supported. Second, both behavioral strategy (C.R.=2.982, $p<.01$) and cognitive strategy (C.R.=5.056, $p<.001$) of students' self-leadership were found to positively influence career preparation behavior. Therefore, research hypothesis 2 was supported.

Discussion

The present study empirically analyzed the influence of the super-leadership of physical education professors on the formation of students' self-leadership and the relationship between the strategies of self-leadership and career preparation behavior. The following discussion is based on the results above.

First, the modeling, goal setting, and encouragement and guidance of professors' super-leadership perceived by students in physical education were found to improve the behavioral strategy of students' self-leadership. In addition, the modeling and goal setting of super-leadership improved the cognitive strategy of self-leadership. The influence of other sub-factors was found to be statistically non-significant. These results are supported by previous studies that concluded that super-leadership significantly influences followers in establishing self-leadership (Manz, & Sims, 1991).

It is necessary to examine the basic question of "Why does super-leadership help self-leadership?" Mans and Sims (1990) explained the characteristics of the behavior of super-leaders as follows. First, leaders constantly strive for followers to learn and acquire desirable thinking and behavior by making themselves an ideal model by acting rather than saying. Second, leaders help followers to set challenging but achievable specific goals with considerations given to followers' own competence. Third, leaders constantly encourage and guide followers so that their performance improves more. These factors were found to help college students to strengthen their self-leadership behavior in the present study as well. Unlike the findings of previous studies (i.e., Mans, & Sims, 1995), however, the present study found that the influence of rewards and reprimands, which are the last factors of super-leader behavior, on the behavioral and cognitive strategies of college students' self-leadership was non-significant. It shows that rewards and reprimands used to promote the thinking and behavior of today's young generation do not appeal to them anymore.

Second, the present study found that the behavioral and cognitive strategies of self-leadership of students majoring in physical education positively influence their career preparation behavior. Previous studies (Bae, & Sung, 2016; Mayer et al., 2004) reported that self-leadership improved career preparation behavior, and it is consistent with the results of the present study. Generally, because leadership influences the behavior of not only individuals but also groups, the large influence of leadership on them is accepted as an accomplished fact (Lussier, & Achua, 2001). That is, as for leadership, the members of a group or organization follow the control or order of the supervisor to efficiently accomplish goals (Sharma, 2010).

Since the current generation is well educated, and each individual's personality or subjectivity is distinct, however, people prefer horizontal communication that occurs in equal relationships to vertical communication in which communication occurs top to bottom within the organization (Manz, & Sims, 1980). Accordingly, as a new leadership paradigm, self-leadership based on one's "autonomy" rather than acting upon a superior's control or command emerged (Neck, & Manz, 2010).

The core of self-leadership is thinking and behaving according to one's own will rather than by somebody else's (Manz, & Sims, 2001). Those who have established self-leadership make autonomous efforts in the process of accomplishing goals due to stronger intrinsic motivation than others (Manz, 1986). A previous study reported that people who perform specific tasks or participate in activities are bound to show the tendency of focusing more on their work due to such reasons (Neck, & Houghton, 2006). Accordingly, self-leadership can be explained as yet another form of self-management.

In particular, there has been research reporting that college students with self-leadership have the propensity of self-directedness and show active preparation behavior to search for and determine their career (Bae, & Sung, 2016). In light of these findings, it can be inferred that students majoring in physical education with self-leadership have strong tendency to actively choose and prepare for their careers, and they have autonomously motivated themselves and absorbed more to achieve their goals. Previous studies also have shown that self-leadership will derive good results in efficiency and outcomes because it makes individuals adjust their behavior and act according to their motivation (Manz, & Sims, 2001; Neck, & Houghton, 2006).

The present study found that the modeling, goal setting, encouraging, and guiding of super-leadership of university physical education professors improved the behavioral strategies of students' self-leadership, and modeling and goal setting improved cognitive strategies. Furthermore, the behavioral and cognitive strategies of students' self-leadership increased their career preparation behavior. Eventually, the results of this study may be helpful for professors to guide students preparing for employment efficiently.

The limitations of the present study are as follows. Since the present study did not consider variables such as gender difference and grade, an in-depth study considering these variables is suggested. In addition, since youth unemployment is emerging as a serious problem these days, it is necessary to conduct a study that compares and analyzes the issue not only for physical education major students but also other students in various majors.

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SportMont

ORIGINAL SCIENTIFIC PAPER

The Effect of Static Stretching in Agility and Isokinetic Force at Football Players

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Abstract

The repercussion is an essential of the football training, also called "Cool Down". Static stretching and slow running are typical activities of this section, but in the last few years static stretching has had a great influence on performance functionality and is one of the most debated topics in sports sciences and medicine. The aspiration of this research is to show the impact of recovery associated with static stretching and the agility performance of young football players. This research was conducted between August and November with a sample of 20 players age 12.1±0.3 years (range 11-13 years) separated into two groups- control and experimental. First measurements that have been initiated are body weight 40.6±6.5 kg, height 152.6±6.9 cm and agility performance (Ajax test 5x10 m and zig-zag test with and without ball). Agility was measured with electronic photocells', with a measurement of .01 sec. Experimental testing proposed that both groups have completed the regular training program, while the experimental group (despite the control group) during the recuperation (cool down) except running, they conveyed out the experimental treatment / static stretching exercises. Each exercise lasts at least 20 seconds. After completing the experimental program members in both groups underwent final measurements. The results that were reached by univariate analysis of variance (ANOVA) at initial and final measurements, have shown insignificant statistical values between the control and experimental group in the agility performance.

Key words: static stretching, recovery, agility, soccer players

Introduction

Football is a sport that is represented by numerous and heterogeneous complex dynamic kinesiology activities that are represented by a large number of cyclic and acyclic movements (Bjelica, Popović, & Petković, 2013; Gardasevic, Bjelica, & Vasiljevic, 2016). Preparation is essential for conditional execution of all technical and tactical assets items and responsible to differentiate high-level players from those at lower levels. During a football game a player performs various activities around 1200-1400, of which 700-800 motoric with change of direction movements (sprint, jumping, stop, restart, etc.) and only 11% of the total distance of these movements are executed with high intensity and with a decisive influence on the outcome of the game (Joksimovic et al., 2015; Reilly, & Williams, 2003; Stolen, Chamari, Castanga, & Wilsloff, 2005).

Every movement that takes place above is closely associated to agility performance and is greatly responsible for carrying out these movements affecting the success of the game of football (Popović, Akpinar, Jakšić, Matić, & Bjelica, 2013; Popović, Bjelica, Jakšić, Hadžić, 2014). Agility is a psychomotor skill that enables rapid change of direction of movement without losing control and balance of movement. In football, players change direction of movement in all directions at a given time and space, with and without ball. Accordingly, the goal agility training in football is to improve the speed of running of the players with fast change of direction of movement with and without ball, with brakes and quick and situational accelerations.

Therefore, precisely the situational agility (the prediction and reaction to the ball, the co-starter, the opponent, etc.) is

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one of the most important means in the selection of footballers, but also determines the success of the football game. Understanding the importance of agility on a football pitch, the planning of training sessions should be in the function of the optimal development of this skill. Numerous researches were done to prove the influence of training sessions, respectively, general and specific body exercises during training sessions. Numerous discussions were made about where, when until what mass and which form of stretching is with optimal indication in motoric performances. Amiri-Khorasani and Sotoodeh (2013) showed that different methods of stretching improved agility performance in young soccer players. On the other hand, there have been many studies (Amiri-Khorasani, Sahebozamani, Tabrizi, & Yusof, 2010; Herbert, & Gabriel, 2002; Milanovic, Sporiš, Trajkovic, James, & Samija, 2013) that have shown that static and dynamic stretching improved flexibility in soccer players and minimizes the risk of injuries to developing muscle (Amiri-Khorasani et al., 2010; Herbert & Gabriel, 2002; Milanovic et al., 2013; Witvrouw, Danneels, Asselman, D'Have, & Cambier, 2003). Nonetheless, recent studies (Marek et al., 2005; Faigenbaum, Bellucci, Bernieri, Bakker, & Hoorens, 2005) have shown that both static and dynamic stretching can decrease soccer performance, high-intensity (what) especially activities like repeat sprint and sprint performance over 5-30m (Behm, Chaouachi, Lau, & Wong, 2011).

For this reason, it is essential to confirm the importance of the static stretching phase (recovery) in agility performance of young soccer players. Recuperation of organism is one of many important components to increase sport performance (Rey, Carlos, Luis, & Joaquin, 2012; King, & Duffield, 2009; Kinugasa, & Kilding, 2009; Tesitore, Meeusen, Cortis, & Caprinica, 2007).

The cool-down phase of the training session is necessary to enhance the recovery where activities like slow running, and static stretching, are typical for this part. Relaxation of the body is reached by extension static (static stretching), as one of the fundamental processes that apply for prevention, and maintenance of physical performance components "recovery of the players" (Dawson, Gow, Modra, Bishop, & Stewart, 2005; Sporiš, Jovanović, & Kubla, 2010). Execution of a variety of movements such as changing the pace and direction of the movement, jumps, execution of technical elements, depends among other things than just the flexibility of the locomotor system (Vučetić, Šoš, & Rocak, 2003; Carling, Espie, Gall, Blomfieldc, & Julie, 2010; Gardasevic & Bjelica, 2013; Famisis, 2015). Static stretching for decades has been part of warm-up during training and competition in order to enhance sports performance, flexibility and prevention of injuries.

Numerous researches conducted in the last few years indicated that static stretching applied during warm-up has affected the reduction of specific motor performance such as speed, strength and explosive agility (Nelson, Driscoll, Landin, Young, & Schexnayder, 2004; Chaouachi et al., 2008; Behm et al., 2011; Gelen, 2010; Sayers, Farley, Fuller, Jubenville, & Caputo, 2008; Albrecht, Meier, & Zahner, 2001; Zakas, 2005). Research conducted suggests that during warm up applied dynamic flexibility exercises should be combined with static stretching exercises, with checked movements and optimal amplitude complete (ROM) which are very effective in the development of flexibility and improving power explosive type of sprint (Frederick, & Szymanski, 2001; Sporiš, 2007; Andersen, 2005). All forms of stretching are effective ways to

increase the amplitude of movements (Walker, 2006; Magnusson, Aagard, Simonsen, & Bojsen-Moller, 1998). Static stretching after exercise is recommended as a precautionary measure for delayed-onset muscle soreness and improved dispersion range of motion through reduction of edema or tension of the muscle-tendon unit (Montgomery et al., 2008). In a survey conducted with 26 football coaches of Mauritius Football Association (MFA), 76% of them think that stretching exercises three times a week in the run-up and 2 times a week during competition, as well as regular sessions with a total duration of 0.6 to 1.3 hours per week (Kelly, Fawzi, & Rajiv, 2012).

The main goal of this study was to ascertaining the impact of static stretching exercises applied during a recovery stage of the training session (Cool-down) on agility performance of young soccer players.

Methods

To accomplish this research, initially all samples were conducted at a medical control center of sports medicine in Pristina and confirmed that all the players are sufficiently healthy to train for football, and in accordance with the statement of Helsinki, all participants were informed of the purpose and procedures of testing and experimental treatment.

Participants

In this study twenty young players U13 have participated, from Football club Ramiz Sadiku from Prishtina led by coaches licensed by UEFA who have held regular training sessions.

Procedures

Twenty participants with an average age 12.1±0.3 years (range 11-13 years), are measured initially by body height 152.6±6.9 cm (anthropometry of Martin) and body weight 40.6±6.5 kg (In body 720), and were divided into an experimental control group (n=10) to compare initial and final tests of body weight, body height and agility performance i.e. Ajax test 5x10 m and 20 m zig-zag test (with and without ball). Agility performance was measured with new test, i.e. Power timer 300 photocells with exact time of 0.01 sec. All measurements were performed on the parquet flooring at College Sports "University" of Pristina. The initial testing took place before the beginning of the pre-season while the final testing was performed at the end of the season (after 16 weeks of intervention with static stretching exercise). Players, after warming up procedure for 10-12 minutes, have undergone the agility test: Ajax test 5x10 m (Verheijen, 1997), test 20 m zig-zag with and without ball (Little, & Williams, 2006; Idrizovic, 2014). Participants in this research were separated into two groups (control and experimental) in length between August and November 2015, and have trained regularly 3 times a week i.e. 48 training sessions with a plan and program of the school's Football club, Ramiz Sadiku Prishtina.

Protocol of the control group as follows - general warm up 5-7 min, specific warm up 10-15 min, the main part of 35-45 minutes, cool down 10 min, recovery by running. Protocol of the experimental group as follows, general warm up 5-7 min, specific warm up 10-15 min, 35-45 min the main part, cool-down 25 min which includes recovery by running (10 min) and static stretching (15 min).

The experimental group (unlike control group) besides regular training, has also implemented an experimental program of recovery with static stretching that is part of the

cooling phase (cool- down) of the training session. The Experimental Program was developed by the author of the study based on the recommendations of the authors researcher of this area (Anderson, 2006; Walker, 2006; Lycholat, 1999).

The Experimental Program consisted of 17 exercises extension–static stretching upper body-flexibility exercises as follows Neck stretch Upper Back, Chest and Back, Shoulder and mid-upper Back, Shoulder and triceps, Lateral flexion right-left, and lower body flexibility exercises (hamstring Teo Leg Stretch, Achilles and Back Stretch, Quadriceps Stretch, hamstring and Groin Stretch, Standing Groin Stretch, Groin Stretch, Chest Stretch, Stretch Sitting hamstring, Lower Back Stretch, The hamstring Seat Leg Stretch, Stretch Tendon Achilles. Each exercise was executed for a period of 20 seconds.

Statistical analysis

Data analyses were performed using the SPSS version 21.0. The Arithmetic mean and standard deviation were calculated for both groups with initial and final measurements for anthropometric (body height and weight) and agility performance (Ajax test 5x10 m and zig zag 20 m with and without ball). Analyses of variance (ANOVA) are calculated differences between arithmetic mean of each variable of control and experimental group before and after the experimental treatment (static stretching). The level of significant is p<.05.

Results

The parameters are shown in Tables 1 and 2 for both groups (control and experimental) of initial and final measures.

Table 1. The significance of differences between arithmetic means of variables data of anthropometric (body height and body weight) and agility performance of the control and experimental group at the initial measurement

Variable	control group (M±SD)	experimental group (M±SD)	F	p-value
Age (years)	11.9±0.5	12.0±0.4	-	-
Weight (kg)	42.36±7.29	38.91±5.5	1.41	.250
Height (cm)	153.8±7.8	151.8±6.1	.543	.471
Ajax test 5x10 m	14.29±0.6	14.67±0.8	1.31	.267
Test 20 m zig-zag with out ball	7.21±0.7	6.93±0.3	1.29	.270
Test 20 m zig-zag with ball	9.04±0.4	9.17±0.6	.316	.581

The measurements data in Table 1. show that univariate analysis of variance (ANOVA) based on the coefficient value F-relations and statistical significance (significance) p-value are proved statistically insignificant among the control and experimental groups; this confirms the homogeneity of the groups initial measurements.

Table 2. The significance of differences between arithmetic means of variables data of anthropometric (body height and body weight) and agility performance of the control and experimental group at the final measurement.

Variable	control group (M±SD)	experimental group (M±SD)	F	p-value
Age (years)	12.3±0.5	12.4±0.4	-	-
Weight (kg)	43.25±7.5	39.9±5.6	1.23	.282
Height (cm)	156.1±8.0	153.6±6.2	.589	.453
Ajax test 5x10 m	13.96±0.6	13.43±0.9	2.47	.133
Test 20 m zig-zag with out ball	6.91±0.4	6.58±0.4	2.69	.118
Test 20 m zig-zag with ball	8.75±0.9	8.27±0.5	2.05	.169

The final measurement data in Table 2. show that univariate analysis of variance (ANOVA) based on a coefficient F-relations and value of statistical significance p-value. These have proved statistically insignificant among the control and experimental group thus certifying that the experimental program (static stretching exercises) has not had an impact on the difference among the groups in the final measurements of basic anthropometric parameters (height and body weight) and motor performance variables of agility of players.

Results reached confirm that the experimental program (static stretching exercises) has not had an impact on the difference between the groups in measurements of variables of final agility.

Discusion

Although a large number of researches have concentrated on the evaluation agility performance of lower extremities in soccer players, most of these studies have been focused only on changes of agility performance after a training program applied during the season (Behm et al., 2011; Milanovic et al., 2013). Static stretching is still one of the topics of controversial discussion in sport and medicine.

Debates focus on the idea that stretching exercises should be applied during warm-up or cooling, for prevention of injuries for growth performances or for other reasons, so there are differing opinions on when, and to what extent, the application of stretching exercises have favorable or unfavorable impact on motor performance of players.

More research is confirmed by the static stretching exercises pertained during the warm up which have negative impact on speed and agility (Little, & Williams, 2006; Nelson et al., 2004; Gelen, 2010; Brandey et al., 2012; Power, Behm, Cahill, Carroll, & Young, 2004; La Torre, 2010; Haddad et al., 2014). Otherwise, some researchers say impact is statistical-

ly non-significant using static stretching execution of movements for speed, agility and explosive force (McHugh, 2006; Kay, & Blazevich, 2011; Behm, & Kibele, 2007; La La Roche, Lussier, & Roy, 2008; Rey et al., 2012;).

Comparing to the above mentioned research, few studies have examined the impact of stretching combined (dynamic and static) and have no impact showing the determinant in motor performance of speed and agility (Behm et al., 2011; Samson et al., 2012; Gonçalves, Pavao, & Dohnert, 2013; Keiner, Sander, Wirth, & Harmann, 2015). In the last years the influence of static stretching on motor performance applied during the warm up is explored by many researchers of sports and medicine. One of the first studies that compared the effect of a stretching program performed during warm-up and cool-down among two groups of schoolchildren, the results of the current study did not show statistically significant differences for both groups (Mayorga-Vega, Merino-Marban, Garrido, & Viciana, 2014). Many researches were done to verify the impact of stretching during warm-up phase; however, such research has been minimal and has been limited to researching the effect of stretching during cool-down in motor performance in soccer players. But the main reason for this study is to establish whether static stretching can decrease soccer performance especially agility (i.e. repeat sprint by changing direction) in the young soccer players. After carrying out the experimental program participants endured final measurements. Univariate analysis of variance (ANOVA) has shown that static stretching exercises applied at the end of the training session "cool-down" have had no statistically significant impact on agility in football players U13. Details of results of tests for agility reflect statistically unimportant differences among the control and experimental group at initial and final tests, thus suggesting that static stretching exercises throughout the cool down have no significant effect on agility performance.

In this research it has been proved that static stretching exercises performed 3 times per week throughout the cool down for a period of 16 weeks have not had a significant impact statistically according to the agility tests to U13 football players. We can conclude that static stretching exercises performed at the end of the training session (cool-down) have no impact on agility performance to young players. Therefore, to young players we can recommend 2-3 times a week application of static stretching during the end of the training session, or special training sessions, in order to increase the optimal flexibility of the body as a prerequisite for executing the movements' agility (i.e. motion quick to change direction with and without the ball). These results may be useful in fulfilling knowledge of the impact of static stretching (during the cool-down) to young players in agility performance; and following the rationalization content of planning and programming training sessions. The results of this study can be used as a stimulus for exploration of the impact of static stretching (during the cool-down) and other characteristics of the anthropological status (i.e. morphological, performing other motor performance, functional, psychological, rehabilitative, recuperative, prevention against injuries, demonstration technical and tactical elements etc.).

Acknowledgements

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SportMont

ORIGINAL SCIENTIFIC PAPER

Stature and Its Estimation Utilizing Arm Span Measurements of both gender Adolescents from Southern Region in Kosovo

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Abstract

This study is based on measurements of Southern region Kosovan adolescents. The aim of this study was to examine the stature of adolescents from Southern region as well relationship between arm span and stature in both Kosovar genders. A total measured subject participated in this research was 225 out of which (105 girls and 120 boys), females average of age is 18.36±0.50 years old (range 18-20 years) and for male 18.40±0.55 years old (range 18-20 years).The anthropometric measurements were done by trained people and were taken according to the ISAK manual. Relationship between stature and arm span has been analyzed by the simple correlation coefficient at a 95% confidence interval. The linear regression analysis was carried out to examine extent to which arm span can reliably predict of stature. Statistical importance was placed at level p<0.05. As a result anthropometric measurements for both sexes showed that the average of stature for boys adolescents from Southern region are 178.60±5.73 centimeters and have the arm span average of 180.92±6.92 centimeters, while girls from Southern 165.33±4.45 centimeters tall, and have the arm span average of 165.60±6.03 centimeters. The results have shown that the arm span was estimated as a reliable indicator of stature assessment to the both genders adolescents from Southern region of Kosovo population. This study also confirms the necessity for developing separate height models for each region in Kosovo.

Key words: Stature, arm span, region, boys and girls, southern region Kosovo

Introduction

Kosovo is geographically clearly defined at the center of the Southwestern part of the Balkan Peninsula. Throughout Kosovo's territory pass roads, which connect Adriatic Sea, Aegean Sea with the center of Balkan Peninsula. Mountain ranges consist of about 63% of the Kosovo's territory. Sorted by their location or altitudes, they would be: peripheral and central mountains, high, average and low mountains. Dinaric Mountains extend in the western and interior part of the land. In central part of the land, such as Mokna Forest, Dry Forest (Mali i Thatë) and Cursed Mountains (Bjeshkët e Nemura), with their geographical position create special climate conditions in Kosovo. Considering that Kosovo's population is part of the central area of population from the Dinaric Race, it was of special significance to complete a professional study and a realistic assessment of morphometric evaluation adolescents from the Southern Region of Kosovo which contains five municipalities (Dragas, Malisheva, Mamusha, Prizren and Suva Reka/Suharekë), mostly due to the reason some regional differences were confirmed in Montenegro (Bubanja, Vujovic, Tanase, Hadzic, & Milasinovic, 2015; Milasinovic, Popovic, Jaksic, Gardasevic, & Bjelica, 2016a; Milasinovic, Popovic, Matic, Gardasevic, & Bjelica, 2016b; Popovic, 2017; Popovic, Bjelica, Tanase, & Milasinovic, 2015; Vujovic, Bubanja, Tanase, & Milasinovic, 2015) and some parameters in Kosovo too (Arifi., 2017a; Arifi, Sermaxhaj, Zejnullahu-Raçi, Alaj, & Metaj,

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2017; Arifi, Sermaxhaj, Alaj,Metaj, & Toverlani; Popovic, Arifi, & Bjelica, 2017a; Popovic, Gardasevic, Masanovic, Arifi, & Bjelica, 2017b) as well as some socio-demographic characteristics (Quanjer et al., 2014).

In scientific literature is known that the measurement of stature is important in many settings (cited in Grasgruber et al., 2017): it is an important measure of body size and gives an assessment of nutritional status (cited in Datta Banik, 2011; Bjelica, Popovic, Kezunovic, Petkovic, Jurak, & Grasgruber, 2012; Gardasevic, Rasidagic, Krivokapic, Corluka, & Bjelica, 2017), as well as in the determination of basic energy requirements, physical capacity abilities based on drugs quantity, as well as the evaluation of children growth, predicting and standardization of physiologic standards such as lungs capability, muscle strength, glomerular filtering, metabolism, etc (cited in Popovic, Bjelica, & Hadzic, 2014a; Golshan, Amra, & Hoghogi, 2003; M. Golshan, Crapo, Amra, Jensen, & R. Golshan, 2007; Mohanty, Babu, & Nair, 2001; Ter Goon, Toriola, Musa, & Akusu, 2011; Arifi et al., 2017a). The stature might also be a relevant factor that can success of some athletes in various sports (Popovic, Bjelica, Petkovic, & Muratovic, 2012; Popovic, Bjelica, Jaksic, & Hadzic, 2014b). The researches by European anthropologists a century ago, which have studied body height of the population living in the surrounding of Dinaric Alps (Pineau, Delamarche, & Bozinovic, 2005). As the modern Kosovars, belongs Dinaric racial classification, it is assumed by the authors of this study that adolescents that live in Southern region, It can be as tall from other parts of Kosovo and might by equally tall or at least very close to Europe's top nations (Popovic, 2016; Popović, Bjelica, Tanase, & Milasinović, 2015), Bosnian and Hercegovinians (male 183.9 cm; female 171.8 cm) Dutch (male 183.8 cm; female 170.7 cm), Montenegrins (male 183.21 cm; female 168.37 cm) and Serbians (male 182.0 cm; female 166.8 cm). Wherefore, the first purpose was to examine the stature in Kosovar adolescents from Southern region as the authors did believe this is the place where the population can reach the full potential of the Sharr Mountains, while the second purpose of this research was to examine the stature in both Kosovar genders and its relationship between arm span.

Methods

The subject of this study was 225, students from high schools, in total there, Included are from Southern region of Kosovo, 120 are male and 105 females average of age is 18.36±0.50 years old (range 18-20 years) and for male 18.40±0.55 years old (range 18-20 years). The Criteria for the selection was that the researches have excluded from the data analysis the individuals with physical deformities as well as those without informed consent. The exclusion criterion was also being non-Kosovan and non–Southern region. Anthropometric measurements of stature and arm span have been conducted according to the protocol of the International Society for the Advancement of Kinanthropometry (Marfell-Jones, Olds, Stewart, & Carter, 2006). The trained measures have measured selected anthropometric indicators (same measurer for each indicator), while the quality of their performance was evaluated against the prescribed "ISAK Manual".

The data was analyzed by Statistical Package for Social Sciences (SPSS) for Windows 23.00. The results obtained were analyzed through descriptive parameters: Means and standard deviation (SD) of the stature and arm span of Kosovars, the ratio between stature and arm span have been analyzed through correlation coefficient according to Pearson with reliability level of 95%. The linear regression analysis was carried out to examine extent to which arm span can reliably predict of stature. In the end, these relationships were plotted as scatter diagram for both genders. Statistical significance was set at p<0.05.

Results

A summary of the anthropometric measurements for both sexes is shown in Table 1. Arithmetic average of stature for

Table 1. Anthropometric Measurements of the Adolescents

Subjects	Stature Range (Mean±SD)	Arm Span Range (Mean±SD)
Male	164.6-192.3 (178.60±5.73)	161.2-196.3 (180.91±6.92)
Female	158.0-184.0 (165.33±4.45)	154.0-195.0 (165.60±6.03)

boys is 178.60±5.73 centimeters, ranked with minimum and maximum results as 164.6-192.3 centimeters. For girls the average was 165.33±4.45 centimeters, ranked with minimum and maximum results as 158.0-184.0 centimeters. These are the results of the arm span for both sexes; the arm span arithmetic average length for boys is 180.91±6.92 centimeters, ranked with minimum and maximum results 161.2-196.3 centimeters. For girls this was 165.60±6.03 centimeters, ranked with minimum

Table 2. Correlation between Stature and Arm Span of the Study Subjects

Subjects	Correlation Coefficient	95% confidence interval	Significance p-value
Male	0.776	0,661–0,891	<0.000
Female	0.688	0,547–0,830	<0.000

and maximum results 154.0-195.0 centimeters.

The simple correlation coefficient and their 95% confidence interval analysis between the anthropometric measurements are presented in Table 2. For both sexes correlative relation between stature and arm span is significant (p<0.000), with these correlation coefficients (boys 0.776; girls 0.688).

Table 3. shows the results of linear regression where high values of regression coefficient are shown suggesting a positive

Table 3. Results of Linear Regression Analysis Where the Arm Span Predicts the Stature

Subjects	Regression Coefficient	Standard Error (SE)	R-square (%)	t-value	p-value
Male	0.776	3.632	60.2	13.361	0.000
Female	0.688	3.247	47.4	9.632	0.000

relation (boys 0.776; girls 0.688) which shows that arm span predicts stature for both Kosovar sexes (boys t=13.361, p<0.000, girls t=9.632, p<0.000), which confirms the R-square

(%) for boys (60.2), and for girls (47.4).

The relationships between armspan measurements and stature among the above models is plotted as a scatter diagram.
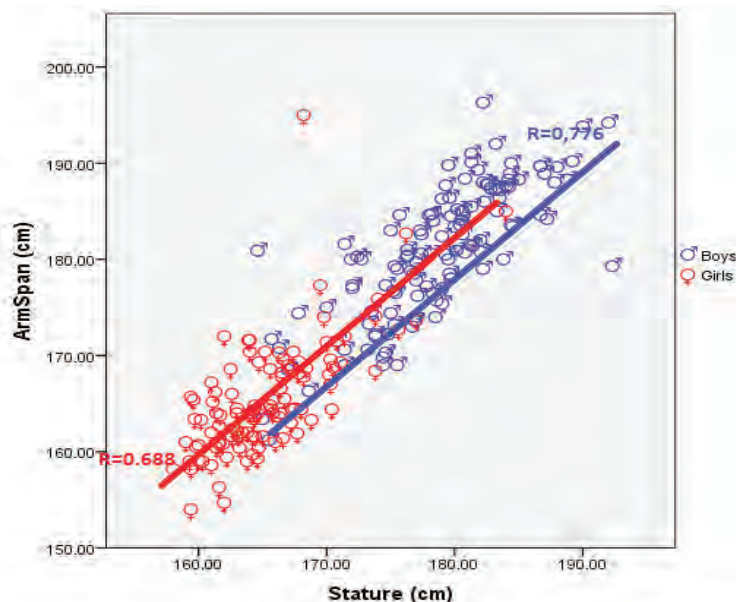
Figure 1. Scatter Diagram and Relationship between Arm Span Measurements and Stature among the Above Models

Discussion

Throughout this work we can proved that the adolescents from Southern region of Kosovo are very tall with an average of 178.60 centimeters for boys and 165.33 centimeters for girls. The results proved that the adolescents from Southern region are tall on average, taller than male population in Macedonia with 178.10 centimeters and taller than female population in Macedonia with 164.58 centimeters (Popovic, Bjelica, Georgiev, Krivokapic, & Milasinovic, 2016), and is very closed to the data that was reached in the measurement of Serbians female 166.8 centimeters (Popovic, Bjelica, Molnar, Jaksic, & Akpinar, 2013), but not taller than male population.

However, there is a hypothesis that both sexes adolescents from Southern region of Kosovo did not reach their full genetic potential yet, since they have been influenced by various environmental factors (wars, in the former Yugoslavia, poor economic situation, etc.) in the last few decades (Popovic et al., 2016). Wherefore , the authors believe that these circumstances had a negative bearing on the secular trend in Kosovo, while it is expected that the secular changes influencing stature will ascend in following two decades, comparing it to developed countries where this trend has already completed such as Dutch (Schonbeck et al., 2013).

The results of this study confirm that the arm span reliably predicts stature, with significant (p-value 0.000) by linear regression analysis based on results achieved for male and female. The relationship between stature and arm span we have been able to verify throughout Pearsons' correlation analysis with validity of 95% in male as well as female, which have given very high value (0.776 and 0.688) of correlations

between them. The results of this study confirm the necessity for developing height models for each region in Kosovo.

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Achievement Motivation of Undergraduates Divided by Sport Activity

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Abstract

This paper strives to contribute to performance motivation research and to point out differences in achievement motivation among college students in terms of sports activities. The research sample was comprised of 248 college students (men: n=141, 22.40±1.62 years of age; women: n=107, 21.78±1.49 years of age) from Bratislava. The respondents were divided into 3 groups according to frequency of sports activities: college students who didn't engage in any sports activities (non-active respondents), college students who engaged in sports activities 1 to 2 times a week (moderately active respondents), and those who engaged in sports activities 3 or more times a week (highly active respondents). A standardized DMV questionnaire consisting of 52 items was used as the research tool. The Kolmogorov-Smirnov test was used to assess the normality of data and the Kruskal-Wallis test and Mann-Whitney tests were used to test the significance of the differences between independent choices. The coefficient η^2, expressed the effect of the independent variable (sport activity) on the dependent variable (achievement motivation). The degree of dependence between the two of the groups of features was expressed by means of the coefficient r. The results revealed significant (p≤0.001) differences in all three performance motivation dimensions. The performance motivation of the highly active respondentswas significantly (p=0.000) higher compared to that of the moderately active respondents. Also, when compared with the non-active respondents, the level of performance motivation was significantly (p=0.000) higher among the highly active respondents. Performance motivation and performance-supporting anxiety increases with the frequency of sports activities; on the contrary, performance-hindering anxiety decreases with the frequency of sports activities. Hence, our results testify to the fact that sport activity is one of the determinants for increased performance motivation.

Key words: performance motivation, college students, sport activity

Introduction

The word motivation comes from the Latin word motivus, which is the infinitive form of the verb movere - to move. The concept of motivation usually refers to the reasons behind a behavior. Motivation is the process of encouraging, maintaining and energizing performance. It determines the origin, direction and intensity of human conduct. The sum of reasons navigates a person toward a certain type of conduct of a certain intensity. The considerable versatility and variability of the quality and intensity in time is referred to as motivation. The aim of motivated individuals is to fulfil their needs (Gurský, 2005). Murphy, Nevill, Neville, Biddle and Hardman (2002), to treat motivation as an inner strength that arises between people and their acts to propel them mutually.

Performance motivation is understood as a concept which aids in explaining differences in the conduct and acts of individuals in different areas of life. It applies to study activities as well as professional results. Good and stable performance is connected not only with success, but also with prestige and admiration. Such positive assessment and acceptance by the community is reflected in the level of self-esteem and self-confidence of the individual (Pavlas, 2015). Along with cognitive abilities, another general feature, or group of features, relevant for professional success is the general concept of performance

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motivation. Performance motivation represents an individual's tendency to achieve the best possible performance. It is therefore probable that individuals who are more success-oriented will be more active in presenting themselves than those who tend to avoid failure; such individuals will be more passive (Bedrnová, & Nový, 2007). Success has a strengthening character and contributes to personalitydevelopment. It also improves the quality of life which is a fundamental and determining factor for any individual in any situation (Křivohlavý, 2009). The more regular and intensive the current mental conditions that have resulted from success, the higher the stabilized aspiration level of the sportsman, which may have a positive influence on his/her performance, but also a deeper and more intensive conflict after a possible failure. The research confirmed that success-motivated individuals tend to attribute their success to internal reasons, especially their own abilities while attributing their failures to time-variable reasons, lack of effort and bad luck (Pavlas, 2015). The authors Schuler, Thornton, Frintrup and Prochaska (2011), describe an onion-like model of performance motivation in their handbook based on their analysis of the current knowledge about performance motivation. This model consists of central features (e.g., expectation of success, self-discipline, endurance), peripheral features (e.g., independence and status-orientation), theoretically-related features (e.g., mode of attribution, beliefs of control, self-confidence), and background features (conscientiousness and neuroticism). Based on this model, performance motivation can be considered as a complicated variable whose level is determined by a range of factors. One of these factors which is dealt with in this paper includes sport activity. The conclusions of the pilot study by Šmela, Pačesová, Kraček and Hájovský (2017) reveal that performance motivation is conditioned by the level of sport activity. The authors outline significant differences among top, professional sportsmen and inactive persons in all of the three dimensions of performance motivation. The results proved that the relationship between performance motivation and sport activity as follows: the higher the level of sport activity, the higher the performance motivation. Slepička, Hošek and Hátlová (2009) claim that the need to achieve success is proved by sportsmen to a higher degree than by the general population. High motivational significance is mentioned in respect of the causal attribution in the area of sports.

According to Kraus (2006), young people represent a social group made up of individuals between 15 and 25 years of age. While no longer children, they are yet to be fully recognized as adults by the general community. This is manifested by the characteristic mode of conduct and thinking, and the specific system of models, standards and values. This period of development, which might also be referred to as the college period for many individuals, calls for typical requirements for living an adult life according to Pavlas (2015). Such requirements include preparation for the pursuit of a profession, professional adaptation and acquisition of a profession, the status in society in which s/he adopts the social roles of spouse, parent, voter, etc. The basic personality features that characterize this age category include a desire for independence, freedom of thought and action, unbalanced self-esteem, critical attitudes and often contradictory self-evaluations. It is more difficult for them to admit compromises and they tend to negate the acts of others. They are unwilling to accept criticism and tend to radically deal with such situations. A young person creates

and modifies his or her value judgments in ongoing confrontations with various life situations (Kraus, 2006). According to a range of studies (Darayi, 2006; Leondari, Syngollitou, & Kiosseoglou, 1998), various stimulators are available through which it is possible to activate students, for example, by leading them toward specific, partial goals, increasing rewards, encouraging positive emotions and feelings of satisfaction. Factors such as gender, family status, family size, profession of parents and economic situation influence the activity of students. Since achievement motivation is shaped already in the early childhood, the key component in the development of achievement motivation is the mother´s demand for their independence and precision of performance. Persons that were led by their mothers toward independence at a very early age achieve high performance motivation values. People attaining low performance motivation values might also have been led toward independence, however, at a later age. It has also been proved that persons with high performance motivation values were rewarded for their minor success in growing independent, especially, by physical manifestations of emotions. The suggestive influence of education upon performance was also confirmed by a comparative anthropological survey which concluded that the frequent training of a child to become independent of adults leads to high performance motivation (Nakonečný, 1992).

Another significant factor that is associated with the activation of college students in attaining goals, or with performance motivation, is sport activity. The social problem of the decreasing level of sports activities among adolescents has been identified (Telama, & Yang, 2000). Šimonek (2007) points out that sports activities conducted by current college students do not suffice to ensure the optimum level of health. College students face an intensive mental load during their studies. Unsuitable planning and organization of study is considerably influenced by the spare time interests of students during the semester. Adequate physical activity is one of the major factors which ensures the stability of mental performance throughout the period of study, but it is often placed last in the hierarchy of interests, despite the fact that it plays an irreplaceable role in the college life according to Nykodým, Zvonař and Sebera (2011). However, due to the great importance which is attributed to achievement motivation, there is a surprising dearth of systematic monographs that prove its impact upon performance itself (Schuler et al., 2011).

The aim of the study is to extend the knowledge about achievement motivation of undergraduates divided by sport activity.

Methods

The research sample was comprised of 248 college students (men: n=141, 22.40±1.62 years of age, women: n=107, 21.78±1.49 years of age) from six faculties in Bratislava: the Faculty of Law of Comenius University in Bratislava, the University of Economics in Bratislava, the Slovak University of Technology in Bratislava, the Faculty of Natural Sciences of Comenius University in Bratislava, the Faculty of Arts of Comenius University in Bratislava and the Faculty of Physical Education and Sports of Comenius University in Bratislava. The respondents were divided into 3 groups according to frequency of sports activities: the non-active group (n=94), the moderately active group (n=96) and the highly active group (n=58). A standardized performance motivation questionnaire

DMV created by Pardel, Maršálová and Hrabovská (1992) was used as a research tool. The performance motivation questionnaire contained 52 items, in which the respondents evaluated their level of consent to each statement on the Likert scale. The questionnaire consisted of three scales: a performance motive scale, an anxiety-inhibiting (weakening) performance scale and an anxiety supporting (facilitating) performance scale.

1. The performance motive scale corresponds with the complex and multifaceted nature of the performance motives and consists of four aspects: performance behavior, aspiration, endurance at work, and time orientation in the future.

2. The anxiety inhibiting performance scale can be described as a recognition of weakening performance, loss of speed and activation in states that cause tension in stressful, new and critical situations. In other words, anxiety inhibiting performance can be characterized as a certain tendency to avoid situations that require high performance in order not to experience the feeling of failure.

3. The anxiety supporting performance scale is characterized by a link between an average, in other words, the optimal sense of tension and the mobilization of activity as a favorable condition for quality performance. In other words, we can define it as an effort to avoid failure.

The data were processed statistically. The Kolmogorov-Smirnov test was used to assess the normality of the data. The Kruskal-Wallis test and Mann-Whitney tests were used to test the significance of the differences between particular independent choices. The significance level was set at $\alpha \leq 0.05$, $\alpha \leq 0.01$ and $\alpha \leq 0.001$ Effect size, and the coefficient η^2 expressed the effect of the independent variable (sport activity) on the dependent variable (performance motivation). The magnitude of the coefficient η^2 is evaluated in the following ranges: $\eta^2 \geq 0.14$ (large effect), $\eta^2 = 0.06-0.14$ (medium effect), $\eta^2 = 0.01-0.06$ (small effect). The rate of dependence (effect size) between the two groups of features was conveyed by means of the coefficient r (r>0.90 - very large effect size, r=0.70-0.90 - large effect size, r=0.50-0.70 - medium large effect size, r=0.30-0.50 - small effect size, r<0.29 - very small effect size). For better interpretation, the results are presented in box-plots.

This study was approved in advance by Ethics committee of Faculty of Physical Education and Sport, Comenius University. Each participant voluntarily provided written informed consent before participating.

Results

The results of performance motivation in the different dimensions of the research sample broken down according to sports activities is presented in Figure 1. Box plots were chosen for the sake of the transparent graphic representation of descriptive statistics and in order to show differences of the mean values between the groups. Already at first sight there are striking differences between the research sample groups across the performance motivation dimensions. In the performance motive dimension, the highest mean (91.05±16.03 points) was attained by the highly active respondents. The moderately active respondents and non-active respondents attained almost identical mean values (Table 1). In the anxiety inhibiting performance dimension, the lowest mean value (49.34±18.81 points) was attained by the highly active respondents, while the moderately active respondents achieved a mean value of 63.60±12.85 points and the non-active respondents reached a mean value of 69.27±10.38 points. As to the last dimension, anxiety supporting performance, we detected the highest mean value among the highly active respondents (55.74±14.90 points), while the mean value of the moderately active respondents (40.68±13.76 points) and the mean value of the non-active respondents (43.96±18.24 points) demonstrate the differences within the research sample.
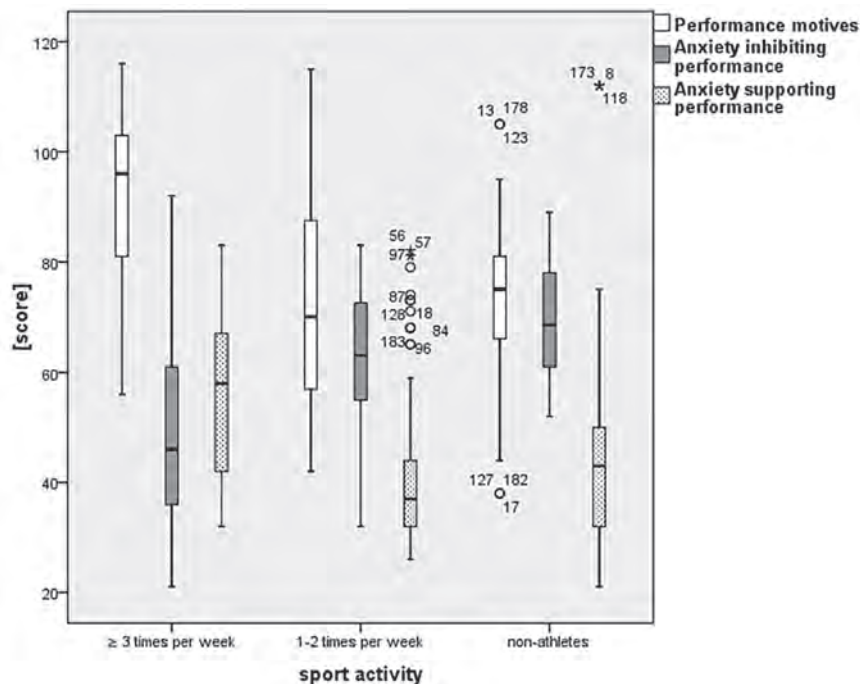

Figure 1. Descriptive statistics of dimensions of performance motivation among the research sample divided according to sports activities

According to the results of the Kruskal-Wallis test, the following differences were treated as statistically significant H(2)=39.264, p=0.000, η²=0.156 in the performance motive dimension, H(2)=49.908, p=0.000, η²=0.202 in the anxiety in-hibiting performance dimension and H(2)=37.768, p=0.000, η²=0.153in the anxiety supporting performance dimension. The effect size of all of the three dimensions achieved a large value (Table 1).

Table 1. The mathematical-statistical characteristics of the research sample segmented according to sports activities and differences in particular dimensions of achievement motivation

Dimension of Achievement Motivation	Sport Activity			Kruskal-Wallis test		
	≥3 times p.w. Mean±SD	1-2 times p.w. Mean±SD	non-athletes Mean±SD	H	p	η²
Performance Motives	91.05±16.03	72.63±20.63	72.76±15.04	39.264	0.000	0.156
Anxiety Inhibiting Performance	49.34±18.81	63.60±12.85	69.27±10.38	49.908	0.000	0.202
Anxiety Supporting Performance	55.74±14.90	40.68±13.76	43.96±18.24	37.768	0.000	0.153

Legend: p.w. - per week

The differences identified in the mean values of the performance motivation dimension among college students segmented according to sports activities listed in Table 1 were further evaluated in order to identify such differences as precisely as possible. By means of the non-parametrical Mann-Whitney U test, the statistical significance of the differences across the groups of respondents was calculated individually in each performance motivationdimension. The statistical significance was also supplemented by the size of the effect expressed by the coefficient r (Table 2).

Comparing the highly active respondents and the moderately active respondents, a statistical significance (α<0.001) was identified in all three performance motivationdimensions. In the performance motivedimension, the difference between those two groups of respondents (U=1365.5, p=0.000, r=047) as measured by the Mann Whitney U test achieved the value of small effect size, or small effect. In the anxiety inhibiting performance dimension, the difference between the mean values was also statistically significant (U=1419.5, p=0.000, r=0.41) with the same effect size as with the previous dimension. The statistically significant (U=1169.5, p=0.000, r=0.49) result between highly active and moderately active respondents was also detected in the anxiety supporting performance dimension.

Table 2. Differences between the mean values across achievement motivation dimensions in the research sample segmented according to sport activity

Dimension of Achievement Motivation	Mann - Whitney U test								
	≥3 times p.w. - 1-2 times p.w.			1-2 times p.w. - non-athletes			≥3 times p.w. - non-athletes		
	U	p	r	U	p	r	U	p	r
Performance Motives	1365.5	0.000	0.47	4297.5	0.571	0.04	1154.5	0.000	0.48
Anxiety Inhibiting Performance	1419.5	0.000	0.41	3424.5	0.004	0.21	960.0	0.000	0.54
Anxiety Supporting Performance	1169.5	0.000	0.49	4025.0	0.198	0.09	1472.5	0.000	0.39

Legend: p.w. - per week

In expressing the statistical significance of the difference between the mean values of the moderately active respondents and the non-active respondents, a statistical significance (α<0.01) was only detected in the anxiety inhibiting performancedimension (U=3424.5, p=0.004, r=0.21). The coefficient r, or effect size indicated a very small effect. The moderately active respondents achieved a lower mean value in this dimension, i.e., feelings of anxiety influence performance with less statistical relevance than among the non-active respondents. No statistically significant difference was identified when comparing the mean values of the two groups in the performance motive dimension (U=4297.5, p=0.571, r=0.04) and the effect size was very small. Furthermore, there were no statistically significant differences between the moderately active respondents and the non-active respondents in the anxiety supporting performance dimension (U=4025.0, p=0.198, r=0.09).

In a pair test, the mean values between the highly active respondents and the non-active respondents showed statistical significance (α<0.001) in all of the achievement performance dimensions. In the performance motive dimension the difference in the mean value obtained by the Mann-Whitney test revealed statistical significance (U=1154.5, p=0.000, r=0.48) with coefficient r indicating a small effect size. In the anxiety inhibiting performance dimension such relationship or effect size corresponded to the medium value. The difference between the mean values in this dimension between the highly active respondents and the non-active respondents achieved statistically significant values (U=960.0, p=0.000, r=0.54). The difference in the mean values between the two groups in the anxiety supporting performance dimension amounted to more than 11 points. Statistically speaking, the highly active respondents attained a statistically more significant (U=1472.5, p=0.000, r=0.39) result in this dimension than the non-active respondents. The coefficient r amounted to a small value.

Discussion

Given the great importance of performance motivation, surprisingly few systematic studies deal with this issue. The research performed in the area of performance motivation is mostly focused on the vocational psychology, but the results may be used in the field of sports psychology as well. The factor of the distribution of the research sample of college students -

sport activity, is not quite employed in this field of research, which makes the results presented in this paper even more surprising. The pilot study conducted by Šmela et al., (2017) in this field confirmed the expected differences in the research sample segmented by activity, or level of sport activity. The research proved the presence of significant differences between the groups (highly active students, moderately active students and non-active students) in all three achievement motivation dimensions. The authors concluded that performance motivation was dependent on the level of sport activity. The same conclusion, i.e., a higher level of achievement motivation with top sportsmen compared to non-elite athletes, was also made by Kavussanu and McAuley (1995) in their paper. The theory suggesting a direct dependence between the level of sport activity and the level of achievement motivation was also supported by the studies conducted by Khan, Khan and Ahmed (2010), Rathee and Singh (2011), Ibrahim and Gwari (2011), Ali (2010), Unierzyski (2003). Their results proved that the relationship between performance motivation and sport activity as follows: the higher the level of sport activity, the higher the performance motivation.

These results also correlate with the results presented in our paper. The highly active respondents attaineda significantly higher level of achievement motivation compared to the moderately active respondents and non-active respondents. Thus, sport activity may be considered as a significant, conditioning determinant influencing the total force of performance motivation. Our study also revealed an interesting finding -a significant difference in the dimensions (with the exception of anxiety inhibiting performance) was attained by the highly active respondents compared to the non-active respondents. Engaging in sport activity 1 to 2 times a week was not sufficient to change the performance motives and anxiety supporting performance dimensions. Based on the results of our study we could formulate a thesis proposing different levels of achievement motivation among the respondents, where significant differences (i.e., statistically higher achievement motivation) were achieved by the highly active respondents. It is assumed that college students with a higher frequency or level of sports activities and hence also a higher level of achievement motivation will be more successful in their professional life. Achievement motivation is conditioned by performance behaviour, aspiration, endurance at work and also time orientation toward the future. These factors play an important role at work and with employers, and the justification of the criterion for the selection for a particular job position - the best employees are sportsmen and sports women who have the strength to accomplish their tasks, learn new skills, attains their goals and cooperate in a team.

In contrast with the studies cited above, it is necessary to mention the research by Singh (2015) who did not detect any significant differences in the research sample of female college hockey players segmented according to level of sport activity. The study by Dureha, Singh, Yaduvanshi and Mishra (2010) did not confirm any significant differences between the hockey players at national and international levels in respect of achievement motivation either. In addition to achievement motivation, the authors of the research did not record any significant differences in the incentive motivation, state anxiety or trait anxiety between national and international hockey players. The results of this study are similar to those of Thakur and Mohan (2008) who dealt with achievement motivation among

volleyball players and non-active persons. Differences in the means at the level of achievement motivation between the research sample of volleyball players and non-active persons did not achieve statistical significance. According to the authors, there is no statistically significant difference in achievement motivation among respondents segmented according to the level of sport activity.

In the study by Ye (2001), the research sample of 2214 Chinese sportsmen was also segmented by gender. The results of his research indicated significant differences between gender and type of sport activity (individual versus collective) in the performance motivation scales. On the contrary, the study by Jiteshwor, Sunderlal and Singh (2013) concerned with achievement motivation among male and female basketball players proved that there are no statistically significant differences. In their conclusions the authors stated that gender does not condition the level of achievement motivation. They also concluded that the psychological states of men and women are mostly similar, but more extensive research samples would be necessary to render more relevant conclusions. We do not consider a research sample of 80 respondents as sufficient to make such a conclusion. However, in this field of research we only have partial findings available and this issue deserves more detailed attention. Vesković and Milanović (2011) also dealt with the relationship between performance motivation associated with sports success and the type of sport activity. They found that sportsmen engaged in individual sports placed higher goals upon the achievement of their own satisfaction. Another criterion to which the performance motivation is linked in the research is age. The results of the study conducted by Castiollo, Duda, Balaguer and Tomás (2009) showed increasing performance motivation under the influence of adolescence as well as the ability to better define success as well as views of its accomplishment.The research goal of segmenting respondents according to school type was outlined in Scholz (2011) who compared the performance motivation of 18-19 year old students of special sport schools and classical grammar schools. His results indicated significantly higher performance motivation among students of special sport schools. Another study proving the level of performance motivation according to sport activity is the work of Sedláčková (2014). She compared the performance motivation of adolescents segmented from a point of view of sport activity. The results of her work indicate a significantly higher performance motivation among sporting adolescents compared to non-sporting adolescents. The results of these studies also correlate with the results of our paper. Individuals who are more active in sport activity attain a statistically higher level of performance motivation.

Achievement motivation is a current and much-needed area of research. The results and conclusions of studies concerned with this issue will find their place not only in vocational, social and sports psychology, but also in the process of learning and success achievement. Achievement motivation is an important and necessary characteristic for each individual and influences their level of success. It is socially appreciated and establishes the grounds for experiencing success-associated, pleasant and joyful feelings in terms of the achievement of a goal. As stated in the introduction, its levelis shaped especially in childhood with the dominant role being played by the mother who determines the degree of independence of the child. The level of achievement motivation among college students, as indicated by the results of our study, is also influ-

enced by the level, or frequency of sport activity. Highly active college students have a higher level of achievement motivation compared to moderately active college students and non-active college students. Since we surveyed the level of achievement motivation only with a research sample of college students, our next research goal will be to extend this research sample to older individuals. In the next stage of our research we will examine changes in the effect of the level of achievement motivation during the life of an individual and in the age at which it reaches its culmination.

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SportMont

ORIGINAL SCIENTIFIC PAPER

Repulsion of the Futsal Ball Depending on the Pressure in it

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Abstract

The aim of this research is to determine the elastic (repulsive) properties of the futsal ball depending on the air pressure in it. Futsal ball of standard dimensions was released on the flat solid surface from the height of nine meters for four times. At the first release the air in the ball was under prescribed pressure. At the second release the pressure in the pumped ball is reduced by 5%, at the third reduced by an additional 5%, at the fourth reduced by another 5%. The setting of the experiment was carried by cinema shooting of free fall of the prescribed futsal ball and a series of rebounds after the rejection of solid surfaces. One can conclude that the distance crossed and the total duration of four successive bouncing mostly dependent on inner pressure. In this study, the initial speed of a futsal ball was unchanged and only inner pressures were changed. It was determined how much the height of the rebound is reduced and the duration of the rebound, respectively, depending on the reduction of inner pressure. Overall, it can be concluded that the initial speed of the ball can be increased by increasing the inner pressure in the ball.

Key words: *futsal, pressure in futsal ball, repulsion*

Introduction

Within physical development program the games have a dominant role, and among all games the most important are the ball games. In our environment the futsal occupies one of leading roles when the ball games are in focus. The most important equipment of these games is ball (Karimi et al., 2015). Today, all kind of balls are produced whose construction has been getting closer to full symmetry, but the ideal symmetry of the ball has not been reached yet!

Basically, the futsal match is, strategically speaking, the battle for space and time. Those are the most important components in the ball games (Bjelica, Popović, Gardašević, & Krivokapić, 2016). Ball sports such as futsal place large metabolic demands on players (Hatamoto et al., 2014). In a good match, each player makes a lot of elementary muscular contractions at the field, providing a series of complex movements, in a struggle to come into possession of the ball before the opponent player, to enter the zone from where the score can be reached before being distracted by the opponent player

(Bjelica, Popovic, Tanase, & Gardasevic, 2017; Bjelica, Popović, & Gardašević, 2016a; 2016b). Since such maneuver takes place continuously and it is time-consuming, furthermore the modern maneuver, where there are already well-coordinated combinations, is being performed in the highest speed and in a state of maximum fatigue, each good futsal game maximally exhaust all players at the field.

The result of a futsal game is not been assessed by the level of motor performance nor who ran longer, or who is running faster, or who has jumped more, but by the number of goals scored. Therefore, all maneuvering movements during a game are subordinated to the ball movement. Ball is a machine, whose properties each player must be fully aware of (Bjelica, 2008). This is the primary reason why every player must be fully aware of the nature of the elastic properties of a futsal. The aim of this research is to determine the elastic (repulsive) properties of the futsal ball depending on the air pressure in it, which basically fall under the kinematic researches.

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Method

Research conducted in this study primarily refers to the standard futsal ball for seniors with the following performances (Table 1.):

Table 1. Dimensions of the futsal ball

Weight (kg)	Radius (m)	Circumference (m)	Cross-section (m²)	Surface (m²)	Capacity (m³)
0.41	0.1025	0.644	0.033	0.132	0.0045

Recently, sophisticated finite element models of sports ball impacts have been developed for various sports (Nevinsa & Smitha, 2013). A standard futsal ball with full symmetry was acquired from the licensee manufacturer. Both layers, one of which is required to construct a ball, have inevitable flaws, affecting the appearance of asymmetry, not huge but enough to cause changes, which do not exist in the ideal spherical body. Since in the cavity of the inner layer has to be pumped the air, there must be a valve, which, no matter how small is represents the asymmetry of the ball.

Futsal ball of standard dimensions was released on the flat solid surface from the height of nine meters for four times.

The flight of a ball through the air is a key part of many popular sports (Barber, 2009). At the first release the air in the ball was under prescribed pressure – p (Table 2.). At the second release the pressure in the pumped ball is reduced by 5% - p1 (pressure prescribed minus 5%, Table 2.). At the third release the pressure in the pumped ball is reduced by an additional 5% - p2 (pressure prescribed minus 5%, minus 5%, Table 2.) At the fourth release the pressure in the pumped ball is reduced by another 5% - p3 (pressure prescribed minus 5%, minus 5%, minus 5%, Table 2.) By calibrated gauge pressure the internal pressures were respectively measured.

Table 2. Air pressure in the futsal ball

(p) Prescribed	(p1) reduced by 5%	(p2) reduced by 5%	(p3) reduced by 5%
0.65	0.6175	0.5865	0.5575

A rather demanding calculation of repulsions coefficient value was made with one of the basic programs. The setting of the experiment was carried by cinema shooting of free fall of the prescribed futsal ball and a series of rebounds after the rejection of solid surfaces. The recording was performed with the rapid-professional digital movie camera JVC GY-HM750E with fifty shots per second and the exposure sec/100. During the shooting, the camera was completely immobilized. In the projection of the futsal ball movement the markers were measured (in meters), in order to determine the extent (R) between the size of the screen and the real size (R-size screen natural). During the research the area of the collision was determined by transmission contrasting colors of the ball and surface before the collision with the ground and measuring the surface impressions on the ball and the ground after the rebound. The duration of the movements is measured in seconds, i.e. every fifty positions lasted one second and the duration between two neighboring positions lasted sec/50. The processing took positions of falls of each ball and its four rebounds.

Results

Table 3. shows a global view of spatiotemporal parameters of repulsion of the futsal ball with full symmetry depending on the air pressure in it.

Table 3. Spatiotemporal parameters of repulsion of the futsal ball with different air pressures

parameters		Pressure of the ball			
		p	p1	p2	p3
h1	Height of free fall (m)	9	9	9	9
t1	Duration of the first fall (s)	1.10	1.10	1.00	1.08
t2	Duration of the first climbing (s)	0.58	0.44	0.40	0.40
h2	Height of the first rebound (m)	2.52	1.34	1.43	1.26
t3	Duration of the second fall (s)	0.58	0.40	0.42	0.40
t4	Duration of the second climbing (s)	0.38	0.24	0.18	0.18
h3	Height of the second rebound (m)	1.26	0.38	0.34	0.34
t5	Duration of the third fall (s)	0.40	0.18	0.20	0.14
56	Duration of the third climbing (s)	0.30	0.08	0.10	0.08
h4	Height of the third rebound (m)	0.80	0.21	1.17	0.25
t7	Duration of the fourth fall (s)	0.30	0.04	0.06	0.08
t8	Duration of the fourth climbing (s)	0.20	0.00	0.04	0.04
h5	Height of the fourth rebound (m)	0.55	0.00	0.08	0.08

At the first phase, the diagrams 1, 2, 3 and 4 shows the futsal ball paths with spatiotemporal parameters in the first four rejections of solid surface, depending on the air pressure in it. In the vertical, there are culmination points of each rejection of the surface, measured in meters, and in the horizontal the length of each rejection of the surface is shown in seconds.
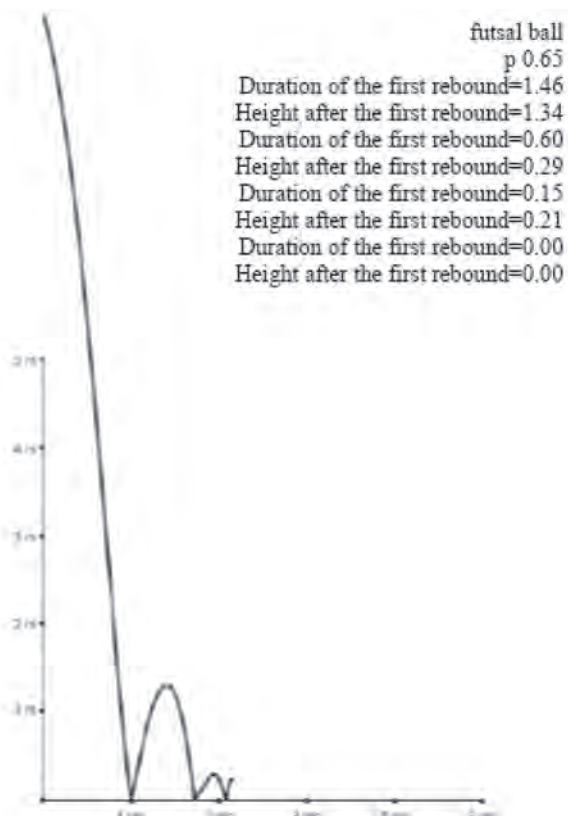
futsal ball
p 0.65
Duration of the first rebound=1.46
Height after the first rebound=1.34
Duration of the first rebound=0.60
Height after the first rebound=0.29
Duration of the first rebound=0.15
Height after the first rebound=0.21
Duration of the first rebound=0.00
Height after the first rebound=0.00

Diagram 1. Time and height of rebound for p

futsal ball
p 0.6175
Duration of the first rebound=1.54
Height after the first rebound=0.30
Duration of the first rebound=0.28
Height after the first rebound=0.22
Duration of the first rebound=0.26
Height after the first rebound=0.17
Duration of the first rebound=0.00
Height after the first rebound=0.00
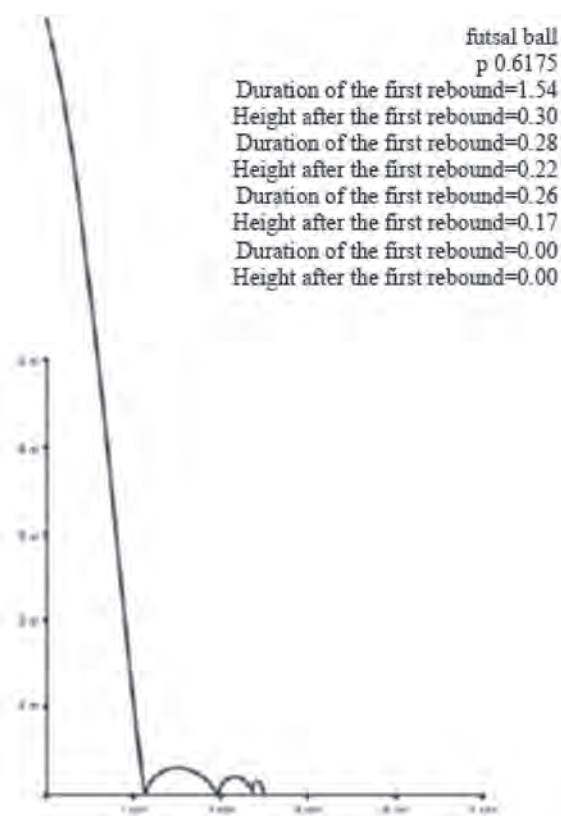
Diagram 2. Time and height of rebound for p1

futsal ball
p 0.5865
Duration of the first rebound=1.50
Height after the first rebound=1.26
Duration of the first rebound=0.60
Height after the first rebound=0.18
Duration of the first rebound=0.30
Height after the first rebound=0.11
Duration of the first rebound=0.10
Height after the first rebound=0.00
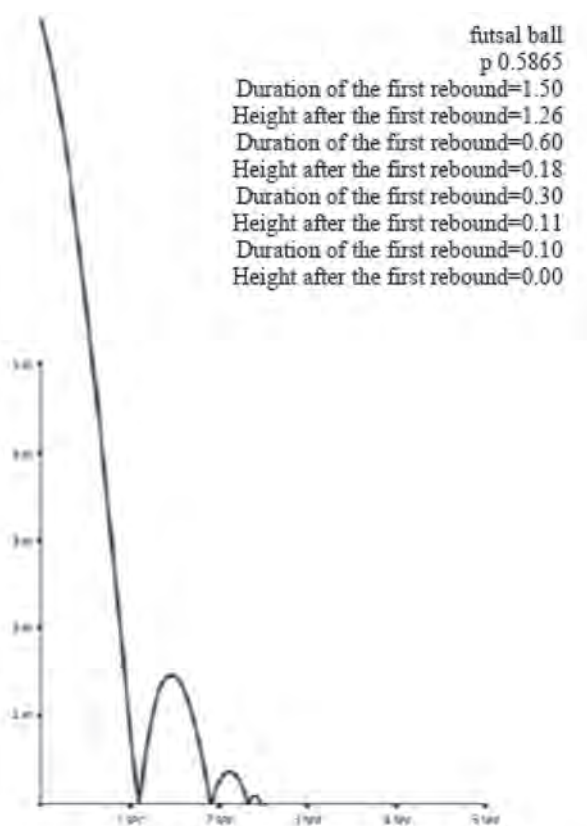
Diagram 3. Time and height of rebound for p2

futsal ball
p 0.5575
Duration of the first rebound=1.48
Height after the first rebound=1.20
Duration of the first rebound=0.58
Height after the first rebound=0.14
Duration of the first rebound=0.22
Height after the first rebound=0.11
Duration of the first rebound=0.12
Height after the first rebound=0.08
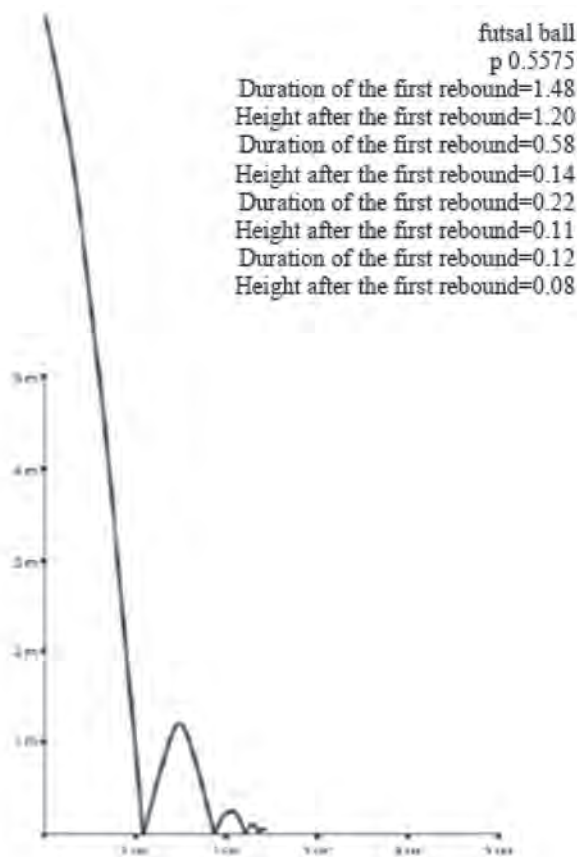
Diagram 4. Time and height of rebound for p3

At the second phase it was carried out the interpolation of diagrams of duration of individual rebounds in a function of distance covered on diagrams 5, 6, 7 and 8, as well as interpolation of diagrams of culmination points of individual rebounds over the time in diagrams 9, 10, 11 and 12 with the entered data.

futsal ball
p 0.65
Duration of the first rebound=1.46
Duration of the second rebound=0.60
Duration of the third rebound=0.15
Duration of the fourth rebound=0.00
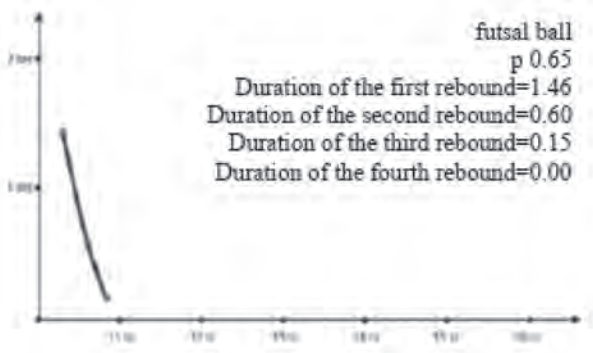
Diagram 5. Duration of rebound for p

futsal ball
p 0.6175
Duration of the first rebound=1.54
Duration of the second rebound=0.28
Duration of the third rebound=0.26
Duration of the fourth rebound=0.00
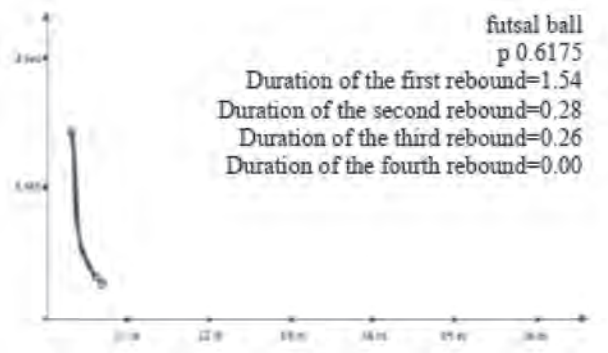
Diagram 6. Duration of rebound for p1

futsal ball
p 0.5865
Duration of the first rebound=1.50
Duration of the second rebound=0.60
Duration of the third rebound=0.30
Duration of the fourth rebound=0.10
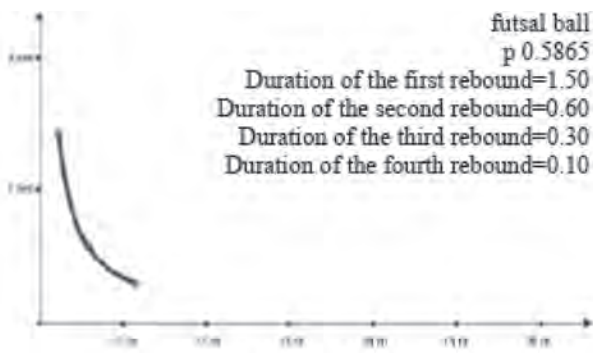
Diagram 7. Duration of rebound p2

futsal ball
p 0.5575
Duration of the first rebound=1.48
Duration of the second rebound=0.58
Duration of the third rebound=0.22
Duration of the fourth rebound=0.12
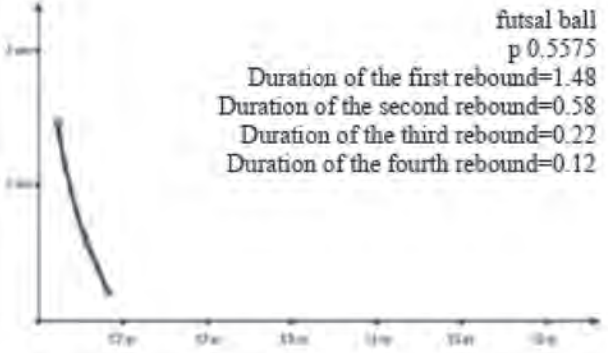
Diagram 8. Duration of rebound p3

futsal ball
p 0.6175
Height after the first rebound=0.30
Height after the second rebound=0.22
Height after the third rebound=0.17
Height after the fourth rebound=0.00
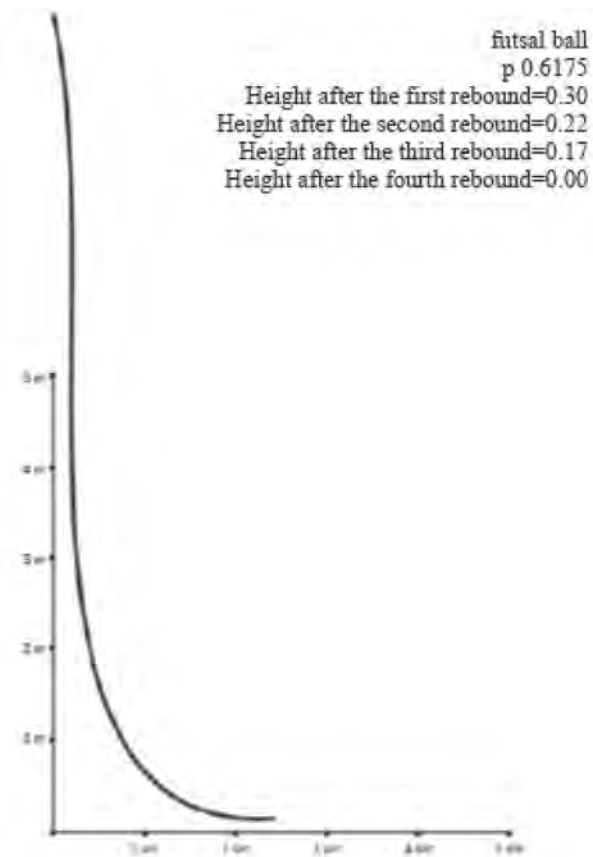
Diagram 9. Height of rebound for p

futsal ball
p 0.65
Height after the first rebound=1.34
Height after the second rebound=0.29
Height after the third rebound=0.21
Height after the fourth rebound=0.00
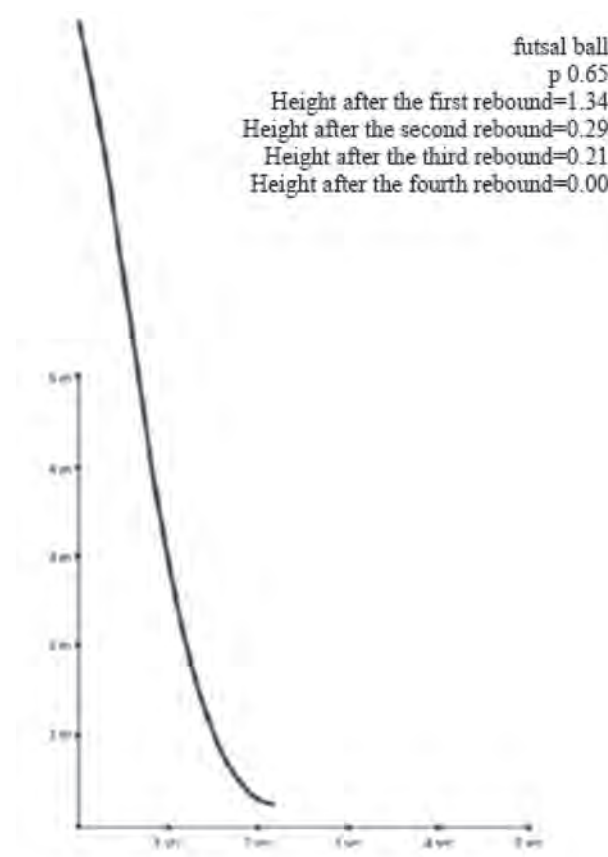
Diagram 10. Height of rebound for p1

futsal ball
p 0.5865
Height after the first rebound=1.26
Height after the second rebound=0.18
Height after the third rebound=0.11
Height after the fourth rebound=0.00
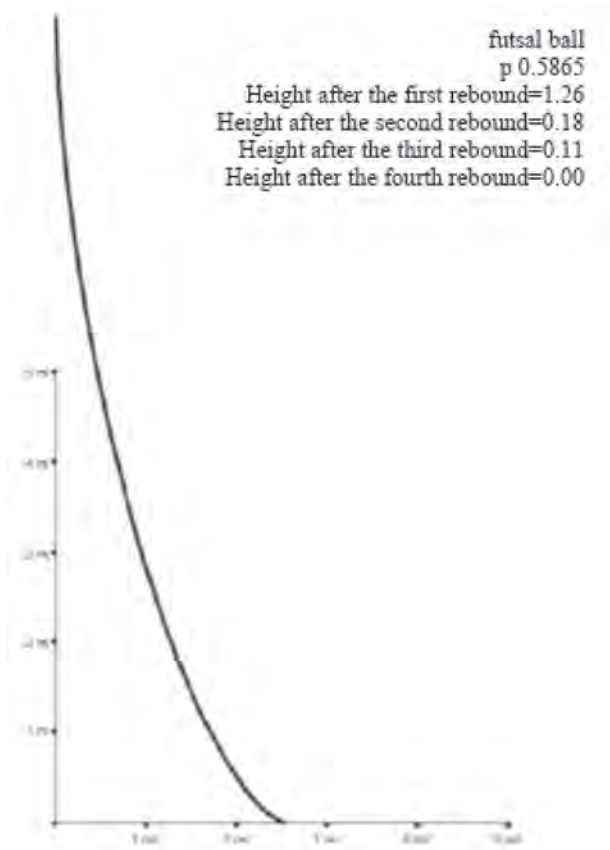
Diagram 11. Height of rebound for p2

futsal ball
p 0.5575
Height after the first rebound=1.20
Height after the second rebound=0.14
Height after the third rebound=0.11
Height after the fourth rebound=0.08
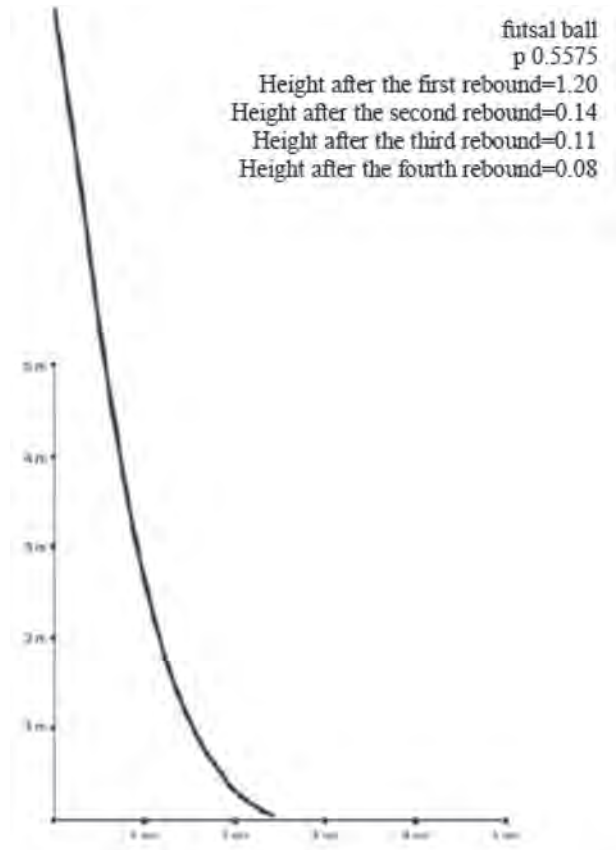
Diagram 12. Height of rebound for p3

At the third phase it was shown the contours of diagrams of time intervals and culminating points for futsal ball, com-paring to the tested pressures summary:

futsal ball
Pressure n: 0.65
Pressure n-5%: 0.6175
Pressure n-5%-5%: 0.5865
Pressure n-5%-5%-5%: 0.5575
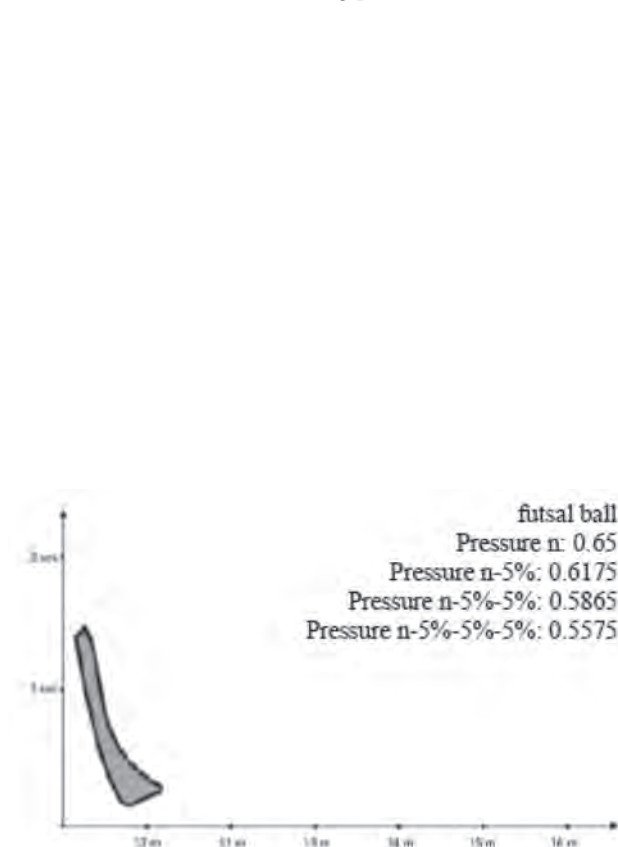
The contours 1. The time intervals summary

futsal ball
Pressure n: 0.65
Pressure n-5%: 0.6175
Pressure n-5%-5%: 0.5865
Pressure n-5%-5%-5%: 0.5575
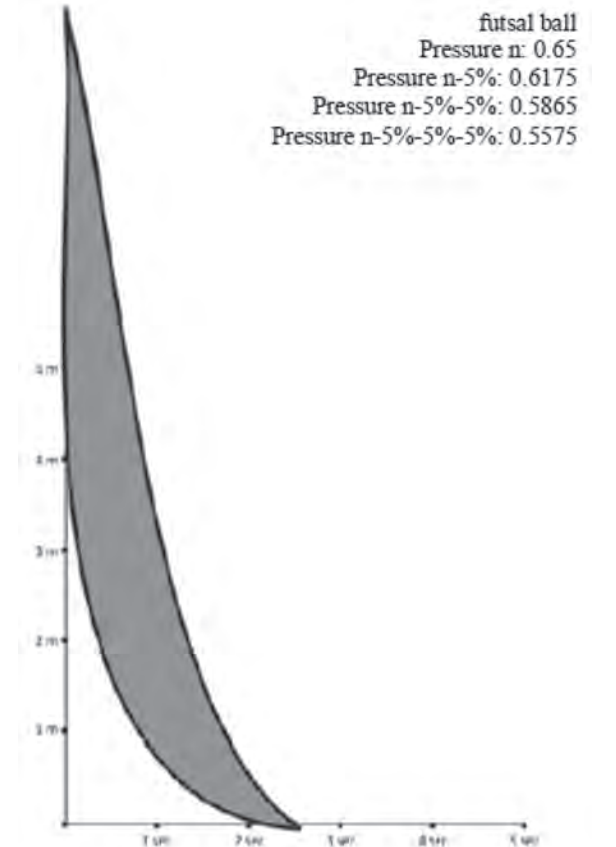
The contours 2. The culmination points summary

At the fourth phase were shown indexes of total duration and distance taken for futsal ball for four rebounds and four val- ues of inner pressure (Table 4.), as well as associated diagrams 13, 14, 15 and 16 for each value of inner pressure separately:

Table 4. Indexes of total duration and distance taken

	Distance (m)				Duration (s)				Index=path/time			
	p	p1	p2	p3	p	p1	p2	p3	p	p1	p2	p3
After first rebound	10.34	10.34	10.43	10.26	1.46	1.54	1.50	1.48	7.082	6.714	6.950	6.932
After second rebound	10.63	10.72	10.77	10.60	2.06	1.82	2.10	2.06	5.160	5.890	5.129	5.146
After third rebound	10.84	10.69	11.94	10.85	2.21	2.08	2.40	2.28	4.905	5.140	4.975	4.759
After fourth rebound	0.00	0.00	10.55	10.53	0.00	0.00	2.50	2.40	0.000	0.000	0.000	0.000
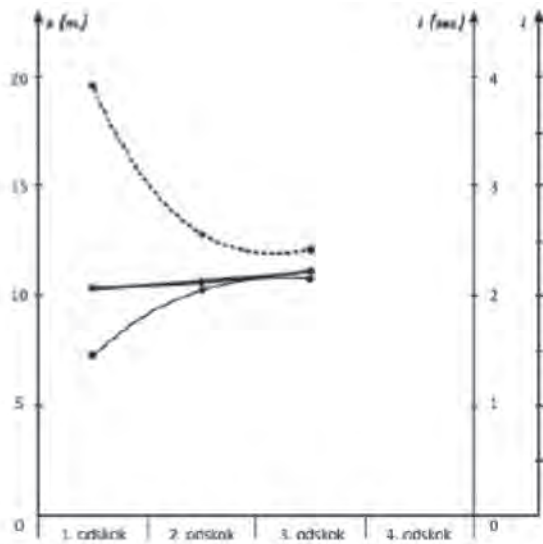
Thinner line: total time duration (t)
Thick line: Total distance traveled (s)
Dashed line: index = s/t

Diagram 13. Total duration and distance for p
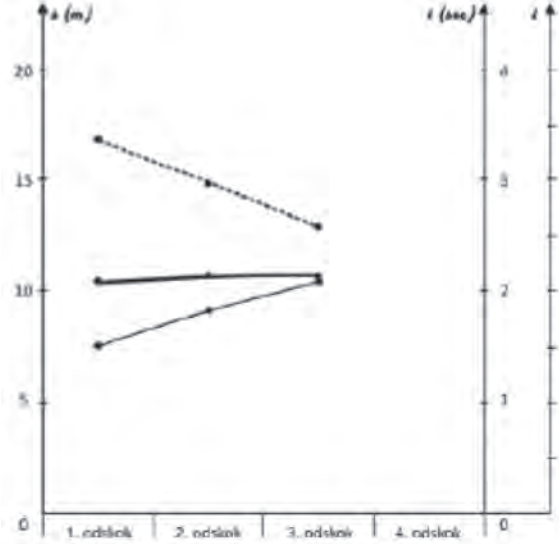
Thinner line: total time duration (t)
Thick line: Total distance traveled (s)
Dashed line: index = s/t

Diagram 14. Total duration and distance for p1
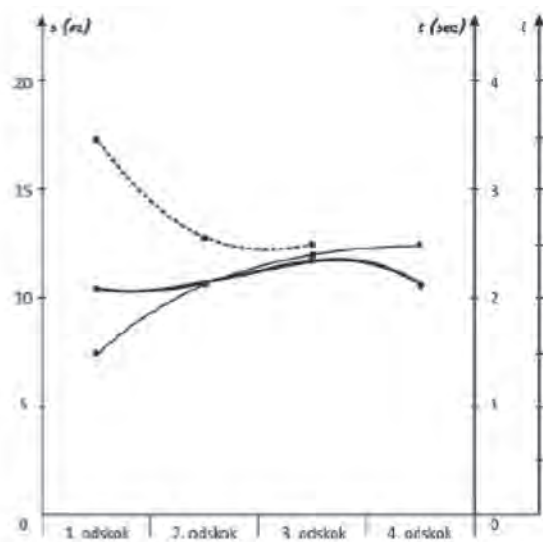
Thinner line: total time duration (t)
Thick line: Total distance traveled (s)
Dashed line: index = s/t

Diagram 15. Total duration and distance for p2
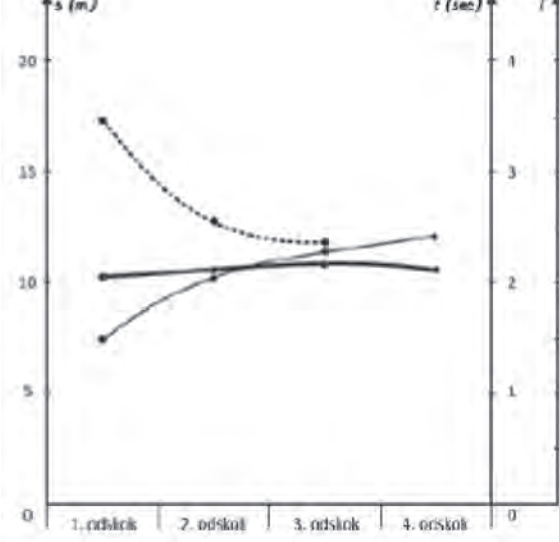
Thinner line: total time duration (t)
Thick line: Total distance traveled (s)
Dashed line: index = s/t

Diagram 16. Total duration and distance for p3

At the fifth phase calculated are the repulsion coefficients for futsal ball, for each pressure, for each duration and each height reached (Table 5.).

Table 5. The repulsion coefficient

Pressure	After first rebound	After second rebound	After third rebound	After fourth rebound	The average values
p (0.65)	0.39	0.47	0.85	0.00	0.57
p1 (0.6175)	0.38	0.41	0.88	0.00	0.57
p2 (0.5865)	0.37	0.38	0.80	0.00	0.38
p3 (0.5575)	0.37	0.34	0.75	0.00	0.49

In the event of an impact of the falling ball with a solid surface, the force of the collision depends on the mass of the body in motion and acceleration that has a falling body at the moment of collision (Bjelica, 2014). Collision of elastic bodies takes place in two stages. In the first stage the substance of the collisional bodies is compressed, and this phase is called the period of compaction or compression. Due to elastic properties of substances in an impact, after the compression the second stage of a collision takes place, which is called the period of return to the previous state or restitution (Bjelica et al., 2016). Futsal ball, no matter how many times after its release moved vertically in free fall, it had no vertical rebound out of four successive bouncing. To be able to determine the rules of repulsions with futsal ball, it is necessary to determine two sizes. Spatial, i.e. the height of culmination center of gravity of each ball rebound on one hand, and the temporal, i.e. the moment of a rebound, on the other hand.

Discussion

Looking at the sum of ball paths from the time of release to the culmination point of the fourth rebound as well as the duration of the bouncing ball from the start of the free fall until culmination point of fourth rebound, one can conclude that the distance crossed and the total duration of four successive bouncing mostly dependent on inner pressure. Inflated futsal ball, with the compressed air pressure greater than atmospheric, when the pressure decreases, it less bounces from the ground even though nothing in its structure has changed. The rebound of the ball is a consequence of the aspirations of compressed air, that in the period of restitution "correct" the deformed part of the ball, which was created by compression. When the air pressure in a ball is higher, the bigger is the compression, and the bigger compression, the greater will be the restitution i.e. the harder rebound from the ground.

The heights of culmination points of a futsal ball with all four rebounds, of which almost all were taken into account when concluding, are the metric values, which in this experiment at least unreliable. The degree of deviation from the ideal value is almost negligible and based on the obtained height values of culmination points can be reliably concluded. After calculating the futsal ball repulsions coefficient, for every air pressure and every rebound it was found that the repulsions coefficient is from 0.38 to 0.57.

In this study, the initial speed of a futsal ball was unchanged and only inner pressures were changed. It was determined how much the height of the rebound is reduced and the duration of the rebound, respectively, depending on the reduction of inner pressure. Overall, it can be concluded that the initial speed of the ball can be increased by increasing the inner pressure in the ball.

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Quality of Life in Adolescent's Idiopathic Scoliosis before and after Physical Therapy: A Preliminary Study

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Abstract

Adolescent Idiopathic Scoliosis (AIS) accounts for 80% of all types of diagnosed scoliosis, occurring in 2%-3% of growing age population. This disorder is quite complicated and physical therapy is important factor in the treatment. The aim of this study is to evaluate the efficacy of physical therapy in quality of life in adolescent idiopathic scoliosis. This research was conducted in 56 consecutive adolescent idiopathic scoliosis patients (32 females and 24 males), aged 10-17 years, Cobb angle 10°-45°, at Physical and Rehabilitation Medicine Clinic, University Clinical Center of Kosovo (UCCK), Prishtina, Kosovo, during the period 2016-2017. The physical therapy protocol, including combined Schroth and Pilates exercise were performed during 3 months. The evaluation of Quality of Life (QoL) is done by SRS-22r questionnaire at the beginning and the end of the treatment. Results displayed that supervised combined Schroth and Pilates exercises have provided benefit to the standard of care by improving QoL before and after physical therapy in all components: the mean for function has improved from 3.15 to 3.45, pain from 3.23 to 5.54, self-image from 3.36 to 5.46, mental health from 3.01 to 3.35, and in overall QoL was improved from 3.30 to 3.68. Quality of life was significantly better after physical therapy ($p<0.05$). The study shows that physical therapy in scoliosis patients achieves good results in daily living life.

Key words: *idiopathic scoliosis, quality of life, physical therapy*

Introduction

Scoliosis is a complex deformity of the spine that develops in three dimensions and results in the appearance of frontal curves, fixed vertebral rotations, and a flattening of the sagittal physiological curves. Scoliosis can progress during growth and usually it occurs most often between 10 years of age to the end of growth, it is called adolescent idiopathic scoliosis (AIS) and is the most common diagnosis which cause a surface deformity, it is usually not symptomatic (Park, & Bae, 2014; Romano et al., 2012). The causes of scoliosis are unknown (Romano et al., 2012; Romano et al., 2013; Janicki, & Alman, 2007; Choi et al., 2013; Konieczny, Senyurt, & Krauspe, 2013; Asher, & Burton, 2006). Problems that causes scoliosis include an increasing cosmetic deformity, disability, pain, functional limitations, if deformation is expressed can cause sometimes pulmonary problems and possible progression during adulthood (Romano, et al., 2012; Weinstein et al., 2003). Adolescent idiopathic scoliosis does not typically cause any health problems during growth, however the resulting surface deformity frequently has a negative impact on adolescents that can give rise to QoL issues and in the worst cases, psychological disturbances (Romano, et al., 2012; Reichel, & Schanz, 2003). Some patients who suffer from scoliosis apart from physical, physiological problems they also may have psychological problems and encounter obstacles in everyday activities. There is a lack of evidence about health-related QoL in patients with idiopathic scoliosis before and after rehabilitation (Tones, Moss, & Polly, 2006). In their study Freidel with collaborators (2002)

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have concluded that the juvenile patients with idiopathic scoliosis were concerned with their QoL and server depression, whereas the adult patients have reported more psychological problems. According to this research it is reported that the QoL of the patients suffering from idiopathic scoliosis may be poor, and also that the psychological state must be treated in these patients (Freidel et al., 2002).

The aim of this study is to evaluate the efficacy of physical therapy inQoL in adolescent patients with AIS.

Methods

The research was performed on consecutive patients which are diagnosed with idiopathic scoliosis, during their outpatient visit in the Physical and Rehabilitation Medicine Clinic, UCCK, Prishtina, Kosovo, during the period 2016-2017. The study was prospective and 56 adolescent patients with idiopathic scoliosis were included in the study, 10-17 year old, both gander, which had the Cobb - angle between 10˚ and 45˚. Exclusion criteria were patients who had Cobb's angle over 45˚, having contraindications to exercise, accompanying mental problems, neuromuscular, neurological problems, congenital malformation or trauma related co morbidity, patient who had non-idiopathic scoliosis and previous spinal surgery. We have informed the parents for implementation of rehabilitation program for idiopathic scoliosis in their children, who came for a treatment. Except parents, each participant was given explanation about the purpose of the research and the exercise methods, and their parents voluntarily have signed inform consent before participated in the research. The study was approved by Ethical Committee of UCCK. Determination of diagnoses and determination of Cobb's level was conducted by orthopedist while the evaluation of QoL was determined by physiatrist and physical therapist.

Rehabilitation Program

The physical therapy regime included 1-hour combined Schroth and Pilates exercises which was performed during 3 months. Exercises were performed by one session in duration of 60 minutes daily for five days per week. Also, we have recommended to them a home exercise program, which consist of 30 minute sessions seven days per week.

Assessment

We have evaluated the QoL of all patients included in the study using a questioner test for QoL (SRS-22r questioner). The SRS-22r questioner is a QoL scoliosis questionnaires' that assesses five domains: function, pain, self-image and mental health (5 questions for each), satisfaction with treatment (2 questions). The number of possible answers for each question was standardized in 5. Points vary from 1 to 5, where 5 is best and 1 is worst. Maximal points for 5 questions are 25 while minimal 5. While in relation to two questions that has to do with satisfaction about treatment, total points were 10 (Kotwicki et al., 2013; Asher, Lai, Burton, & Manna, 2004; Schreiber et al., 2015). The patients have fulfilled the questionnaire with our help, pre-treatment and after 3 months of treatment.

Statistical analysis

The statistical analysis was performed using Statistical Package for the Social Science (SPSS). The presentation of results was carried out through the tables and figure. The following statistical parameters were included: index of the structure, arithmetic average, standard deviation, minimal and maximal value. T-test was used for the parametric data. A $p < 0.05$ was considered significant.

Results

Table 1 shows the demographic data of the patients which were included in the study. From 56 patients, 32% or 57.1% of them were female and 24% or 42.9% were male. The patients included in this study were adolescents from 10 to 17 years old, the mean age was 13.4 years old. The mean Cobb angle in thorac/lumb was 17.7˚, in thoracic was 17.9˚, while in lumbar was 16.2˚. Forty cases or 71.4% of them had scoliosis in the thoracic/lumbar region, 12 cases or 21.4% had scoliosis in the thoracic region, where 4 cases or 7.1% had scoliosis in the lumbar region. In 23 cases or 41.1% of them, the orientation of the scoliosis curve was left, in 15 cases or 26.8% was right, while in 18 cases or 32.1% the orientation of the curve was S in both sides. 37 patients or 66.1% of them were treated with only physical therapy while 19 cases or 33.9%, except physical therapy treatment they also were treated with brace.

Table 1. General characteristics of patients (N=56)

Patients	Frequency	%
Female	32	57.1
Male	24	42.9
Mean Age	13.14±2.03	
Mean Cobb angel -Th/L	17.7±6.6	
Mean Cobb angel -Cobb/Th	17.97±7.5	
Mean Cobb angel- Cobb/L	16.22±7.42	
Thoracic	12	21.4
Lumbar	4	7.1
Thoraco/Lum	40	71.4
Right	15	26.8
Left	23	41.1
S (double)	18	32.1
Without Breace	37	66.1
WithBreace	19	33.9

Table 2 and Figure 1 shows the results of SRS 22r variables as well as a total score, before and after physical therapy show-ing significant improvement in all components.

Table 2. Quality of life according SRS-22r patients questioner pre-treatment and after 3 month of treatment

	Initial		Final		%	R	T	Sig
	Mean	Std.Dev.	Mean	Std.Dev.				
Function	3.15	0.55	3.45	0.41	9.52	0.37	-4.05	.000
Pain	3.23	0.81	5.54	13.00	71.52	0.58	-3.58	.002
Self image	3.36	0.62	5.46	13.01	62.50	0.29	-2.30	.035
Mental health++	3.01	0.38	3.35	0.43	11.30	0.55	-6.48	.000
Sub Total	3.19	0.45	3.56	0.30	11.60	0.53	-7.17	.000
Satisfaction/Dissatisfaction	4.36	0.86	4.71	0.43	8.03	0.53	-3.59	.001
QoL total	3.30	0.47	3.68	0.27	11.52	0.57	-7.44	.000

The Mean for function has improved from 3.15 to 3.45 (t-4.05, sig=.000), pain from 3.23 to 5.54 (t-3.58, sig=.002), self image from 3.36 to 5.46 (t-2.30, sig=.035) mental health++ from 3.01 to 3.35 (t-6.48, sig=.000), subtotal SRS-22r from 3.19 to 3.56 (t-7.17, sig=.000), satisfaction/dissatisfaction from 4.36 to 4.71 (t-3.59, sig=.001) and in overall QoL from 3.30 to 3.68, (t-7.44, sig=.000).
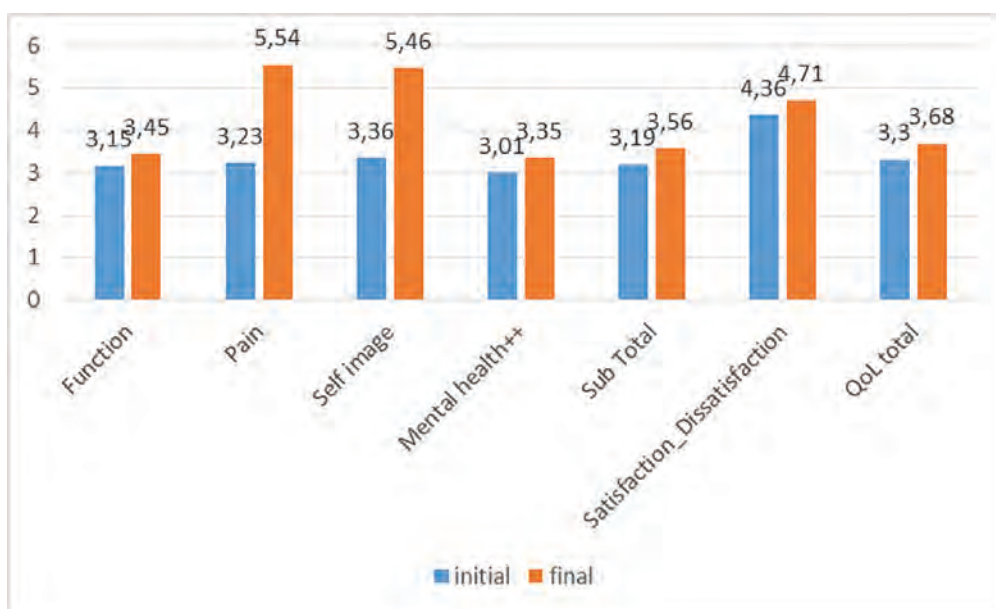
Figure 1. Changes in Quality of Life according SRS-22r patients questioner pre-treatment and after 3 month of treatment

Discussion

The real idiopathic scoliosis causes deformity of the spine column and as a consequence of this deformity physical and psychological problems can be caused in patients, then these problems can have negative impact in QoL (Freidel et al., 2002; Çolak et al., 2017). Some studies report that conservative treatment – application of different protocols of exercises has no impact on improvement of QoL, while some of them report that have positive effect in improvement of QoLin patients with idiopathic scoliosis. Vasiliadis and Grivas (2008) have reported that health-related quality of life (HRQoL) was negatively affected after conservative treatment of the patients with AIS. Kuru et al. (2015), in their study have evaluated QoL in patients with scoliosis before and after the treatment, using SRS-23 instrument, and they have reported that there was no significant difference between the groups of patients with scoliosis. In our study we evaluated the QoL by using the SRS-22r questioner pre-treatment and after 3 month of treatment, we have improvement in the mean function, pain, self image,

mental health++, subtotal, satisfaction/dissatisfaction and in overall Qol from 3.30 to 3.68 (t-7.44, sig=.000).The results of our study have similarity with the results of some studies which have reported that application of different methods of conservative treatment, especially application of Schroth method has positive impact in QoL in patients with scoliosis, for example: Schreiber et al. (2015), in their study had an intention to determine the effect of combined exercises Schroth with standard care in QoL and back muscle endurance (BME), comparing to only standard care in patients with AIS. They have confirmed that the group of patients that was treated with Schroth exercises had improvement in self-image for 0.13, and in QoLin general, while the control group didn't have an improvement, on contrary there was worsening of the self-image for 0.17. Also they reported about the difference in SRS-22r pain score between the groups, in Schroth group the pain was improved with increase of 65.3%, while in control group there was decrease for 20.0%. Schroth group had improvement also in other variables of SRS-22r: pain=18.4%, function=28.6%,

with decrease of SRS-22r total in 0.08 (p=0.047), also there was improvement in the results of SAQ instrument (Schreiber et al., 2015). Kwan, Cheng, Koh, Chiu and Cheung (2017) also reported that application of Schroth method showed significant improvement in function and in total score, while in other domains they reported that there was significant difference in experimental group, while in control group they didn't find significant improvement in none of SRS-22 domains. For evaluation of the QoL, these authors used SRS-22 instrument.

Physiotherapy, different regimens, has been shown to have favourable outcomes in scoliosis patients, in many studies in international literature, and generally we can consider that Schroth and Pilates exercises, are well received by patients with scoliosis and instead of showing good results in improving Cobb angle, they also prevent the development of deformity, increase the flexibility of trunk, muscular strength and fixing the posture, by reducing the spinal deformities, and it also may improve the QoL.

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Using the Concept of Sports Business Intelligence in Evaluating Sport Policies

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Abstract

In 2017 the author conducted an audit of the relevant policy documents on sport and physical activity in 14 Czech regions and cities with the number of inhabitants above 50 thousand. Furthermore, the data was collected from the phone survey conducted on the topic of monitoring physical activity and the well-being of the population.Respondents/sample file in this survey were heads of the sports departments in cities with 50 000 or more inhabitants and heads of the sports departments in Czech regions. The results from this qualitative and quantitative study focus on the utilization of programme budgeting principles and Sports Business Intelligence in a national context, providing the base for a comparison with other countries and proposing the way towards effective and efficient usage of the key performance indicators for sports policies evaluation.

Key words: sports policy, programme budgeting, sports business intelligence, key performance indicators

Introduction

Sports policies play an important role in achieving the recommended levels of physical activity for health and physical fitness. Sport policy documents reflect political commitment to take action and are important measures of accountability (Bull, Bellew, Schöppe, & Bauman, 2004; Schmid, Pratt, & Witmer, 2006). But there is a lack of research on how these sports policies are addressing the issue of physical fitness using the performance indicators based on real and available data. So far there have been conducted analyses of policies promoting physical activity at European Union and national level (Bull et al., 2004; Daugbjerg et al., 2009, Christiansen, Kahlmeier, & Racioppi, 2014). Therefore this paper aimed at reviewing and analyzing of recent regional and local sports policies in the Czech Republic with a focus on the performance measures that are suggested to support the fitness -enhancing physical activities. In this sense the concept of SportsBusiness Intelligence (Rasku, Puronaho, & Turco, 2015) - that means relevant, systematic, and continuous data collection to develop sports organizations, sports events and/or sports activities - seems to be the most suitable tool for assessing the performance focus of the sports policies. Moreover, The Strategy for

Sport up to 2025 in the Czech Republic envisages joint efforts of the public sector to gradually eliminate the problems and barriers to the sport to enhance the physical activities and thus physical fitness of the population. In tune with this principle our research focuses on the analysis of the current state of sports policy documents at regional and local level. The aim is todefine recommendations of how to elaborate the regional and local sports policies that would be linked to the allocation of finances based on the indicators for measuring and assessing the effects of financing in the area of physical fitness. The research results are important to objectify some official decisions affecting sport and physical activity at the municipality level. The absence of evidence - based approach in decision making that envisages gathering, using and elaborating data significantly weakens the effectiveness of the public resources spent on sports activities and development. Coordination and synergy between the public administration and the sports organizations and associations should be established as well. The issues that this article and research address are crucial as far as when it comes to the sport sector funding in Czech Republic,the highest revenues come from the regional and local public budgets. Thus our qualitative and quantita-

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tive study focuses on the utilization of data, Sports Business Intelligence,and programme budgeting in a country context, providing the base for a comparison with other countries and proposing the way towards effective and efficient usage of the key performance indicators for sports policies evaluation. One of the goals of modernizing the regional administration is its economization with the emphasis on the quality of its performance so that it is efficient, transparent and flexible. Regular costs overview and comparison of the services provided are the prerequisites to fulfill this goal. To achieve this goal the programme budgeting as a system of planning, budgeting and evaluating (Young, 2003;Robinson, 2007)allows the subjects of the regional and local administration to pass the qualified decisions in sports development by given priorities. The regional and local governments are highly autonomous, their processes in sports development are not unified and the use of the programme budgeting is not obligatory in the Czech Republic which results in the insufficient use of the possibility to link the indicators of the programme budget with the regional strategic objectives in the sport. Thus the goals of our research are the analysis of the existing approaches towards the creation of goals and indicators of the sport strategies at the regional and local level and examination that would assure the interconnectivity of the strategic goals in sports with the goals and indicators set by programme budgets. Based on this we will propose the realization of the measures that would help the regional and local administration to design the indicators for sport by using and processing the relevant data and the programme budgeting that would lead to the evidence - based and reasonable allocation of the public resources for sport.

Methods

The data was collected in a national context, employing two instruments. Desk research method has been used for identifying the relevant policy documents on sport and physical activity in selected cities and all 14 Czech regions. Systematic content analysis of all documents has been conducted. Categories suggested by Christiansen et al. (2014) were used for the content analysis of the policies namely evaluation – whether the strategy had an evaluation plan and whether the responsibility for evaluation was clarified. To achieve the given goal, we analyzed the strategic documents with the emphasis on the indicators of the performance and their linkage with the strategic plan in the sports area. Moreover, the data was collected from the phone survey conducted on the topic of monitoring physical activity and the well-being of the population. Respondents/sample file in this survey were the heads of sports departments in cities with 50 000 or more inhabitants (n=35; return rate 70%) and heads of the sports departments in (n=10; return rate 71%) Czech regions. Data collection was realized during the year 2017. The data from the phone survey was analyzed with the IBM SPSS Statistics (24.0) software. All the information was then used to identify the scope of key performance indicator and data sets that are used for tracking and analyzing the data regarding the physical activity of citizens.

Results

The results of the study showed that sports strategies in Czech cities and regions differ significantly regarding the formulation of performance criteria for evaluation of their sports policies. In general, they contain aggregate goals that address physical activities and health on an overall level by recognizing

the importance of Sport for All approach. Few also focus on various target groups specifying the time frame and responsible body for implementation. However, in almost all strategies, there is a lack of measurable targets and indicators that would enable the evaluation of the regional development in the physical activity, physical fitness, and health. Moreover, in sports policies there is no clear distinctions of outputs indicators (as a result which are achieved immediately after implementing an activity), outcomes indicators (that are the difference made by the outputs) and impacts(as a long - term outcomes indicators). Shortcomings and problems in defining indicators in strategies for sport are as follows:

- the tendency to set the goals that represent only output measured by the number of various services, while the outcome of the sports activities are set vaguely or not at all
- the given goals are not differentiated as the short-term and long-term
- there is no system of monitoring specified
- there are no indicators of the quality and inputs that results in no efficiency measuring
- the output - oriented goals are measured by the outcome indicators and vice versa (e.g. the improvement in the quality of service is measured by the number of visitors, the increased number of visitors is measured by spending, and all this is not based on the comparative basis and so on.)
- the outcome and output - oriented goals and indicators are not differentiated, or they are confused (the goal measuring is presented as output/outcome)
- regions and cities do not follow in their strategic materials the principles of the programme budgeting
- there is no factual classification into the programmes and sub-programmes in sport

We identified two approaches when comparing the intentions, goals and measurable indicators for sports. They differ in the way the intentions,goals,and indicators reflect the strategic objectives in sport.

In the first case the goals and indicators are aimed primarily at sustaining the current status and for securing the fulfillment of the duties of the cities and regions about the sport and subsequently to reaching the development goals in this area. The goals are defined as the output goals and are characterized by the measurable indicators through quantity. The indicators of quality and efficiency are missing. It is not clear from the given targets and indicators how to fulfill the given plan. The linkage to the strategic documents is not clear.

In the second case, it is the approach when the region uses the outcome and output - oriented goals, and indicators. The goals are defined as better and higher quality provision of sports services and activities. Thus, they do not concentrate on securing the basic operations that are considered evident as for the fulfilling the essential mission of the city and region in the area of sport according to the law (ACT no. 115/2001 on the Support of Sports). The presentation of outcome and output indicators defined this way is clear and understandable also to the public from the communication point of view.

By perceiving the defined goals and indicators, the public sees that the interest of the city and regions is not only to provide activities for sport but also to improve the quality of life.The above - mentioned approaches towards the goals and

indicators definitions differ significantly in cities and regions, while the second one stresses the concrete outcome and output related to the given development objectives in the sport. Though at both approaches we see the lack of linkage towards the strategic goals defined by the regions and cities for different areas of sport.

Cooperation with other sectors such as health and education is envisaged, but strategies lack identifying the areas where this could take place.The results from phone survey showed thatmore than 55% of cities and regions cooperate in the implementation of sport policies with the department that implements activities related to transport policy and more than 31% cooperate in the implementation of activities to increase the physical fitness of citizens with a department that implements activities from the "Health Program for the City / Region".The results from phone survey also showed that just 11% of cities and regions have been able to implement projects in the past three years during which the basic diagnosis of the health status of citizens was carried out even by age categories. When it comes to the data sources for designing and evaluating the sports policies almost 38% of surveyed cities and regions are using the data on the frequency of movement activities of city/region population and 71% data on the use of sports facilities by citizens of the city/region. Just 13% use the data on the physical fitness of the inhabitants of their city/region and 11% data coming from their investigations and research. 85 % are tracking the number of participants (according to different age categories) at events supporting movement activities but just 9% are tracking the changes in the level of physical activity of the population after the favourable changes in pricing policies of sports grounds, 11% changes after the change in transportation system, almost 16% changes after building of the new sport facilities and only 4% are tracking the changes after a campaigns that are promoting the physical activity. These results are indicating the lack in the usage of Sports Business Intelligence concept that is based on using advanced data-collection and sophisticated analyses to support informed decision and quality improvement (Raskuet al., 2015).

Discussion

The results from the conceptual and content analysis performance management systems used by municipalities in the Czech Republic at local and regional level showed the commonalities regarding purpose, principles but also the insufficient array of indicators related to the changes in population physical activity as a result of sport policies implementation. As it was suggested by Woodside (2011) Business Intelligence is not a single product, application, program, user, area, or system, rather an architecture of integrated systems that provide users with easy access to and storage of information for decision making and learning. When it comes to the data warehousing and data mining to design and evaluate the sports policies in the Czech Republic the achievement of the synergies at the documentation and organizational levels are of the utmost importance. Internal alignment of performance indicators and data collections on different levels of the municipality and regular update of the indicators in changing circumstances will provide a balanced picture about the sports policies performance as a whole.

Based on the analysis results we present the proposals how to secure the more effective linkage of the Sports Business Intelligence, programme budgeting,and the sports strategies. The use of the outputs of the programme budget will be possible only if the strategic, specific goals and measures from Sports Strategy are linked and compatible with goals and indicators of the programme budget. To reach the above - mentioned status, it is necessary to harmonize various conceptual materials on the level of the region and city and create the understandable strategy for the citizen. Strategic plan for sport should include short and well-arranged initiatives and goals. Clearly formulated goals and indicators will after the evaluation of their fulfillment identify the meaning of the public resources use and will serve to measure the success rate of the regions and cities when fulfilling the declared initiatives and objectivesin the sport. For the purposes of the linkage of the strategic plans of the cities and regions and the programme budgets we recommend to follow the logic as presented in the Table1. The proposed framework will require the indicators of input to be watched apart from the indicators of the output and outcome in order to measure the efficiency.

Table 1. Framework for the initiatives, goals and indicators of a programme budget formulation in sport

Sport	Objectives	Outcome oriented goal	Outcome indicators
Intentions Improve the physical activities in schools	High-quality and effective school services offered to the pupils	Increase the quality of the provided services Increase the pupils' interests in the out-of-school activities	% increase in the activities with newly created attractive programme % increase in the number of pupils taking part in the activities
		Output oriented goal	**Output indicators**
		Improve the material and technical equipment for the activities	Number of activities with renewed material and technical equipment

To increase the quality of the creation of the programme budgets of the cities and regions in order to improve the formulation of the outcome of the goals and indicators, they should respect the fact that the strategic planning, programme budgeting and Sports Business Intelligence (SBI) are closely linked together. Various forms of physical activity interventions (measured by outputs) result in changes in physical activity behaviour (outcomes) intermediate outcomes (aerobic capacity, body composition, metabolic fitness, mood, skill-based fitness, etc.) lead to long- term health outcomes /impact

(mortality, morbidity, quality of life, hypertension, diabetes, cancer, fall with fractures, depression, etc.). The key issues of the strategic plans of the cities and regions such as the vision, the mission, the initiatives, goals and the measurable indicators should be reflected in the programme budget. While the mission and vision are reflecting the ideal state of sport in the city and region, the initiatives and the outcome-oriented medium-term goals define the priorities in sports. These should be taken into consideration when preparing the budget so that the structure of the programme budget reflects and integrates

them. When taking this approach into consideration the linkage of the strategic planning and the programme budgeting will be provided for.Furthermore, it is necessary for the cities and regions to define the proper Sports Business Intelligence tools for the monitoring of the successfulness of the solution of the initiatives and goals as well as the satisfaction of citizens with the performance of the public administration in sport. SBI can also help to standardize their processes and create a product portfolio in sports with the criteria of quality. We consider the procedural audits to be the proper tool for the process standardization and the setting of the mutually comparable indicators of the outputs/outcome and quality in sports. The services and products of the cities and regions in sport would

be defined according to the procedural audits as the outputs for the citizens. Together with the criteria of their quality, they would be the basis for the definition of the product strategy of the city and region in the sport. After the definition of the spot products and criteria of their quality, it will be easier to understand their philosophy of the programme budget linked to the sport and other sectoral strategies i.e. health, transport, spatial planning, education etc. The given criteria of the quality will help to set the measurable indicators for the individual programmes and sub-programmes in the sport.

The linkage among the procedural audit, sport strategy,programme budget and Sport Business Intelligence is documented in Figure 1.
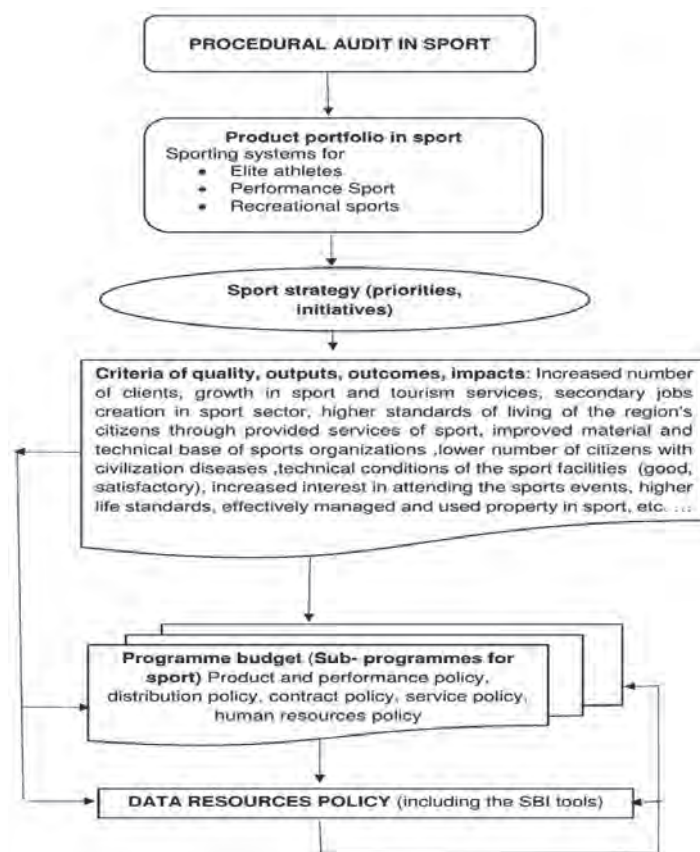
Figure 1. Integrated model of the strategic planning, programme budgeting and Sports Business Intelligence in sport

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SportMont

Differences in the Morphological Characteristics and Body Composition of Football Players of HSC Zrinjski Mostar and FC Siroki Brijeg in Bosnia and Herzegovina

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Abstract

The aim of this research was to determine the differences among the top football players of the two clubs in Bosnia and Herzegovina, HSC Zrinjski Mostar and FC Siroki Brijeg in the morphological characteristics and body composition. A sample of 50 subjects was divided into two sub-samples. The first sub-sample of the subjects consisted of 28 players of HSC Zrinjski Mostar of the average age 24.36±4.14, the champions of the Bosnia and Herzegovina in the season 2016/17, while the other sub-sample consisted of 22 players of FC Siroki Brijeg of the average age of 24.00±6.22, the champions of the Cup of Bosnia and Herzegovina in the season 2016/17. Football players were tested immediately after the end of the competition season 2016/17. Morphological characteristics in the body composition were evaluated by a battery of 11 variables: body height, body weight, body mass index, fat percentage, muscle mass, bone mass, waist size, triceps skinfold, biceps skinfold, back skinfold and abdominal skinfold. The standard central and dispersion parameters of all variables were calculated. The significance of the differences between the players of the top two football clubs in the morphological characteristics and variables for assessing body composition was determined by a t-test for independent samples. It was found that the football players of the two mentioned clubs have statistically significant differences by the three variables that estimate the bone mass, waist circumference and triceps skinfold, in favor of FC Siroki Brijeg.

Key words: *football, morphological characteristics, body composition, Bosnia and Herzegovina*

Introduction

A football game is said to be the most important secondary thing in the world, it gathers huge masses at stadiums and in front of TVs (Gardašević, 2010; Gardašević, Bjelica, Popović, & Milašinović, 2016). It is a highly dynamic and fast team game which, with its richness of movement, falls under category of polystructural sports games (Bjelica, 2005; Gardašević & Goranović, 2011; Gardašević & Bjelica, 2013; Gardašević & Bjelica, 2014a; Gardasevic & Bjelica, 2014b). Football is a sport that is characterized by numerous and various complex and dynamic kinesiological activities which are then characterized by either cyclical (Gardašević, Vasiljević, & Bojanić, 2015; Bjelica, Popović, & Gardašević, 2016a; Bjelica, Popović, & Gardašević, 2016b; Sermaxhaj, Popovic, Bjelica, Gardasevic, & Arifi, 2017; Gardasevic, Bjelica, & Vasiljevic, 2017a; Gardasevic, Bjelica, & Vasiljevic, 2017b) or acyclical movement (Gardasevic, 2015; Gardašević et al., 2015; Gardašević, Bjelica, & Vasiljević, 2016a; Gardašević, Bjelica, & Vasiljević, 2016b; Gardasevic, Bjelica, Milasinovic, & Vasiljevic, 2016; Gardašević & Vasiljević, 2016; Gardasevic, Popovic, & Bjeli-

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ca, 2016). In football, top score can be achieved only under conditions of well-programmed training process (Gardašević, Bjelica, & Popović, 2015). High quality management of the training process depends on the knowing of the structure of certain anthropological capabilities and player's characteristics, as well as their development (Bjelica & Popović, 2012; Bjelica, 2013). Various researches are to be done in order to establish certain principles and norms for the transformational processes of the anthropological characteristics important for football (Gardašević, Bjelica, Georgiev, & Popović, 2012); with morphological characteristics and body composition among them as expected. Findings regarding morphological characteristics and body composition are of crucial importance for complex sports games such as football. The morphological space is defined by the longitudinal dimension of the skeleton, the transversal dimensionality of the skeleton, the mass and volume of the body (Bjelica & Fratrić, 2011). The purpose of knowing morphological characteristics is to improve skills in many sports (Carter & Heath, 1990). The morphological status of top level athletes is relatively homogeneous, depending on the sport, and it can be defined as a model of athletic achievement (Mišigoj-Duraković, Matković, & Medved, 1995). Research on morphological characteristics and body composition among athletes of different sports indicates that athletes of different sports have their own specific characteristics. Muscle mass improves performance in activities that require muscular strength and endurance, but also in those that require enviable aerobic ability (Ramadan & Byrd, 1987; Green, 1992; Rico-Sanz, 1998).

Today, football is certainly the number one sport in the world for its view and popularity (Gardašević, Georgiev, & Bjelica, 2012; Vasiljević, Gardašević, & Bojanić, 2013), and the same applies to Bosnia and Herzegovina. The two clubs that are at the top of the Premier League of Bosnia and Herzegovina and are fighting for trophies almost every year are HSC Zrinjski Mostar and FC Siroki Brijeg. In the 2016/17 competitive season, they both have achieved a staggering success, HSC Zrinjski Mostar was the champion of Bosnia and Herzegovina and FC Siroki Brijeg was the winner of the Cup of Bosnia and Herzegovina. Based on these two trophies that they have won at the end of the competition season, both clubs have acquired the right to play on the international football scene within the framework of UEFA's competitions. It became as interesting for researchers to determine the models of anthropometric characteristics and body composition of the players who play for these clubs as to determine the differences among them.

The aim of this research was to analyze the differences in some morphological characteristics and body composition among top football players, players of HSC Zrinjski Mostar and FC Siroki Brijeg, who compete in the Premier League of Bosnia and Herzegovina.

Method

The data obtained in the study of morphological characteristics and body composition are checked and prepared for processing according to the set goal. Data bases are arranged according to the features and prepared for planned statistical processing. The results obtained by statistical analysis are presented in the tables and analyzed by the corresponding logical units. In general, the results of the research, through gradualness in the explanation of individual relationships, allow seeing differences in the observed morphological measures and

body composition in accordance with the aim of the research, that is, they contribute to a clearer application of the obtained results in practice. In terms of time constraint, the research is of transversal character, and it consists of a one-off measurement of the corresponding morphological characteristics and body composition of top-level senior players.

Sample of subjects

A sample of the subjects consists of a total of 50 top-level senior players who performed in the Premier League of Bosnia and Herzegovina, divided into two sub-samples. The first one consists of 28 players of HSC Zrinjski Mostar, the average age of 24.36±4.14, Bosnia and Herzegovina's Championship winner in season 2016/17, and the second one that consists of 22 players FC Siroki Brijeg, the average age of 24.00±6.22, the winner of the Cup of Bosnia and Herzegovina for that season. The football players were tested immediately after the 2016/17 season ended.

Sample of measures

Anthropometric research has been carried out with respect to the basic rules and principles related to the selection of measuring instruments and measurement techniques standardized in accordance with the International Biological Program guidelines. For the purpose of this study, 7 morphological measures have been taken: body height (ABH), body weight (ABW), waist circumference (AWC), triceps skinfold (ATS), biceps skinfold (ABS), skinfold of the back (ASB) abdominal skinfold (AAS), and 4 bodyweight assessment variables: body mass index (BMI), fat percentage (AFP), muscle mass (AMM) and bone mass (ABM). Anthropometer, caliper, and measuring tape were used for morphological measurements. To evaluate the body composition, Tanita body fat scale - model BC-418MA, was used. The principle of this scale is based on indirect measurement of the body composition; a safe electrical signal is transmitted through the body via electrodes located in the standalone unit. The Tanita Scale, thanks to its athletics mode, enables athletes to closely monitor their body weight, health condition and form with all relevant parameters.

Method of data processing

The data obtained through the research are processed by descriptive and comparative statistical procedures. For each variable, central and dispersion parameters, as well as asymmetry and flattening measures are processed. Differences in morphological characteristics and the composition of the body of the players of these two clubs were determined by using a discriminatory parametric procedure with t-test for small independent samples, with statistical significance of $p < 0.05$.

Results

In tables 1 and 2, basic descriptive statistical parameters of anthropometric variables and body composition of the players of the two clubs, where the values of central measurements and dispersion tendencies are calculated, are shown: Arithmetic mean (Mean), Standard eviation (Std. Dev.), Variance (Variance), Minimal (Min) i Maximal (Max) values, coefficient of Curvature (Skewness) and Elongation (Kurtosis). First, the central and dispersion parameters of the variables were analyzed to evaluate the morphological characteristics and body composition of the players of HSC Zrinjski Mostar (Table 1).

Table 1. Central and dispersion parameters of variables for assessment of morphological characteristics and body composition of players of HSC Zrinjski Mostar (N=28)

| Var. | Min | Max | Mean | Std.D | Variance | Skewness | | Kurtosis | |
						Stat.	Std. E.	Stat.	Std. E.
ABH	170.8	193.0	182.593	4.82	23.27	-.07	.44	.25	.86
ABW	70.0	90.5	78.850	5.80	33.68	.13	.44	-.92	.86
AWC	77.0	98.0	86.393	4.35	18.91	.34	.44	.95	.86
ATS	4.6	13.0	7.589	2.09	4.39	.88	.44	.63	.86
ABS	3.3	6.2	4.329	.74	.55	1.07	.44	.59	.86
ASB	3.7	13.8	9.232	2.18	4.74	.31	.44	.92	.86
AAS	4.0	15.0	8.018	2.77	7.66	.89	.44	.36	.86
BMI	21.4	26.1	23.629	1.14	1.30	.16	.44	-.47	.86
AFP	3.9	14.6	8.786	3.18	10.14	-.05	.44	-.88	.86
AMM	35.5	46.9	40.668	2.67	7.12	.05	.44	-.03	.86
ABM	2.7	5.0	3.468	.55	.30	1.36	.44	1.49	.86

Legend: body height (ABH), body weight (ABW), waist circumference (AWC), triceps skinfold (ATS), biceps skinfold (ABS), skinfold of the back (ASB) abdominal skinfold (AAS), and 4 bodyweight assessment variables: body mass index (BMI), fat percentage (AFP), muscle mass (AMM) and bone mass (ABM).

Based on the central and dispersion parameters, the values of the skewness and the kurtosis, it can be noted that all the variables are placed within the normal distribution boundaries. It can be seen based on the value of skewness as well, that the two variables: bone mass (ABM) and biceps skinfold (ABS) have mild asymmetry, and though not statistically significant on behalf of better results, they are a positive sign, since it is essential for football players to have lower values of subcutaneous fat tissue and bone mass value. By the value of the kurtosis, it can be seen that the bone mass variable (ABM)

has a mild leptokurticity, not statistically significant, which indicates that a greater number of results in this variable are arranged around the arithmetic mean. Generally, according to all statistical parameters, it can be concluded that here we have some top football players; that there is a normal distribution in all variables and that the results that prevail are superior to the arithmetic mean, which is not statistically significant because it is to be expected that regarding players of a professional football club, there is no too large a span between the results of analyzed variables.

Table 2. Central and dispersion parameters of variables for assessment of morphological characteristics and body composition of players of FC Siroki Brijeg (N=22)

| Var. | Min | Max | Mean | Std.D. | Variance | Skewness | | Kurtosis | |
						Stat.	Std. E.	Stat.	Std. E.
ABH	167.2	195.5	183.286	6.75	45.59	-.59	.49	.34	.95
ABW	64.6	87.9	77.600	6.57	43.12	-.46	.49	-.52	.95
AWC	78.0	92.0	83.773	3.84	14.75	.59	.49	.14	.953
ATS	4.0	9.2	5.877	1.17	1.37	1.06	.49	1.81	.95
ABS	3.6	6.6	4.577	.75	.57	1.00	.49	1.01	.95
ASB	6.6	13.6	8.959	1.75	3.05	.92	.49	1.14	.95
AAS	4.8	13.6	8.509	2.49	6.19	.45	.49	-.69	.95
BMI	20.7	26.8	22.991	1.51	2.28	.37	.49	.34	.95
AFP	4.2	14.5	9.841	2.69	7.22	-.38	.49	-.18	.95
AMM	33.1	46.1	39.573	3.26	10.61	-.17	.49	.23	.95
ABM	2.5	3.8	3.168	.32	.10	-.16	.49	.19	.95

Based on the central and dispersion parameters, the values of skewness and kurtosis of the players of FC Siroki Brijeg, it can be stated that all the variables are within the normal distribution boundaries and that the values are very similar to those of the players of HSC Zrinjski Mostar. It can also be stated that the players of FC Siroki Brijeg are younger on average, have less body weight than the players of FC Siroki Brijeg, and have a higher percentage of body fat, but also lower values of skinfolds, though insignificantly. However, a comparative statistical procedure, t-test (Table 3), will show whether it is statistically significant. By the value of the skewness, it can be noticed that in the variables of the triceps skinfold (ATS) and skinfold of the biceps (ABS), there was a slight inclination on the side of the

lower results, which is good because subcutaneous fat is a disrupting factor for professional athletes. The values of the kurtosis of variables of the skinfold of triceps (ATS), the skinfold of the biceps (ABS) and the skinfold of the back (ASB) form a slight leptokurtic curve, which witnesses the fairness of playmates of FC Siroki Brijeg in these three variables. In order to determine whether there are statistically significant differences in the analyzed variables in the top football players of these two clubs, the statistical procedure t-test (Table 3) was applied.

Based on the obtained values of t-test results, it can be noted that there are statistically significant differences in three variables at $p<0.05$. It is one of the variables that evaluate the body composition, bone mass (ABM), and the other two are mor-

Table 3. T-test values between the arithmetic mean of variables for the evaluation of morphological characteristics and body composition of players of HSC Zrinjski Mostar (N=28) and FC Siroki Brijeg (N=22)

Variable	Club	Mean	Std. D.	Std. E.M.	t-test	Sig.	Mean Difference
ABH	ZRI	182.593	4.8235	.9116	-.424	.674	-.6935
	SIR	183.286	6.7517	1.4395			
ABW	ZRI	78.850	5.8036	1.0968	.714	.479	1.2500
	SIR	77.600	6.5667	1.4000			
AWC	ZRI	86.393	4.3490	.8219	2.224	.031	2.6201
	SIR	83.773	3.8413	.8190			
ATS	ZRI	7.589	2.0959	.3961	3.429	.001	1.7120
	SIR	5.877	1.1711	.2497			
ABS	ZRI	4.329	.7418	.1402	-1.169	.248	-.2487
	SIR	4.577	.7534	.1606			
ASB	ZRI	9.232	2.1768	.4114	.479	.634	.2731
	SIR	8.959	1.7459	.3722			
AAS	ZRI	8.018	2.7686	.5232	-.651	.518	-.4912
	SIR	8.509	2.4877	.5304			
BMI	ZRI	23.629	1.1421	.2158	1.700	.096	.6377
	SIR	22.991	1.5115	.3223			
AFP	ZRI	8.786	3.1849	.6019	-1.244	.220	-1.0552
	SIR	9.841	2.6878	.5730			
AMM	ZRI	40.668	2.6689	.5044	1.307	.197	1.0951
	SIR	39.573	3.2571	.6944			
ABM	ZRI	3.468	.5525	.1044	2.263	.028	.2997
	SIR	3.168	.3183	.0679			

phological measures of the waist circumference (AWC) and the skinfold of the triceps (ATS). It can be stated that the football players of HSC Zrinjski Mostar have statistically significantly higher bone mass, waist circumference and skinfold of the triceps than the players of FC Siroki Brijeg. In all other variables the differences are negligible and not statistically significant.

Discussion

The aim of this study was to determine the difference in the morphological characteristics and body composition of the top players of the two football clubs in Bosnia and Herzegovina, HSC Zrinjski Mostar, winner of the Championship and FC Siroki Brijeg, winner of the Cup in the 2016/17 season. A sample of 50 respondents was divided into two sub-samples. The first sub-sample consisted of the 28 players of HSC Zrinjski Mostar of 24.36±4.14 age on average, who were older indeed but not much different in a statistically significant way than the 22 players of FC Siroki Brijeg, who made the second sub-sample of 24.00±6.22 age on average. The results were obtained by using a battery of 11 tests in the area of morphological characteristics and body composition. By looking into the basic descriptive statistical parameters, it can be concluded that we have examined professional sportsmen indeed. It can be noticed that the players of both clubs are of the approximately similar mean values of the variables analyzed, which is not surprising because these are the top two clubs in Bosnia and Herzegovina, a state where there is also a great concentration of good players. The t-test results showed a statistically significant difference only in three variables. The first one is one of those that are important for body composition and for bone mass of football players, which has shown that the players of HSC Zrinjski Mostar have significantly higher bone mass values than the

players of FC Siroki Brijeg. Similar results have been obtained in a recent research of Gardasevic, Bjelica, Popovic, Vasiljevic and Milosevic (2018) where statistically significant differences between the values of these variables have been found between the players of FC Buducnost, who won the championship that season, and the players of FC Mladost from Podgorica, a runner-up, in favor of the first-mentioned, have been found. The second variable in which a statistically significant difference has been found is a variable that estimates waist circumference, where the playmates of HSC Zrinjski Mostar also have a statistically higher value than the players of FC Siroki Brijeg. Also, at the variable of triceps skinfold (ATS), players of FC Siroki Brijeg have shown statistically better values because a smaller number means a better result when the disrupting factor of subcutaneous fat on playing football is taken into account. Similar results have been obtained in a recent study of Bjelica, Gardasevic and Vasiljevic (2018), where the football players of FC Sutjeska, winners of the Cup of Montenegro, had significantly lower skinfold value than the football players of FC Mladost, runner-up in the league of Montenegro. Also, Corluka and Vasiljevic (2018) have shown that football players of FC Sutjeska, were dominant in these parameters in Montenegro, and that they had significantly lower values of skinfolds than the football players of FC Buducnost Podgorica, winners of the Championship of Montenegro.

For other variables, some values are better for players of HSC Zrinjski Mostar and some for players of FC Siroki Brijeg, although, insignificantly for statistics, which indicates that these players have very similar anthropometric parameters and body composition, which is again, not surprising, considering that these two clubs shared the two possible trophies in the 2016/17 competitive season in Bosnia and Herzegovina. The values ob-

tained in this research can be useful for coaches of these clubs for making a comparison of their players with others and formulate their work in a way that enables reduction of those parameters that are not good, and raise those that are good to a higher level. That will surely make their football players even better and more successful. Also, both clubs should turn to other researches and check the functional-motoric status, psychological preparation as well as tactical training of their players and analyze whether there is room for their improvement. The results obtained in this research can serve as model parameters for the estimated variables for players of all other football clubs in Bosnia and Herzegovina, because the players that have been analyzed here, were among the best and the most successful football players in Bosnia and Herzegovina at the end of the competitive season of the Premier League of Bosnia and Herzegovina 2016 / 17.

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SportMont

Is Montenegro Considered as a Sports-Recreational Destination?

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Abstract

The paper aims to examine if, according to the tourists coming to the country, Montenegro is considered as a sport-recreational destination. The data used in the study is extracted from the Montenegrin survey called Guest Survey 2014, comprising of 35 questions related to the tourist travel behavior and satisfaction during their stay in Montenegro. The paper uses the results of the study to provide descriptive statistics concerning the motives of tourist to visit Montenegro (one of the question is related to sport-recreational activities). Furthermore, it verifies link between tourists' motivation related to sport -recreational activities to come to Montenegro and their overall satisfaction with sport -recreational activities. The results indicated that only around 1% of tourists in our sample who visited Montenegro indicated sport- recreational activities as the main motive for the visit, around 3% of tourists indicated sport- recreational activities as a second motive while around 5% of tourists indicated sport and recreational activities as the third motive. However, around 60% of tourists reported that they were satisfied with overall sport -recreational activities during their stay in Montenegro. This study shows that even that Montenegrin sport-recreational offer is on the satisfactory level, managers and policy-makers should provide additional effort to present Montenegro as a sport-recreational destination since very low percentage of tourists are motivated to visit Montenegro related to these activities. The paper thus concludes by setting recommendations related to diversification of Montenegrin tourism offer by pursuing sports-recreational tourism forms.

Key words: *sport tourism, Montenegro, destination*

Introduction

The paper sets the tone through the analysis of the existing literature on the sports tourism and destination branding through sports, emphasizing also the specificities of the regional tourism development and tendencies. In the second part, we address the Guest survey conducted by National tourism agency of Montenegro in order to comprehend the contemporary tourism practices in Montenegro and the possible development strategies. The main purpose of the paper is to investigate to which extent sport-recreational activities act as a motivator for destination selection in contemporary tourism development of Montenegro, as well as their overall satisfaction with sport-recreational offer at the destination. This should allow capturing the synergies between sports and tourism in Montenegro, in order to diversify the general tourism

offer by designing unique sport tourism experience.

With tourism being one of the fastest growing industries in the world of the last decades, it becomes increasingly important to understand what motivates people to travel and chose certain destination over another. Faced with the growing competition and increasingly demanding consumers, the marketers are required to diversify tourism offer by relying on less exploited, innovative tourist attractions, fostering the existing offer of the particular destination (Cohen, Prayag, & Moital, 2014). One such area is the sports tourism, identified as critical factor in many destination development strategies (Klenosky, 2002), especially when it comes to rejuvenating established tourism destinations (Agarwal, 2002). What more, as argued by Stanovčić, Peković, Celebić and Simović (2015) sport- recreational activities present a tool that could help

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firms to differentiate their product/service from others.

Sports tourism emerged relatively recently as an important part of the general tourism research field (Hinch & Higham, 2003), as number of studies pointed out that sports is increasingly seen as a critical factor motivating the destination selection (Kozak, 2002) as well as overall satisfaction with destination (Markuš, Peković, & Popović, 2017). Scholars have particularly addressed the role of popular sports events (e.g. World Cup, Olympic Games, Super Bowl) in branding tourism destination (Chalip & Costa, 2005), visitor satisfaction with sport tourism experiences (Shonk & Chelladurai, 2008), growing market of active sport tourism (Tassiopoulos & Haydam, 2008), but in recent years also aspects such as sport heritage as a feature of sports tourism (Ramshaw & Gammon, 2015) or the role of place in the interaction of activity and people in sports tourism (Geffroy, 2017).

Hall (1992) identified sport as one of the key motivating factors for the choice of the tourism destination, articulating its main concept around three tourism domains–hallmark events, outdoor recreation (adventure tourism) and health/fitness related tourism. Similar typologies have been defined by scholars throughout the years, especially regarding different types of involvement with sport activities at the destination and the general place of sport within the attraction mix of the destination. However, in this paper we adopt the framework suggested by Hinch and Higham (2011), according to which sport tourism refers to the sport-based temporary travel away from the place of residence, completely or partially motivated by participation and/or attendance of certain sport events or activities.

According to Harrison-Hill and Chalip (2005), if the destination marketers plan on capitalizing the sport's contribution to their destination's attractiveness, it is necessary to first determine the role sport plays in brining tourists to the certain destination and the ways it interacts with other tourist determinants in creating the overall tourist experience and satisfaction. This is why in the paper we attempt to address determinants of sports tourism development in Montenegro and understand the motivations and perceptions related to sports of tourists coming to visit the country. In order to do so, the paper analyses survey and interprets the results in order to draw preliminary conclusions related to whether Montenegro is considered as a sport-recreational destination.

Methods

This paper builds on the data extracted from the survey of Montenegrin tourists called "Guest Survey 2014: Attitudes and Expenditures of Tourists in Montenegro", which was conducted, analysed and published by the National Tourism Organization of Montenegro. The main objective of the survey was to collect reliable and representative data regarding tourist traveling attitudes and destination satisfaction during their stay in Montenegro. The survey was conceptualized in order to understand tourist behavior, motivation, attitudes and preferences in order to further develop Montenegrin tourism products and enhance its overall quality and competitiveness. It was conducted in the coastal area of Montenegro, as a set of personal interviews with tourists staying in commercial accommodation facilities (hotels, apartment, tourist resorts) through the summer months. The main data collection instrument was the structured questionnaire, containing 35 questions which was translated, distributed and conducted in several languages.

In our analysis, we specifically focused on the questions related to the main motivation of tourists for coming to Montenegro (in order to understand whether sport-recreational activities play an important role in their destination-related decision-making), as well as the overall tourism satisfaction with particular elements of the tourism offer (in particular satisfaction with sport-recreational offer in destination). In order to address our main research question, the paper thus first provides a through descriptive statistics related to the main motives of tourists to visit Montenegro (specially reflecting on the response related to sport-recreational activities). In the second part, we will verify the link between tourists' motivation related to sport- recreational activities for choosing Montenegro and their overall satisfaction with sport -recreational activities at the destination.

The question we address in the first part is: "Which are the main motives of your visit to this place?" Respondents were asked to choose three of the suggested answers (which were as follows: 1. Entertainment, 2. Passive vacation, relaxation, 3. Enjoying food and drinks, gastronomy, 4. New experiences, 5. Visiting family and friends, 6. Pursuing sports- recreational activities, 7. Getting to know natural landscape, 8. Getting to know cultural heritage and events, 9. Health- wellness activities, 10. Business, 11. Other reasons) and rang them (1 – the main motive, 2- the second most important motive, 3 – the third most important motive).

In the second part, we analyze the results of the question, in which respondents were asked to rate their tourist satisfaction by particular aspects of the offer, including the sports offer in the country. They were asked to choose a number corresponding to their level of satisfaction (1 – excellent, 2 – very good, 3 – good, 4 – bad, 5 – very bad, 9 – I don't know). Similarly, we address the question in which respondents were required to rate satisfaction with particular elements of the tourism offer in Montenegro compared to the some other chosen country they already visited (1 – better in Montenegro, 2 – similar, 3 – worse in Montenegro).

Results

The following section analyses obtained findings.
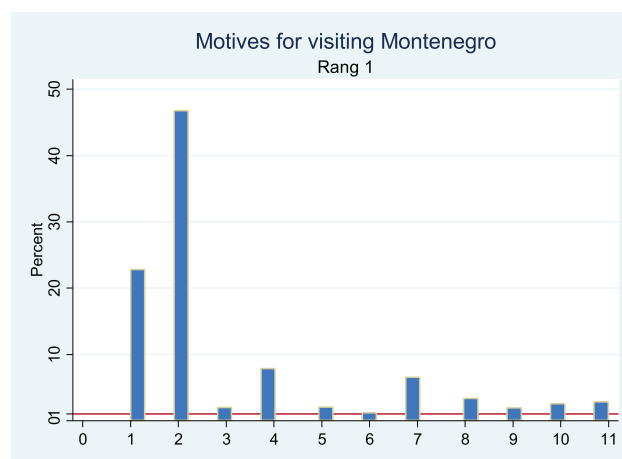
Legend: 1. Entertainment, 2. Passive vacation, relaxation, 3. Enjoying food and drinks, gastronomy, 4. New experiences, 5. Visiting family and friends, 6. Pursuing sports- recreational activities, 7. Getting to know natural landscape, 8. Getting to know cultural heritage and events, 9. Health- wellness activities, 10. Business, 11. Other reasons

Figure 1. Main motivation of tourists coming to Montenegro (first choice)

As shown in the Figure 1, most of the tourists coming to Montenegro, according to employed data, were primarily motivated by willingness to pursue the passive vacation and relaxation, which was the main motive for almost 50% of the respondents. It is also evident from the Figure 1 that for over 20% of the respondents, the motive number 1 for coming to Montenegro was the entertainment, while only about 1% of tourists indicated as their first choice when it comes to motivation the sports- recreational activities.
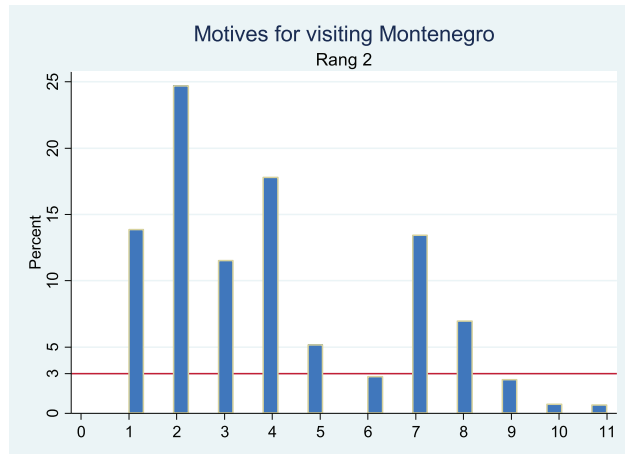
Figure 2. Motivation of tourists coming to Montenegro (second most important motive)

Figure 2. points out that when it comes to the second choice – or the second most important motive for visiting Montenegro, for almost 25% of respondents it was the passive vacation and relaxation. Again, only about 3% of tourists expressed that their motivation (in the second place) was based on the sport-recreational activities in the country.
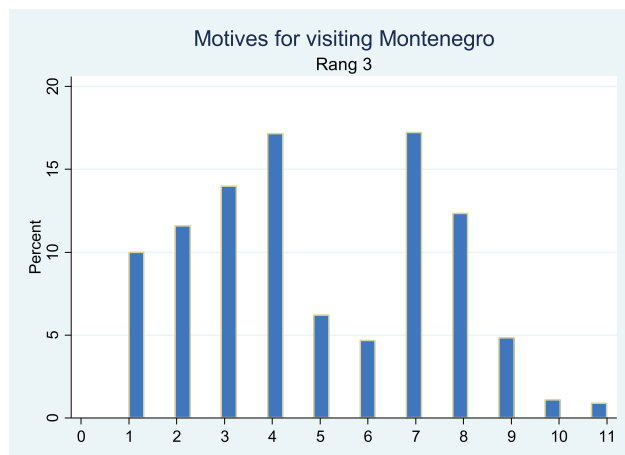
Figure 3. Motivation of tourists coming to Montenegro (third most important motive)

From the Figure 3 it is evident that sports – recreational activities was chosen as the third main motivating factor for about 5% of respondents. This is slightly more significant percentage compared to the previous results, but still rather low compared to other choices (such as gastronomy, natural landscape, cultural heritage, etc.).

Concerning the question related to the satisfaction by certain elements of the tourism offer in Montenegro, on the scale from 1 to 5 (1 being excellent, 5 very bad, while 9 was the

Legend: 1 – excellent, 2 – very good, 3 – good, 4 – bad, 5 – very bad, 9 – I don't know

Figure 4. Tourist satisfaction of sport offer in Montenegro

choice for "I do not know"), the respondents in general qualified their satisfaction with sports offer as good (3) – for almost 30% and very good (2) for over 20% of respondents (Figure 4). However, it can be noted that over 30% of respondents did not have the opinion about sports offer in the country and thus could not express the tourist satisfaction with this particular aspect (number 9).
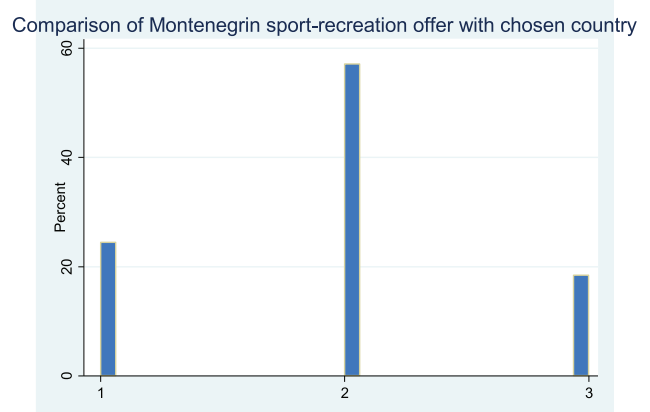
Legend: 1 – better in Montenegro, 2 – similar, 3 – worse in Montenegro

Figure 5. Comparison of sport-recreation offer in Montenegro with the one of the chosen country

As shown in the Figure 5, almost 60% of respondents evaluated sport-recreation offer in Montenegro similar to the one of the other country they visited, and about 25% considered sport-recreation offer in Montenegro to be better than the one in the chosen country. Less than 20% considered it to be worse than in other country, which clearly shows that there is a potential which may be further developed in the years to come.

When we consider the satisfaction with sports offer in the country of only tourists whose primary motive for coming to Montenegro were sport activities, we can observe high levels of satisfaction with the existing offer – almost 60% rated it as excellent, very good or good (Figure 6). Only about 10% found of tourists motivated by sport-recreational activities found the offer to be bad, and none considered it very bad. However, over 30% answered that they do not know – or cannot tell much about the sports offer in the country.
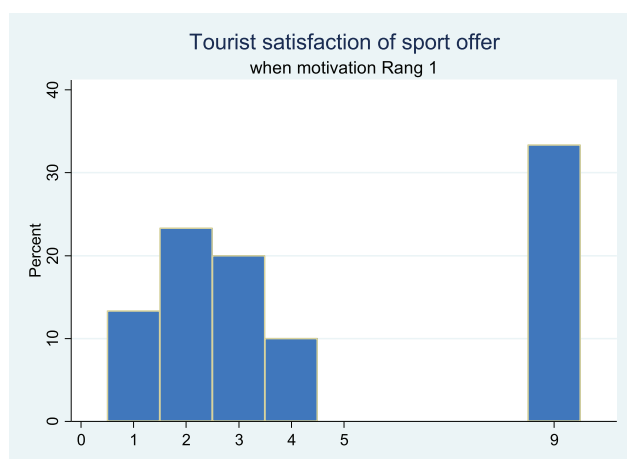
Legend: 1 – better in Montenegro, 2 – similar, 3 – worse in Montenegro

Figure 6. Tourist satisfaction with the sport-recreation offer when primary motivation sports- recreational activities

Discussion

The results highlighted in the previous chapter clearly demonstrated that, sport-recreational offer does not play an important role in the overall tourism offer or development in Montenegro. Only a very minor percentage of tourists coming to visit Montenegro are motivated by participation in sports-recreational activities, with most of the tourism in the country being driven by tourists seeking a passive vacation and relaxation, and to the lesser extent also the entertainment. Results point out that, at this point, tourists do not consider Montenegro as a sports-recreational tourism destination and they come to visit the country for different reasons.

The results are, however, far from discouraging–while not many tourists are coming to the country primarily to engage in sports activities, they find the overall sports-recreational offer in the country rather satisfying. This points out that there is a significant potential to develop sport-recreational tourism offer in the country and highlight variety of sports activities the tourists might take part into during their stay. It would be important to connect relevant stakeholders in the field (both sports and tourism strategists and managers) to reflect on these results and suggest policy framework for further development of this branch.

Taking in consideration important success in the field of sports (water polo, basketball, handball, etc.), increasingly developing infrastructure and sports facilities, as well as the number of educated experts in the field, it would be noteworthy to consider integrating different forms of sports tourism in the national tourism offer. To some extent, this has already been done in the northern part of the country–where adventure tourism, including sports activities such as rafting, canoeing, mountain bike becomes increasingly popular, attracting number of tourists to these destinations. However, it would be interesting to complement this offer with number of additional sport-tourism forms, such as sport-recreational programs for sport teams and school groups, event sport tourism (watching hallmark events such as championships) and sport tours and challenges complementary to the existing offer in hotel facilities in the country. As results pointed out that there is already rather good sports offer for tourists, it is likely that what would be most needed in near future is to further promote this offer, make it more visible and more attractive to tourists prior and upon their arrival to the destination. This would ensure the existing capacities are used

to their potential, and new further developed in accordance with the tourism tendencies in the area of sports recreational tourism.

Finally, it is important to acknowledge the limitations of the study–the data used are from 2014, which means that we may have significant changes, since the overall tourism offer in Montenegro diversified, and the number of tourists coming to the country is showing steady increase. As this survey is conducted every 4 years, it will be interesting to compare this study with the new data in 2018 (once they are available) and try to identify patterns of development and overall dynamics of tourism offer. Furthermore, as the study mainly addressed coastal cities – where most of the tourists indeed come primarily to take rest and enjoy the seaside, and not central/mountain area where most of tourists coming for the adventure/sports tourism may be found, it is highly probable that results would be more encouraging if the sample was wider and the survey included some of the traditional 'sports tourism' destinations (Tara river, Nevidio canyon, etc.). Thus, it would be highly relevant to conduct a broader study which would overcome mentioned limitations and through interviews with tourism agencies and workers from the country increase the understanding of challenges and opportunities of promoting Montenegro as sport tourism destination.

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Sport Financing Through the Gambling Revenues in Montenegro

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Abstract

Sport financing is of great national importance, having in mind that it's recognized as an activity of public interest by the Law. Since most of sport organizations in Montenegro are publicly owned, they are dependent on public financing, which are often scarce and insufficient for fulfilling sport's function in society. Therefore, new sources of financing must be introduced. One of the most common funding systems in Europe includes resources redirected from gambling industry profits – taxed by the government. Even though the idea isn't exactly new, it's implemented differently in various countries. This paper analyzes current Montenegrin system of sport financing from this source, compares it to other European countries and provides recommendations for its' improvement. Taking into account that most gambling revenues come from sport betting, it would be beneficial for the society that most of these incomes find their way back to sport. The research results for Montenegro show considerable lagging behind other European countries in terms of sport funding from taxed gambling profits. With the share of only 14% of funds allocated to sport from this source there is a plenty of room for Montenegro to improve its sport financing system, which would lead to faster sport development. This share is considerably low, compared to neighboring EU countries such as Croatia's 35% and Slovenia's 80%. With certain improvements and taking into account other countries good practice examples, Montenegrin sport financing system can be considerably improved.

Key words: sport financing, gambling revenues, sport development

Introduction

Sport financing system consists of different sources of revenue, out of which the most important are state budget allocations. However, these financial resources are limited and scarce, therefore, gambling revenues are one of the possible ways to increase funds for sport. Importance of this problem is confirmed by a large number of studies and scientific papers which treated this topic since late 90s, based on sport financing systems in different countries. Main question which is addressed in these studies is how sport can gain certain financial advantage from a relationship with gambling.

When it comes to implementation of this system, England can be observed as a role model country. Introduction of sport financing through gambling revenues in England started in mid 90s, which together with requirements for National Governing Bodies (NGBs) to create planning documents in order to receive money from those funds, represent a set of structural changes which affected course of sport policy debates (Green, 2007). This topic was also treated by Oakley and Green (2001), by exploring two main issues - establishment and distribution policies of the National Lottery and elite sport initiatives. Their study showed that the period 1995-1998 was characterized as a period of selective reinvestment into the British sport, with traditional sports being favored. As an important area of interest for governments, the development of elite sports is emphasized, so today "winning medals are just as important as getting people to take part in sports" (UK Sport, 2002). Another reason for focusing on elite sports in this regard is the fact that volunteer sport clubs are often unable to meet the requirements for this type of funding (Garett,

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2004). Also, Forest and Simons (2015) examined the link between gambling and sports and showed that amateur, Olympic sports, and sports infrastructure made significant benefits from the funds obtained from the National Lottery of England.

In a vast number of countries, one of the problems of financing sport is a non-transparent distribution of funds from the state budget. In this regard, Considine, Crowley, Foley and O'Connor (2008) conclude that the procedures that enable the Minister of Sports of Ireland to make the final decision on the allocation of grants create the possibility that this decision will be based on the personal interests of the Minister rather than on the interests of the society as a whole. Therefore, it is necessary to limit the role of the Minister in the allocation procedure by establishing a system similar to the British, which includes the distribution boards.

The Austrian lottery is a public monopoly that allocate son average 16.3% of the income for sport development, which is a trend that's recording growth, given the growth of online gambling (Institute of Public Finance, 2012). Observing the period 2000-2009, the amount of funds allocated for sport based on this source doubled. In Sweden, the Law on Lotteries stipulates that the excess gambling assets have been used to finance the development of social activities, and in 2008, EUR 145 million were allocated to sport, which is an increase of 40% compared to 2005. In Germany, out of EUR 15.9 million from the 2009 lottery, 35% was allocated to the German Olympic Committee, 25% German Sport Aid Foundation and 40% regional sport confederations (Bundesministerium des Inneren, 2010).

One of the countries that, apart from England, stands out as an example of positive practice in the field of sport financing is Finland. The share of the national gambling company Veikkaus' support for the total sport budget in Finland is approximately 98% (Mäkinen, 2010; Suomi et al., 2012). It is interesting to notice that the government does not subsidize professional sports. However, the Ministry of Education and Culture promotes favourable conditions for competitive and performance sports. To this end, it intensifies coaching, develops coach training, awards grants to athletes, supports anti-doping work, and coordinates performance sports.

In Netherlands there are three different lotteries which support the sport sector: the Dutch Lottery, the Sponsor Bingo Lottery, and the Lotto. The total revenue returned sport from lotteries and games of chance was over EUR 100 million, while the most significant part was distributed to National Olympic Committee and National Sport Federations and, further, to the federations to uphold the organizational infrastructure of the sport federations, while a certain portion is allocated to elite sport, talent development, coach development, sport infrastructure, and grassroots sports (Hallmann & Petry, 2013).

Regarding countries from our region, a survey of the Economics Institute from Belgrade (2011) showed that financing sport from gambling in Serbia with EUR 0.3 per capita is lower than in selected EU countries (Slovenia, Hungary, Romania, Greece, Slovakia, France, Germany, Spain, Italy, Finland, Denmark, Sweden and Netherlands.). The problem of financing sport through revenues from games of chance is also present in Croatia, and in this regard, the Institute for Public Finance conducted a research project in 2012, with the aim of comparing systems of financing sport within the EU. The share of gambling allocations for organizations that encourage the development of sport ranged from 30-35% which shows that the share of sport financing from gambling in Croatia is con-

tinually increasing. The situation in Bosnia and Herzegovina is the following: in 2017, the sport received EUR 205 thousand from gambling revenues (Federal Ministry of Culture and Sports, 2017).

Even though idea of using gambling revenues as an additional source for sport financing is widely accepted, there are big differences among countries regarding implementation of this system. For that reason in this paper different countries were analyzed in order to learn from their practice and to understand the cultural and political circumstances of each nation involved. Finally, this paper analyzes current Montenegrin system of sport financing from gambling revenues and provides recommendations for its improvement.

Methods

Given the characteristics of the treated problem, the methods used in this paper are content analysis, as well as the comparative case study method. As noted earlier, the comparative method allows for the perception of similarities and differences in the systems of certain countries, and, in addition, it is possible to make relevant conclusions on the improvement of the existing system of financing sport in Montenegro.

Using the method of content analysis, the current level of investment in sports from the income from games of chance is determined. In addition, content analysis enables the ranking of sports in relation to the funds received, as well as the recognition of priority areas in sports. From this analysis, the conclusions are drawn about the cause-and-effect relationship between the level of allocated funds and the achieved sports results.

In the function of creating recommendations for improving the system of financing sport through revenues from games of chance in Montenegro, research of scientific and professional materials from the countries of the region as well as selected EU countries was carried out. Chosen countries are examples of positive practice for the treated problem. Given the fact that gambling revenues are constantly increasing with the development of electronic forms of betting, there is a clear tendency for the larger part of those revenues to be returned to sports. Therefore, the importance of this topic doesn't have to be specifically proven, but attention should be focused on creating an optimal model of financing sport from this source, which will contribute to the development of sport in Montenegro.

Results

The Montenegrin sport financing system includes financing from public funds - state and local budgets and resources from companies and citizens (membership fees, sponsorships, donations and other income). Amount of funds allocated to sport range from 0.2% to 0.3% of the Budget of Montenegro. The largest part of those funds is allocated to national sport federations and Montenegrin Olympic Committee, which equals to about 70%. The other 30% is distributed for programs of sport clubs, scholarships for promising athletes, and premiums for sporting results (National Sport Development Program, 2011).

Additionally, through the Decision on the allocation of part of the gambling revenue, sport subjects can obtain further funding for their activities. Concession fees from games of chance go to the Montenegrin budget, while 60% of these funds are allocated to financing plans and programs of organizations in different areas. Earnings at a level of at least 75%

(of the envisaged 60%) are allocated by the Commission for the allocation of part of the income from games of chance, and according to the Decree on the criteria for determining the users and the manner of distribution of part of the income from games of chance (Official Gazette of the Republic of Montenegro, 2011). Distribution is carried out as follows: social protection and humanitarian activities 12%, satisfaction of the needs of persons with disabilities 40%, sport develop-

ment - 14%, culture and technical culture - 12%, non-institutional education and education of children and youth - 10% and contribution to the fight against drugs and all forms of addiction - 12%.

For the period from 2011 to 2017, the average amount of funds distributed to sport from gambling revenues amounted to EUR 352,539.55. The following Figure 1 shows the amount allocated to sport for each year.

Figure 1. Amount of funds allocated to sport from income from games of chance in the period 2011-2017

Although gambling revenue has a tendency to grow from year to year, with a significant increase expected in 2018 through the implementation of Information System for the Online Surveillance of the Games of Chance (ISONIS), allocations for sport remain at the same level. The ISONIS system collects all kinds of data from gaming devices and provides fiscal information to the competent authority - the Games of Chance Administration.

The recommendation for economic policy makers is precisely referring to directing a larger annual volume of gambling revenues to sport. In Croatia, for example, it has been noted that the share of sport financing from games of chance is continuously growing. Currently, the allocation of revenue from games of chance for organizations that encourage the development of sport in Croatia is 35% of the generated revenues, which is significantly higher than the amount that is

allocated in Montenegro (14%). Isolated data on the share of sport in total funds for Bosnia and Herzegovina are not available, however, it is known that only 10% of gambling revenues is allocated for financing programs and projects of culture and sport.

On the other hand, Slovenian system can be taken as an example of good practice in the region and guide in the development of domestic regulations, as this domain is well-regulated. For the financing of sport organizations, 20% of the funds are collected from paid concessions for permanent lottery, lottery with the currently known gain and lotto, and 80% of funds are collected from paid concessions for organizing sport forecasts, other sport games and lottery quizzes (Centres for Civil Initiatives, 2005).

Expressing the financing of sport from gambling in EUR per capita, the following chart is given (Figure 2).
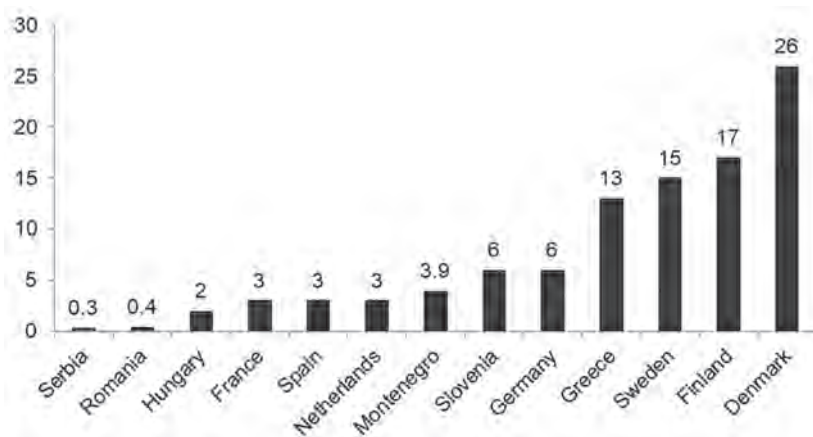
Figure 2. Amount of funds per capita allocated to sport from gambling revenues in selected countries for 2011

Considering the inaccessibility of recent data, this graph shows the amounts for 2011. However, taking into account recent data for Montenegro, significant progress can be noticed in relation to the previously observed period. During 2017, the per capita amount allocated to the sport from gambling reve-

nues amounted to EUR 5.66.

If we observe isolated data for 2017 for funds allocated for the sport, it is concluded that the total amount of funds is distributed almost equally to sport clubs on one, and other associations and NGOs, on the other hand (Figure 3). It is im-

portant to note that among the sports clubs that receive funds from these sources there are no big successful clubs (e.g. basketball club Budućnost and Sutjeska, karate club Budućnost, handball club Budućnost, etc.), but mostly funds are given to smaller clubs, whose achievements are not so well known to the public.
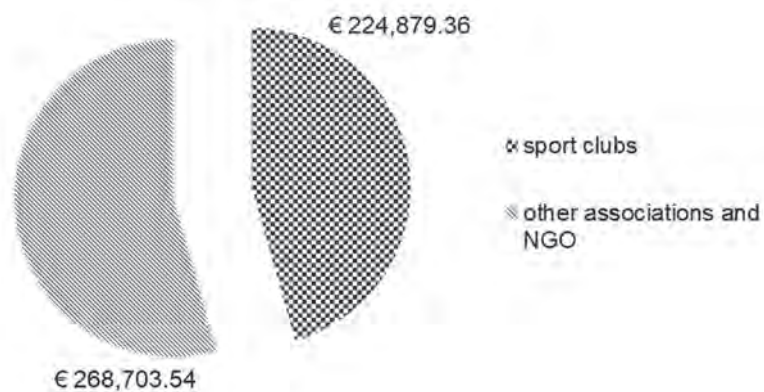
Figure 3. Participation of the amount of funds allocated to sport clubs in relation to other associations and NGOs

While observing the data for the same year, after grouping clubs based on the sport they belong to, the following sports stand out: football, judo and karate. They have the greatest number of clubs that have applied for the funding and con-sequently, they received the largest amounts (in total), as it's shown on the graph below (Figure 4). Football, judo and karate clubs have received EUR 68.849 in total, which amounts to 52.84% of the amount distributed to sport clubs.

Figure 4. Sports with the largest amount of allocated funds

These funds are divided into ten football clubs, nine judo clubs and six karate clubs, which points to the popularity and importance of these sports in Montenegro. However, among these football clubs there are no first league clubs, but funds are allocated exclusively to smaller clubs in order to develop and improve younger selections.

Discussion

Over the last six years, state budget received about EUR 42 million from gambling, of which 10.85 million was achieved in 2016 (Games of Chance Administration, 2017). Even though the certain amount of gambling profits is given back to sport, and, in a broader sense, to society in general, there are ways to improve this system, having in mind the total amount of the revenue generated through gambling. Also, stated figure is only just a part of the actual gambling revenue, since there is no efficient control mechanisms, and the Government mostly relies on the reports provided by the gambling companies. However, during 2017, the Ministry of Finance started implementing the ISONIS (Information System for the Online Surveillance of the Games of Chance), expecting to improve the tax collection in this industry. The Law on Games of Chance prescribes obligations for betting, gambling and automotive gamblers on the Internet to connect to the online surveillance system of the competent authority. The ISONIS system collects all kinds of data from gaming devices and provides fiscal information to the competent authority - the Games of Chance Administration. Therefore, it is expected that ISONIS can bring more relevant data on gambling revenues in the future.

Considering the fact that Montenegro has opened the chapter on EU accession negotiations, it has taken on the obligation of selective alignment with secondary sources of law, which will be of importance in the eventual adoption of the new Law on Games of Chance. The authors' recommendation is that the new Law should define a higher percentage of gambling revenues for sport financing, since 14% of the allocations are at a significantly lower level than the countries in the region, such as Croatia and Slovenia.

As noted in the previous section, these funds are mainly allocated to smaller clubs, while large clubs do not even compete for these funding sources. If the available amount for the development of sport were to increase, large clubs would be encouraged to participate in this distribution, which would

significantly contribute to their development, better sport achievements, and the development of younger categories.

Improved model of sport financing should lead to sport development and consequently to economic development by creating additional sources of revenue, including the production of sport equipment, the development of sport through services and infrastructure, or the organization of sporting events. It opens up the possibility of building social entrepreneurship as a catalyst for social change through the creation of new jobs in the private sector and non-governmental organizations. This is of great importance for Montenegro, as besides tourism, sport is recognized as one of key trump cards for the future development.

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

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ORIGINAL SCIENTIFIC PAPER

Learning as Transformation in the Development of Expertise by Elite Indigenous Australian Athletes

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Abstract

This article addresses the lack of attention paid to research on the development of Indigenous sporting expertise from a socio-cultural perspective. It inquires into the role that informal games played in the development of Australian Indigenous AFL and NRL players up to the age of thirteen. The study adopted a combined narrative inquiry and constructivist grounded theory methodology. The study highlighted to central role that informal games played in the development of expertise and a distinctive Aboriginal style of play shaped by Indigenous culture. This article suggests the central role that informal games shaped by Aboriginal culture played in the development of expertise and an Aboriginal style of play. It also suggests the need for coaching beyond Indigenous players to consider the use of games in training regimes.

Key words: *Indigenous sport, informal games, Australian football, rugby league, Australia, transformative learning*

Introduction

Despite only making up 2.5 percent of the Australian population Indigenous Australians account for ten to fourteen percent of the elite player population in the national rugby league (NRL) and Australian football league (AFL) with up to 35 percent of players in the Australian national rugby league team being Indigenous (Evans, Wilson, Dalton, & Georgakis, 2015). However, views of this ability as a reflection of innate racial qualities fail to recognize Indigenous Australian's achievement (Adair, 2012; Evans et al., 2015). A recent study conducted on the journeys of Indigenous athletes to the AFL and NRL challenges this reductionist view by identifying the participants' development of expertise as a socially and culturally situated process of transformative learning (Light & Evans, 2017, 2018; Light, Evans, & Lavallee, 2017). The concept of transformative learning we use in this article reflects a constructivist view of learning as involving change in the learner and not merely adding on knowledge through a process of interpretation in which the learner draws on his/her existing knowledge and

dispositions to construct new and unique knowledge. We take an holistic view of learning that rejects the division if the mind from the body. This article draws on this study to focus on the pivotal role that informal games played in their development of game sense, creativity and anticipation as deep, embodied learning and hallmarks of Indigenous AFL and NRL players (Hallinan, Bruce & Burke, 2005).

Methods

This study combined constructivist, grounded theory and narrative inquiry methodology aimed at providing an inside perspective and a holistic understanding (Charmaz, 2006; Lal, Suto, & Ungar, 2012). This complemented the importance of story telling in Australian Indigenous culture and helped understand experience in particular socio-cultural settings that facilitated the participants' development of expertise in Australian football and rugby league. Its use of a life history type interview and its emphasis on locating theory within a narrative allowed us to keep the stories intact while identifying

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emerging themes from which to develop theories grounded in the data.

Sixteen Indigenous players participated in the study with eight having played in the AFL and eight in the NRL and were selected using a purposive and snowballing approach. Data were generated using an initial one-hour life history type interview in which the participants were asked to tell their story from their first exposure to their sport to making the AFL or NRL. Analysis of this data identified emerging themes that were explored with two rounds of shorter, semi-structured interviews used to focus on common emerging themes. All names used are pseudonyms and the study was given ethical clearance prior to data collection by The University of Sydney.

Results

We identified three factors that most facilitated the participants' development of talent and expertise up to around the age of thirteen, in order of importance, were (1) informal learning through games, (2) playing a range of other sports, and (3) the socio-cultural environment. In this paper we focus on learning through informal games shaped by culture.

Learning through informal games had the strongest influence on the development of expertise up to the age of twelve to thirteen. Desmond's (NRL) experiences of growing up always "being on a park or playing in the backyard, just constantly for hours and hours" is typical of the stories told to us by the participants in the study. It was intimately tied into the players' social and cultural environments, relationships with significant other people and playing a range of other sports. They did learn from adults and older relatives through some direct instruction and from coaches of teams they played in at school and in their communities as they grew older but learning through participation in informal games as a form of 'deliberate play' made the strongest contribution to their development of expertise as children and to a distinctively Aboriginal approach to play.

Alvin felt that most of what he learned was through playing games on his own and with relatives and friends as learning things that "don't get noticed". After watching local adult games and games on the television he would go out into the back yard where he would kick, anything shaped like a football, that's how bad we were. This (plastic) bottle - it's shape - so we used to kick around two-litre coke bottles, there was always these special little ways to make it a lot more harder so it's better to kick but we just had to be aware, I guess, of hitting the wrong tip of the bottle but we kicked toilet rolls, stubby coasters in the house, put goals everywhere in the yards and that's just how it was.

This provides an example of how the physical and socio-cultural environment the participants in this study grew up in as young Indigenous boys developed creativity through being forced to adapt to constraints in terms of resources available to them. Even when he didn't have any friends to play with Alvin would play on his own for hours, experimenting and testing out ideas on technique: "I'd actually go outside and play footy on my own and I'd kick around and even up until I was a teenager and I found out things for myself, just little things".

All the participants played informal games modified to suit conditions and the resources available such as how many were available to play, the size and shape of the playing space available and in two cases participants mentioned having to use an empty drink bottle because there was no ball. These games featured most prominently in the stories told of growing up in remote regions and in the Northern Territory in particular. Brent's first experiences of Australian football were playing with cousins and other relatives at ten years of age in informal games after moving to rural Victoria from South Australia: "So that was my first time playing footy and that was just with cousins and family at the time there in 'Hometown' and I didn't make much of it really, it was just a bit of fun and I didn't know the skills too well so I didn't start playing until I was 12 or something like that".

Most participants' stories also suggested the ways in which they felt they learned by watching from an early age. This included watching adults, older boys in the community and older brothers as well as watching AFL and lower leagues on television and watching local league games live. For example, Carl believed that he learned to play most by watching good players and by playing backyard games. He suggested that the knowledge developed through experiences of watching and playing 'backyard games' was enacted without any conscious or rational thinking:

> That's where you learn that sort of backyard skills and it just becomes natural, it just all happens and you don't think about it because you're playing with your mates, playing with cousins, you're just enjoying it and it's not really structured. It's just, 'have fun, enjoy yourself' and whether that was in my court or whether it was in my mate's court against his brothers. There was a group of six or seven of us playing against six or seven of them.

When asked about the importance of informal games on his development into an AFL player, Max (AFL) not only suggested their importance for developing expertise through modified games but also through playing other sports. When asked about the role participation in informal games played in his development into an AFL player he said:

> I think massive, especially like with soccer and stuff in K-town (Northern Territory) because I had a lot of cousins around me. We were always doing stuff down at the place called the low level and we'd all have barbies (BBQs) and that and that was it. That's where you learned all your skills, you know, you'd chase your older cousins around and that sort of stuff so I think that was massive in obviously the early development.

Reginald's (NRL) description of learning through games captures the ways in which the participants were typically creative in drawing whatever resources were at hand:

> like all our cousins would come together and whether it was a ball or a stick or anything we could get our hands on, if there was a game you could make out of it, we'd look at making a game out of it. So whether it was throwing this or who could make the stick hit the tree or take bark off the tree or hit the hornet's nest or hit the bee's nest or who could stand as closer to the bee's nest and not get stung, sometimes it was quite dangerous, but sometimes we learnt from our mistakes. (Reginald, NRL Interview)

Discussion

Participation in sport for children is typically dominated by 'deliberate play' (Côté, Baker, & Abcrnathy, 2007) and this is evident in this study. In reflecting upon their experiences of learning to play footy as children the participants made lim-

ited reference to being taught how to play. The influence of parents and other adults such as aunties and uncles was strong on the participants' development but not as 'parent coaches'. These significant people did not coach but did provide support and exert a powerful influence upon the development of culture specific 'character' and positive personal traits. They helped the participants develop resilience, fair play, self-control and respect for others, ethical values and staying on track to realize their long-term goals. As children the participants played with older brothers and sometimes 'uncles' but here was little evidence of adults intruding into their games or trying to teach them how to play, as is so common in Western societies (Kerr & Stirling, 2013).

The participants learned to play footy as part of social life in their communities as an example of how "people develop as participants in cultural communities" and how "Their development can be understood only in light of the cultural circumstances of their communities" (Rogoff, 2003). They all learned to play through games that they designed to suit their needs and the resources at hand. They modified footy games to squeeze them into a basketball court or a concrete squash court. They made up simple game-like activities to develop skills in pairs or on their own. When short of a ball two players used an empty plastic drink bottle and developed special techniques for kicking it with bare feet – drawing on their creative resources and growing, practical knowledge of the game enacted in games. In all these modified games the emphasis was not only on developing a challenging contest but also on having fun and enjoying the experience.

Until the age of twelve to thirteen the participants' participation in sport was largely free of adult interference and the imposition of adult values that can kill spontaneity, creativity, joy and freedom in games (Kerr & Stirling, 2013; Light, 2004). This approach to learning also suggests the cultural roots of the creativity, awareness and game sense described by Hallinan, Bruce and Burke (2005) as a 'sixth sense' that Aboriginal AFL and NRL players display. It contrasts with the highly structured approaches to coaching that typically characterise mainstream coaching in Australia and other countries and, which have been criticized for making play predictable and producing players lacking in creativity (Kimber, 2005). In a study on rugby (Light & Evans, 2010) a highly experienced former national rugby coach lamented the demise of learning through informal 'knock up' games and the creativity it produced with his account of learning as a child resonating with the experiences of the participants in this study:

> as young Australian boys we learnt our sport by playing our sport and we really didn't have any such thing as coaches. We didn't have any such thing as a field; we didn't have a marked out field. We didn't have any such things as sidelines or for the most part goal posts. We certainly didn't have a referee and at times we didn't even have a ball!

Despite some similarity with the modified games used in games-based teaching and coaching (see, Light, 2013), the informal games through which the participants learned to play footy could be seen more cultural activities located within particular settings and contexts. Indeed, there is a long history of playing games within Aboriginal communities that predates white settlement:

> Aboriginal people had a sporting culture before 1788 and played a variety of games that assisted in prepar-

ing young people for their life as hunters and gatherers. Traditional sport incorporated self-reliance, discipline, and instilled the concept of a well-organized group or team approach to life. (Maynard, 2012)

Learning to play footy for the participants was, however, not limited to these informal games because they operate as a cultural practice situated within local communities and larger cultural and social settings. The skills and knowledge that enabled the participants to become elite level players were learned within, and shaped by, the larger field of Aboriginal culture. This specific and identifiable learning was intertwined with broader, implicit cultural learning through participation in the practices of a community and a larger cultural field (Lave & Wenger, 1991; Bourdieu, 1986). The nature of the social and cultural settings within which they learned to play footy as young boys facilitated this learning – whether in the suburbs of Melbourne or Sydney, rural NSW or Victoria, or in an isolated community in the Northern Territory.

Australian Aboriginal AFL and NRL players are seen to be highly skilled with a particular "sense of space and time" (Hallanin et al, 1999) and have been described as being "scintillating, instinctive, naturally talented, magical and having breathtaking flair" (Hallanin et al, 1999). These characteristics of play have typically been passed off as naturally occurring and the "outcome of racial makeup" (Hallanin, et al., 1999) or as them just having the "physical equipment" (Hallanin, et al., 1999) rather than something that is learned and earned (Judd, 2005). The results of the study deawn on in this article challenge such crude and reductionist dismissals of Aboriginal expertise to suggest how they are strongly influenced by participation in the practices of communities as situated learning (Lave & Wenger, 1991) or apprenticeship learning (Sheets-Johnson, 2000) with an emphasis on learning in and through informal games.

Playing other sports and Aboriginal culture made a contribution toward the participants' development of expertise as children but it is long term participation in informal, self-regulated games, created and modified by the participants that this study suggests most enhanced their development and put them on the road to elite level performance in their sport. It is, however, important to recognise how these games and the transformational learning emerging from them were shaped by the culture of their communities and influenced by broader Aboriginal traditions of interaction, relationships and culture, and the important cultural role that sport plays in contemporary Aboriginal communities.

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Youth and Sport in Montenegro

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Abstract

In this paper we investigate to which measure sport is developed among young people in Montenegro and what should be done to improve and spread physical culture among young people and beyond school systems in order to influence their proper development and to create opportunities for choosing potential talents for certain sports disciplines, who would later grow into top athletes and members of national teams. In addition to the theoretical framework set out from referent literature on sports, we will analyze the indicators - the existing regulation and strategy, and analyze the structured interviews conducted among sports professionals, based on which we will form the theory and sublimate the conclusions of work, as recommendations for improving sports among young people. Disadvantages are inadequate realization of teaching in schools, lack of adequate infrastructure in schools, lack of athletic stadium in the capital of Montenegro and lack of sports schools beyond classes. Advantages are great sports potential in youth, youth interest in sport and generations of educated professors in physical culture. The recommendations are related to addressing the shortcomings that exist and the adoption of laws that will stimulate the development of sports among young people.

Key words: *sport, youth, physical culture, state*

Introduction

Successfully completed classes of the Physical Culture during elementary and secondary school and also engagement into sport activities during childhood and youth undoubtedly influence the proper development of the population of a country. Young people are developing physically and mentally, and with being engaged into such healthy activity, they avoid being close to vices and addiction illnesses. Additionally, sports activities from the earliest days are the best way to recognize talents that later can professionally be engaged with a particular sport and become part of a national representation of a country. During the previous survey, "inadequate sports education" was registered as a weakness, "interest in sports" as a force, and "sports education" as a chance, and "population depopulation" and "changing the field of interest among young people" as a threat, in SWOT analysis of positive and negative factors related to sport in Montenegro (Maros, & Mujak, 2015).

The lack of adequate sports education from the earliest age is certainly a problem for the development of sports, because in athletics as a basic sport mass development is necessary (from the fifth grade to the end of the secondary school),

and in the football schools adequate training for gifted and after the youngest age must be enabled, which is now missing. Teaching practice is more focused on training sports-technical elements and less to the development of motor-and functional abilities of students (Ljubojevic et al., 2016).

"In a decision adopted by the European Parliament in November 2007, physical education is the only school class that seeks to prepare children for a healthy life and focuses on their overall physical and mental development and transfers important social values such as: fairness, self-discipline, solidarity, team spirit, tolerance, fair play ... Together with sports, physical education is considered one of the most important tools for social integration" (Hardman, 2007).

The highest normative acts of the Council of Europe and the United Nations, in particular the European Sports Charter in Article 5, are dedicated to the participation of young people in sports, which speaks of the significance of this issue, highlighted in the first of the articles in SE Committee of Ministers: "Every society should provide conditions to young people for engaging into physical activities, which provide constructive use of free time, but also helps to solve many social problems, such as intolerance, goal absence, violence, alcoholism, illegal

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drug use, etc." (Djurdjevic, 2007). It is also noted that adequate attention is not paid to the physical activity of young people, that in order to improve the current state the private-public partnership must be developed, and that public authorities should implement a policy that will develop positive attitudes towards lifelong engagement in sport and physical activity.

The National Sports Development Program of Montenegro states that there are school sports societies in six sports (athletics, handball, basketball, volleyball, small football and chess) and that at competitions organized by the Union of School Sports Associations of Montenegro, participate over 30,000 pupils - athletes from elementary schools. The problem is that in high schools, for many years now, the system of school sports competitions is not functional. The quality movement in this segment of sports was stimulated by the work of the Student Sports Union of Montenegro, through which the overall policy of student sports development is conducted, for over 3,000 students, and students are included in the system of competitions organized by the World Student Sport Association.

Improving sports in youth assumes insufficiently concrete measures, which we notice by reading the National Program, because planned activities are seminars for teachers and contest organizers, establishing a network of participants and a creative approach ... The only concrete measure would be under item 3: "linking physical education and extra-sporting activities through cooperation of schools with sports associations and clubs, in order to create opportunities for prospective students – athletes to achieve top-notch sports achievements" (National program of sports development in Montenegro).

In addition to the fact that insufficient physical activity in youth damages development and contributes to poor socialization and lack of recognition of sports talents, it certainly affects the increase in obesity among children, which is often the case in the world, and especially in Britain. "Compared to other European countries, an increase in the number of obese people in England is high and practically reflects the situation in the United States where, technically, 30% of the adult population is obese (Crossley, 2004). It is claimed that a dramatic increase in obesity in England occurred, among other things, because in the last generation physical activity decreased by 70 percent (Parkinson, 1966)" (Skembler, 2007).

It is similar in Montenegro where extensive research is carried out, as a part of an international project, among the elementary school population, in the realization of the Faculty for Sport and Physical Education and the Institute for Public Health. However, earlier studies among high school students are worrying, according to the data from the Action Plan for Food consumption and safety of Montenegro (2010-2014), 21% of children and adolescents aged 7 to 19 years had an excessive weight, or are obese, and three quarters are with healthy weight. The fact that more than 20 percent of school-age children have an increased body mass or belong to the category of obese should have to worry everyone, parents, schools, health workers, the whole society.

"Finally, efforts in population-based prevention of overweight and obesity in children and adolescents should be matched with enhancing access to health-care interventions for weight management and for reducing the adverse effects of obesity, including intensive behavioural therapy to change diet and exercise; screening for and management of hyper-

tension, glucose intolerance, dyslipidaemia, and abnormal liver function in children and adolescents with obesity; and in extreme cases bariatric surgery" by the NCD Risk Factor Collaboration (NCD-RisC).

Theoreticians primarily expect from the state to play a patronizing role in the development of sports among young people, either in providing funding, in norming, or in encouraging physical and sports activities: "State involvement through these activities creates, at the very least, waves of influence through all aspects of sport: from sports development and amateur sport to professional sports and international competitions, from sports in school to many sports-related jobs, from improving national health (and by that additional savings) to improving the infrastructure, national pride and world recognition. The complexity of these interactions makes the role of the state - whatever it is - so important. Because of this importance, one of the vital aspects of business and sports management is understanding and influencing that role" (Beech, & Chadwick, 2010)

The establishment of the Ministry of Sport (formerly the Directorate for Youth and Sports) promoted the youth's sports activity in and outside of schools, and one of the steps in that direction is the introduction of free medical examinations, which makes easier for young people who already have significant expenses to pay membership in clubs to stay engaged in sports. "We have the idea to create a diagnostic center that would deal with the examination of all of our athletes" (N. Janovic, personal communication).

Methods

For the purposes of this paper, we conducted interviews with relevant sports workers who have scanned the current situation in the field of youth sports in Montenegro, each from their own perspective, and then gave opinions and recommendations what should be done in order to improve, to better develop sports among young people. Interviewed are: Milorad Vuletic, President of the Athletic Association of Montenegro, Branko Krivokapic, sports journalist of TV Vijesti, Milovan Ljubojevic, professor at the Faculty for Sport and Physical Education and Pavle Malovic, president of the Student Council of the Faculty for Sport and Physical Education in Niksic. The responses were analyzed by double open coding by selecting significant and removing insufficiently significant codes, i.e. characteristics for this topic, and then individually and together analyzed. This led to the formation of a kind of theory about sport among young people in Montenegro, which objectively presented the current state and made recommendations for its improvement.

Results

Interviewed as problems in the development of sports in young people stated inadequate realization of physical education teaching in elementary and secondary schools, lack of adequate infrastructure in schools, lack of athletic stadium and track in the capital of Montenegro. In addition to these problems, it is considered that there are disadvantages in the adequate engagement into sports outside the school system. What is considered to be an advantage is the great sporting potential in youth and generations of educated professors of physical culture who come from the faculty. As a positive aspect, it is necessary to emphasize that more and more young people sees sports as their main activity outside school.

Table 1. Disadvantages and advantages of youth in sport in Montenegro

Disadvantages	Advantages
Inadequate realization of teaching in schools	Great sports potential in youth
Lack of adequate infrastructure in schools	Youth interest in sport
Lack of athletic stadium in the capital of Montenegro	Generations of educated professors in physical culture
Lack of sports schools beyond classes	

Discussion

Generations of young people go through elementary and secondary school without adequate physical education. This is generally considered to be a lighter subject, one which does not require much effort and knowledge, thus grades in these subjects are often given for better overall success. The place where the classes are held is often inadequate, the gyms roofs are leaking, and the dressing rooms are unregulated. Teachers of physical culture either can not face with such a state or contribute to it by ignoring it.

We are witnesses that physical education in elementary and secondary schools is not basic, but the subject of secondary significance: teaching is mostly performed in an uncomfortable space, absences are easily passed, grades are copied and "given away", the form is more important than the essence" (Branko Krivokapic).

We definitely can't talk about some kind of high-quality physical education, and it's permanent in the last 20 years, which is not good (Milorad Vuletic).

In schools, physical education is limited by the number of hours, space capacities and equipment (Milovan Ljubojevic).

Sports among young people, within the framework of physical culture in schools, suffers from extremely high, I can say freely, lack of seriousness and engagement of young people (Pavle Malovic).

Interviewed persons also state specific problems. The teaching of physical education is carried out for several departments together in a gym that is not sufficient for one department, and in such conditions the foreseen movement and activity can't be realized. The problem is the lack of equipment, and the number of hours of physical education in elementary school as an elective subject is also reduced.

As a solution to overcome this problem priority is given to providing conditions for adequate physical education, which is under jurisdiction of the Ministry of Education and Sports Ministry, thus each school would have a functional gym. Right behind it is continual professional development of teachers of physical education, and third - a constant work in promoting awareness among young people that physical education and sports, is not seen as a school subject, but as a healthy habit. "Here is even the least important if and in what percentage they will become top athletes - it is important first of all to learn to walk properly; that care of their own body becomes a cultural code. Another item stands out - affirmation and media popularization of school sports competitions"(Branko Krivokapic).

Encouragement, in this sense, comes from a student of the final year of physical education who believes that we should trust in the young generations of professor of the course "Thanks to the more and more quality generations coming out from our University departments, there is hope that the quality of work and dedication coming from such persons will attract the attention of youth in a subtle and interesting way,

thus affecting the stated syndrome" (Pavle Malovic).

One of the biggest problems in the development of sports among young people is the lack of an athletic stadium and the track in the capital of Montenegro, said Milorad Vuletic, president of the Athletic Association of Montenegro, who states that this did not happen even after half a century of efforts, and that without mass presence there is no quality. The construction of such a stadium would mark an threshold in the development of the Montenegrin sport, and it could be built in real terms if capital would provide the land with the necessary infrastructure and become the owner of the stadium later. The Athletic Association would contribute by equipping the stadium with a rubber backing tartan track through the World Athletics Federation, and the state could round up a financial construction with a public-private partnership, as is the case in the region. "This means, above all, seriously planned investment in available sports facilities in the part of renovation and reconstruction in order to get an architectural comfortable areas, as well as increasing the capacity of indoor and outdoor areas for sport" (Popovic et al., 2016).

Sport outside the school has some problems, the interviewees stated. There are many sports clubs, schools and organizations, but because of the market competition, quality is neglected for the sake of quantity. This can mean a certain kind of recreation for children provided by their parents, but this is not a way of working with talents, who need more attention and the work with professional teams.

I think that the number of professional services in the clubs should increase (health service, kinesiological monitoring service, psychologist, etc.). The Sports Act must define the areas of education for people working in sports, mostly in professional services. A person who manages the development process of one's organism can't be without formal education in the field related human organism (Milovan Ljubojevic).

Another item stands out - affirmation and media popularization of school sports competitions. Example: the women's soccer team of Montenegro is practically formed on the basis of representation of primary and secondary schools.

It is necessary to develop a national, networked information system that would record every qualitative sporting step forward of children at equal level from any part of Montenegro. They should be encouraged to compete with their peers from Europe, and scholarships should also be provided by the state, in addition to the Montenegrin Olympic Committee and the national federations (Branko Krivokapic).

The interviewees confirm the authors' thesis that the efforts of the newly founded Ministry of Sports are going in the right direction, because in cooperation with the Ministry of Education it improves the sports environment for young people, so that physical education becomes factually obligatory subject, and not optional, and the fund of classes is increased, which requires new education of teaching staff, especially professor of physical education. Pedagogues should be directed

towards the affinities they possess, from general education to the scouting method of selecting pupils and their adequate sports, by using medicine and everything else, and directing after the age of ten.

In order to extract the quality from the masses, it is necessary to have skilled and qualified teaching staff-trainers, because they are deficient in those sports that are basic for dealing with some other kind of highly specialized sports (Milorad Vuletic).

It would be necessary, as the Faculty for Sport and Physical Education states, to adhere to the attitudes of professional teams, who would rely on the true qualities of athletes, which so far may not always have been the case, since parents had other desires, as well as managers.

We all must trust the trainers and let them do their job. Without intrusion of parents, managers and others (Milovan Ljubojevic)

Recruiting young people from the school sports system is not at a level that is already active in more developed countries, but instead young people choose a certain sport discipline under someone's influence or are simply lead towards some sport discipline, regardless of whether this sport corresponds to its anthropological status (Pavle Malovic).

The draft of the new Law on Sports of Montenegro (2017) provides stimulation measures that will enable the inclusion of as many children as possible in sports activities; they are related the co-financing of their membership in sports clubs, that is, by paying part of their membership fee". The legislation draft stipulates that funds are paid on the account of a professional sports club, within which the child is engaged in sports activity, for the previous period and at most for two months at a time. This method of payment is foreseen for the purpose of avoiding possible misuse, given that a professional sports club will have to provide evidence that the child was really involved in sports within that club in the previous period for which the payment of funds is being made". Call for a public invitation is also planned for co-financing children for sport engagement, and professional sports clubs with at least ten children will be eligible to apply. The legislation draft further states that the root of this idea lie primarily in the desire to create a healthy and physically active nation because the physical activity prevents the emergence of certain non-communicable diseases, such as, for example, obesity disease, and related illnesses. On the other hand, Montenegro is a nation that continuously

achieves high sports results at the domestic and international level, and it is necessary to establish conditions for engaging into sports, in order to achieve such results in the future.

We can conclude that in any case there are enough candidates for sports, for managing the sport and for producing good results, which we have shown in all sports from individual to collective, since 2006 when they start competing for Montenegro. Nevertheless, the examination of the problem, and its resolution and improvement of the situation, would certainly help the development of sports among young people in Montenegro, the acquisition of healthy habits and more successes in sports.

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Standing Height and its Estimation Utilizing Arm Spam and Foot Length Measurements in Dinaric Alps Population: A Systematic Review

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Abstract

Several researches have reported the benefits of using various body parameters in predicting standing height, and arm span happened to be one of the most reliable ones in adults, while foot length measurement is the most reliable predictor during adolescent age. On the other hand, it is well-known that the tallness and body proportions are specific in the area covered by Dinaric Alps. Therefore, the purpose of this study was to investigate the potential relationship between arm span and foot length measurements and body height in Dinaric Alps population. The most visible electronic database (Google Scholar) was searched for original research articles available until April 2018. Then research findings were summarized and relationship between arm span and foot length measurements and body height in Dinaric Alps population were identified, as well as areas of future research were recommended. The assessment of body height using various anthropometric measures is very typical from the past centuries and it has been attempted to be studied by many researchers. However, it is important to underline that the arm span has been obtained as the most reliable body indicator for predicting the true height of an individual, while foot length was very close. However, the studies sampled with the populations which live at Dinaric Alps Mountains have specific estimates. Therefore, all the above-mentioned has confirmed the necessity for developing separate body height models for each population on account of ethnic as well as regional differences.

Key words: *standing height, tue height, growth, estimation, arm spam, foot length*

Introduction

A great number of studies have shown that body height measurement is a valuable factor which is highly affective on the state of nutrition in adults (cited in Arifi et al., 2017a; Popovic, & Bjelica, 2016), as well as for estimating the growth rate in children, evaluating the basic energy needs, adjusting the physical capacity measures, as well as for estimating the amount of taking certain medications and a number of other things, such as muscle strength assessment, metabolic processes, lung capacity, and the like. (Golshan, Amra, & Hoghogi, 2003; M. Golshan, Crapo, Amra, Jensen, & R. Golshan, 2007; Mohanty, Babu, & Nair, 2001; Ter Goon, Toriola, Musa, & Akusu, 2011).

However, according to Quanjer and his associates (2014), body height cannot always be accurately determined, primarily in cases such as paralysis, fractures, amputations, and various deformities such as scoliosis and kyphosis. For this reason, it is necessary to evaluate the relative body height from other reliable anthropometric indicators such as hand and foot length, knee height, forearm length, chest length, sitting height, blade length, arm length, and a number of other less reliable indicators (as cited in Gardasevic, Rasidagic, Krivokapic, Corluka, & Bjelica, 2017; Popovic, 2017; Masanovic, 2017). Accordingly, all anthropometric indicators used as an alternative to estimating relative body height are of great importance in all the above listed cases when the body height is significant but cannot be measured by a standard method. It is also important to point out that all of these should and have to be applied in sports sciences, since the importance of body height is highly important and affective on the success in various sports disciplines (Popovic, 2017).

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A significant number of studies have indicated the usefulness of different body parameters in assessing relative body height (Popovic, Arifi, & Bjelica, 2017a, Popovic, & Bjelica, 2017, Popovic, Gardasevic, Masanovic, Arifi, & Bjelica, 2017b) and it was found that arm span was the most reliable of all of them (Jalzem, & Gledhill, 1993; Mohanty et al., 2001; Ter Goon et al., 2011), while foot length measurement is the most reliable predictor during adolescent age, due to the fact that ossification and maturation occur earlier in the foot than the long bones and standing height could be more accurately predicted from foot measurement as compared to long bones during adolescent age (Singh, Kumar, Chavali, & Harish, 2012). On the other hand, it is widely known that body height and body proportions are specific when talking about populations living on Dinaroids. Therefore, the main objective of this study is to explore the potential relationship between arm span and foot length measurements and body height in the given area.

Method

The most apparent electronic database of scientific papers, "Google Scholar", was used in this research, while all the materialsthat entered the analysis were available until the 30th of April 2017. The field of research of the above mentioned electronic database of scientific papers is related to the determination and compilation of potential relations between arm span and foot length measurements and body height in subjects who have lived and are living in the area of mountain wreaths named Dinaroids. In the search of the mentioned database, the following keywords were used: "hand length", "foot length", "body height", "dinaric alps" and "anthropometric measures", while the author reviewed and made a further selection of the papers, and rejected all that did not follow the criteria. Later on, according to the criteria (that the population is from the territory of the Dinaroids, and that a linear regression analysis was applied in the work that determined the relationship between arm span and foot length measurements and body height, which is the main goal of this study (Moher et al., 2009), he performed the systematic analysis of the materials in accordance with the principles of "Preferred Reporting Items for Systematic Reviews and Meta-Analyzes (PRISMA)".

Results

The initial research included 44 quotations that made up the basic database. Then a program called "Reference Manager" was used for referencing all the quotations to be included in the program database for easier analysis. 25 papers out of the total base were excluded from the further analysis because they did not fit into the purpose of this research, while 19 papers went into shortlist after they have been systematically analyzed in detail (Tables).

Table 1. Sistematic analysis of the relationship between body height and arm span at the national level

Autor(s)	The aim of The research	Sampled subjects	Statistic analysis	Results
Arifi et al. (2017a)	Determination of the relationship between body height and arm span	830 boys and 793 girls of high schools in Kosovo	Linear regression analysis	It was found that arm span is the most reliable indicator of body height assessment. It has also been established that there are differences in relation to ethnicity.
Bjelica et al. (2012)	Determination of the relationship between body height and arm span	187 male students and 107 female students of the University of Montenegro	Linear regression analysis	It was found that arm span is the most reliable indicator of body height assessment. It has also been established that there are differences in relation to ethnicity.
Popovic (2016)	Determination of the relationship between body height and arm span	981 boys and 1107 girls of high schools in Montenegro	Linear regression analysis	It was found that arm span is the most reliable indicator of body height assessment. It has also been established that there are differences in relation to ethnicity.
Popovic et al. (2016)	Determination of the relationship between body height and arm span	114 male students and 125 female students od the University of Macedonia	Linear regression analysis	It was found that arm span is the most reliable indicator of body height assessment. It has also been established that there are differences in relation to ethnicity.
Popovic et al. (2013)	Determination of the relationship between body height and arm span	318 male students and76 female students of the University of Serbia	Linear regression analysis	It was found that arm span is the most reliable indicator of body height assessment. It has also been established that there are differences in relation to ethnicity.
Quanjer et al. (2014)	Determination of the relationship between body height and arm span	1503 persons who are residents on three continents (Europe, Asia and Africa)	Linear regression analysis	It was found that arm span is the most reliable indicator of body height assessment. It has also been established that there are differences in relation to ethnicity.

In this systematic analysis, 43.18% of the total number of preliminary studies coincided with the objective of this study, and the main conclusions based on detailed systematic analysis were that the relationship between both anthropometric indicators (arm and foot length) ranged from one racial or ethnic group to another, which was previously known, and was applied in detail to the ethnic differences between the populations living in the areas that were in the focus of the author's research.

Table 2. Sistematic analysis of the relationship between body height and arm span at the regional level

Autor(s)	The aim of The research	Sampled subjects	Statistic analysis	Results
Arifi et al. (2017b)	Determination of the relationship between body height and arm span	90 boys and 87 girls of high schools in the north region of Kosovo	Linear regression analysis	It was found that arm span is the most reliable indicator of body height assessment. It has also been established that there are differences in relation to ethnicity.
Bubanja et al. (2017a)	Determination of the relationship between body height and arm span	593 girls of high schools in the middle region of Montenegro	Linear regression analysis	It was found that arm span is the most reliable indicator of body height assessment. It has also been established that there are differences in relation to ethnicity.
Gardasevic et al. (2017)	Determination of the relationship between body height and arm span	193 students of the University of the Federal entity of Bosnia and Hercegovina	Linear regression analysis	It was found that arm span is the most reliable indicator of body height assessment. It has also been established that there are differences in relation to ethnicity.
Milasinovic et al. (2016a)	Determination of the relationship between body height and arm span	87 boys of high schools in the south region of Montenegro	Linear regression analysis	It was found that arm span is the most reliable indicator of body height assessment. It has also been established that there are differences in relation to ethnicity.
Milasinovic et al. (2016b)	Determination of the relationship between body height and arm span	149 girls of high schools in the south region of Montenegro	Linear regression analysis	It was found that arm span is the most reliable indicator of body height assessment. It has also been established that there are differences in relation to ethnicity.
Popovic et al. (2015)	Determination of the relationship between body height and arm span	178 male students and 34 female students of the University of RepublikaSrpska in Bosnia and Hercegovina	Linear regression analysis	It was found that arm span is the most reliable indicator of body height assessment. It has also been established that there are differences in relation to ethnicity.
Vujovic et al. (2015)	Determination of the relationship between body height and arm span	593 girls of high schools in the middle region of Montenegro	Linear regression analysis	It was found that arm span is the most reliable indicator of body height assessment. It has also been established that there are differences in relation to ethnicity.

On the other hand, it has been found that there are deviations from the regional fragmentation of samples analyzed in the countries that gravitate in the area of the Dinaric, which is a remarkable contribution to science, primarily because it could point to the potential ethnic diversity of the population that believes it belongs the same ethnic group may indicate that regional division also influences the relationship between body height and hand range as one of the most important or most important predictors when determining the relative body height of the adult concerned, as well as the relationship between the body height and the foot length as one of the most important or most important predictors when determining the relative body height of the adolescents.

It is interesting that a significant number of research pre-

sentations at scientific conferences were not found in the subject search, especially when presentations at the annual scientific conferences organized in Serbia, Slovenia, Croatia and Montenegro are taken into account (Bjelica, Popovic, & Akpinar, 2014; 2015; 2016; 2017) but it was confirmed that all these researches that have been found (Popović, Bjelica, Petković, Muratović, & Georgiev, 2014; Popović, Milašinović, Matić, Gardašević, & Bjelica, 2016; Popović, Milašinović, Jakšić, Vasiljević, & Bjelica, 2016; Popović, Bjelica, Milašinović, & Gardašević, 2016; Milašinović, Popović, Bjelica, & Vasiljević, 2016; Popović, Bjelica, Milašinović, Gardašević, & Rašidagić, 2016; Popovic, & Bjelica, 2016), have later been published in magazines in full text, so that the subject analysis did not lose significance.

Table 3. Sistematic analysis of the relationship between body height and foot length at the national level

Autor(s)	The aim of The research	Sampled subjects	Statistic analysis	Results
Popovic et al. (2017a)	Determination of the relationship between body height and foot length	338 boys and 326 girls of high schools in the north region of Kosovo	Linear regression analysis	It was found that arm span was the most reliable indicator of body height assessment, while foot length was very close. It has been established that there are differences in relation to ethnicity.
Masanovic et al. (2018ba)	Determination of the relationship between body height and foot length	185 boys and 179 girl of high schools in the eastern region of Kosovo	Linear regression analysis	It was found that arm span was the most reliable indicator of body height assessment, while foot length was very close. It has been established that there are differences in relation to ethnicity.
Masanovic et al. (2018b)	Determination of the relationship between body height and foot length	87 boys and 90 girls of high schools in the north region of Kosovo	Linear regression analysis	It was found that arm span was the most reliable indicator of body height assessment, while foot length was very close. It has been established that there are differences in relation to ethnicity.
Popovic et al. (2017b)	Determination of the relationship between body height and foot length	830 boys and 793 girls of high schools in Kosovo	Linear regression analysis	It was found that arm span was the most reliable indicator of body height assessment, while foot length was very close. It has been established that there are differences in relation to ethnicity.
Masanovic et al. (2018c)	Determination of the relationship between body height and foot length	100 boys and 93 girls of high schools in the central region of Kosovo	Linear regression analysis	It was found that arm span was the most reliable indicator of body height assessment, while foot length was very close. It has been established that there are differences in relation to ethnicity.
Masanovic et al. (2018d)	Determination of the relationship between body height and foot length	120 boys and 105 girls of high schools in the southern region of Kosovo	Linear regression analysis	It was found that arm span was the most reliable indicator of body height assessment, while foot length was very close. It has been established that there are differences in relation to ethnicity.

Discussion

Since it is known that the highest people live in the Dinaroids area (Grasgruber et al., 2017), and that individuals have specific body proportions, for example, Montenegrins as the tallest people in the world from the beginning of the 20th century, with an average height of 177 centimeters who had significantly longer legs and significantly shorter hands (Popović, 2017), it was logical to assume that the ratio of body height and anthropometric indicators, which are used as an alternative to assessing relative body height has a different proportion. As it has already been established in a significant number of studies, the ratio of arm span and foot length measurements and body height varies from race to race and from ethnic group to ethnic group, it was clear that something would be confirmed in Montenegro (Bjelica et al., 2012), in Serbia (Popovic et al., 2013), as well as in Kosovo (Arifi et al., 2017a). Namely, all the studies that aimed at determining the relationship between arm span and foot length measurements and body height in the Dinaroids area have undoubtedly proved that it is necessary to create new coefficients necessary for determining relative body height through other anthropometric parameters that we apply when the body height can not be measured the standard way, and that has already been explained in detail in the introduction of this study.

As all the populations in the area of Dinaroids showed similar characteristics, several detailed studies were soon carried out on the territory of Bosnia and Herzegovina, Macedonia and Albania, all areas that, partly or completely, lie on the slopes of Dinaroids, as it was expected that it will be necessary to establish new and unique coefficients for assessing relative body height through other anthropometric parameters, arm span and foot length in the first place that have proven to be the most reliable indicators in adults and adolescents. These assumptions have been confirmed, in other words, in all the mentioned countries, specific relations have been established when the body height and arm span or the length of the foot are concerned, but it is interesting to point out that in Serbia only the student population, which is believed to have specific demographic characteristics is measured (Popovic et al., 2013), and it is recommended to do further research of the general population in order to determine whether the evidence obtained on the student population is valid for the general population. On the other hand, in Montenegro, matching results were obtained on the student and general population, while the differences were obtained when the regions were in question: the northern, middle and southern regions (Popovic, 2016). When it comes to Kosovo, regional differences when the arm span and foot length measurements and body height

are in question also occur, which was the case in Montenegro too (Arifi et al., 2017).

It is also important to mention Albania here, where the students have beenthe subjects of anthropometric measurements, and wherethe preliminary results indicated that there are specifics among the Albanians. The most interesting thing is that Albanians areon average about 5 centimeters lower than Kosovars (J. Jarani, personal communication), even though they are believed to belong to the same ethnicity. Results like these indicate that the political definition of a nation or ethnic group in the Western Balkans area does not always have to go hand in hand with the indicators we receive in biological research. As for Macedonia, which lies in the Carpathians to a large extent,specifics are also notedamong the student population that has been measured, but the significantly lower body height instructs us to scale the entire population and do a regional analysis, since a multiethnic society and two mountain wreaths unambiguously demand it from us. In the end, the specifics obtained among the population of Bosnia and Herzegovina are, at least confusing, because differences in the measurement of the general population and students have been found (Grasgruber et al., 2017; Popovic et al., 2015; Gardasevic et al., 2017), while there was no difference between students from all three entities, which leads to similar conclusions as when the populations in Kosovo and Albania are in question.

All in all, it is evident that there are many specifics in body height and body proportions in populations living in the area covered by Dinaroids, and it is necessary that the coefficients for the estimation of relative body mass are calculated carefully and thoroughly, first of all in order not to make omissions that could result in fatal consequences in all of the foregoing cases that depend on the above assessment.

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SportMont

Is Financial Reward Enough for Motivation in Football?

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Abstract

Motivation obviously plays a great role in the life of each athlete. The purpose of this paper is to bring out the importance of motivation in sport from the perspective of Self-determination theory (SDT). This theoretical review paper demonstrates the application of Self-determination theory (SDT) in amateur sports environment and professional athletes. Self-determination theory (SDT) postulates assumption that there is one motivational continuum rather than individual types of motivation and that each athlete has the same basic psychological needs that need to be satisfied. Our review is based not only on Self-determination theory (SDT) theory, but also on several studies from different countries and environments. The review is focused on recommendations regarding implementation of specific strategies that could help athletes to improve their internal motivation in order to reach better performance and results.

Key words: _motivation, basic psychological needs, self-determination theory, football_

Introduction

Motivation lies at the heart of many interesting problems within most sports, therefore researchers' interest in motivation can be easily understood. Children are usually involved in football because of the interest and pure enjoyment of the activity itself. On the other hand, external rewards are being often used to encourage young athletes even more, although empirical data proves contrary to the expectation of the coach. Instead of contributing, use of external incentives often causes a negative effect to internal motivation and additionally undermines inner interest and enjoyment of sports (Mladenović, 2010). However, according to the Self-determination theory, external and internal motivation are not two discrete categories, but a unique continuum. On one end of continuum is intrinsic motivation, and on another amotivation. Different forms of extrinsic motivation are distinguished between intrinsic motivation and amotivation (Deci, & Ryan, 2000).

The Self-Determination Theory

The original idea that led to the creation of the Self-Determination Theory (SDT) in the 1970s arisen when Porter and Lawler introduced into life concepts of internal (intrinsic) and external (extrinsic) motivation to cover all possible factors of work satisfaction (Gagné, & Deci, 2005). Factors that arose from the work itself (its contents and activities that it required) were described as internal motivation and the factors that are related to the effects of work activity (money, status, power, popularity) were described as external motivation. In sports, intrinsic motivation reffers to athletes who participate in sport for internal reasons (particularly pure enjoyment and satisfaction). Extrinsic motivation may come from social sources (e.g. avoiding disappointments) or material rewards. Extrinsically motivated athletes tend to focus on the competitive or performance outcome. Porter and Lawler emphasized the need to redesign jobs to maximize the job satisfaction. Such approach is based on the assumption of the additivity of internal and external motivation - sum of internal and external motivators leads to the maximum possible motivation. On the other hand, the Self-Determination Theory began to use a different approach and has started to address the distinction of types of motivation. The original idea of SDT was that the type and quality of personality motivation is much more important than the overall amount of motivation (Ryan, 2009). Deci (1971) has tested the hypothesis about the summation of inter-

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nal and external motivators and found that additivity does not apply - internal and external motivation are found in a much more complex relationship. Material rewards do not increase existing internal motivation, on the contrary - they reduce it. In the experiment, two participant groups were asked to reproduce certain types of three-dimensional puzzles. Time analysis showed that participants who were initially motivated and interested in this task spent significantly more time solving the puzzle despite no reward. This result, in combination with the results of similar experiments has confirmed that the implementation of external standards reduces intrinsic interest if previously existed. On the other hand, Deci(1971) found that positive feedback for performance improves already existing internal motivation. This finding has opened another series of attempts to identify the psychological mechanism that's behind the experimental effect of material rewards. The influence of the external reward on intrinsic motivation can take place within two processes (Ryan, & Deci, 2000).

1) Control aspect of a reward

If the reward is very high, it will be perceived as the only reason for playing football (it is the one that controls behavior), which will greatly reduce internal motivation. Activity, motivated by intrinsic motives, when using the reward as an extrinsic source, leads to a change in the perception of the cause. In other words, the impairment of intrinsic motivation happens because an external prize is seen as the primary reason for why one is participating in football.

2) Informational aspect of a reward

When the reward is understood as information that we

did something good, it reflects on internal motivation as it increases the sense of competence and self-confidence. On the other hand, when an individual receives punishment, one feels less competent and confident, and his/her intrinsic motivation reduces.

According to authors (Ryan, & Deci, 2000) each reward has potential control and informational aspects. For example, if young footballers feel as if they have to win to achieve the approval of their parents or coaches, there will be a stronger controlling aspect of this external cause than the informational one. Therefore, internal motivation can be expected to decrease. If a child receives praise for successful completion of a motoric task, the informational aspect of reward will prevail, so the internal motivation will increase. The competition also has an informational and controlling aspect - success increases and failure reduces internal motivation. Authors (Deci, & Ryan, 2000) state that if the informational aspects of a reward are more dominant and positively contribute to the sense of personal competence and self-determination, then the intrinsic motivation will be maintained and increased. On the other hand, if the control aspects of reward are more significant, the external reward will reduce the intrinsic motivation

Continuum of Motivation

Amotivation, placed at the left end of motivational continuum, is the state of absence of any will for activity - therefore no self-regulation is present (Table 1). Amotivation is based on negative evaluation of activity, lack of competence to achieve the goal or expecting undesired outcomes (Deci, & Ryan, 2000).

Table 1. Continuum of motivation (Deci, & Ryan, 2000)

Behavior	Nonself-Determined					Self-Determined
Motivation	Amotivation		Extrinsic Motivation			Intrinsic Motivation
Regulatory Styles	Non-Regulation	External Regulation	Introjected Regulation	Identified Regulation	Integrated Regulation	Intrinsic Regulation
Perceived Locus of Causality	Impersonal	External	Somewhat External	Somewhat Internal	Internal	Internal
Relevant Regulatory processes	Nonintentional, Nonvaluing, Incompetence, Lack of Control	Compliance, External Rewards and Punishments	Self-Control, Ego-Involvement, Internal Rewards and Punishments	Personal Importance, Conscious Valuing	Congruence, Awareness, Synthesis With Self	Interest, Enjoyment, Inherent Satisfaction

Extrinsically motivated behavior is in the continuum of self-determination placed between amotivation and intrinsic motivation. Least autonomously extrinsically motivated behavior is external regulation. This behavior serves to satisfy external demands. Such motivated individuals experience externally regulated behaviors not as their own, because the activities have external locus of control. External regulation is a kind of motivation that the operative-conditional theorists (Deci, & Ryan, 2000) have focused their research on. In past research, external regulation is usually perceived as the opposite of intrinsic motivation because it represents a classic example of motivation with rewards and punishments.

However, it could happen that a footballer does not fully

internalize external reasons for performing uninteresting activities. There is no coach who has not faced the quiet resistance of the athlete to some aspect of the training. In this case, when footballer only superficially and automatically performs some aspect of the training because he/she needs to or must, we are talking about introjected regulation. It refers to the incomplete internalization of goals or values that some social environment highly values and promotes. The introjection, as an internalization mechanism, is manifested in football as, for example, commitment due to feelings of duty or guilt, motivation not to ignore the expectations the of coach or parents, self-esteem that depends on the current perception of one's performance, etc. (Mladenović, 2010). The motivation based

on introjection can contribute to the extraordinary persistence and commitment that is very similar to intrinsic motivation on the behavioral plan (Vansteenkiste, & Deci, 2003). It can be assumed that during the age of adolescence this type of extrinsic motivation is developmentally appropriate for the optimal psychological and sporting development of young athletes, however, it is important to ensure the process of internalization is more complete and contributes towards a greater integration of social influences into the self.

The next step in the internalization of the social environment is called identification. An individual consciously values and accepts the rules and demands of the social environment, although at deeper level one does not have to feel these requirements as his/her own. This more autonomous type of extrinsic motivation is called identified regulation (Deci, & Ryan, 2000). Playing football is inseparable from external factors and inevitably under their influence. Many aspects of playing football do not have to be interesting, and they can even be unpleasant, sometimes even meaningless. From a psychological point of view, the success in football, as well as in other sports in general, involves long training hours, repetition of the same activities in order to acquire the necessary skills, etc. Some activities separated from the big picture can be perceived as meaningless and demotivating if the athlete has not developed awareness of their meaning for sports activity and overall performance (Mladenović, 2000). A football player who understands and accepts the importance of external causes develops responsible behavior. When a football player responsibly and consciously approaches all important tasks, both pleasant and less pleasant, we can say that there is present identified regulation. The development of a sense of responsibility and professionalism of future affirmative football players takes place with this identification mechanism. In football, one is driven by identified regulation when one professionally and responsibly accepts all his/her sporting responsibilities.

Finally, the most autonomous type of extrinsic motivation is integrated regulation. This motivation occurs when regulations are fully assimilated with self so they are included in self-evaluation and beliefs about personal needs (Deci, & Ryan, 2000). Because of this, integrated motivations share qualities with intrinsic motivation but are still classified as extrinsic because the goals that are trying to be achieved are for reasons extrinsic to the self, rather than the inherent enjoyment or interest in the task. Integrated regulation occurs when athletes perform activities to benefit different aspects of their life, rather than for the pleasure of participating itself. For example, training and dieting hard in order to develop a healthy life style (Deci, & Ryan, 2000). At the second end of motivational continuum is intrinsic motivation, characterized as the ideal of inherent motivational behavior as it requires internal locus of control and intrinsic behavioral regulation (Deci, & Ryan, 2000). Intrinsic motivation pushes people to do activities that are of interest to them, which generates a spontaneous feeling of satisfaction. In sport, intrinsic motivation is defined as pure enjoyment due to participation in a favorite sport itself. For example, football players who play the sport simply for the pleasure and satisfaction that they gain from learning new skills are displaying intrinsic motivation.

Very important point in Self-determination theory is the distinction between autonomous and controlled motivation. Autonomous motivation includes intrinsic motivation and those types of extrinsic motivation in which people identify themselves with the value of activity, ideally when they integrate the value into self. When people are autonomously motivated, they feel free and supported. On the other hand, controlled motivation involves external regulation. Behavior is a function of external contingencies (system of rewards and punishments) and introjected regulation in which the regulation of activity is only partly internalized and reinforced by factors such as praise, avoiding feeling of shame, conditioned self-esteem (Deci, & Ryan, 2008). When people are controlled, they experience the pressure to think, feel or act in a certain way. Athletes whose participation is driven largely by self-determined factors perform at a higher level, experience more positive emotions, use positive coping strategies in stressful situations and invest higher levels of concentration, persistence, and effort than athletes with lower self-determined motivation and stronger controlled motivation. In comparison, athletes with a high level of controlled motivation tend to experience a variety of negative outcomes such as dropping out from sport, burnout, antisocial behaviour, anxiety, and negative affect (Deci, & Ryan, 1985).

Basic Psychological Needs

In the past, within the field of psychology of motivation, the concept of needs has dealt with two very different intellectual traditions. Experimental psychologist Hull (1943) argued that the role of psychology is to understand molar behavior related to the primary needs of the organism and relevant environmental conditions (Ryan, & Deci, 2000). Hull specified a whole set of innate physiological needs (e.g. thirst, hunger, sex) that are based on tissue deficiency in the nervous system, which is forcing the organism to action. These inner needs need to be satisfied to keep the organism healthy. The second tradition is based on the work of Murray, which defined needs psychological rather than physiological, and primarily perceives them as acquired, not as innate (Ryan, & Deci, 2000). This concept defines needs very broadly, and the term needs could very easily be confused with the motives, wishes or goals. The basis of empirical studies in Murray tradition was the emphasis on individual differences in the power of needs, particularly the needs of achievement, power and affiliation. These two theories are important because they provide a very useful contrast to Self-determination theory. Unlike many contemporary theories, SDT deals with the concept of needs explicitly and clearly specifies their meta-theoretical principles. Like in Hull's tradition, SDT defines needs as innate psychological nutrients that are essential to continued psychological growth, integrity and well-being" (Deci, & Ryan, 2000).

To explain the significance of the needs in SDT, we consider not only the theoretical concept but also the meta-theory underlying the needs. The theory assumes that every need has independent effects on personal well-being. The impact of any behavior or life event on well-being is, for the most part, only a function of the relationship between well-being and needs satisfaction. SDT uses the term self-realization or self-actualization (based on a eudaimonic philosophical approach) as the decisive aspect for defining well-being and attempts to explain the meaning of self-realization and how to achieve it. Therefore, SDT research explores factors that enable (rather than prevent) psychological growth, integrity, and well-being.

According to Hull, the needs are physiological or psychological energizing states that when satisfied lead to health and well-being (Ryan, & Deci, 2000). Unsatisfied needs contribute

to pathology and an absence of well-being. The SDT, in line with the biological and evolutionary approach, defines psychological needs as being organic - innate, basic and universal. Three basic psychological needs are the need for autonomy, the need for competence and relatedness need, which should be satisfied throughout life. Satisfaction is delivered through individual experience with constant mental growth (through mechanisms of intrinsic motivation), integrity achievement (through internalization and cultural norms assimilation) and mental well-being (life satisfaction and mental health). In other words, SDT assumes that satisfaction of basic psychological needs is a clear predictor of well-being, health and personal growth (Ryan, & Deci, 2000).

Autonomy. The need for autonomy refers to the one's need to be able to arbitrarily and autonomously run one's activity, as the opposite of excessive external control. When athletes feel that they do not have influence on their behavior, they may experience less satisfaction and more frustration in their life. (Deci, & Ryan, 1991; Ryan, 1995; Sheldon, & Kasser, 1995). In the case of young athletes, autonomy is manifested by voluntary dedication of time and energy to play sports. Niemiec et al. (2009) argue that if teachers minimize the importance of pressure from evaluation and maximize the possibility for students to freely decide their own academic activities, the need for autonomy will be satisfied. People who behave autonomously for intrinsic causes or for religious reasons (Ryan, Rigby, & King, 1993), in an academic domain (Ryan, & Connel, 1989) or in close relationships (Blais, Sabourin, Boucher, & Vallerand, 1990) show better adaptation, in contrast to people who have more external, controlled or introjected reasons in the same areas.

Competency. The need to feel successful, effective and have control over the environment. It is supported by optimal challenges and constructive feedback related to success and a sense of efficiency. In case of football players, it is a possibility to develop their football skills. Niemiec et al. (2009) claim that people who feel competent but not autonomous cannot maintain an intrinsic motivation for learning. Various authors point to the need for competence as the main pillar of self-esteem and self-confidence (Ryan, & Deci, 2000). Bandura emphasizes that the key determinant of mental health is the feeling of being able to achieve the desired goal (Ryan, & Deci, 2000). On the other hand, the feeling that certain behavior does not lead to the desired results can cause feeling of helplessness and hopelessness with multiple negative consequences (Abramson, Seligman, & Teasdale, 1978; Abramson, Metalsky, & Alloy, 1989).

Relatedness. The need for relatedness is the need for a person to feel in relation to other people and social groups. Relatedness is stimulated by care and sense of significance for others. All humanistic theories of human motivation and development include a similar concept of the inner processes by which people seek and establish satisfactory relationships with other people. For football player, the relatedness need relates to feelings towards the coach, for example feeling as if the coach likes, values and respects him/her. Satisfaction of needs also leads to greater intrinsic motivation and greater willingness to engage in less interesting tasks (Niemiec, & Ryan, 2009). In psychological and medical literature, it is clearly confirmed that people who are better integrated into the social network and have satisfactory relationships with others tend to live longer and have better mental and physical health (Berschied, & Reis, 1998).

The concept of human needs has proven to be very useful as a means for understanding how different social factors and interpersonal environment affect autonomous and controlled motivation. More specifically, considering whether or not a particular contextual factor (e.g. financial reward, choice or performance evaluation) supports the satisfaction of basic psychological needs, enables people to predict the effects of the factor on motivation, behavior and well-being (Deci, & Ryan, 2008). In addition, basic psychological needs help us explain why some effective ways of behavior can increase well-being, while others do not.

Discussion

Young people love football because they can satisfy many intense inner motives, such as socializing, fun, pleasure from the game, competence, tension release, curiosity, learning and mastering sports skills. If playing football can create conditions that allow satisfying these motives, then there is a realistic assumption that these motives can develop, maintain and remain relatively durable, strong, and dominant. However, while playing football, at the very beginning, young footballers are faced with specific demands regarding the amount of training, effort, length of learning, spontaneity limitation, etc. This often leads to both unsatisfied motives (the reasons young people begin to play football) as well as a weakening of motivation for playing football and even to leaving the sport (Lazarević, 2003).

Mechanisms which lead to the improvement of health, development of positive human characteristics and abilities and knowledge should be initiated through training. It is extremely important to develop and maintain the intrinsic motivation of football players. This is the main reason why coaches should organize their trainings according to SDT principles of satisfying basic psychological needs (Deci, & Ryan, 2008). A young football player needs to perceive the game as a success which will eventually increase his sense of competence, therefore coaches may find it useful to follow these recommendations for training organization: 1) Organizing a variety of trainings sessions; 2) Allowing player to take more responsibility in terms of making decisions and performing tasks; 3) Defining realistic objectives (both team and personal) in way that player perceives them as their own; 4) Emphasizing the role of each player and his personal contribution to the team, which will stimulate self-confidence and self-esteem; 5) Inviting footballer players to increase their efforts, to be more persistent, to improve self-control and not to excite for things that are beyond the reach of personal influence; 6) Adjusting the requirements as much as possible to individual abilities. If the demands are too high, insecurity and a sense of anxiety can arise. If the requirements are low in relation to ability, loss of interest and boredom may appear; 7) Use of incentives in the form of rewards, praises, etc. should have an informational character; 8) Providing conditions that allow football players to reach the flow. Flow is a state of complete immerse in the game, in which the player does not notice anything else (audience, coach). In such a state football player will reach maximum engagement.

Rewards should have an information aspect, that is to provide information regarding the competence of the football player (Ryan, & Deci, 2000). However, controlling the aspect of the prize can be more significant, and then the reward reduces the intrinsic motivation. Everyday practice confirms this statement. Many parents have a need for their children to

be victorious and put pressure on them. Children see that and want to satisfy the needs of their parents. At the same time, they realize that training, matches, etc. are controlled by need to win the opponent and win the prize. This is the situation where the controlling aspect of the reward is more dominant than the informational aspect. During the period when footballers are still in development, we must create conditions in order to develop real, authentic and relatively permanent motives that form the structure of their intrinsic motivation. The dominance of these motives enables a more permanent, stable and adequate motivation of the football players and contributes to the development of potential, sports competence and thus self-actualization at a senior level. It takes strong motivation and the desire to endure all efforts, but the most important thing is to enjoy every training. Football should be enjoyment for players. On this path, dedication and desire are very important, but the support of people around them and especially coaches, is also very important. In moments when a football player starts to decrease his motivation the coach should be there to awake one's intrinsic motivation again, because this is the only motivation that lasts.

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Guidelines for Authors

Revised September 2017

*** Please use the bookmark function to navigate within the guidelines. ***

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

1. UNIFORM REQUIREMENTS

1.1. Overview

The *Sport Mont Journal* (SMJ) applies the Creative Commons Attribution (CC BY) license to articles and other works it publishes.

The submission with SMJ is free of charge but author(s) has to pay additional 250 euros per accepted manuscript to cover publication costs. If the manuscript contains graphics in color, note that printing in color is charged additionally.

SMJ adopts a double-blind approach for peer reviewing in which the reviewer's name is always concealed from the submitting authors as well as the author(s)'s name from the selected reviewers.

SMJ honors six-weeks for an initial decision of manuscript submission.

Authors should submit the manuscripts as one Microsoft Word (.doc) file.

Manuscripts must be provided either in standard UK or US English language. English standards should be consistent throughout the manuscripts accordingly.

Format the manuscript in A4 paper size; margins are 1 inch or 2.5 cm all around.

Type the whole manuscript double-spaced, justified alignment.

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

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

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

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

1.2. Type & Length

SMJ publishes following types of papers:

Original scientific papers are the results of empirically- or theoretically-based scientific research, which employ scientific methods, and which report experimental or observational aspects of sports science and medicine, such as all clinical aspects of exercise, health, and sport; exercise physiology and biophysical investigation of sports performance; sport biomechanics; sports nutrition; rehabilitation, physiotherapy; sports psychology; sport pedagogy, sport history, sport philosophy, sport sociology, sport management; and all aspects of scientific support of the sports coaches from the natural, social and humanistic side. Descriptive analyses or data inferences should include rigorous methodological structure as well as sound theory. Your manuscript should include the following sections: Introduction, Methods, Results, and Discussion.

☑Open Submissions   ☑Indexed   ☑Peer Reviewed

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

Review papers should provide concise in-depth reviews of both established and new areas, based on a critical examination of the literature, analyzing the various approaches to a specific topic in all aspects of sports science and medicine, such as all clinical aspects of exercise, health, and sport; exercise physiology and biophysical investigation of sports performance; sport biomechanics; sports nutrition; rehabilitation, physiotherapy; sports psychology; sport pedagogy, sport history, sport philosophy, sport sociology, sport management; and all aspects of scientific support of the sports coaches from the natural, social and humanistic side.

☑Open Submissions   ☑Indexed   ☑Peer Reviewed

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

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

☐Open Submissions   ☑Indexed   ☑Peer Reviewed

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

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

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

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

☑Open Submissions   ☑Indexed   ☐Peer Reviewed

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

Invited papers and award papers include invited papers from authors with outstanding scientific credentials. Nomination of invited authors is at the discretion of the SMJ editorial board. SMJ also publishes award papers selected by the scientific committee of the International Scientific Conference on Transformation Processes in Sport.

☐Open Submissions   ☑Indexed   ☐Peer Reviewed

Invited papers and award papers should be:
- Up to 3000 words (excluding title, abstract, tables/figures, figure legends, Acknowledgements, Conflict of Interest, and References);
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- Maximum combined total of 6 Tables/Figures.

1.3. Submission

SMJ only accepts electronic submission to the e-mail of the Journal Office: **sportmont@ac.me**.

Submitted material includes:
- A manuscript prepared according to the Guidelines for the Authors;
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- A signed form that there is no conflict of interest.

Name the files according to the family name of the first author. Authors submitting revised versions of the manuscript can use the identification number of their manuscript as provided by the Journal Office. *See* example:
- ✓ FAMILY NAME-manuscript.doc – (main manuscript file)
- ✓ FAMILY NAME-statement.PDF – (authorship statement)
- ✓ FAMILY NAME-declaration.PDF – (declaration of potential conflict of interest)
- ✓ FAMILY NAME-fig1.tiff – (Figure 1)

1.4. Peer Review Process

A manuscript submitted for publication will be submitted to the review process as long as it fits the following criteria:
- The study was not previously published, nor has been submitted simultaneously for consideration of publication elsewhere;
- All persons listed as authors approved its submission to SMJ;
- Any person cited as a source of personal communication has approved the quote;
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- The author signs a formal statement that the submitted manuscript complies with the directions and guidelines of SMJ.

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

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

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

1.6. After Acceptance

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

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

1.7. Code of Conduct Ethics Committee of Publications

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

2. MANUSCRIPT STRUCTURE

2.1. Title Page

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

<div align="center">

Talented High School Football Players' Perception of Talent Identification Criteria

Original Scientific Paper

Talent Identification Criteria

Vazjwar Matin[1] and Stig Arve Sæther[1]

[1]University of Science and Technology, Department of Sociology and Political Science, Trondheim, Norway

Corresponding author:

S. A. Sæther

Norwegian University of Science and Technology

Department of Sociology and Political Science

Dragvoll, 7491 Trondheim, Norway

E-mail: stigarve@ntnu.no

Word count: 2,946

Abstract word count: 236

Number of Tables: 3

Number of Figures: 0

</div>

2.1.1. Title

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

2.1.2. Type of publication

Authors should suggest the type of their submission.

2.1.3. Running head

Short running title should not exceed 50 characters including spaces.

2.1.4. Authors

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

2.1.5. Affiliations

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

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

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

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

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

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

2.1.7. Manuscript information

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

2.2. Abstract

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

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

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

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

Abstract

Results of the analysis of

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

2.3. Main Chapters

Starting from the third page of the manuscripts, it should be the main chapters. Depending on the type of publication main manuscript chapters may vary. The general outline is: Introduction, Methods, Results, Discussion, Acknowledgements

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

2.3.1. Headings

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

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

2.3.2 Ethics

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

2.3.3 Statistics reporting

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

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

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

2.4. References

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

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

2.4.1. References style

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

2.4.2. Examples for Reference citations

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

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

Works by three to five authors: cite all the author names the first time the reference occurs and then subsequently include only the first author followed by et al.
- ✓ First citation: Bangsbo, Iaia, and Krustrup (2008) stated that
- ✓ Subséquent citation: Bangsbo et al. (2008) stated that

Works by six or more authors: cite only the name of the first author followed by et al. and the year
- ✓ Krustrup et al. (2003) studied
- ✓ In one study (Krustrup et al., 2003), soccer players

Two or more works in the same parenthetical citation: Citation of two or more works in the same parentheses should be listed in the order they appear in the reference list (i.e., alphabetically, then chronologically)
- ✓ Several studies (Bangsbo et al., 2008; Duffield & Marino, 2007; Reilly, 1997) suggest that

2.4.3. Examples for Reference list

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

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

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

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

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

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

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

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

Thesis and dissertation:
Pyun, D. Y. (2006). *The proposed model of attitude toward advertising through sport.* Unpublished Doctoral Dissertation. Tallahassee, FL: The Florida State University.
Book:
Borg, G. (1998). *Borg's perceived exertion and pain scales*: Human kinetics.

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

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

2.5. Tables

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

Tables should be presented as standard MS Word tables.

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

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

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

2.5.1. Table heading

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

2.5.2. Table sub-heading

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

2.5.3. Table footnotes

Table footnotes should be written below the table.

General notes explain, qualify or provide information about the table as a whole. Put explanations of abbreviations, symbols, etc. here. General notes are designated by the word *Note* (italicized) followed by a period.
- ✓ *Note.* CI: confidence interval; Con: control group; CE: carbohydrate-electrolyte group.

Specific notes explain, qualify or provide information about a particular column, row, or individual entry. To indicate specific notes, use superscript lowercase letters (e.g. [a, b, c]), and order the superscripts from left to right, top to bottom. Each table's first footnote must be the superscript [a].
- ✓ [a]One participant was diagnosed with heat illness and n = 19.[b]n =20.

Probability notes provide the reader with the results of the texts for statistical significance. Probability notes must be indicated with consecutive use of the following symbols: * † ‡ § ¶ ‖ etc.
- ✓ *P<0.05,†p<0.01.

2.5.4. Table citation

In the text, tables should be cited as full words. *See* example:
- ✓ Table 1 (first letter in all capitals and no full stop)
- ✓ ...as shown in Tables 1 and 3. (citing more tables at once)
- ✓ ...result has shown (Tables 1-3) that... (citing more tables at once)
- ✓ ....in our results (Tables 1, 2 and 5)... (citing more tables at once)

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

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

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

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

2.6.1. Figure legends

Figures should not contain footnotes. All information, including explanations of abbreviations must be present in figure legends. Figure legends should be written bellow the figure, in sentence case. *See* example:
- ✓ **Figure 1.** Changes in accuracy of instep football kick measured before and after fatigued. SR – resting state, SF – state of fatigue, *p>0.01, †p>0.05.

2.6.2. Figure citation

All graphic materials should be referred to as Figures in the text. Figures are cited in the text as full words. *See* example:
- ✓ Figure 1
    - × figure 1
    - × Figure 1.
    - ✓ ….exhibit greater variance than the year before (Figure 2). Therefore…
    - ✓ ….as shown in Figures 1 and 3. (citing more figures at once)
    - ✓ ….result has shown (Figures 1-3) that... (citing more figures at once)
    - ✓ ….in our results (Figures 1, 2 and 5)... (citing more figures at once)

2.6.3. Sub-figures

If there is a figure divided in several sub-figures, each sub-figure should be marked with a small letter, starting with a, b, c etc. The letter should be marked for each subfigure in a logical and consistent way. *See* example:
- ✓ Figure 1a
- ✓ …in Figures 1a and b we can…
- ✓ …data represent (Figures 1a-d)…

2.7. Scientific Terminology

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

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

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

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

Signs should be placed immediately preceding the relevant number.

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

2.8. Latin Names

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

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

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

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

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

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

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The University of Montenegro is the leading higher education and research institution in Montenegro. It is a public institution, established by the state, operating as a unique legal entity represented by the Rector. It is an integrated university organized on the model of the most European universities. Organizational units are competent for provision of study programmes, scientific-research and artistic work, use of allocated funds and membership in professional associations.

Since its foundation, the University of Montenegro has continuously been conducting reforms in the area of education and research, while since 2003 in line with the trends in EHEA. After adoption of the Bologna Declaration, University of Montenegro organized systematic preparation of documents aligned with it. Already in 2003, the experimental teaching programme started and today, all studies are organised in line with the Bologna principles. During the last two years systematic reforms of the University`s study programes have been conducted in order to harmonize domestic higher education system with European standards and market needs to highest extent.

The University of Montenegro has unique academic, business and development objectives. It comprises 19 faculties and two research institutes. The seat of the UoM is in Podgorica, the capital city, while university units are located in eight Montenegrin towns. The University support services and centers (advisory services, accounting department, international cooperation, career orientation) are located in the Rectorate.

Academic community of University of Montenegro is aware of the importance of its functioning for further development of the state and wider region. It has been so far, and will be in the future, the leader in processes of social and cultural changes, along with the economic development.

In the aspect of attaining its mission, University of Montenegro is oriented towards the priority social needs of the time in which it accomplishes its mission; open for all the students and staff exclusively based on their knowledge and abilities; dedicated to preservation of multicultural and multi-ethnic society in Montenegro; entrepreneurial in stimulating social and economic application of supreme achievements within the scope of its activities.

In 2015/16 there were a total of 1.192 employees at UoM, 845 of which were engaged in teaching. In the same year there were 20.236 students registered at all three cycles of studies.

Internationalization is high on the agenda of UoM priorities, thus it has participated in a number of international projects – over 50 projects funded under the Tempus programme, over 15 Erasmus Mundus Action 2 projects for student mobility, a number of projects under FP7 funding scheme or IPA supported projects, Erasmus + capacity building and International credit mobility projects and other.

For more information about University of Montenegro, please visit our website www.ucg.ac.me or send e-mail to pr.centar@ac.me.

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Montenegrin Journal
of Sports Science
and Medicine

CALL FOR CONTRIBUTIONS

Montenegrin Journal of Sports Science and Medicine (MJSSM) is a print (ISSN 1800-8755) and electronic scientific journal (eISSN 1800-8763) aims to present easy access to the scientific knowledge for sport-conscious individuals using contemporary methods. The purpose is to minimize the problems like the delays in publishing process of the articles or to acquire previous issues by drawing advantage from electronic medium. Hence, it provides:
- Open-access and freely accessible online;
- Fast publication time;
- Peer review by expert, practicing researchers;
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MJSSM is published biannually, in September and March of each year. MJSSM publishes original scientific papers, review papers, editorials, short reports, peer review - fair review, as well as invited papers and award papers in the fields of Sports Science and Medicine, as well as it can function as an open discussion forum on significant issues of current interest.

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

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

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UNIVERZITET CRNE GORE
FAKULTET ZA POMORSTVO – KOTOR

UNIVERSITY OF MONTENEGRO
MARITIME FACULTY - KOTOR

In addition to maritime education in navigation and marine engineering, University of Montenegro - Maritime Faculty in Kotor also provides additional training for professional seafarers in:
- Different IMO model courses
- DP - Dynamic positioning courses
- Offshore courses

From 2015 runs the newly established joint training center with partners from NTNU - Aallesund in Norway, being one of the most experienced and most successful in providing offshore and DP training courses worldwide. The up-to-date bridge simulator, accompanied by AB simulations and instructor station, enables the organization of all the courses held as in the Norwegian training centers, with the same team of instructors and certificates. So far, a series of courses have been organized related to the operation of complex offshore equipment and team work in these demanding operations, both for students and international crews. In addition, the Kotor/Aalesund training center has recently been awarded with the Nautical Institute accreditation for holding DP (Induction and Simulator) trainings and so far has successfully launched several groups of DP operators.

OSC offshore simulator at Maritime Faculty Kotor, Montenegro

UNIVERZITET CRNE GORE
PRAVNI FAKULTET – PODGORICA

Faculty of Law was founded on October 27th, 1972 in Podgorica as a scientific and artistic educational institution, in which educational and research work was organized in the area of law and similar social studies. While making into law the establishment of this institution, Assembly of Socialistic Republic of Montenegro highlighted that "The establishment of this institution of high education is necessary for meeting overall demands of the society of the Republic". Faculty of Law is one of the founding fathers of the University of Montenegro.

During the forty-five years of its existence Faculty of Law grew to a modern, contemporary, scientific and artistic educational institution. Forty-five generations studied at the faculty. About 17.000 students enrolled at the faculty and 4285 students graduated from the faculty. About 15 percent of the students studied abroad. Part of the best students continued postgraduate and doctoral studies at prominent university centers. Most of the former students stayed in Montenegro due to family ties. 88 professors and associates worked at the faculty, out of whom there were 26 guest professors. Today most of the professors and cadre at the faculty are former students.

Faculty organizes graduate and postgraduate studies. There are teaching and cadre resources for organizing specialist and doctoral studies in all the areas of law.

As a university branch Faculty of Law realizes a big number of its planned aims and tasks and finds soulutions for many important questions of cadre organization, technical and material problems. With the help of the University of Montenegro, faculty largely develops the international coorporation net.

Faculty follows world trends and achievements in the area of high education with the aim to coordinate its work with European and world demands. This year faculty made the first steps in realization of Bologna declaration. There is enough cadre for all the necessary teaching at the faculty.

The faculty was founnded because of expression of need to reach the neccessary standard for socio-economic, political, cultural and social development of Montenegro. During its overall existence faculty shared the fate with Montenegrin society. It will continue to do so by making steps towards implementing new practises and creating new relations, with the help of implementatation of modern European trends .

The faculty is a complex organization and managing institution nowadays.

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