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THE DUAL CAREER OF STUDENT-ATHLETES IN FOOTBALL: GUIDELINES FOR EDUCATIONAL INTERVENTION

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ABSTRACT. By drawing on primary scholarly literature on the dual career in sport, this article aims to identify the key features and problems concerning the development and implementation of programs promoting school and university education for young footballers. The paper highlights the importance of bridging the gap between professional sport and learning in young footballers by promoting dissemination actions within dual-career programs. To implement these actions, the authors have investigated and examined by comparative, historical, and hermeneutical methodology the role that team manager may play to support programs that, in the context of Italian legislation and regulations, encourage the development of specific skills in young footballers. These skills deal mainly with coping with transitions affecting athlete-students and student-athletes' sports experience and post-career years. The paper will conclude with a list of educational principles to be developed as practical actions to implement dual-career programs for young footballers attending high school or university.

Keywords*: dual-career, football, education, team manager*

1. Introduction

All main changes that mark the sporting experience of an athlete, such as, for instance, joining a new division, level, club, role, or suffering any injury, can take on a critical connotation, especially in the post-career of athletes. According to some authors, such criticality is to be found in the poor integration between the formal educational system and the sports one (Ibex, 2000; Bellantonio, 2016).

This highlights the importance for the educational system to design, develop and support dual-career programs aiming to provide guidance, advice, and educational models to help athletes develop skills needed to meet the

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challenges they face in their everyday life. These problems emerging in the transition phases of athletes' sports careers, and their lives are mutually dependent. They concern academic, educational, and family life (Stambulova, 2012; Wylleman, Rosier, De Knop, 2016; Wylleman, De Knop, Ewing, Cummings, 2000; Wylleman, Lavallee & Alfermann, 1999).

The sporting experience requires a sincere dedication by the athlete, who tends to focus their interest and efforts on building a strong personal identity (Bellantonio, 2016). This could be a risk for the balanced development of their personality (Maulini, 2018). One-dimensional identity development does not allow the athlete to face unexpected events, such it could be an accident, the inability to participate in high-level competitions, or the expected experience of the inevitable end of the sports career. This event usually causes a real upheaval in the athlete, and the need for reconstructing the personal self, the relations with others and the world around them. The process of identity reconstruction is only possible if the person has had the opportunity to explore and cultivate other dimensions of their life, and to experience the personal self in different roles by harmonically developing its potential. This implies having acquired skills that make the person able to cope with the shocks of life and to trigger, therefore, resilience processes.

In 2012, the European Union, by publishing the Guidelines on recommendations for policy actions in support of athletes' education (EC, 2012), urged governments, sports bodies, education, and labor market institutions to implement policies to promote actions to develop the dual-career of athletes. This call is in line with the objectives of the Europe 2020 Strategy for Growth (EC, 2010), and for the prevention of early school leaving and the strengthening of employment opportunities for workers.

The same text highlights the need to build relations between the sports system, the training sector, and the labor market, to open paths to ensure the balance between sports training and employment. Recently, the law of 13 July 2015 no. 107 has identified, among the priority educational objectives for schools, the protection of the right to study for students engaged in competitive sports (art. 1, paragraph 7).

Moreover, the Decree no. 935 of the Minister of Education, University and Research of 11 December 2015, promoted initiatives to innovative teaching and learning projects for the three school years 2015-2018, «intending to identify actions addressed to providing educational support to educational institutions that have pupils engaged in competitive sports activities».

By signing the Memorandum of Understanding between MIUR and CONI (Italian National Olympic Committee) on 28 November 2016, the parties agreed, in line with the most recent European guidelines, to undertake joint

actions to recognize the value of sport through the testing of innovative teaching methods and experiences.

The most recent Ministerial Decree no. 279 of 10 April 2018 has confirmed the need for innovative teaching in the next five school years. This training – is said in the document – must be supported by the usage of digital technologies addressed to high-level student-athletes, which have been identified upon specific criteria. The criteria have been established in agreement with the Italian National Olympic Committee (CONI) and the Italian Paralympic Committee (CIP). They regard students enrolled in secondary education institutions of second-degree level in all the country.

The objective is to implement and support the schools in planning practical actions aimed at concretely promoting the right to study and the educational success of students engaged in high-level competitive sports. These projects open the way to agreements between schools and sports clubs to safeguard the growth of young athletes and promote the balance between sports training and education.

Also, in recent years, Italian Universities have put into place support programs for students playing the sports at the highest level (ASAG-Unicatt, 2017; Sánchez Pato, Isidori, Calderón, Brunton, 2017; Lupo et al. 2015; Guidotti, Cortis, Capranica, 2015; Migliorati, Maulini, Isidori, 2018a). The support actions aimed at this target group of students are part of the commitment by Italian universities to fight against the high rate of abandonment. This relegates Italy to the lowest places among European countries for the number of graduates in the youth population (ISTAT, 2018). Within this context of dropping out, athletes who decide to undertake a university course are more at risk than others or so-called worker-students, because of the complexity that characterizes their profession.

Coupling traditional study (in-presence lessons, classroom work, and a planned schedule of examinations) with the needs concerning competitive sports (training, competitions, sports training sessions, medical tests) requires a mental and physical commitment by the athlete. This commitment is often faced without athletes being able to count on stable relationships with fellow students developed and maintained constant only through attendance (Isidori, 2016).

Most professional and high-level athletes have difficulty in entering the job market after their sports career because of the lack of specific skills.

Sporting organizations and clubs should promote training in a way that enables athletes to retrain their professional careers, which are generally of short duration.

Usually, the student-athlete has developed leadership skills thanks to their sports experience. These skills can be the starting point for the development

of new skills, which academic studies could help to increase. In this regard, some studies (Wylleman, Lavallee, 2004) have underlined the importance of enhancing the value embodied by the student-athlete as a whole overcoming the fragmentation of identity, the briefness, and the alternation of phases that characterizes professional development.

The results of some studies on athletes' education at the university have underlined the relevance of guidance and tutoring as crucial elements to promote the dual career of student-athletes. These studies have also stressed the importance of offering them the opportunity of experiences capable of combining sport and education, career and life (ASAG-Unicatt, 2017; Sánchez Pato, Isidori, Calderón, Brunton, 2017; Lupo et al., 2015; Guidotti, Cortis, Capranica, 2015; Migliorati, Maulini, Isidori, 2018a).

Being this the scenario of the dual career of student-athletes in Italy, in light of the need for implementing actions to support and guide them in schools and universities, this work will analyze the guidelines more effective to develop educational interventions useful to help the training of student-athletes playing football at the high level.

2. The case of football

In Italy, Football is not only a sport but also a cultural phenomenon with an incidence of about 25% of the total members, in the amateur and youth sector, of the 45 sports federations affiliated to CONI (Report Calcio, 2018).

The number of players working in the youth division is 838,430; affiliated male football players aged between 5 and 16 years old represent 20% of the Italian population. In 2016/2017, 1,044,505 players were counted, affiliated to 12,693 clubs, while the total number of teams amounted to 82,616. Activities in the youth and school divisions account for 64.5% of registered players and 82.8% of the number of teams. FIGC (Federazione Italiana Giuoco Calcio, in English: Italian Football Federation) registered members amount to almost 1.4 million (of which 78% are players); an amount that has increased in the last eight seasons. The increase in managers (+12%), technical staff (+1.5%), and registered personnel in the youth and school divisions (+12%) was offset by the decrease in players involved in professional and amateur activities (-3.5%). More importantly, only 6.4% of players between 15 and 21 years old who were members of professional clubs in 2007-2008 were still active in Italian professional football in 2016-2017. This highlights the difficulty for a football player to move from the youth division to the first team one. Moreover, when this happens, it emerges the difficulty to remain in this division for a long time (Ibid.).

The conference organized by AIC (Italian Association of Players) in Udine on October 30, 2017, entitled "Extra time-traumatic and psychological aspects of post-career" (Ghiretti, AIC, 2015) highlighted the difficulties of the post-career for footballers. Problems confirmed by the research "End of the first half, Analysis of players' post-career," conducted by Aic Onlus, which found a discrepancy between players' expectations for their post-career and the possibilities that the environment offers.

Our study has extracted by data mining, confronted, and summed up the results of three surveys using different methodologies. The first survey, entitled "What happened to them" (Ibidem), has analyzed the post-career path of 2,611 professional players included in the first team roster of the 128 professional clubs of Italian Division A (18 teams), Division B (20 teams), Division C1 (36 teams) and Division C2 (54 teams) of the 1992-93 football season. The survey has revealed that 44.1% of active players imagine their future only in professional football. Moreover, the same study has shown that 61.4% of former professional footballers of 1992/93 season, even having the qualification of "professional footballer" for working as a coach, sports director, football agent, athletic trainer and health care professional, did not operate at any level in the football labor market in the 2014/2015 season. Moreover, only 10% of them have worked at a professional level consistently in the last three football seasons.

The second survey, entitled "What am I going to do when I grow up?" (Ibidem) was carried out by analyzing the questionnaires of 499 professional players in the 2014-2015 season, with an average age of 25.5 years. The research shows that 69.8% of them have declared to have a high school diploma, while 3.8% say to have earned a bachelor's degree. This is a higher result than that of the previous research (Ibidem), which reported 48.1% of players having a middle school certificate, and 48.1% of them have earned a secondary one. This result is more in line with the average of the Italian population, according to which just over 75% of young people usually earn a higher education degree (Istat, 2015).

Of the 499 professional players, 51.8% said they had already begun to think about a future post-career. Specifically, 46.3% of Division A and 44.8% of Division B players said they were thinking about the end of their career as well as 58.2% of Lega Pro. This shows how the opinion of footballers is influenced by the category to which they belong. If only 16.9% of Division A players are worried about their future, the percentage rises to 22.1% in Division B and 43.9% in Lega Pro. Compared to a post-football career, the higher the number of players thinking about their future only in football, the higher the category: from 43% of Lega Pro to 45.9% of Division B and 46.3% of Division A.

A worrying fact is that 55.1% of those who are convinced that, in the future, they will be engaged in football have not thought of any alternative. An encouraging fact is, however, the interest in training: 83.5% of the players surveyed and as many as 85% of those who imagine a post-career only football, consider career guidance courses useful. This result is hugely positive as it calls for new training courses to be designed and planned with a view to retraining former athletes for their relocation outside the football labor market.

The third survey we have used for our review study has analyzed the stories of footballers after the end of their careers (Ghiretti, 2015). It has highlighted, through the voices of players who have been able to reinvent themselves in work activities far removed from football, how this sport develops communication and management skills and competencies along with a social capital that can be transferred to other areas of human development and work.

In light of this analysis, it is necessary to question the future of thousands of young people who begin to play football at a high level and are imagining a future as champions that will not always become true. Indeed, the majority of them will have to develop competencies to rethink their future and take alternative paths by cultivating education and lifelong learning.

3. Education and training of athletes in European and national football regulations

The data presented leads to an inevitable analysis of the educational role played by football clubs in young people's education. Also, this leads to a reflection on the actions that ought to be taken to promote dual career paths, i.e., the possibility for athletes to finalize a high-level sports course, in combination with training or professional tracks (EC, 2012).

Regarding the education of young football players, UEFA (Union of European Football Associations), has fixed specific criteria and requirements for the granting of the license. These criteria focus on the importance of education and on the duty (of the license applicant sports club and society) to promote and support the education of young players, guaranteeing them the possibility of completing compulsory schooling and continuing their studies (FIGC-UEFA, 2018, p.21). Among the documents necessary for the granting of the license, the UEFA manual indicates the statement certifying the commitment of the license applicant to promote and support the education of young players» (Ibidem, p.21).

The relevance of education is reported and identified among the tasks of the coach of youth Division. He/she is responsible for «the promotion of

educational programs aimed at encouraging the completion of school education and the gradual integration into the world of work of young players» (p.39).

The National Licensing System of Lega Italiana Calcio (Italian Football League), among the requirements for Italian football clubs to obtain a license to participate in A, B and C Divisions championships for the year 2019/2020, indicates «the commitment to promote and support the education of young players» (FIGC, 2019a,b,c).

The documents mentioned above, therefore, reaffirm the importance of education and integration into the world of work of young players. However, as emerged from the results of Ghiretti's research (2015), they show concern for their future, and most of them do not operate in the world of football in the post-career despite the achievement of specific qualifications.

4. The dual career in football

The UEFA Licensing System and the National Licensing System, as described above, require that sports clubs encourage young players to complete compulsory education and gradually enter the labor market.

To make clubs do not merely fulfill their obligations by carrying out the administrative acts necessary for enrolment in school, they should promote «the idea of dual careers in contracts and codes of conduct for coaches and other members of the team. National sports organizations and international federations [...] should include the concept of dual careers in their training programs [...] as part of a lifelong learning strategy». (EC, 2012a p.14-15). The implementation and dissemination of interventions aimed at accompanying athletes in their education and training should also include individualized orientation actions and monitoring systems of these latter ones.

5. Strategies to be implemented for an effective dual-career in football

The pedagogical premise of any educational intervention in sport is to develop all dimensions of athletes' lives. In this sense, sports clubs should structure spaces, times, and put into place processes to build learning opportunities by aiming not only at the overall training of the person but also encouraging athletes to transfer and develop the skills acquired through the sports in other contexts.

To this end, the sports clubs should provide themselves with a staff of experts in the pedagogical field of guidance and training. These can accompany and monitor the young player in choosing their trucks, be they academic or

professional. The figures who will be part of the staff may be freelancers or «employees of a sports organization, institution or a private body and must be competent and qualified to work with high-level athletes» (Ibidem, p. 14). An important role, in this perspective, could be played by the team manager.

6. The educational role of the team manager

The team manager could play a key role not only in designing and implementing these courses but also in coordinating the pedagogical staff within the football club. As indicated in UEFA Manual (FIGC-UEFA, 2018), the main tasks of the team manager include «managing relations and contractual relations between clubs and players or technical staff; conducting negotiations with other sports clubs, which concern the transfer of players and the stipulation of contracts; supervising the activities of observers; supervising sporting activities of the teams» (p. 35).

About the latter function, it is clear that the team manager is responsible for coordinating the coaches themselves. According to the UEFA manual, coaches are required to «promote educational programs aimed at encouraging the completion of school education and the gradual integration of young footballers into the job market» (Ibid., p. 39). The implementation of these programs must necessarily be shared and built by a collaboration between coaches and the team managers. Therefore, the latter ones play a fundamental educational role. They have the responsibility to promote, within the sports club, the educational process within the lifelong learning framework of athletes.

The team manager has relevant educational responsibilities, especially in football, which on the one hand, is considered a sport with high educational potential, but on the other hand, risks generating expectations that far exceed reality. This makes it essential for the team manager to acquire all the skills necessary to enhance their educational and training functions. This requires the inclusion in the training courses for team managers promoted by the Federal Technical Centre of Coverciano (Florence) of spaces for reflection and the practice of instructional design to improve critical and reflective thinking in football players.

These actions ought to be reinforced through the constant dialogue between educational agencies and sports clubs in a way that students-athletes or athletes-students can perceive the educational aspect of their training as an integral part of their development and the school/training/university institution as the context in which to give space to their human and professional growth (Migliorati, Maulini, Isidori, 2018b).

The following sections present the objectives and main actions needed to implement an effective dual-career intervention in football.

7. Designing dual-career interventions in football

The analysis of the scenario we have conducted till now shows how schools and Universities are trying to respond to the educational and training needs of high-level athletes. At the same time, it shows that there are indications in the regulations regarding the education and training of young players.

Taking for granted the acceptance and development of these indications, these are the general and specific objectives and actions that sports clubs should adapt to their context to plan dual-career interventions.

1) Promoting networking between the different actors acting within the life contexts of the athletes by:

- raising and taking awareness among the agencies (training agents, sports clubs and families) of the need to support student-athletes through specific training courses;
- building and fostering the dialogue aimed at sharing objectives and actions with the other agencies involved in the development of the dual-career of the student-athlete or athlete-student.

2) Guiding and accompanying athletes in their training in the sporting context by:

- building personalized and flexible accompanying paths through support figures with counseling and tutoring skills;
- collaborating with educational and academic institutions to foster the development of skills and the achievement of specific learning objectives;
- implementing digital technologies and organizational strategies to accommodate and support the educational experiences that are spreading in schools and universities. This with the view of overcoming the critical issues of the training of student-athletes and athlete-students.

3) Developing in sports agents (coaches, athletic trainers, managers, and further) the educational skills necessary for the implementation of dual career paths by:

- raising awareness of the value of sport as a human practice and of the educational responsibility that comes with it;
- implementing practices that allow their pedagogical function to be acted upon;
- favoring the development of intercultural competencies to facilitate the process of inclusion of foreign athletes.

4) Making families of student-athletes aware of their function of linking agents between sport, school, and life by:

- encouraging an active collaboration of youngest students-athletes' families with schools and sports clubs in order to implement all actions regarding the dual career.

In order to achieve the objectives outlined above, the team manager should be responsible for the following actions:

- to raise awareness and promote awareness within the sports clubs of the educational value of specific training courses for student-athletes;
- to propose the establishment of experts' staff in pedagogy within the club (tutors, counselors, and people specialized in guidance and training), in order to plan dual-career actions;
- to propose training interventions aimed at the acquisition and expansion of educational skills of the sports club's community;
- to analyze the context and plan activities;
- to work in collaboration with educational agencies and the family;
- to establish partnerships with schools, universities and training institutions through the signing of agreements and agreements;
- to ensure adequate space within the sports club for the implementation of learning activities (multimedia study, meeting, and plenary meeting rooms, and so on);
- to coordinate and monitor the actions implemented by the pedagogical staff within the sports club;
- to promote measures to enhance and publicize the dual-career programs.

Moreover, the educational staff, coordinated by the team manager, will be called:

- to map training opportunities in order to guide the choice of players;
- to develop and implement a dual career training models shared with sports club agents (coaches, athletic trainers) and families;
- to design training courses for the club's sports agents;
- to schedule dual career program information meetings for student-athletes and their families;
- to conduct interviews and orientation counseling activities with student-athletes to accompany them in the choice of the school and university track or professional training;
- to build along with the student-athlete or athlete-student a personalized dual-career project;
- to identify a sports tutor to support the athlete in their way of study

and practice in collaboration with the tutors of the education context (university or school tutor);
- to schedule meetings to coordinate actions with educational agencies (university or school tutors) and the family;
- to build and implement tools for monitoring the intervention (interviews, focus groups, questionnaires).

The implementation of this project hypothesis requires attention and care by sports clubs. That is to say, on the one hand, attention and care for the education of athlete-students. On the other hand, awareness of the relevance of sport for society.

8. Conclusion

This study has highlighted the need for implementing effective dual-career programs in football for athletes. These programs should promote the development of all footballers as persons, be they professional or post-career athletes.

The data presented in the previous paragraphs show considerable participation in football, which calls for a strong sense of responsibility on the part of sports clubs. The data reveals concern on the part of footballers for their future, which is growing in the lower-level divisions. In addition to this, there is a positive fact, namely the interest of players in training.

As explained above, the UEFA Licensing System and the National Licensing System invite sports clubs to promote education and the gradual integration of players into the labor market. The educational, school, and academic fields are experimenting with new teaching methods to facilitate the reconciliation of study and sport. The actions implemented regard projects with high-level student-athletes attending Italian secondary schools (D.M. 279 of 2018) and universities (ASAG-Unicatt, 2017; Sánchez Pato, Isidori, Calderón, Brunton, 2017; Lupo et al. 2015; Guidotti, Cortis, Capranica, 2015; Migliorati, Maulini, Isidori, 2018a).

It would be desirable for the football community to be ready to rethink its regulations in light of the provisions of the Guidelines by EC, 2012, by developing specific interventions to promote the dual career of footballers and providing monitoring actions for lifelong learning of football players.

In parallel with the educational and training agencies, the sports clubs should also work to promote the general preparation of the athlete and implement dual career programs in collaboration with the school, the university, and the labor market. They should start a new reorganization of the timescales, spaces, and human resources to be committed to their implementation.

In conclusion, this study proposes a methodological hypothesis aimed at supporting the football players in their learning and education experiences by stressing the role of the team manager as the promoter, within his own club, of dual-career interventions, being they responsible for the educational growth of young players and their future both as athletes and persons. The team manager has to ensure that the club is not for young people a "factory of illusions" but an educational space in which to develop all their potential harmoniously. This is the determining element for the construction of a full and satisfying life for the athletes.

The proposed hypothesis is part of the educational policies of the European Union, and it aims to implement what the Guidelines on the dual career of athletes continuously wishes (EC, 2012), namely the promotion of actions aimed at the exchange and dissemination of good practices.

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"VACCINATION" BY STRESS IN PHYSICAL PREPARATION OF PROFESSIONAL SOLDIERS

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ABSTRACT. ***Introduction.*** This article deals with the issue of the use of "vaccination" techniques using stress in the physical training of professional soldiers. In the practice of a military professional, exposure to stressors is a common phenomenon, so it is important in the physical training of professionals to include in exercise programs training means to increase adaptation to stress. ***Results.*** The professional article contains a description of the issue of the influence of stressors on the performance of professional soldiers, adaptation, response to stress and proposals for individual training methods to increase stress tolerance.

Keywords: *stress, adaptation, professional soldier, physical preparation.*

Introduction

A professional soldier must engage in many physically and mentally demanding activities in the battlefield. The speed with which these activities can be performed can affect the combat effectiveness and survival of soldiers. Therefore, it is important to create training programs that will be able, within the time, space and material constraints of the army, to prepare soldiers for combat missions. Based on these requirements, a comprehensive exercise program of physical training of professional soldiers was created. This program was scientifically verified and according to Markovič (2018a) 74 tested professional soldiers showed significant improvements in all tested disciplines at 1% level of statistical significance ($p \leq 0.01$) and was also proven to be more effective compared to the current physical training system (Markovič, 2018b; Markovič, 2019). An important part of this comprehensive exercise program of physical training of professional soldiers are also exercises that increase the adaptation of soldiers against the effects of stress, which we will describe in more detail in this professional article.

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Stress

Security forces are exposed to stress and fatigue not only during the exercise of their profession, but also in everyday life. Our lives are very variable and during them we encounter a number of situations that require constant adaptation. Once our adaptive abilities stop increasing or there are many problems in our lives, they grow into emotions that quickly turn into stress (Blahutková et al., 2010). Stress according to Černý (2006) can be expressed by the following equation:

STRESS = STRESSOR + STRESS RESPONSE
STRESS = reaction of the organism to a negative life event
STRESOR = stimulus that triggers a stress response,
STRESS RESPONSE = a reaction in which the subjective ability to control decreases.

Selye (1976) described as stressors everything that has certain requirements for us and our organism and to which we have to adapt. It is therefore common or extraordinary situations and events of our lives that unbalance our organism, whether they are negative or positive. Stressors are usually divided into physical and mental, sometimes also social. Classification of stressors in the military environment, according to the US Army Manual FM 8-51 (1994):

Psychic stressor - this is information given to the brain, without direct action on the body. This information can burden both the utilitarian and cognitive systems, as well as the emotional systems of the brain, or both. Thus, psychological stressors are further divided into two types - cognitive and emotional.

Physical stressor - has a direct, potentially harmful effect on the body. These can be, for example, environmental conditions or the internal physical / physiological needs of the human body required or tolerated. Physical stressors are also further divided into two categories - physiological stressors and stressors from the external environment.

Macrostressors - thermal extremes, atmospheric influences, gravitational influences, lack of sleep, lack of rest, starvation, thirst, lack of stimuli (sensory deprivation), reduction of social contact (social deprivation), etc.

Microspressors - humiliation of a person in interpersonal contact (devaluation), destructive criticism, impossibility to agree with someone, get along with him in good times, reduction of social space, its compaction, etc. This is approached by an inadequate ability to cope with stress, lack of social recognition, lower self-esteem, limited social contact, poor skills in social contact.

Stress factors in soldiers

According to Driskell and Salas, (2009), during II. World War the biggest stressors for soldiers were excessive noise, smoke, earthquakes, debris and rubble. In the field of military, in the professional literature (Driskell, Salas 2009) we can meet with the term, Combat stress. It is actually a reaction of the organism to a combat situation - the so-called fatigue from the fight. This stress is created by a combination of several stressors such as: danger, hanger, environmental factors (noise, heat, cold), stamping and insulation, fatigue, sufficient sleep, uncertainty, insufficient control, time pressure.

Development of stress adaptations

Stress response

Kunimatsu and Marsee (2012) describe reactions to stress so that when it comes to a violent or potentially violent encounter, we have several reaction options: escape, avoidance, subordination, collapse, struggle, "freezing" and collapse. Avoiding, subordinate attitude and collapse are learned types of behavior, but they are not always appropriate for tackling social violence. Escape, fighting, and "freezing" are physiological reactions that can occur when we respond to or perceive danger. Physiological responses to danger begin in the hypothalamus, which activates the sympathetic nervous system and the adrenal cortex, from which the stress hormones adrenaline (epinephrine) and noradrenaline (norepinephrine) are released. These hormones can have many effects on the body, including increased heart rate, tunnel vision, absence of hearing, time distortion, memory loss, and loss of fine motor skills (Suresh et al., 2014).

According to Pendas (2014), there are many ways to work to make you resistant to exaggerated reactions to stress:

"Anti-freezing" - basically this means that when you have to do an awkward task (get out of bed, cold shower, etc.), do not hesitate and do it immediately and vigorously. It is also important to get used to unpleasant stimuli. One way to do this is, for example, to take a cold shower, fast, exercise, or participate in activities completely outside of your comfort zone (Miller, 2011).

Visualization - you play a "what if" game inside. Create a scenario of a stressful situation and visualize how you would react in a real situation. It is important to note that when using visualization, it is necessary to visualize

success and be as realistic as possible with details (Pendasa, 2014). Physiological responses to danger begin in the hypothalamus, which activates the sympathetic nervous system and the adrenal cortex, from which the stress hormones adrenaline (epinephrine) and noradrenaline (norepinephrine) are released. These hormones can have many effects on the body, including increased heart rate, tunnel vision, absence of hearing, time distortion, memory loss, and loss of fine motor skills (Suresh et al., 2014).

Stress "vaccination" - Just as a vaccine contains a certain amount of virus, stress inoculation must contain a certain amount of the same type of stress that you want to be vaccinated. The dashed line in Figure 1 is where the stress vaccination comes from. By participating in stress inoculation training, we can condition our mind and body to move the limits of our optimal performance from the red state (145 pulses / min) to the gray state (145-175 pulses / min). This basically means that when we are confronted with a high stress situation, we can avoid the effects of releasing hormones during the gray state. Stress vaccination must be carried out in such a way that it is effective. The best way to work on stress vaccinations is to mimic the type of stress you are preparing for. Physiological responses to danger begin in the hypothalamus, which activates the sympathetic nervous system and the adrenal cortex, from which the stress hormones adrenaline (epinephrine) and noradrenaline (norepinephrine) are released. These hormones can have many effects on the body (Suresh et al., 2014).

Grossman (2008) describes 5 conditions that a fighter can experience in combat. Each condition occurs within a specific heart rate range and is associated with predictable changes in performance. During the fight, it is important to know what state you are working in. Only then can you deliberately begin to control your physiological responses and perform your tasks. The 5 physiological readiness conditions according to Grossman (2008) provide a spectrum from the quiescent state of white through the almost non-functional state of black. Increased heart rate due to fear or stress is physiologically different from exercise-induced changes, although they may be increased in the presence of increased activity. When the heart rate reaches a certain limit, the chambers of the heart that receive deoxygenated blood are unable to fill completely and heart rate begins to decline. When you exercise, your blood vessels usually dilate, allowing more blood to flow to your muscles and certain organs. During life-threatening stress reactions, blood vessels narrow, which increases blood pressure and depletes many muscles of oxygen.

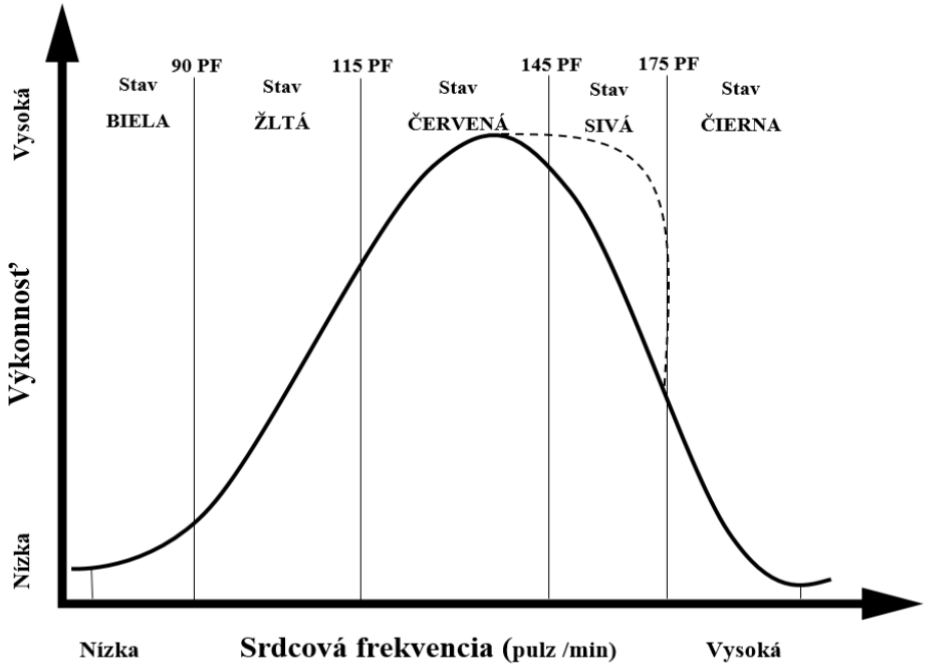

Fig. 1. Grossman (2008) model of the effect of stress "vaccination" on stress performance

Grossman (2008) recommends that soldiers achieve and maintain a red state during combat situations due to the best reaction times and mechanisms needed to survive. For a professional fighter pilot, the red condition is already a disadvantage, because rough motor skills prevail at the expense of fine motor skills. For fighter pilots, the yellow condition is much more suitable, where fine motor skills are preserved. As the heart rate rises from 115 -145 pulses / min, the aircraft's fine control begins to fade rapidly and the pilot's ability to make simple entries into its aeronautical, radar and combat technologies degrades. During periods of extreme stress, the body's sensory and cognitive abilities may not behave the same way you are used to. If you enter a state of red, gray, and finally black, your body devotes more and more of its limited resources to the most established mechanism of survival. Below are some of the most commonly described examples of what happens when you get gray and black: attenuated sounds (hearing impairments), intensified sounds, tunnel vision, increased visual clarity, temporary paralysis, memory loss for some or all events / actions, memory distortions, and more.

Stav	Pulzová frekvencia (pulz/min)	Reakcia
Biela	60 80	Normálny pokojový stav
Žltá	90 115	Psychologický pripravený na boj Jemné motorické zručnosti sa zhoršujú
Červená	120 145	Stav optimálného prežitia bojovníka Prevládajú hrubé motorické zručnosti na úkor jemných motorických zručností Doba vizuálnej reakcie a doba kognitívnej reakcie sú najvyššie
Sivá	150 175	Prechodná fáza medzi stavom Červená a Čierna, ktorá môže byť upravená s tréningom, Zhoršené kognitívne vnímanie, strata periferného videnia (tunelové videnie), krátkodobej pamäte, HÍbky a dočasná strata sluchu
Čierna	175 a viac	Katastrofická porucha duševného a fyzického výkonu. Boj / útek / zamrznutie

Fig. 2. Stress performance model (adapted from Grossman, 2008)

The strategy for improving combat performance under stress is the technique of tactical breathing. Tactical breathing is a technique for controlling your reaction (fight, escape, „freezing“) to stress. The only two autonomous nervous system responses you can control are respiratory rate and blinking. By training tactical breathing, we try to intentionally slow down the heart rate caused by stress. Tactical breathing technique according to Grossman (2008):

- 4 seconds slow inhale
- 4 seconds breath holding in breath
- 4 seconds slow exhalation
- 4 seconds holding your breath in the exhalation
- repeat the technique 4 times.

Conclusion

The requirement of the armed forces is to effectively and efficiently prepare and train a professional soldier to perform combat tasks during his deployment in real combat conditions as soon as possible. In the field of physical training and special physical training, the requirements are mainly placed on increasing physical performance and the correct performance of individual exercise techniques under the influence of various stressors. In order to meet the conditions for the correct and successful execution of a combat task, it is important to have automated certain selected movement patterns and to be adapted to high stress loads. Therefore, we decided to incorporate into the comprehensive movement program for professional

soldiers stress exercises, which are performed simultaneously with the training of movement techniques (athletic, combat, climbing, swimming and skiing), which the soldier needs to handle demanding combat tasks. Figure 3 shows the informative part of the program and the application of stress-inducing exercises. The intensity of action of these stressors gradually increases in two-week mesocycles.

KOMPLEXNÝ POHYBOVÝ PROGRAM - 1-2 týždeň			
MIESTO VYKONÁVANIA: telocvičňa, rovný spevnený povrch, trávnik, lesný povrch, blato, piesok, štrk, sneh, voda.			
MATERIÁLNE ZAŤAŽENIE: športový odev a obuv, vojenský odev a obuv, batoh s rôznou hmotnosťou, prilba, nosný modulárny systém s balistickou ochranou.			
PODMIENKY VYKONÁVANIA: vhodné poveternostné podmienky, vysoké teploty, mrholenie, dážď, mráz, vietor, sneženie.			
VYSTAVENIE PÔSOBENIU STRESOROV: zadržiavanie dychu, nedostatok osvetlenia, tma, hluk, nedostatok času, bolesť			
Interval 20s + 10s	**Popis**	**PONDELOK, STREDA, PIATOK v čase od 5:40 do 6:00**	
30	apnoe v nádychu do 20s, ventilácia od 10s	očná gymnastika - pohyby očí do tvaru +	Marković (2019) Imitačné cvičenia v telesnej príprave
1		atletická abeceda - nízka chôdza na mieste	
1:30		atletická abeceda - stredná chôdza na mieste	
2		atletická abeceda - vysoká chôdza na mieste	
2:30		atletická abeceda - zakopávanie na mieste	
3		atletická abeceda - predkopávanie na mieste	
3:30		imitácia lezenia - unožovanie skrčmo na mieste	
4		imitácia lezenia - unožovanie skrčmo na mieste	
4:30		imitácia plávania - pomalý pohyb dolnej končatiny pri voľnom štýle	
5		imitácia plávania - pomalý pohyb dolnej končatiny pri štýle prsia	
5:30		imitácia behu na lyžiach - lyžiarský krok na mieste (stoj na ľavej nohe)	
6		imitácia behu na lyžiach - lyžiarský krok na mieste (stoj na pravej nohe)	
6:30		imitácie boja zblízka - kop kolenom	
7		imitácie boja zblízka -priamy kop pretláčací	
7:30		imitácie boja zblízka - priamy kop švihový	
8		imitácie boja zblízka - bočný kop	
8:30	údery otvorenou dlaňou na (30s)	oblasť brušných svalov	
9		oblasť sedadcích svalov	
9:30		oblasť vonkašia a vnutorná strana stehien	
10		oblasť predkolenia	
pôsobenie hladu (pred cvičením nebudú probandi prijímať žiadnu potravu), **pôsobenie chladu a trenia** (trenie celého tela studeným mokrým uterákom), **pôsobenie časového stresu** (cvičenie v časovom intervale a cvičenie v skorých ranných hodinách), **pôsobenie hypoxie** (apnoe tréning), **pôsobenie bolestivými podnetmi** (údery otvorenou dlaňou)			

Fig. 3. Comprehensive exercise program: 1-2 weeks - Part 1 - the effects of stressors

The use of stress "vaccination" techniques significantly streamlines the training of special physical training (close combat, military-practical swimming and climbing, accelerated movements, obstacle courses) and helps to combat readiness of professional soldiers to perform challenging tasks. We recommend that stress "vaccination" techniques and exercises be included in training and education for police, fire and rescue services, as well as professional athletes, taking into account the particular specifics of stressors working in the given profession or sport.

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THE CONTRIBUTION OF SPORT TO ECONOMIC AND SOCIAL DEVELOPMENT

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ABSTRACT. In contemporary social life, both ordinary people and political and cultural personalities value sport as a phenomenon with special functions in the development of the individual and through its socio-economic implications. Through its economic-financial implications such as the ever-flourishing industry of sports equipment and technology, huge amounts of money, accumulated and handled by clubs and sportsmen, advertisements, legal implications concerning national and international regulations, political implication in relationship with competition between countries, national pride, cultural implications including media, spectators, fanaticism, health implications in correlation with the obsession with the healthy body and others, it can be said that today sport is a major social phenomenon. This is valid for the developed countries, but also for the developing countries even if the agreement of opinions is not so high in this regard. In our paper we analyze the social and economic dimensions of the sport and of how it came to influence sustainable development today, as well as a presentation of the gains generated by some of the most important sporting events over time.

Keywords: *sport events, sport practices, economic effects, social dimension, economic growth.*

REZUMAT. ***Contribuţia sportului la dezvoltarea economică şi socială***. În prezent, atât pentru oamenii simplii cât şi pentru personalităţile politice şi culturale, sportul este un fenomen cu caracteristici specifice care contribuie nu doar la dezvoltarea individuală, dar are şi implicaţii economice şi sociale. Prin implicaţiile sale economice şi sociale care au în vedere industriile şi tehnologiile de echipament sportiv, implicaţiile legale manifestate prin reglementările naţionale şi internaţionale, implicaţiile politice care vizează competiţiile între ţări şi mândria naţională, implicaţiile culturale care fac referire la mass-media, spectatori şi chiar fanatism, implicaţiile pentru sănătate care vizează un corp sănătos şi altele putem să afirmăm că sportul este un fenomen social major. Acest lucru este valabil atât pentru ţările dezvoltate cât şi pentru ţările în curs de dezvoltare chiar dacă există

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divergențe de opinie în acest sens. În lucrarea de față analizăm dimensiunile economice și sociale ale sportului, și felul în care sportul contribuie la dezvoltarea durabilă, precum și o prezentare a câștigurilor generate de cele mai importante evenimente sportive.

Cuvinte cheie: *evenimente sportive, practici sportive, efecte economice, dimensiune socială, creștere economică.*

Introduction

People practice sports and physical activities for a variety of reasons, including pleasure, to improve their physical condition and health and to a sense of well-being. Promoting sport to help people achieve these goals is important in itself, but there are other reasons to encourage sport and physical activity in addition to immediate personal benefits.

Sport is considered a real institution with specific rules and internal operating mechanisms. Sport has positive values, if we talk about sports as physical activities for recreational purposes, or used as therapeutic means. Things are starting to get a different connotation when we talk about performance sports, which, according to many specialists, have become a product, which is intended to be sold as profitably as possible. In a modern economy, sport contributes directly to economic activity, it can be used as a vehicle for generating a wider range of economic activities and social actions, while being a powerful motivating factor for various individuals and groups. In short, sport and physical activity can have major economic and social effects, especially at local or regional level.

Nowadays, both internationally and nationally, the importance of the harmonious development of the society based on the use of the principles of the innovative economy increases, thus increasing the role of the social factors of the economic growth (Sitnikov and Bocean, 2013). In this sense, sports activities have a great significance and a great social potential. Sport and physical education are important for the social-political life of the country, and by the fact that they can contribute to the consolidation of the economic potential.

Literature review

The social dimension of sport

Starting from the premise that socialization is the process by which people acquire skills, attitudes, values and behaviors that make them able to

participate as members of the society in which they live, through its educational and cultural dimensions, sport is recognized as a strong socializing factor.

Sport offers unique opportunities to meet other people, to communicate, to assume different roles, to acquire moral attitudes such as fair play, tolerance, respect and to live emotions different from other spheres of life and so on. Through its forms of practice (sports for all, performance sports and adapted sports - for people with special needs), sport helps to socialize children, by learning different roles in games, the elderly re-establish contact with the social world, young people value their performances in the competitive social framework, and people with special needs manage to exceed their limits. Due to its flexibility, sport is an appropriate form of social development, being applicable in cultural, political and economic diversities of different countries.

A facet of socializing through sport is its character of spectacle that gathers around it a large number of spectators and viewers from all over the globe. The spectator's connection with his team or with the sportsman, shows that the sport triggers psychological reactions, experiences and special behaviors, going so far as to identify with the athletes in the arena. We mention the ability of sport to provoke positive social behaviors, to prevent and reduce antisocial attitudes among young people.

Sport has as its basic feature the competition with a predominantly competition character, but also a formative character, present both in performance sport and in sport for all (Barbu et al., 2019). The functions of the sport are complex, acting on the athlete, answering the need for movement of young people everywhere. Moreover, the correspondence between the practice of physical education and sport, in its various forms and the effect, their impact, spreads throughout the social life, bringing the structural continuity of the entire training and educational system.

In the field of physical education and sport there are objectives with physiological functions, others with instructive-educational functions and last but not least, objectives with social functions. If we combine the functions, the profession, the education, the relaxation, the entertainment, the hygiene, the self-reliance, we reach the interpersonal relationships that are so important in the development of the youth.

A healthy society cannot be built without understanding the role of physical education in the evolution of children towards maturity. How could children be better educated to follow the rules, if they were not initiated in compliance with the rules of play? The mentality of a winner must be created from childhood and can be found throughout life in all areas of activity. The desire for self-sufficiency, a necessary condition for the progress of society, can be developed especially through sport, leading to the development of the individual's personality.

The one regarding the sport and the physical education under their fundamental aspect, as human activities endowed with a social function and that contribute to the formation and the development of the personality, is immediately tempted to ask what relation can exist between these activities and the culture.

This is because both sport and culture contribute to the enrichment of human heritage: firstly by the intelligent and deliberate development of our body, secondly, by a patient search that constantly follows the field of our intelligence and sensitivity.

First of all, sport and culture were born from the same source, which is called free time. There is no culture and no sport without this time that the work leaves the man and with whom he can do what he wants. Sport can express all feelings, all human emotions, just as culture and cultural spectacle - especially dance and theatre, the most complete arts - express feelings and emotions in the actor and, through sympathy, in the spectator.

Through sports, competitive or recreational activities, by spending leisure time in a pleasant, organized, beneficial for health, one can satisfy the need for movement, but also the desire to watch sports competitions as spectators, which makes the sport phenomenon it becomes a social phenomenon.

The economic and financial dimension of sport

Sport is defined as a factor with major impact on economic growth and the creation of new jobs. Sport is a tool for local and regional development, urban regeneration or rural development. The sport benefits from synergies with the sectors: tourism, financial, infrastructure, based on partnerships that can be concluded with other sectors of activity that lead to the creation of new sports bases (Stroe and Barbu, 2006).

Sport is often closely linked to the private business sector, which is normally geared towards short-term profit, which is at odds with conservation. In areas with potential and demand for sport, planning and monitoring can provide strong support for the sustainable development of communities based on sport and physical education.

At the same time, from a cost point of view, the (professional) performance sport often exceeds the amateur sport. From the economic activity point of view, professional sport offers for consumers and entertainment services, and the spectators obtain psychological satisfaction from the consumption of these services and, therefore, they are ready to pay for it. At the same time, the higher the quality of the services provided (which is expressed in the prestige of the competition), the higher the price.

Sport is an important economic enterprise that can bring benefits in other areas of society, based on competent management (Constantinescu, 2008).

Generally speaking, sport aims on the one hand services, infrastructure, material goods and on the other hand, the commercialization of the phenomenon on three levels:

- the transformation of some sporting events, clubs and sportsmen, into value brands;
- increasing the importance of sport as a source of profit for the business environment through sponsorships, marketing rights, broadcasting rights;
- development of sports-related businesses - sports equipment, materials and sports facilities.

The present active commercialization of the sport, forced its transformation, into one of the most intensely developed types of business. This fact facilitates a new visualization of sports activities through the intensification of research in the field of sports organizations management (Florea et al., 2018). All over the world, the increased social-political significance of the physical culture and sport, condition the active participation of the state in the economic-financial support of sports organizations (Apostu et al., 2010).

As society develops, physical activity and sport, increasingly, penetrate into all spheres of human life, becoming one of the most significant and integral parts of the vital activity of world civilization (Barbu, 2009).

Currently, millions of people live a healthy lifestyle in all countries of the world, whose component is practicing physical activity and improving health, participating in sports competitions. In the last decades, with gigantic rhythms, the sport of performance has developed, gradually becoming a real industry of spectacular sporting events.

A society that practices physical culture and sport, inevitably, will have prosperous citizens in other areas, such as: education, health, science, etc., and, on the contrary, in a society where the practice of sport is not emphasized and caring for the physical condition of the nation, we will also have a moral degradation: drug addiction, alcoholism, culture and education will decline, moral values, conscience and pride for his people will not be as important. Consequently, the inferiority complex of the nation will be intensely developed. Therefore, the physical health of the nation is an extremely important element for the economic and political state of society, it is an essential component, which underlies the conception of the world and ideological positions, the determining priority of human behavior.

The commercialization has determined at global level, a change in the attitude of some governments towards the sporting field, this not only

perceived as a mere consumer of the public subsidies, but as a productive sector of the industry and the economy in general.

Another general trend is the different ratio of athletes to the field, in the sense of increasing professionalism in an increasing number of disciplines and of the number of nations that grant financial rewards for the performances obtained at the major international competitions. The problem that arises in certain European countries is related to the balanced orientation of the financing of the sport for all and the performance sport (Profiroiu and Popescu, 2003).

Although elite sport can generate profit for potential investors, it can only develop if there is a broad base of talented athletes who can improve their potential and gain experience in the lower competitions. As a result, investment in performance sport can only be ensured after the base of children and juniors is created - a potential source of values.

In recent years, the sports sector in Europe has undergone many changes that have influenced the field of resource management, employment and/or technological evolution. Given that in the European space, sports activities have diversified / multiplied against the background of globalization, the labor force involved in this sector has increased by almost 60% in the last 10 years; however, there is a tendency to employ averaged qualified personnel in the field, while for highly qualified occupations (coach, psychologist, sports doctor, physiotherapist, etc.), there is a high level of competition, including at the level of management positions, IT and customer service.

At European level, on the one hand, there is a higher involvement of some less active traditional population categories and on the other, a change in the way subjects participate in sports activities, in the sense that they are inclined to play individual sports and less team sports. This fact is explained by the decrease of the leisure time budget of the active population, which makes it difficult to synchronize the activities of several people. As a result, from an economic point of view, sports service providers have to design flexible programs to meet these changes, in the form of multiplication of fitness centers, personal trainers and programs that can be practiced at home.

An increasingly significant part of the economic value of sport is related to intellectual property rights (copyrights, trademarks, image and its dissemination, etc.) In careful analysis, especially in the regional/local context, there are contradictions between the costs of some sports activities and limited access of certain categories of population, as beneficiaries.

Although sport has an important share in the economy, the vast majority of sporting activities take place within non-profit structures, many depending on the public support, in order to favor the access of all citizens to sport, the so called sport for all.

Certainly sport generates economic values by creating jobs (organization, maintenance, construction, etc.) on the one hand, and, on the other hand, through the effects/benefits it has on health and, finally, capacity, work of citizens (Turcu, 2008).

At the same time, we confirm that sport and physical culture strongly influence the quality of human capital, the structure of consumption and demand, consumer behavior, external economic relations, tourism and other indicators of the economic system.

Thus, sport as a special type of business is specific to a number of characteristics, such as: as a commodity, sport can provide a valuable show, where performance athletes are trained, different components of sports infrastructure, sports attribute, etc.; a high degree of unpredictability of sports results and, therefore, risks associated with an investment in sports; longer duration of the "life cycle" of the sports infrastructure, athletes and coaches, which can be used as an object in which to invest for sale and profit.

It is known that in order to obtain a professional in the field of sport it is necessary to invest in its development at least 5-7 years, a large volume of capital - financial, material and labor costs invested in sports; the need to maintain an extensive infrastructure to ensure the practice of physical culture and sport: sports equipment, special means of transport, etc.

These and many other factors contribute to a significant participation in the sporting activity of state and public organizations, that is, the state-private partnership. Although it is believed that a large number of sports activities must be provided at the expense of the state, however, at present, in this regard, there is the problem of the efficient use of the budgetary funds allocated for sports.

Therefore, the economic role of physical culture and sport is pronounced in several main directions. First of all, sports health improvement practices contribute to minimizing economic losses in almost all areas of the company's vital activity and are an alternative to vices, which, have a powerful destructive effect on the economic system (Turcu, 2009).

Secondly, physical activity is an important factor in increasing the life expectancy of the population and has a positive effect on increasing the working age of people. Thirdly, physical culture and sport are some of the main components of high quality workforce training and, therefore, it is the factor of ensuring economic growth (Şomăcescu et al., 2016). Fourth, physical activity, sport and sport-events tourism are, at present, important sphere of extensive entrepreneurial activities, which ensure, on the one hand - the employment of many people in the sectors of the sports industry and the tourist complex, and on the other part - the mentioned sectors complete the budget from the tax receipts, which allows the state to effectively solve the social problems of the population.

The economic influence of major sporting events

The economic component of physical education and sport is divided in two, taking into account the economic activity at the macroeconomic and microeconomic level. Macroeconomics reveals general trends in the development of physical culture and sport, develops measures for the state regulation of economic relations in the sports field. At the microeconomic level, the emphasis is placed on the analysis of the economic behavior of certain entities in the field of physical culture and sport.

Thus, at both levels, physical education and sport aim to carry out the following tasks:

- accumulation and systematization of economic knowledge in the field of physical culture and sport;
- generating new knowledge and research in the field of physical activity and sports economics;
- identifying the economic problems arising in the process of developing economic relations in the field of physical and sports culture, as well as determining certain ways to solve them;
- determining the trends of economic processes development in sports activities inside and outside the country, forecasting their direction and dynamics;
- elaboration of practical recommendations for increasing the efficiency of economic relations in the field of physical culture and sport.

In terms of global sports market revenue, statistics show that the North American sports market is the largest in the world, with revenues of over $ 50 billion of US dollars from major sports leagues - NFL, MLB, NBA and NHL. The NFL, for example, generates nearly $ 9 billion in revenue each year, while the NBA around $ 3.7 billion.

In comparison, the European football market is estimated at 28.4 billion euros in the season 2017-2018, according to a Deloitte report. More than half of this revenue is generated by the so-called big five leagues. The term refers to football in the first leagues in England (Premier League), Germany (Bundesliga), Spain (Primera Division), Italy (Serie A) and France (Ligue 1).

Assessing the economic impact of mega-events requires further consideration. Mega-events (for example, the World Cup, Olympics, European Championship, Champions league, Euro league) attract many thousands of visitors to a city. The visitors generally bring “new” money to the area, rather than just relocate spending within an area. To the extent that the visitors stay for longer periods of time and spend higher amount per day, mega-events may benefit a local economy. From a broader (for example, country) perspective,

however, there remains considerable expenditure switching, as tourism money generated by a popular event in one country often comes at the expense of expenditures in other countries (Mules and Faulkner, 1996).

The World Cup in Russia had excellent figures. It was the most watched final tournament in history, and social media played a very important role here. The only major minus was the sponsors. At the 2018 edition, partner companies contributed $ 1.45 billion, down from 2014, when revenues were $ 1.62 billion.

However, FIFA has managed to attract record receipts from TV rights. Revenues amounted to over $ 3 billion. The World Cup in Russia was broadcast on 210 countries on various platforms. FOX US has paid $ 425 million to watch the matches from the 2018 and CM 2022. Telemundo has paid 600 million euros to broadcast the matches in the Spanish-speaking countries. Also, the rights to India, Pakistan and Nepal were sold for $ 90 million.

Gratton and his colleagues have studied and analyzed the economic impact of major sports events in the United Kingdom (UK). Authors have provided a detailed overview of ten economic impact studies undertaken at major sports events, all World or European Championships, in the UK since 1997.

Those 10 events were: 1997 World Badminton Championships, 1997 European Junior Boxing Championships, 1997 European Junior Swimming Championships, 1998 European Short Course Swimming Championships, 1999 European Show Jumping Championships, 1999 World Judo Championships, 1999 World Indoor Climbing Championships, 2001 World Amateur Boxing Championships, 2001 World Half Marathon Championships and 2002 World Snooker Championship.

The authors' analysis was based on using a standard questionnaire survey to interview key interest groups at an event and the data collected was then analyzed using a specialist statistical software package and spreadsheets to calculate the additional expenditure in the host economy. Results showed that the most significant economic impact is attributable to the 2002 World Snooker Championship (2.27 million of pounds) closely followed by the 1997 World Badminton Championships (2.22 million of pounds). Both these events took place over a two week period and this extended period for the events did lead to higher economic impact (Gratton et al., 2006).

FIBA EuroBasket 2015 was the 39th annual edition of the EuroBasket championship that is organized by FIBA Europe. It took place in four different countries: Croatia, France, Germany, and Latvia.

According to the sources of income analysis, it was concluded that the measure as a whole Latvian economy has brought more than 15.3 million, which is a direct complement to national budgets, with more than 2.2 million Euro

VAT revenue. Based on the results it is concluded that the following events in addition to sports, country image and the development of tourism, also provide significant economic benefits to the organizing state (Kehris et al., 2015).

After the Sydney Olympics hundreds of people were provided with employment in the Olympic village which functioned as a suburban area with shops, offices, entertainment facilities, fitness centers. This was the first suburbs in the world which was operated with solar power and after the Olympics as many as 5000 people were provided with homes here. The buildings having functioned as hospitals during the Olympics were reused as schools, kindergartens, leisure centers. The 2008 Football European Championship contributed to generating employment of nearly 6000 people in Austria, 7500 people in Switzerland, 13400 people altogether. The Football World Championship in South-Africa and its preparations between 2005 and 2010 created 415,000 workplaces in the country which struggles with a 24.3 % unemployment rate.

In December, 2005 Price Waterhouse Coopers published a report claiming that three quarters of the economic effects of the Olympics on the GDP would be realized in London considering the whole period of 2005-2016, meaning that only one quarters would fall on the outside London territories of the UK. In contract, the results show a different impact. The national impacts are much more extensive than that of in London. The GDP increasing effect of the Olympics has already appeared, the investments had been done. The achievements in connection with tourist arrivals are significant. The income, the addition value of which is related to the Olympics, can be estimated as much as 762 million GBP (Denes, 2012).

Today's sports market size is experiencing strong growth, having developed into a full-blown worldwide industry in the past decades, with unprecedented levels of revenue and more industry players than ever. The market is divided into four main segments: gate receipts (ticket sales for live sporting events), sponsorship, media rights and merchandising.

Conclusions

Sport directly generates economic activities, be it large football clubs or local sports clubs and gyms. The sports activities require human contribution and, therefore, are quite effective in generating jobs locally, both within the actual sports activities, as well as for the construction and maintenance works of the sports bases. In short, sport is an important factor in increasing employment. As an essential element of the experience economy, sport is effective in attracting talents and encouraging new and innovative forms of experience, from new types of sports to new methods of measuring performance and

monitoring activities. Sports events and activities can have a direct and powerful impact on local economies, also offering great marketing and promotion opportunities - from specific products to foreign investments. Sport has multiple links to other economic activities, especially tourism, and can be a significant element of a broader development strategy. Sport and physical activities can both improve mental agility and physical condition, and both can have direct effects on productivity and professional insertion capacity, thus contributing to active aging and good health. Sport is effective in motivating people and promoting welfare and social cohesion. Sport is especially beneficial in creating relationships with social groups that face exclusion and developing basic but transferable skills, as well as in increasing the capacity for professional insertion. An intense physical activity can lead to a reduction in the use of carbon dioxide-generating means of transport and generate other environmental beneficial effects.

All authors of this paper contributed equally to the research.

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INFLUENCE OF PARENT PROFESSION IN CHOOSING CHILDREN'S SPORTS

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ABSTRACT. The present study was meant to be a part of a more complex investigation on the perceptions, opinions and beliefs of today's Romanian children on sport. The data were collected using methods like the direct observation, the spontaneous and directional conversation and the standardized questionnaires. Based on the results, tennis seems to be preferred as a sport for their children by parents with an intellectual profession, while football is preferred mostly by workers.

Keywords: *children, sport, profession, parents, tennis.*

REZUMAT. ***Influența profesiei părinților în alegerea sportului copiilor*****.** Studiul de față a fost menit să facă parte dintr-o investigație mai complexă cu privire la percepțiile, opiniile și credințele copiilor români de azi cu privire la sport. Datele au fost colectate folosind metode precum observația directă, conversația spontană și direcțională și chestionarele standardizate. Pe baza rezultatelor, tenisul pare să fie preferat ca sport pentru copiii lor de părinții care au o profesie intelectuală, în timp ce fotbalul este preferat mai ales de lucrători.

Cuvinte cheie: *copii, sport, profesie, părinți, tenis*

Introduction

Answering why the social classes and the socio-professional categories practice sports in different amounts of time and especially why they differ regarding the type of sports activities the get involved into, sociologists often call on the famous French sociologist P. Bourdieu, and in particular his famous work, "La distinction" (1979). He argues that the positioning of social groups (and implicitly of their members) in the social space is made according to two main dimensions: economic capital (material-financial possibilities) and cultural-

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symbolic capital (schooling, value system, social representations). At the individual and subjective level, these dimensions are internalized in the form of habits, dispositions and habits of manifesting in a certain way, distinctly, in different sectors of social life. Orientation to the future or to the past, optimism or pessimism, are determined by the perceived social trajectory, the way in which the groups manage to reproduce the properties of the ancestors and the way they feel able to pass on these properties to their descendants. The economic, cultural capital and habits also operate in the field of sport. Not by chance, says P. Bourdieu, in France tennis is practiced only by 1.5% of workers and 15.5% by senior managers (1979, p. 238).

To a large extent, in the view of the French sociologist quoted, playing a sport is an issue of accessibility (economic cost, first and foremost). But as R. Thomas (2002) points out, nothing is less costly than jogging, and it is practiced to a lesser extent by the lower classes and more by individuals at the top of the social hierarchy. Other arguments are in favor of the thesis that the explanation regarding the differences between social classes in sports practice is complex. For example, it could also account for the difference in size by socio-professional categories. According to statistics from the 70's France, in this country the average height for men was as follows (in cm): agricultural employees - 167.5, farmers - 169, workers - 170, employees - 171, average level employees - 172.5, upper level employees - 173 (cf. Thomas, 2002)

It is well known that certain sports require a higher height, such as basketball and even tennis. Several studies, including some on monozygotic twins, have shown that there is a genetic predisposition to certain types of sports, both in practice and in vision (Baron & Byrne, 2000). Let us also not forget that sport, with its anti-establishment function, is not practiced too much by farmers and workers, because the physical movement is part of their work and life. It seems quite clear that no single factor can account for the social configuration of sports practice. It depends on some conditions and factors, which are intertwined, the influence of some cancelling each other, of others adding up, which makes the sports board look different at country level. Even among young people, the differences are striking.

A Eurobarometer made in 1990 by the Council of Europe indicates the following figures regarding those who practice at least one sport, in the population aged 15-20: 56% in Denmark, 45% in Luxembourg, 35% in Ireland, 59% in The Netherlands, 34% in the United Kingdom, 34% in Germany, 26% in France, 21% in Italy, 16% in Greece, 11% in Portugal, 13% in Spain. Although the general tendency is to increase sports activities worldwide, these figures do not seem to have changed radically in the last 10 years (Thomas, 2002). The traditions of a country or of societal classes, blankets and

professions, more broadly, the general lifestyle, also guide the practice of sports activities, and the option for some of them. On the other hand, it is necessary to keep in mind that the process of globalization, migration, tourism, mass-media makes the boundaries of lifestyle between peoples and the social segments within them no longer so rigid. Based on field research on sports in 6 cities in France, finding the intersection of multiple socio-demographic criteria (age, gender, occupation, etc.), S. Juan (1991) asks rhetorically, about the cultural capital assumed by P. Bourdieu, if social classes still represent a homogeneous cultural reality?

Materials and methods

The direct observation, spontaneous and guided conversations with parents and the standardized questionnaire were the specific methods of this study. As a qualitative-general methodological principle, we used the so-called grounded theory (Iluț, 1997; Băban, 2002; Chelcea, 2004). M. Agabrian in his work "The qualitative research of the socio-human" (2004), quoting Strauss and Corbin (1990) shows that it represents "a qualitative research method derived in an inductive manner, using a systematic set of procedures...".

Although, without fulfilling all the requirements of a qualitative research of this kind, the principle of emergent theory was applied. The investigation was based on the observation "from the inside". As a tennis coach, we drew on a comparison between the profession of parents who guide their children towards tennis and those who guide them towards football. We could see this because both the tennis and football lessons took place in the same sports ground. Supporting the idea that tennis is an elite sport, and football more popular, I made a list of the professions of parents whose children were enrolled in the "Ivansuc" Football School and those who were in the "Ciprian Porumb" Tennis School.

Results

Table 1. The situation regarding the occupations of the parents and the performance sport practiced by their children

Sport Type Parental occupation	**Tennis**	**Football**	**Total**
Elite, intellectual occupations	20 *41.7%*	—	20 *23.0%*
Other intellectual occupations	27 *56.3%*	8 *20.5%*	35 *40.2%*

Sport Type Parental occupation	Tennis	Football	Total
Average employee	1	8	9
	2.1%	*20.5%*	*10.3%*
Working class	—	23	23
		59.0%	*26.4%*
Total	48	39	87
	100%	*100%*	*100%*

p: 0,000000000001237<10; df = 3; χ^2=58,453

Discussion

Before proceeding to interpret this completely significant difference, two important observations are appropriate: 1) By "elite intellectual occupation" I have designated the parents with an university degree in architecture, law, medicine, university professors, and the business owners entered the "Another intellectual category"; 2) It is known that the calculation of significance coefficients (χ^2) makes sense if the samples are probabilistically chosen. However, in the literature they are used even if these samples are not strictly probabilistic. In our case, however, we only observed those who practice football (at the "Ivansuc" school) and those who play tennis (at "Ciprian Porumb" school). The justification for calculating differences and significance would be that the two groups are representative of what is called "contrasting sampling" (Radu, 1994), very close to "theoretical sampling" in qualitative research (Agabrian, 2004). But we add that based on direct observations and discussions with other coaches, the situation is largely the same throughout the country.

This situation refers to the fact that wealthy parents (as schooling and earnings) guide their children towards tennis, while the more modest ones as school and socio-economic status, towards football. From the conversations with the parents, coaches and other factors involved, as well as on the basis of the specialized literature (Bourdieu, 1978; Defrance, 2000; Thomas, 2002), it follows that the explanation consists mainly of the material possibilities and the mentality (values, attitudes, habits): for tennis, much more money is spent on lessons, court booking, equipment, participation in tournaments than for football. Then, the elitist parents as a scholar and economic-social status do not want to expose their children to a more brutal and risky game such as football, but to a more "noble" one, without such disadvantages.

Regarding the investments that parents make in their children when it comes to becoming performance athletes, especially tennis players, we have found in the literature more indirect references to this issue (Thomas, 2002;

Defrance, 2000; Gasparini, 2000), but even more direct, in the work "From Parent to Child" (1995), written by J. Behrman, R. Pollak and P. Taubman. It is true that this book, entitled "Intrahousehold Allocations and Intergenerational Relations in the United States", mainly analyses the investments that parents make in their school careers, but also examines other types of allowances, including leisure and of sport. Moreover, one of the basic conclusions of the authors, drawn from meticulous statistical processing of the collected data, is that the school success itself and later success in life is also due to the investments that parents make in non-school activities, including the practice of sports, is a considerable one. Probably, as the authors suggest, engaging in systematic sports activities means, on the one hand, the functioning of the "healthy mind in the healthy body" principle, and on the other, protecting children from involvement in delinquent acts, harmful both individually and socially.

In the empirical research I found, based on conversations with parents and direct observation, that they spend significant amounts for their children to learn tennis, in the hope that they will become performers. Thus, until the age of 11, while not playing tournaments abroad, the average amount would be around 120-130 euros per month (counting here, payment of lessons, court booking, equipment and travel within the country). From the age of 12, those who have good results and participate in international tournaments, require expenses of 12-15 thousand euros per year.

Tied to the material investments, and in close determination with them, the parents also invest in an aspirational manner in their children. Naturally, parents want that their children assert themselves in tennis, become champions, be stars and make money, have a higher quality of life. What is important to note here, however, is that these desires and aspirations are quite realistic. It was clear from the immediate observations, from the conversations with parents, children and coaches, that the strategy adopted regarding the future was to combine the intense training in becoming a tennis player with the good school performance, or the idea that in the effort to obtain the best results in tennis, the school should not be neglected. This also results from a standard questionnaire applied to parents and children. Although respondents are few in both the case of the parents and the children, the consensually in answers to some questions is an argument in favor of the above conclusion. Thus, to the question "What will you encourage the child?", More than 70% of parents answer "to dedicate to tennis but also to school" and 29% opt for the "depends on how it evolves" variant, which in essence, is not in competition with the former. When asked "What do you want by playing this sport?" addressed to the children, they answer almost 80% "to become a champion", but to the question "Do you want to dedicate more to tennis or school", more than 60% of them choose the "both" option, while 33% respond "only to tennis".

Conclusions

Therefore, even though in the children's vision the emphasis is placed more on tennis than on school, both the players and their parents are agreeing with the idea that the two activities should be combined. An interesting problem to study would be how "parents" and children "negotiate" the enrolment both in the demands of the school and in those of a good preparation in tennis. Also, it would be profitable to look at the similar situation, in the case of the parents who guided their children towards football. However, it is necessary to observe that when we are talking about children up to the age of 11, in the vast majority, dropping out of school is somewhat out of the question, but this is likely to happen if we think about high school and higher education.

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THE PREVALENCE OF CLIMBING ACTIVITIES IN 11-15 YEARS OLD CHILDREN FROM ROMANIA. A CROSS SECTIONAL PILOT STUDY

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A**BSTRACT.** ***Introduction*****:** Climbing consists in raising or moving the body using the arms or the arms and legs from a suspension or a holding position...climbing with the arms and legs recruits the muscles of the entire body, in particular the core and upper limbs. ***Objectives:*** Our primary goal is to find out how often the subjects from Romania are engaged in climbing activities and what the most popular types of climbing are. ***Methods:*** Throughout the school period of March 4, 2019 to March 11, 2019, 83 (46 boys with a mean age of 12.84±1.24, and 37 girls with a mean age of 12.83±1. 23) children were examined. 68.7% of the children were urban residents and 31.3% were rural residents. ***Results*****:** On a weekly basis, 14.5% of respondents experience some form of climbing. The 64% of respondents say that their school gym has equipment (rope, rod, ribbed wall) that is suitable for practicing climbing. 89.2% of respondents have been climbing a forest adventure park at least once. However, 30% of these have been at least 5 times and another 35% 3-4 times in an adventure park. ***Discussion:*** Climbing is a movement skill that needs to be taught. Its teaching is prescribed in current and older Romanian school curricula. The teaching of its simpler forms in almost every school could be possible by a physical educator or teacher. It would be important to teach and practice as it has many benefits for children, as studies have shown. ***Conclusion:*** The interviewed children have already tried several types of climbing, among which tree climbing dominates. Of the climbs which use safety equipment, indoor and obstacle course climbs are more common.

Keywords*: climbing, obstacle climbing, ropes challenge course, physical activity.*

REZUMAT. ***Prevalența activităților de cățărare la copii de 11-15 ani din România: un studiu pilot transversal. Introducere:*** cățărarea constă în ridicarea și deplasarea corpului folosind doar brațele sau simultan membrele inferioare și superioare dintr-o poziție suspendată. În cățărare sunt angrenați toți mușchii corpului, mai ales ai brațelor și ai trunchiului. ***Obiective:*** obiectivul

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principal al acestui studiu este de a afla cât de frecvent sunt implicați subiecții din România în activități de cățărare și care sunt cele mai populare tipuri de cățărare. ***Metode:*** în perioada 4 martie 2019 - 11 martie 2019, au fost examinați 83 de copii (46 de băieți cu o vârstă medie de 12,84 ± 1,24 ani și 37 de fete cu o vârstă medie de 12,83 ± 1,23 ani). 68,7% dintre copii erau din mediul urban și 31,3% din mediul rural. ***Rezultate:*** 14.5% dintre copii practică cu frecvență săptămânală cel puțin o formă a cățărării. 64% dintre ei au răspuns că sala lor de sport este dotată cu diferite echipamente pentru practicarea cățărării (frânghie, bară, spalier). 89.2% dintre copii au fost deja într-un parc de aventură forestier. ***Discuții:*** cățărarea este o deprindere motrică care trebuie învățată. Predarea acesteia a fost și este prevăzută în programele școlare actuale și cele vechi. Învățarea formelor simple ale cățărârii ar putea fi posibilă de către un profesor de educație fizică sau de învățătoarele claselor primare. Practicarea acesteia ar fi importantă, deoarece are numeroase beneficii fizice pentru practicanți, așa cum au arătat unele studii. ***Concluzii:*** copiii intervievați au încercat deja mai multe tipuri de cățărare, printre care domină cățărarea pe copaci. Dintre acele tipuri care folosesc echipamente de siguranță sunt mai frecvente cățărările la sală și cele pe obstacole în parcuri de aventură.

Cuvinte cheie: *cățărare, cățărare pe obstacole, parc de aventură forestier, activitate fizică.*

Introduction

Climbing is a basic movement activity of the humans, which can be started to learn at the age of 3-4 (Davis, 2017). Some types of climbs may be as old as humanity. It's hard to imagine how living outdoors could have happened without climbing. In our developing world, for many of us, climbing is present in our daily lives as a sport or recreational activity, and less as an essential tool of subsistence. Although in some jobs (mountain rescue, firefighting, certain types of construction, sports, etc.), even daily exercise is required. Climbing is a motor skill that we learn throughout life. Because there are many types of climbing (Wikipedia, 2018), everyone can find the appropriate type for themselves, depending on their age, readiness and strength. The most common surfaces on which we can climb are solid, stable surfaces, such as a rocks, trees, in- or outdoor climbing wall, or even a rope. In contrast, on ropes courses, we encounter a different form of climbing, namely obstacle climbing. In many cases, obstacle climbing occurs on unstable surfaces, which are not always vertical surfaces, they are hanging objects and this position makes climbing more difficult. (Balla & Boros-Balint, 2019)

According to Herbert (1912, p.58), "Climbing consists in raising or moving the body using the arms or the arms and legs from a suspension or a holding position... climbing with the arms and legs recruits the muscles of the entire body, in particular the core and upper limbs." The Collins English Dictionary (2012) defines climbing as a physical activity as follows: "to ascend, go up, or get to the top of, especially by the use of the hands and feet or feet alone or by continuous or strenuous effort".

Climbing could be considered as a difficult physical activity, because the energy demand can exceed 10 MET, which can mean 660-820 kcal/h energy demand. Watts et al., (1999) studied the energy expenditure of rock climbers in a variety of settings, with average energy expenditure values for outdoor climbers recorded at ~10–11 kcal/min of climbing. During training and competition, energy expenditure can vary depending on the type and difficulty of climbing (Dickson, Fryer, Blackwell, Draper, & Stoner, 2012). Numerous studies have been published on the physical effects of different types of climbing, but we will not begin to describe them now.

In a 2017 study by Siegel & Fryer, we can find some data regarding the frequency of climbing in children and adults. In fact, it is very difficult to get an exact number of how many people are currently climbing regularly. Rockwerx, the leading manufacturer of climbing walls in North America estimates that „approximately 5 million persons younger than 18 years of age climb in rock gyms in the United States." The number of climbing gyms in the UK have also jumped in the last 1-2 decades, with more than 350 public gyms registered in 2015 (British Mountaineering Council, n.d.). In France, there are many more rooms than this, numbering more than 2,200 (Siegel & Fryer, 2017). In Romania, compared to these numbers, the number of indoor climbing gyms is negligible. According to the summary of the Climb in Romania website, the number of climbing halls is estimated at 28-30 (Săli de escaladă în România, 2018). According to them, there are still plenty of big cities in Romania where there is no possibility of indoor climbing at all.

A 2017 survey in the UK found that 4.8 per cent of regular physical active people choose to climb and hike. This ratio does not tell us too much at first, but the study also shows that the number of climbers almost reaches the number of those who are practicing football (5.0%) (McQuaid). Also in the United States, the trend shows that more and more people are starting to engage in climbing activities year after year (Kuelthau, n.d.). Lock (2020) found that in 2018, 9.84 million people participated in climbing activities. Just to show the upward trend, in 2006 that number was 6.31 million. This represents an increase of almost 56%.

Objectives

Our primary goal is to find out how often the subjects from Romania are engaged in climbing activities and what the most popular types of climbing are. Secondly, we would like to find out where they have the opportunity to climb.

Methods

Our study follows a cross-sectional descriptive study design. The measurement was performed by a self-constructed questionnaire which contained 19 questions. The items of the questionnaire were grouped around four limited subjects, which are the following: A) knowledge about climbing; B) the frequency of climbing in the last year C) places for climbing activity and D) the importance of physical activities.

Throughout the school period of March 4, 2019 to March 11, 2019, 83 (46 boys with a mean age of 12.84±1.24, and 37 girls with a mean age of 12.83±1. 23) children were examined. 68.7% of the children were urban residents and 31.3% were rural residents.

Statistical analysis and data processing

In our research, we used descriptive statistical analyzes (frequency and mean calculation), and the chi-square test for independence was used to discover if there is a relationship between categorical variables. We used the SPSS v.20 software to analyze the data.

Results

We placed a list of 14 types of climbing in front of the children (including: tree, rock, rope, indoor, outdoor, obstacle climbing, etc.) and asked them to indicate what types of climbing have they practiced in the past year. Most climbed trees (86.7%), more than half of the respondents (60.2%) climbed ropes, almost a quarter tried indoor climbing (20.5%), and almost a tenth (9.8%) tried rock climbing, and bouldering, which was included in the Olympic Games 2020, is just showing up (2.4%).

Figure 1 shows how often respondents did climbing activities in the past year. On a weekly basis, 14.5% of respondents experience some form of climbing. Another interesting result is that approx. one in ten children has never climbed (not even a tree) in the past one year.

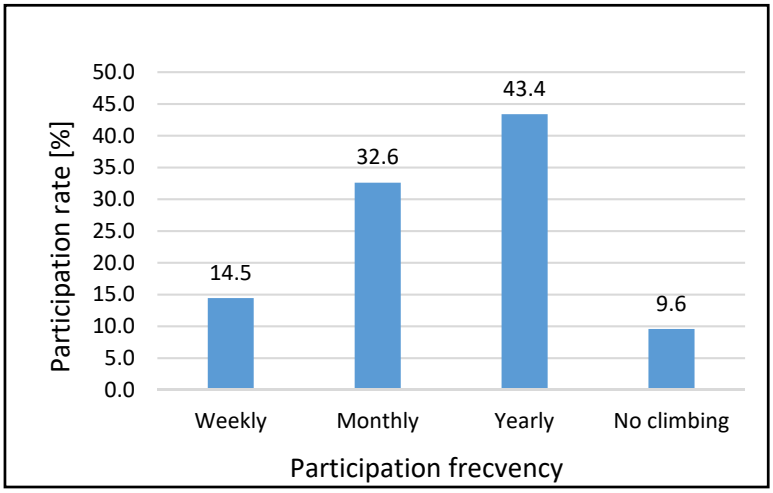

Fig. 1. The participation rate and frequency in climbing activities

The 64% of respondents say that their school gym has equipment (rope, rod, ribbed wall) that is suitable for practicing climbing. However, we consider that all schools should be equipped properly to offer the possibility of climbing. Although climbing is possible in 2/3 of the gyms, we found that only 13.3% of the respondents practice it frequently and 25.2% rarely. See Figure 2.

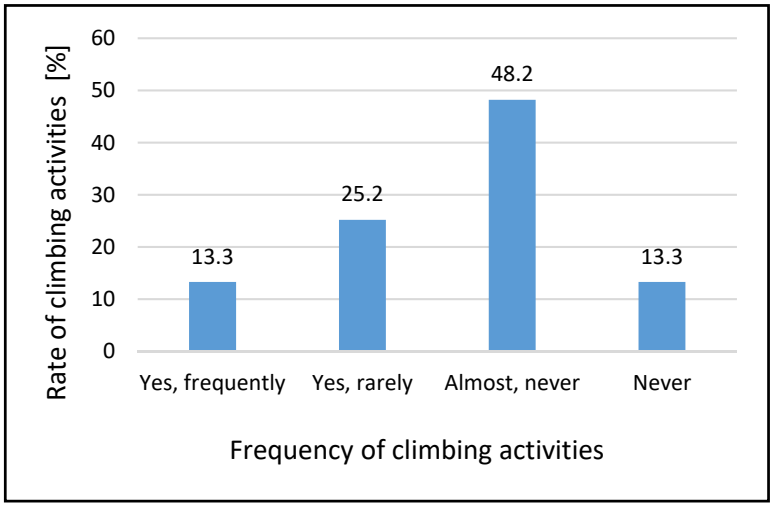

Fig. 2. Frequency of climbing activities in physical education classes

89.2% of respondents have been climbing a forest adventure park at least once. However, 30% of these have been at least 5 times and another 35% 3-4 times in an adventure park.

83% of children are aware of the importance of regular physical activities, because they think that exercises are very important for maintaining good health and another 13% consider it important. The 40% of respondents think they do enough exercise and another 38% think they do roughly enough exercise to maintain good health.

Children do not consider climbing to be a particularly safe activity, as

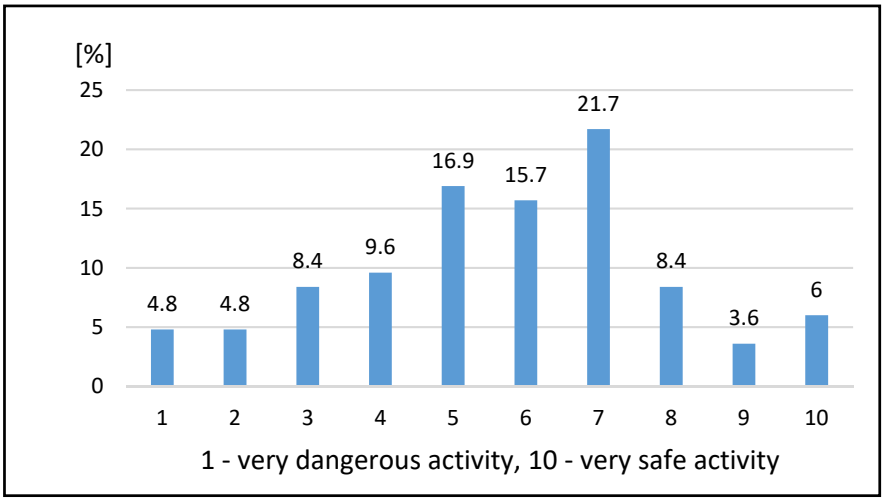

Fig. 3. Children's opinion about the dangers of climbing

Figure 3 shows. If we calculate the average from the frequency of the responses, we get a value of 5.68 for climbing safety. Only 17 percent suffered a notable injury while climbing. The result of the Pearson Chi-Square test tells us that there is no statistically significant association between injuries sustained during climbing and the opinion about the dangers of climbing $\chi(9) = 10.910$, $p = .282$. Interpreting the result of the test, we can claim that those children who have suffered injuries during climbing do not necessarily consider that climbing is a very dangerous activity, unlike their non-injured peers. Statistical analysis also shows that those who find climbing useful for maintaining health perceive climbing as being safer than their peers consider it : $\chi(81) = 105.675$, $p = 0.034$. Kids who have been in a forest adventure park several times find it safer to climb obstacles than their peers who have not been or have only been 1-2 times $\chi(27) = 39.025$, $p = .043$. Children who consider climbing safer would also prefer to climb in school physical education $\chi(81) = 115.354$, $p = .007$.

Figure 4 shows how much children are hindered by fear of height. The proportion of those who are not afraid of heights in climbing is relatively high. Calculating an average based on the frequency of the responses, a value of 6.39 is obtained.

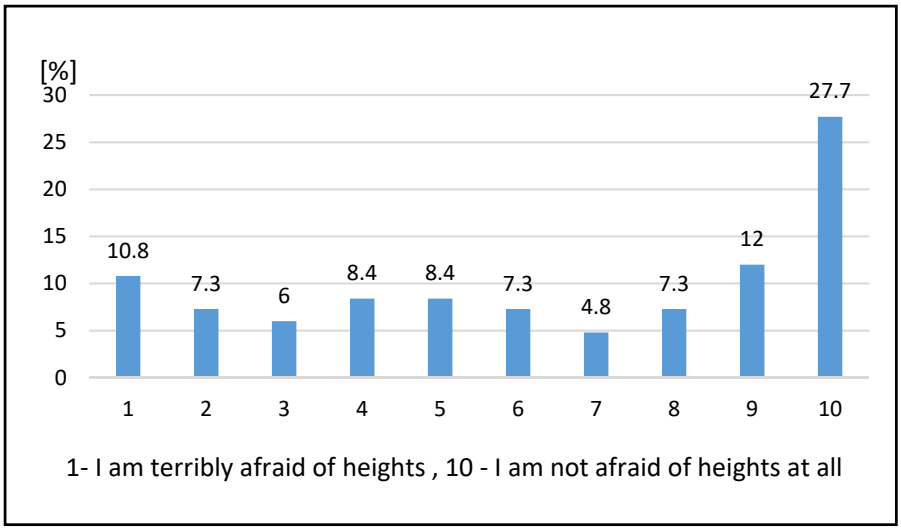

Fig.4. Children's fear of heights

We investigated whether there is a relationship between fear of heights and injuries of climbing which two, according to the Pearson Chi-Square test, have no significant correlation $\chi(9) = 4.200$, $p = .898$.

Discussion

There are far fewer places for indoor climbing in Romania than in any of the more developed countries of the European Union, but due to our natural endowments there are plenty of rock walls for climbing (more than 4550 tracks) (Climb in Romania, n.d.). In the last two decades, via-ferratas have also started to appear in our country, the number of them is slowly reaching twenty (Jbanca, 2018). Although we did not make a comparison of what other sports children practice and with what regularity, we consider that climbing is not a common one. This is suggested by the low number of climbing exercises in physical education classes.

There may even be a misconception in many people that climbing (any type of climbing) is a particularly dangerous physical activity. This is also shown by

the children's response. In reality, climbing is no more dangerous than many other sports, and looking at the number of injuries can be considered even safer. The studies are mainly based on rock, indoor and bouldering climbing when conducting research, but even so we get really low injury rates. We think that more people are injured while climbing a tree than in other types of climbing where safety equipment is used. Humphries (1993) reports 0.9 injuries in beginner, advanced and expert rock climbers after 1000 h of climbing. Backe, Ericson, Janson, & Timpka in a 2009 study mention a higher rate of injuries (4.2 injuries/1000h), but they note that 93% of these were caused by overuse. Overweight and practicing bouldering were found to be significant risk factors. Another study analyzed data collected from more than 515,000 indoor climbers, but only 0.02 injuries occurred in 1000h of climbing activities (Schöffl, Hoffmann, & Küpper, 2013).

Climbing is a movement skill that needs to be taught. Its teaching is prescribed in current and older Romanian school curricula. The teaching of its simpler forms in almost every school could be possible by a physical educator or teacher. It would be important to teach and practice as it has many benefits for children, as studies have shown (Siegel & Fryer, 2017).

With the spread of forest adventure parks (Balla & Boros-Balint, 2019), new opportunities for practicing climbing have opened up. The children's responses also revealed that many of them climbed for several times in adventure parks.

Conclusion

The interviewed children have already tried several types of climbing, among which tree climbing dominates. Of the climbs which use safety equipment, indoor and obstacle course climbs are more common.

Indoor climbing is possible in larger cities, but there are still relatively few indoor climbing gyms at national level. Adventure parks provide a new opportunity for children to practice climbing.

Even though climbing should be taught in school physical education, it does not seem to be spent much time on this. Kids would love to practice climbing in physical education class.

Limits of the study

Due to the small sample size, we did not engage in more serious statistical analyzes. We consider that data gained from a representative sample may even deviate significantly from the results obtained in this pilot study.

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EFFECT OF 12-MONTH RESISTANCE TRAINING ON PHYSICAL FUNCTION IN POSTMENOPAUSAL WOMEN WITH OSTEOPENIA OR OSTEOPOROSIS: A PILOT STUDY

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ABSTRACT. ***Objective.*** The present study aimed to evaluate the effects of 12-month resistance training (6 reps x 70% of 1RM + 6 reps x 50% of 1RM) in physical performance in women with postmenopausal osteoporosis or osteopenia. ***Methods:*** Ten women with postmenopausal osteopenia/osteoporosis were divided into a exercise group (EX, *n* = 5) and control group (C, *n* = 5). The training program included exercises for upper and lower limb muscles with intensities of 50 – 70% of 1RM over a period of 12 months (twice weekly, 50 minutes training session). Physical performance was evaluated before and at the end of the study using the 30-second sit to stand test 30-second arm-curl test. ***Results:*** At the end of the study, the results of 10 patients were analyzed. A significant improvement was noted in physical performance for exercise group compared to control group: arm curl test (22.2±0.8 vs. 20.2±0.8, *p* = .014, *r* = -0.78) and chair stand test (19.8±0.8 vs. 17.6±1.7, *p* = .023, *r* = -0.72). ***Conclusion:*** Resistance training program improves physical performance among women with postmenopausal osteopenia/osteoporosis.

Keywords*: osteoporosis, osteopenia, resistance training, postmenopausal, physical performance.*

REZUMAT. ***Efectele programului de antrenament cu rezistență pe o perioadă de 12 luni asupra performanțelor fizice la femeile cu osteopenie/osteoporoză postmenopauză: studiu pilot. Obiectiv.*** Studiul de faţă a urmărit să evalueze efectele antrenamentului de rezistenţă de 12 luni (6 repetări x 70% din 1RM + 6 repetări x 50% din 1RM) asupra performanţelor fizice la femeile cu osteoporoză sau osteopenie postmenopauză. ***Material şi metode:*** Zece femei cu osteopenie / osteoporoză postmenopauză au fost împărţite într-o grupă experimentală (EX, *n* = 5) şi grupă de control (C, *n* = 5). Programul de antrenament a inclus exerciţii pentru muşchii membrelor superioare şi inferioare, cu intensităţi de

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50 - 70% din 1RM pe o perioadă de 12 luni (de două ori pe săptămână, 50 minute sesiunea de antrenament). Performanţa fizică a fost evaluată înainte şi la sfârşitul studiului, folosind testul de flexie a antebraţului pe brat în 30 de secunde cu o ganteră de 2 kg în mână (*arm curl test*) şi testul de ridicare din aşezat în stând în 30 de secunde (*chair stand test*). ***Rezultate:*** La sfârşitul studiului, au fost analizate rezultatele a 10 subiecţi. S-a observat o îmbunătăţire semnificativă a performanţei fizice în cadrul grupei experimentale, în comparaţie cu grupa de control: testul de flexie a antebraţului pe braţ (22.2 ± 0.8 vs. 20.2 ± 0.8, p = 0.014, r = -0.78) şi testul de ridicare din aşezat în stând (19.8 ± 0.8 vs. 17.6 ± 1.7, p = 0.023, r = -0.72). ***Concluzie:*** Programul de exerciţii cu rezistenţă îmbunătăţeşte performanţa fizică în rândul femeilor cu osteopenie / osteoporoză postmenopauză.

Cuvinte cheie: *osteoporoză, osteopenie, antrenament de forţă, postmenopauză, performanţă fizică.*

Introduction

Osteoporosis is a skeletal disorder characterized by low bone mass and micro architectural deterioration of bone tissue, leading to an increase in bone fragility and susceptibility to fracture (Al-Tubaikh, 2010). An operational definition of osteoporosis has also been defined, based on a value for bone mineral density (BMD) 2.5 standard deviations or more below the young adult mean (World Health Organization, 1994). Bones reach their peak density in the third decade of life and then decrease gradually at the rate of 0.25– 1% per year. This percentage is higher in women at the menopause, which may reach up to 8% per year.

Bone remodeling, essential for bone strength, is mediated by osteoclast and osteoblasts. Osteoclasts resorb mineralized bone (resorption of old bone), which is then replenished by osteoblasts (formation of new bone matrix). Osteoporosis in caused by an imbalance of the two biological processes (uncoupling of osteoblasts and osteoclasts), with an increase in osteoclast activity, leading to overall bone loss (Shanks, Sharma, & Mishra, 2019).

The process of ageing in women is associated with an increase in the rate of bone remodeling in both cancellous and cortical bone, combined with a negative remodeling balance, resulting in bone loss and disruption of bone microarchitecture. Trabecular thinning and loss of trabeculae can be observed in cancellous bone (Parfitt, Mathews, Villanueva, Kleerekoper, Frame, & Rao, 1983), whereas in cortical bone, endocortical and intracortical bone loss lead to reduced cortical thickness and increased cortical porosity (Zebaze, et al., 2010).

From the age of 50 in women, bone loss accelerates through bone cortex thinning, increased cortical porosity and trabeculae destruction by thinning and perforation (Seeman, 2013). Bone loss does not attenuate with age, but continues throughout the whole life, at least in peripheral skeletal sites. Various factors contribute to age-related bone mass decrease and microstructural alterations (Rizzoli, 2018).

Osteoporosis constitutes a major public health problem, through its association with age-related fractures, particularly of the hip, vertebrae, distal forearm and humerus, with serious consequences in terms of morbidity and mortality (Johnell & Kanis, 2006).

Osteoporosis and poor bone health effects approximately 200 million people worldwide, with numbers expected to increase as the population ages. Increases in osteoporosis and poor bone health are associated with increased fragility fracture rates, increased morbidity and mortality, and a huge economic burden (Goode, Wright, & Lynch, 2020). More than half of all individuals older than the age of 50 are affected by poor bone health, osteopenia and/or osteoporosis, and the prevalence is expected to rise for many years. Fragility fracture rates along with their inherent morbidity and mortality are likewise predicted to rise (Miller, Lake, & Emory, 2015; Wright, Looker, & Saag, 2014; Friedman & Mendelson, 2014).

The number of new fractures in 2010 in the EU was estimated at 3.5 million, comprising approximately 610,000 hip fractures, 520,000 vertebral fractures, 560,000 forearm fractures and 1,800,000 other fractures such as pelvis, rib, humerus, tibia, fibula, clavicle, scapula, sternum, and other femoral fractures (Hernlund, et al., 2013)

Hip fractures create a huge economic burden as well. More than $20 billion in health care is spent on osteoporosis-related hip fractures annually (Weaver, Bischoff-Ferrari, & Shanahan, 2019).

Objectives

The present study aimed to evaluate the effects of 12-month resistance training (6 reps x 70% of 1RM + 6 reps x 50% of 1RM) in physical performance in women with postmenopausal osteoporosis or osteopenia.

Methods

Participants in the study: sedentary women (who perform less than 60 minutes of light intensity exercise - moderate per week), non-smoker, suffering

from osteopenia / osteoporosis and who have no contraindications for practicing physical exercises. Women who reported problems with high blood pressure and / or orthopedic conditions that could prevent them from carrying out the proposed exercise program were excluded. Inclusion criteria: a) patients age 50 or older; their history does not include hormone therapy in the last 5 years; b) patients to present a total T score on the spine between -1.5 and -3. Exclusion criteria: a) patients who have suffered a fracture in any segment; b) hormone therapy for the last 5 years; c) women smokers or with a history of more than 5 years of smoking; d) patients who have been diagnosed with metabolic bone disease; e) patients whose body mass index exceeds 35; f) long-term treatment with corticosteroids or patients with thyroid disease; g) women already participating in an intense exercise program (once or twice a week); h) patients who have contraindications for intense physical exertion - high blood pressure, recent history of cardiac arrhythmias; i) patients with musculoskeletal problems that limit physical activity. The volunteers were divided into 2 groups (control group – sedentary group and exercise group – volunteers who wanted to participate in a resistance training program twice a week). Both groups were on alfacalcidol 0.5 μg daily. The flowchart of patient enrollment is given in Figure 1. The training program was conducted over a period of 12 months, twice a week and includes exercises for the development of the strength of the main muscle groups at the lower and upper limbs. The strength exercises were divided into two programs. In the first program, the exercises performed were the following: seated hip abduction, seated machine dip, seated back extension, seated hip flexion, seated hip extension and seated hip adduction. In the second program, the exercises performed were the following: horizontal leg press, prone hamstring curls, seated knee extension, bodyweight squats, Scott Bench biceps curls.

Each training session lasted approximately 50 minutes, and the sessions took place in the gymnasium of Ştefan cel Mare Suceava University – Faculty of Physical Education and Sport. The subjects had a period of two weeks of familiarization with the exercises and learning the correct technique of execution, and in this two weeks the intensity used was 40% of 1RM with a number of 12 – 15 repetitions for each set. Subsequently, in the third week the intensity increased to 50% of 1RM, followed by the fourth week to use the specific method (6 x 50% of 1RM + 6 x 70% of 1RM) and each exercise was performed in 2 sets and the break between sets was between 1'30'' – 2'. Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS, Inc., Chicago, IL, USA) version 20. The data were expressed as the mean and standard deviation (SD) for each variable. The Shapiro-Wilk test

was used to test the normality of the data, Wilcoxon test was used for within-group comparisons. Between-group comparisons of difference scores and/or percent changes were performed using the Mann-Whitney U test. A p value < 0.05 was considered statistically significant. Effect size (r) was also calculated.

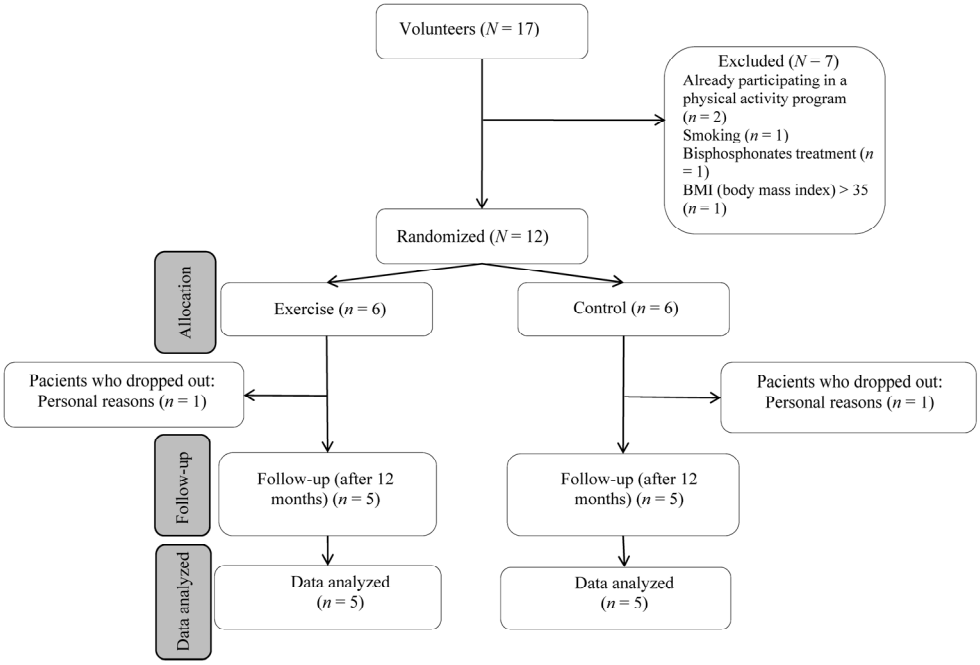

Fig. 1. Flow diagram of study participants

Results

One patient from the control group and one patient from the exercise group dropped out from the study. The patient from the exercise group dropped out because of personal reason (could not reach the exercise program) and the other patient in the control group dropped out due to family issues. The results of the remaining 10 patients were included in the analysis.

There were no significant differences at the baseline between the age, height, weight, BMI, T score, BMD spine, arm curl test or chair stand test between the exercise and control group (Table 1). Subjects in the experimental group recorded an statistically significant increase in performance (Δ% = 11%) at the end of the study (M = 22.2, SD = 0.8) compared to the baseline results (M = 20, SD = 0.7), Z = -2.12, p = .034, r = -0.95 (Table 2).

Table 1. The Descriptive Characteristics for Volunteers Groups in Baseline

	Exercise (n = 5)	Control (n = 5)	U	p	r
Age (years)	55.2±1.3	55.4±1.1	-0.32	.75	-0.10
Height (cm)	160.0±6.0	156.4±4.4	-1.27	.21	-0.40
Weight (kg)	67.2±3.7	65.2±6.5	-0.95	.34	-0.30
BMI (kg/m^2)	26.2±1.3	26.6±1.9	-0.42	.68	-0.13
T_{total} score (Spine)	-2.2±0.3	-2.1±0.3	-0.32	.75	-0.10
BMD_{Total} (Spine)	0.811±0.039	0.819±0.030	-1.36	.92	-0.43
Arm Curl test	20.0±0.7	20.6±1.1	-0.98	.32	-0.31
Chair Stand test	18.0±0.7	18.0±1.2	-0.34	.74	-0.11

Note. Results are represented as mean and standard deviation (±); BMI = Body Mass Index; BMD = bone mineral density (g/cm^2); r = effect size.

Within the control group, there was a decrease in performance (Δ% = -1.94%) after 12 months (M = 20.2, SD = 0.8) compared to the baseline (M = 20.6, SD = 1.1), but the decrease was not statistically significant, Z = -1.41, p = .16, r = -0.63. For the arm curl test, Mann-Whitney U test showed a significant difference between the two groups at the end of the study, U = -2.46, p = .014, r = -0.78 (Figure 2).

Table 2. Pre and Post-test Results for the Physical Performance Tests

	Exercise (n = 5)			Control (n = 5)			
	Pre	Post	p^a	Pre	Post	p^b	p^c
Arm Curl (30')	20.0±0.7	22.2±0.8*‡	.034	20.6±1.1	20.2±0.8‡	.16	.014
Chair Stand (30')	18.0±0.7	19.8±0.8*‡	.034	18.0±1.2	17.6±1.7‡	.16	.023

Note. Results are represented as mean and standard deviation (±); The symbol (*) indicates a significant difference p ≤ .05 intra-group; The symbol (‡) indicates a significant difference p < .05 inter-groups in the favor of exercise group; The p^a value measures the intra-group (pre vs post) difference at the exercise group level; The p^b value measures the intra-group (pre vs post) difference at the control group level; The p^c value measures the intergroup post-test difference.

For the 30 second chair stand test, the exercise group showed an increase in performance (Δ% = 10%) after 12 months (M = 19.8, SD = 0.8) compared to the baseline (M = 18, SD = 0.7), Z = -2.12, p = .034, r = -0.95. In

contrast, control group showed a decrease in performance (Δ% = -2.22%) at the end of the study (*M* = 17.6, *SD* = 1.7) compared to the baseline results (*M* = 18, *SD* = 1.2), *Z* = -1.41, *p* = .16, *r* = -0.63. However, at the end of the study, the difference between the two groups was significant different, *U* = -2.27, *p* = .023, *r* = -0.72.

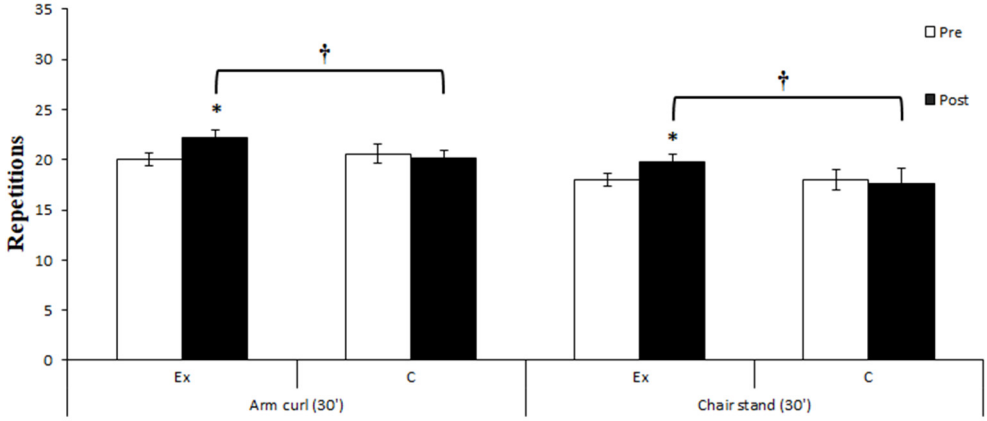

Fig.2. Pre and post-test results with 95% confidence interval for the arm curl and chair stand tests. The symbol (*) indicates intra-group difference ($p < .05$) and the symbol (†) indicates inter-group difference ($p < .05$)

Conclusions

Weight bearing exercise forms an integral component of osteoporosis management (Howe, et al., 2011). Many articles and meta-analyzes demonstrate the beneficial effect of strength training on the elderly and postmenopausal women (Arnold & Bautmans, 2014; Shaw, Gouveia, McIntyre, & Shaw, 2016; Fernandez-Lezaun, Schumann, Makinen, Kyrolainen, & Walker, 2017); Nunes, et al., 2017; Radaelli, et al., 2018). Increased muscle strength through resistance training contributes to reduce fracture risk by maintaining bone mass by stimulating bone formation and decreasing bone resorption (Girgis, 2015). Mixed loading exercise appears to be effective to reduce bone loss in postmenopausal women (Kelley, Kelley, & Kohrt, 2012; James & Carroll, 2009). Some prevention of hip fracture by physical activity has been consistently reported (Karlsson, Nordqvist, & Karlsson, 2008).

In the case of beginners, it is recommended that in the initial stage, when they are in the period of learning the technique execution, the intensities used will be between 50 – 60% of 1RM or even lower (American College of Sports Medicine, 2009). In the case of the elderly, the strength training performed with intensities of 85 – 95% of 1RM with a number of 4 series, improves the functional capacity and leads to the prevention of falls. Also, this type of training leads to the increase in size of type II muscles fibers, as well as to the increase in their number (Wang, et al., 2017).

For postmenopausal women, both strength training that used 3 sets and those that used 6 sets with an intensity of 70% of 1RM led to similar changes in muscle strength and hormonal responses (Nunes, et al., 2017). The use of multiple sets led to increases in muscle strength between 3.5 – 5.5% while the use of a single set led to decreases in strength by up to -1% and even -2% (Kemmeler, Lauber, Engelke, & Weineck, 2004).

For older women, high volume strength training (3 sets per exercise) leads to similar changes in strength and muscle mass, with lower volume strength training (1 series per exercise), both workouts being performed twice a week (Radaelli, et al., 2013; Cuhna, et al., 2018; Radaelli, et al., 2018).

This pilot study provides a brief presentation of the effects that resistance training has on physical performance in patients with postmenopausal osteopenia/osteoporosis. Thus, practising resistance exercises can help improve the upper and lower body strength in these patients and can be used as a preferential method.

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RELEVANCE OF ANTHROPOMETRIC INDICATORS IN ASSESSING ADIPOSITY IN ADULT WOMEN

KALMAN KLÁRA[1,*], HANŢIU IACOB[1]

ABSTRACT. ***Introduction:*** Although the body mass index (BMI) has been widely used as a measure of adiposity, in fact, it is a measure of excess weight relative to height, rather than excess body fat. Other measurements of adiposity, such as waist circumference, waist-hip ratio (WHR) and skinfold thickness supplement information regarding the body fatness. In order to counteract some of the limits of BMI, it has been suggested the introduction of a new way of calculating the percentage of body fat, namely the body adiposity index (BAI). ***Objectives:*** This study was conducted to analyze the relevance and relationships between BMI, IAC, waist circumference, waist-hip ratio and the percentage of adiposity in adult women. ***Subjects and methods*****:** This study involved 95 adult women, who practiced physical activities in two gyms in Oradea, for 12 months, between February 2015 and June 2016. Anthropometric measurements were performed: height, weight, girths, skinfolds. It was calculated the BMI, BAI, WHR, body composition, body fat percentage (BF%) based on the five skinfolds measures. Data were statistically analyzed with SPSS, version 20.0 (descriptive analysis, comparison of means and correlations). ***Results:*** The effect of the workouts in the gyms was the significant reduction of the values of the adiposity parameters of the analyzed subjects, except for the waist-hip ratio. The relationship between BMI, BAI, waist circumference and waist-hip ratio with BF% was statistically significant, both at initial and at final evaluation, but the correlations of BF% with BMI (initially r = 0.824, final r = 0.750) and waist circumference (initial r = 0.812, final r = 0.737) were stronger than those with IAC (initial r = 0.739, final r = 0.688) and the waist-hip ratio (initial r = 0.445, final r = 0.484). ***Conclusions:*** The physical activities performed by adult women in gyms had the effect of reducing body fat. The present study shows the relevance of anthropometric parameters: current BMI-based classifications for overweight and obesity are superior to the BAI-based measurements for determining overweight and obesity; BAI overestimates body fat in individuals with a low BF%; the waist-hip ratio does not reflect the degree of overweight.

Keywords: *body adiposity index, body mass index, waist circumference, waist-hip ratio, body fat percentage, adult women*

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REZUMAT. ***Relevanţa indicatorilor antropometrici în evaluarea adipozităţii la femei adulte. Introducere:*** Cu toate că indicele de masă corporală (IMC) a fost utilizat pe scară largă ca o măsură a adipozităţii, de fapt, este mai degrabă o măsură a excesului de greutate în raport cu înălţimea, decât a excesului de grăsime corporală. Alte măsurători de adipozitate, cum ar fi circumferinţa taliei, raportul talie-şold sau plicile subcutanate suplimentează informaţiile privind grăsimea corpului. Pentru a contracara unele limite ale IMC-lui s-a sugerat introducerea unui nou mod de calculare a procentului de adipozitate, şi anume indicele de adipozitate corporală (IAC). ***Scopul:*** Acest studiu a fost făcut cu scopul analizei relevanţei şi relaţiilor dintre IMC, IAC, circumferinţei taliei, raportul talie-şold şi procentul de adipozitate la femei adulte. ***Subiecţi şi metode:*** La acest studiu au participat 95 de femei adulte, care au practicat activităţi fizice în două săli de fitness din Oradea, timp de 12 luni, în perioada februarie 2015 – iunie 2016. Au fost efectuate măsurători antropometrice: înălţimea, greutatea, circumferinţele, plicile subcutanate. A fost calculat IMC-ul, IAC-ul, raportul talie-şold (RTŞ), compoziţia corporală, ţesutul adipos procentual (ŢA%) pe baza a cinci plici cutanate. Datele obţinute au fost analizate statistic cu programul SPSS 20 (analiza descriptivă, compararea mediilor, corelaţii). ***Rezultate****:* Efectul antrenamentelor din sălile de fitness a fost reducerea semnificativă a valorilor parametrilor adipozităţii subiecţilor analizaţi, cu excepţia raportului talie/şold. Legătura dintre IMC, IAC, circumferinţa taliei şi raportul talie-şold cu ŢA% au fost semnificativă statistic, atât la evaluare iniţială, cât şi la evaluare finală, însă corelaţiile ŢA% cu IMC (iniţial r = 0,824, final r = 0,750) şi circumferinţa taliei (iniţial r = 0,812, final r = 0,737) au fost mai puternice decât cele cu IAC (iniţial r = 0,739, final r = 0,678) şi raportul talie-şold (iniţial r = 0,445, final r = 0,484). ***Concluzii:*** Activităţile fizice desfăşurate de femei adulte în săli de fitness au avut ca efect reducerea adipozităţii corporale. Studiul de faţă arată relevanţa parametrilor antropometrici: clasificările actuale bazate pe IMC pentru supraponderalitate şi obezitate sunt superioare măsurătorilor bazate pe IAC pentru determinarea supraponderalităţii şi obezităţii; IAC supraestimează grăsimea corporală la indivizii cu un ŢA% scăzut; raportul talie-şold nu reflectă gradul de supraponderalitate.

Cuvinte cheie*: indicele de adipozitate corporală, indicele de masă corporală, circumferinţa taliei, raportul talie-şold, ţesut adipos procentual, femei adulte*

Introduction

The body mass index (BMI), used to predict body fat percentage for almost 200 years, is not linearly associated with body fat percentage (Gallagher, Heymsfield, Heo, Jebb, Murgatroyd & Sakamoto, 2000). It provides us information about increasing body weight, it allows comparison of body weights and identifies individuals or groups at increased risk of morbidity and mortality.

However, the accuracy of BMI in assessing body fatness is still being discussed. Widely used as a measure of adiposity, in fact, BMI is a measure of excess weight relative to height, rather than excess body fat. However, it does not differentiate between a person's fat mass and lean mass, and the distribution of body fat cannot be assessed by it.

Other measurements of adiposity, such as waist circumference, waist-hip ratio (WHR) and skinfold thickness supplement information regarding the body fatness.

Although BMI has traditionally been the chosen method by which to measure body size in epidemiological studies, alternative measures – such as body adiposity index (BAI) (Bergman et al., 2011), waist circumference (WC) (Wei, Gaskill, Haffner & Stern 1997; Welborn & Dhaliwal, 2007), and waist-hip ratio (WHR) (Bigaard et al., 2005; Janssen, Katzmarzyk & Ross, 2004) – were considered to be superior to BMI in predicting the risk of cardiovascular diseases.

According to the WHO, a healthy WHR is 0.9 or less for men and 0.85 or less for women. In both men and women, a WHR of 1.0 or higher increases the risk of a cardiovascular disease and other conditions that are linked to being overweight (WHO, 2000a, b).

Central adiposity was highlighted as a growing problem. Currently, WHO accepts that waist circumference between 80.0-87.9 cm and the WHR 0.8 in women correspond to a BMI of 25-29.9 kg/m2 (WHO, 2000a, b). Waist circumference, as an index of abdominal fat, has an increased value between 80 and 87.9 cm, and substantially increased over 88 cm, with an increased risk of developing cardiovascular diseases and diabetes (WHO, 2008).

To counteract some limits of BMI, Bergman et al. (2011) suggested the introduction of a new way of calculating the percentage of body fat, namely the body adiposity index (BAI). It can be calculated solely from anthropometric measurements – hip circumference and height of subjects (hip circumference / height$^{1.5}$ - 18) – and can be used to reflect the percentage of body fat in adults. The use of BAI has several advantages over BMI, including that it yields associations with body fat percentage for men and women and may be easier to evaluate in field studies because it does not require weight measurement (Appelhans et al., 2012).

The BAI was developed and validated on samples of Mexican-Americans and African-Americans. Several studies of BAI values for predicting fat percentage or metabolic disorders in European-American, Mexican-American and Caucasian subjects have reported controversial results: in Caucasians, BAI is a better estimate of adiposity than BMI in non-obese subjects, but less effective than BMI in obese men and women (Johnson, Chumlea, Czerwinski & Demerath, 2012; Sun et al., 2013). According to Schulze et al. (2012), BMI correlates more

strongly with body fat percentage than BAI and is more highly associated with diabetes risk in Caucasians. In a Spanish-Mediterranean population, the Receiver Operating Characteristic (ROC) curve analysis showed a higher accuracy for BMI than BAI (López et al., 2012). Also, in African-American and Hispanic women, the use of BAI has no advantage over the use of BMI (Appelhans et al., 2012; Geliebter, Atalayer, Flancbaum & Gibson, 2013; Freedman et al., 2012; Gibson, Atalayer, Flancbaum & Geliebter, 2012). With Korean women, the current BMI-based classifications for obesity might be superior to BAI-based measurements for determining obesity and predicting metabolic risk (Sung, Oh & Lee, 2014). For Brazilian patients with severe obesity, BAI does not provide an accurate estimate of BF% (Belarmino et al., 2015). In case of Colombian college students, there was poor agreement between BAI- and bioelectrical impedance analysis-based estimates of BF%, and so BAI is not accurate in people with low or high body fat percentage levels (Ramírez-Vélez et al., 2017). The conclusion of a systematic analysis shows that it exists "enough evidence that the BAI does not present satisfying results, and its use is not recommended for BF% determination in adults" (Cerqueira et. al., 2018). However, although validated in a sample of adults, BAI has already been used with children and adolescents. As a method of assessing BF%, its ability to predict risk factors for cardiovascular diseases and metabolic syndromes has been tested with Chinese adults (Lam, Koh, Chen, Wong & Fallows, 2015).

Aim and obiectives of the study

The aim of this study was to analyze the effect of physical activity on anthropometric indicators of body fat, highlighting the relevance and relationships between these indicators and the percentage of body fat in adult women. The anthropometric indicators used in the study were BMI, BAI, waist circumference, waist-hip ratio and body fat percentage.

The objectives of the study were:

- evaluation of subjects regarding body fat;
- detecting cases of obesity and overweight;
- statistical analysis of anthropometric indicators: comparison of averages and determination of relationships between them;
- discussing the results.

Hypothesis

In this study we started from the assumption that the systematic practice of physical activities in gyms will help reduce the body fat percentage.

Materials and methods

Subjects

This study involved 95 adult women, who practiced physical activities in two gyms in Oradea, for 12 months, between February 2015 and June 2016. The research included only those women who showed interest, accepted the measurements and gave permission that their data should to be used in research.

Methods

Anthropometric measurements were performed after the standards described by ISAK - International Society for the Advancement of Kinanthropometry: stature (in centimeters, with stadiometer); body mass/ weight (in kg using a calibrated weighing scale); girths (in cm, anthropometry tape) in the following areas: waist, hips and it was calculated the WHR; skinfolds (in mm, with Slim Guide calipers): only at the right side of the body, 3 times each region and using the average value in the following 5 regions: biceps, subscapular, abdominal, supraspinal (or wing), thigh .

Calculation of body composition was made after formulas by the National Center for Sports Medicine from Romania (Drăgan, I. 2002; Iliescu, A. 2013; Şerbescu, C. 2007), based on the measurement of five skinfolds: biceps, subscapular, abdominal, supraspinal and thigh in mm:

- Body fat percentage (BF%) = (5 skinfolds sum(mm) x 0.15) + 5.8 + BSA(m^2)
- BSA = Body Surface Area, was estimated using Du Bois formula (Du Bois & Du Bois, 1916)

BAI was calculated according to the formula:

- BAI = hip circumference / (height$^{1.5}$) - 18.

To specify the percentage of adiposity, we used the classification of the body adiposity index for women according to Gallagher (Gallagher et al., 2000).

Data were statistically analyzed with SPSS, version 20.0 (descriptive analysis, comparison of means and correlations).

Physical activity program applied

The physical activity program consisted in combined training of Pilates, Step - aerobics and strength training in the gym, 3 times a week for 60-90 minutes, for 12 months.

Depending on individual objectives (weight loss, decrease body fat - at overweight and obese subjects, weight gain - at underweight subjects) there

was a different number of repetitions, a different load and a different intensity of training were used.

There were used: dynamic repetitive exercises, with large muscles groups; hard resistive exercises; functional exercises; high intensity interval training; balance exercises (Pilates); circuit training; stretching exercises.

Muscle strengthening was conducted mainly in the following muscle groups: upper limb muscles, back muscles, abdominal muscles, lower limb muscles.

Results

The analysis of the data of the subjects participating in the study reveals that their average age was 28.45 (8.75) years, the minimum age being 18 years and the maximum 52 years. The descriptive analysis, according to the age range, is presented in Table 1. Of the 95 subjects, 41 (43.2%) were under the age of 25, 31 (32.6%) in the age range of 25-34 years, 14 (14.7%) in the 35-44 years, and 9 (.5%) were over 45 years.

Table 1. Descriptive statistics of subjects by age range (N=95)

Age Interval	Frequency	Percent	Valid Percent	Cumulative Percent	Minim	Maxim	Mean	StDev
<25	41	43.2	43.2	43.2	18	24	21.10	1.828
25-34	31	32.6	32.6	75.8	25	34	28.42	2.527
35-44	14	14.7	14.7	90.5	35	43	37.79	2.887
>45	9	9.5	9.5	100.0	45	52	47.56	2.068
Total	95	100.0	100.0		18	52	28.45	8.746

After signing the acceptance to participate in the research, we made anthropometric measurements of the participants, and BMI, BAI and the BF% were calculated. Measurements and calculations were resumed after the intervention program was completed.

At the initial assessment of BMI, 6 subjects (6.3%) were in the underweight category, 65 subjects (68.4%) in normal weight, 19 subjects (20%) were overweight, 4 subjects (4, 2%) had class I obesity, and 1 subject had class II obesity. At the final evaluation 7 subjects (7.4%) were underweight, 69 subjects (72.6%) had normal weight, 15 of the subjects (15.8%) were overweight and 4 subjects (4.2%) were overweight and had class I obesity (Table 2).

Regarding BAI, at the initial testing, 61 subjects (64.2%) were in the healthy category, 29 subjects (30.5%) were overweight and 7 subjects (7.4%) were obese. At the final evaluation, 66 subjects (69.5%) were in the "healthy" category, 23 subjects (24.2%) were overweight and 6 subjects (6.3%) were obese (Table 2).

Table 2. Frequency of overweight and obesity depending on the index and test time (N=95)

			Frequency	Percent	Valid Percent	Cumulative Percent
BMI	T1	Underweight	6	6.3	6.3	6.3
		Normal weight	65	68.4	68.4	74.7
		Overweight	19	20	20	94.7
		Obese class I	4	4.2	4.2	98.9
		Obese class II	1	1.1	1.1	100.0
		Total	95	100.0	100.0	
	T2	Underweight	7	7.4	7.4	7.4
		Normal weight	69	72.6	72.6	80.0
		Overweight	15	15.8	15.8	95.8
		Obese class I	4	4.2	4.2	100.0
		Total	95	100.0	100.0	
BAI	T1	Healthy	61	64.2	64.2	64.2
		Overweight	27	28.4	28.4	92.6
		Obese	7	7.4	7.4	100.0
		Total	95	100.0	100.0	
	T2	Healthy	67	70.5	70.5	70.5
		Overweight	22	23.2	23.2	93.7
		Obese	6	6.3	6.3	100.0
		Total	95	100.0	100.0	

Waist circumference, as an index of abdominal fat, at the baseline in 75 subjects (78.9%) was below the threshold value (below 80 cm), in 10 subjects (10.5%) it was increased, and also in 10 subjects (10.5%) was substantially increased (over 88 cm). At the final evaluation in 77 subjects (81.1%) it was below the threshold value, in 10 subjects (10.5%) it was increased, and in 8 subjects (8.4%) it was substantially increased.

Table 3. Testing the normality of the data distribution of anthropometric parameters of subjects (N=95)

Tests of normality

Variable	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Weight 1 (kg)	.159	95	.000	.910	95	.000
Weight 2 (kg)	.157	95	.000	.901	95	.000
BMI 1 kg/h^2	.137	95	.000	.913	95	.000
BMI 2 kg/h^2	.145	95	.000	.901	95	.000
BAI 1 %	.092	95	.044	.954	95	.002
BAI 2 %	.097	95	.029	.965	95	.013
BF 1 %	.182	95	.000	.907	95	.000

Tests of normality

Variable	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
BF 2 %	.199	95	.000	.824	95	.000
Hip girth 1 (cm)	.112	95	.005	.970	95	.026
Hip girth 2 (cm)	.112	95	.005	.970	95	.026
Waist girth 1 (cm)	.178	95	.000	.897	95	.000
Waist girth 2 (cm)	.181	95	.000	.894	95	.000
WHR 1	.115	95	.004	.948	95	.001
WHR 2	.084	95	.098	.949	95	.001

The comparison of the means from the two measurements was made after testing the data distribution (Table 3), and, depending on the results, parametric or non-parametric tests will be used to compare the means.

As the number of subjects is over 50, we will consider the results from the Kolmogorov - Smirnov test. According to this, for all the variables involved in this study, the distribution was not normal ($p < 0.05$), consequently the comparison of means was done using the non-parametric Wilkoxon test.

According to the data presented in Table 4 the difference is significant for all pairs of variables, and the effect size (r) is medium (for example at BMI Z = -5.729, df = 95, p = .000, r = -0.416; at BF% Z = -7.583, p = .000, r = -0.550), except for the waist-hip ratio, where the difference is insignificant (Z = -1.789, p = .074, df = 95, r = - 0.130).

Table 4. Descriptive analysis and comparison of means of anthropometrical measurement before and after intervention program (N=95)

	Descriptive statistics						**Test Statistics[a]**		**Effect size**
	Test	N	Mean	St.dev.	Min	Max	Z	p	r
Weight (kg)	T1	95	63.67	11.699	43	103	-5.578[b]	.000	-0.404
	T2	95	62.39	10.634	43	98			
BMI (kg/m^2)	T1	95	22.87	3.96	16.61	36.49	-5.729	.000	-0.416
	T2	95	22.40	3.61	16.96	34.72			
Hip (cm)	T1	95	107.16	7.694	90	130	-6.218[b]	.000	-0.451
	T2	95	108.82	9.027	90	140			
Waist (cm)	T1	95	73.13	9.625	58	104	-5.283[b]	.000	-0.383
	T2	95	72.16	8.915	59	99			
BF %	T1	95	72.16	8.915	59	99	-7.583[b]	.000	-0.550
	T2	95	22.97	5.628	13	39			
BAI	T1	95	32.55	4.59777	23.10	46.29	-6.298[b]	.000	-0.456
	T2	95	31.79	4.11807	23.33	44.35			
WHR	T1	95	.6705	.04884	.58	.83	-1.789[b]	.074	-0.130
	T2	95	.6722	.05056	.58	.83			

a. Wilcoxon Signed Ranks Test
b. Based on positive ranks

The correlation coefficient was used to determine the relationships between the variables BMI, BAI, waist circumference, WHR and BF%. Since the data were not normally distributed, the Spearman test was used.

The correlations between the body fat percentage (BF%) and BMI, BAI, waist circumference, and WHR at the initial and final test can be seen in Table 5. It can be observed, both at the initial and at the final test, that there is a high positive relationship between BF% and these anthropometric parameters, except for the one with WHR, at which the relationship is medium (r = .445, p = .000). This means that increased values of anthropometric parameters indicate high values of the percentage of adipose tissue.

Table 5. Correlations between BMI, BAI, waist circumference, BF% and WHR before and after the intervention program (N = 95)

			Correlations				
			BMI T1	**BAI T1**	**Waist T1**	**WHR T1**	**BF T1**
Spearman's rho	BMI T1 (kg/m²)	Correlation Coefficient	1.000	.815**	.854**	.530**	.824**
		Sig. (2-tailed)	.	.000	.000	.000	.000
	BAI T1 (%)	Correlation Coefficient	.815**	1.000	.697**	.346**	.739**
		Sig. (2-tailed)	.000	.	.000	.001	.000
	Waist T1 (cm)	Correlation Coefficient	.854**	.697**	1.000	.737**	.812**
		Sig. (2-tailed)	.000	.000	.	.000	.000
	WHR T1	Correlation Coefficient	.530**	.346**	.737**	1.000	.445**
		Sig. (2-tailed)	.000	.001	.000	.	.000
	BF T1 (%)	Correlation Coefficient	.824**	.739**	.812**	.445**	1.000
		Sig. (2-tailed)	.000	.000	.000	.000	.
			BMI T2	**BAI T2**	**Waist T2**	**WHR T2**	**BF T2**
Spearman's rho	BMI T2 (kg/m²)	Correlation Coefficient	1.000	.778**	.843**	.539**	.750**
		Sig. (2-tailed)	.	.000	.000	.000	.000
	BAI T2 (%)	Correlation Coefficient	.778**	1.000	.605**	.268**	.678**
		Sig. (2-tailed)	.000	.	.000	.009	.000
	Weist T2 (cm)	Correlation Coefficient	.843**	.605**	1.000	.766**	.737**
		Sig. (2-tailed)	.000	.000	.	.000	.000
	WHR T2	Correlation Coefficient	.539**	.268**	.766**	1.000	.484**
		Sig. (2-tailed)	.000	.009	.000	.	.000
	BF T2 (%)	Correlation Coefficient	.750**	.678**	.737**	.484**	1.000
		Sig. (2-tailed)	.000	.000	.000	.000	.

**. Correlation is significant at the 0.01 level (2-tailed).

The relationship between BF (%), BMI and BAI in the two tests of the subjects (initial and final) can be observed on the dispersion diagrams presented in Figure 1.

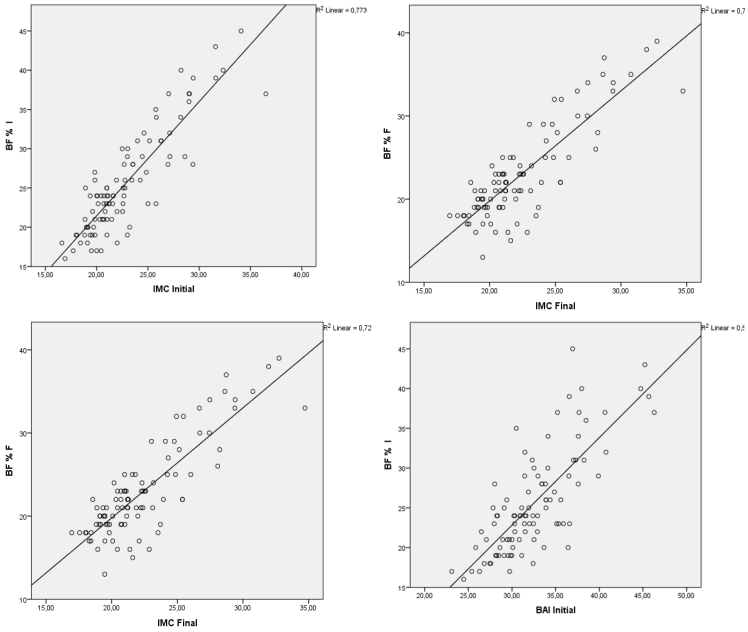

Fig. 1. Dispersion diagrams showing the relationship between BF (%), BMI and BAI before and after the intervention

Discussions

The assessment of the body composition, the estimation of the BF% based on the 5 skinfold thickness and the effect of the intervention program on the BF%, respectively the waist circumference were described in a previous article (Nagy, K. & Hanţiu, I., 2017).

According to the data presented in Table 5, the correlations of BMI, BAI, waist circumference and WHR with BF% were statistically significant, both at baseline (T1) and follow-up (T2) evaluation, but correlations of BF% with BMI (T1 *rho* = 0.824; T2 *rho* = 0.750) and waist circumference (T1 *rho* = 0.812; T2 *rho* = 0.737) were stronger than those with BAI (T1 *rho* = 0.739; T2 *rho* = 0.678) and WHR (T1 *rho* = 0.445; T2 *rho* = 0.484).

The mean WHR, both initial (0.670) and final (0.672) is below 0.8, which is the WHO-defined threshold for increased health risk for women. It is interesting that according to the WHR, only 2 subjects have moderate health risk, although the other measurements show there are several overweight and obese people (20 subjects at baseline, 16 subjects at the follow-up evaluation).

A study by Molarius et al. (1999) on waist and hip circumference and WHR in 19 populations of the WHO: MONICA project, shows that "waist circumference and waist-hip ratio, both used as indicators of abdominal obesity, appear to measure different aspects of the human body: waist circumference reflects mainly the degree of overweight, while the WHR does not". "The WHR is a ratio and as a result suffers from limitations in relation to its use in statistical analyses and its interpretation" (Allison, Paultre, Goran, Poehlman & Heymsfield, 1995). Some reports have suggested that waist circumference alone may be a better indicator of visceral fat accumulation and cardiovascular risk than WHR (Han, van Leer, Seidell & Lean, 1995; Pouliot et al., 1994). In our study we found similar results, the correlation of the WHR with BF% was the lowest of the measured parameters, in both evaluations (T1 *rho* = 0.445 and T2 *rho* = 0.484).

In the group studied by us, according to the BAI, no subject was in the underweight category, although according to the BMI, 8 subjects were classified in this category at the baseline and 7 subjects, at follow-up, this indicating the overestimation of the BAI in those with low BF%. A recent systematic review by Cerqueira and coworkers (2018) of the validity of BAI in determining the percentage of body fat in adults found similar results: BAI systematically underestimates body fat in individuals with a high BF% and overestimates in individuals with a low BF%; taking into consideration the proposal of BF% classification for men and women suggested by Heo et al. (2012), the best BAI range performance (20 – 30%) is exactly the lowest health risk range. BAI overestimation for BF% less than 20% would inappropriately classify low-BF individuals as adequate, resulting in false-negative errors in individuals who may be at risk of malnutrition. However, the greatest public health risk is the underestimation that BAI generates for those with BF% higher than 30%, which may lead to non-detection of overweight or obese individuals (false-negative results for high BF%).

Conclusions

The analysis of the relevance of anthropometric indicators of body fat led to the following conclusions:

- for the estimation of overweight and obesity, classifications based on BMI calculation are recommended;
- waist-hip ratio showed weaker correlations with BF% than BAI, waist circumference and BMI;
- BAI overestimates body fat at individuals with lower BF%;
- the waist-hip ratio does not reflect the degree of overweight;
- waist circumference, as an index of abdominal fat may be used to identify individuals who are at risk.

The conclusions of our study are similar to the conclusions of other studies.

Limitations of the study

There are two major limitations in this study that could be addressed in a future research. The first is related to the sample size: the number of subjects was not large enough to be considered representative. The second limit is the method we use to determine the body fat percentage (based on skinfolds). We consider that the results would have been more accurate if we had been able to determine the percentage of adipose tissue using bioelectrical impedance analysis or DEXA analysis.

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CONSTATATIVE STUDY REGARDING THE EFFICIENCY OF COMUNICATION IN A TEAM SPORT

ORMENIŞAN SEPTIMIU[1,*], MONEA DAN[1], RADU PAUL OVIDIU[1]

ABSTRACT. Communication is a fundamental condition in the teaching process and helps to crystallize, strengthen the relationships between athletes and coaches. Communication within the team has a complex character, combining different forms, types and means of communication. ***Objectives.*** One of the objectives is to form a perspective on how athletes perceive communication from athletes-athletes or athletes-coach and vice versa. ***Materials and methods.*** For a period of 4 weeks different trainings of the children were followed, at which time the survey method was applied, collecting and analyzing their response. ***Results.*** In this paper, we used the survey method, in which a questionnaire was applied to a number of 70 children (12-14 years) from 3 football teams for children and juniors from Cluj-Napoca. ***Conclusions.*** Communication is proving to be indispensable in human relations and is present in almost any human activity, regardless of domain.

Keywords: *communication, football, children, relationships.*

REZUMAT. ***Studiu constatativ privind eficienţa comunicării în cadrul unei echipe sportive.*** Comunicarea este o condiţie fundamentală în procesul de predare şi ajută la cristalizarea şi consolidarea relaţiilor dintre sportivi şi antrenori. Comunicarea în cadrul echipei are un caracter complex, care îmbină diferite forme, tipuri şi mijloace de comunicare. ***Obiective.*** Unul dintre obiective este de a ne forma o perspectivă asupra modului în care sportivii percep comunicarea de la sportivi-sportivi sau sportivi-antrenori şi invers. ***Materiale şi metode.*** Pentru o perioadă de 4 săptămâni s-au urmărit diferite antrenamente de copii şi juniori, moment în care s-a aplicat metoda anchetei prin completarea unui chestionar, colectând şi analizând rezultatele obţinute. ***Rezultate.*** În această lucrare, chestionarul a fost aplicat pe un număr de 70 de sportivi (14-16 ani) din 3 echipe diferite de fotbal din oraşul Cluj-Napoca. ***Concluzii.*** Comunicarea se dovedeşte a fi indispensabilă în relaţiile umane şi este prezentă în aproape orice activitate umană, indiferent de domeniu.

Cuvinte cheie*: comunicarea, fotbal, juniori, relaţii.*

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Introduction

Communication is a fundamental condition in the teaching process and contributes to the crystallization, strengthening of relationships between athletes and coaches. Communication within the team has a complex character, combining different forms, types and means of communication (Şoitu, 1997). The communication is also predefined by Wilson E. as "an action of an organism or a cell that alters the likely patterns of behavior of another organism or of another cell, in an adaptive manner for one or both participants."

The general theory of communication studies the characteristics and relationships between the general factors that facilitate the transfer of a quantity of information from one object to another and, based on the use of operational methods, recommends ways of establishing optimal regimes for the circulation of information within the different types of systems (Popescu-Neveanu, 1979).

The human individual does not exist singly but, through affiliation with other persons, forms groups. Groups are crystallized based on common principles and common aspirations or ideals. After the crystallization of groups an essential role in maintaining them in sustainable forms over time has the group dynamics. Group dynamics is born primarily due to the trends determined by interpersonal relationships. Interpersonal relationships, which include both formal and informal structures, are created based on the communication process, which essentially contributes to the development of societies (Gomboş, 2012).

Two major forms of communication make a teaching process a constructive one, reaching its purpose and objectives, so effective communication in the sports group must be based on a mix between verbal and non-verbal communication. The most common way of communication is oral communication. Non-verbal communication accompanies the verbal one, defining itself in relation to it in a particular way, in the sense of the support it provides through the elements of reinforcement, nuance and motivation of the message. Non-verbal communication is unintentional, it betrays our emotions or attitude even if we do not want it, so we need to be aware that non-verbal messages can sometimes contradict what we say (Fiske, 2003).

Objectives

One of the objectives is to form a perspective on how athletes perceive the communication from athletes-athletes or athletes-coach and vice versa.

Another objective is to find out how the athletes communicate, how they perform the communication act and their opinion about the coach's communication during training and matches.

The last objective is the confidence given to the coach by the athletes, so we try to find out how much they appeal to the coach's advice regarding their personal life.

Materials and methods

For a period of 4 weeks different trainings of the children were followed, at which time the survey method was applied, collecting and analyzing their response. The questionnaire comprises 10 questions with answers from scale 1-5, where 1 means "barely" and 5 means "very well".

This method was used to give a real perspective on the way and the communication relationships within each team, whether we are talking about the athletes-athletes, athletes-coach or coach-athletes relationship.

Results

In this paper, the survey method was used, in which a questionnaire was applied to a number of 70 children (12-14 years) from 3 football teams for children and juniors from Cluj-Napoca.

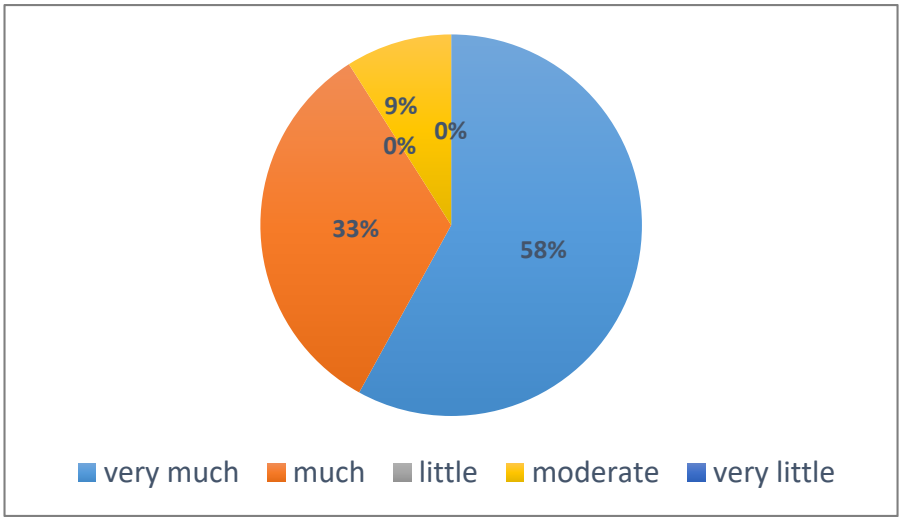

Fig. 1. The importance of communication between coach and athletes

For question No. 1 of the questionnaire, the one in which the communication between coach and athletes during training and matches was expressed, we had 41 athletes who gave 5 (very well) and 23 athletes who

gave 4 (a lot), resulting in the fact that athletes are aware of the importance of communication during training and matches.

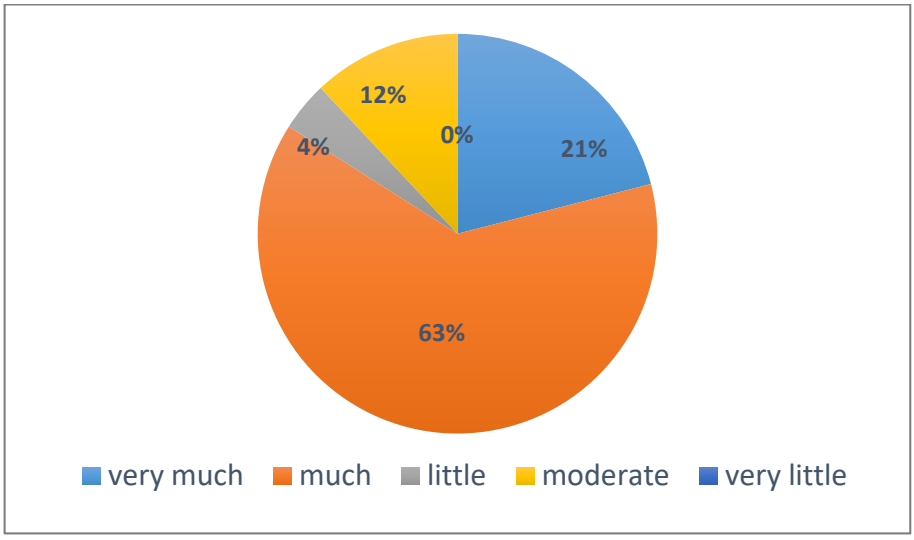

Fig. 2. Using verbal communication by the coach in the teaching act

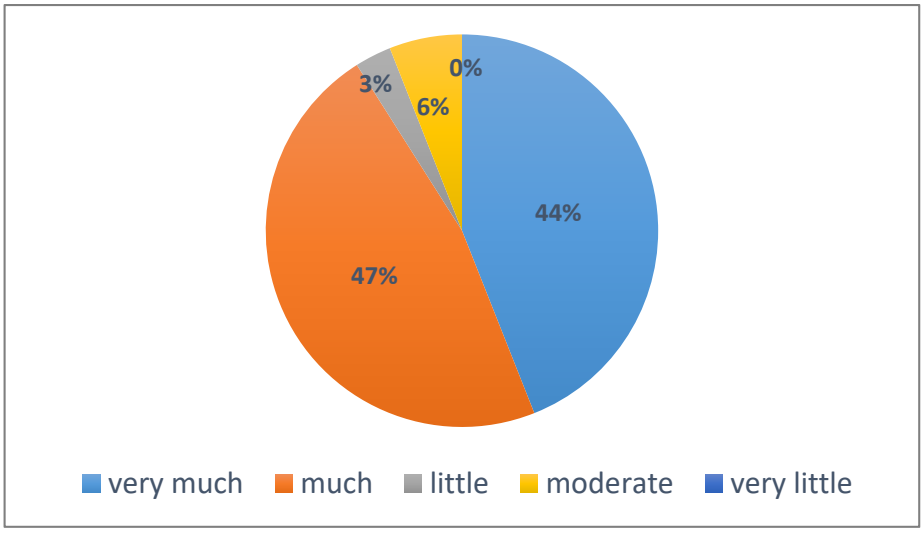

Fig. 3. The act of communication from coach to team

Following the answers given to the use of non-verbal communication by the coach and its efficiency, the highest number of athletes replied that it helps a lot (44), and 15 athletes replied that it greatly helps the body language when the coach explains certain situations.

The percentage of athletes who say they are satisfied and very satisfied with the way the coach communicates with them is 91%. A percentage of 9% replied that they were little or "moderately" satisfied with the communication act regarding the coach's communication with the team.

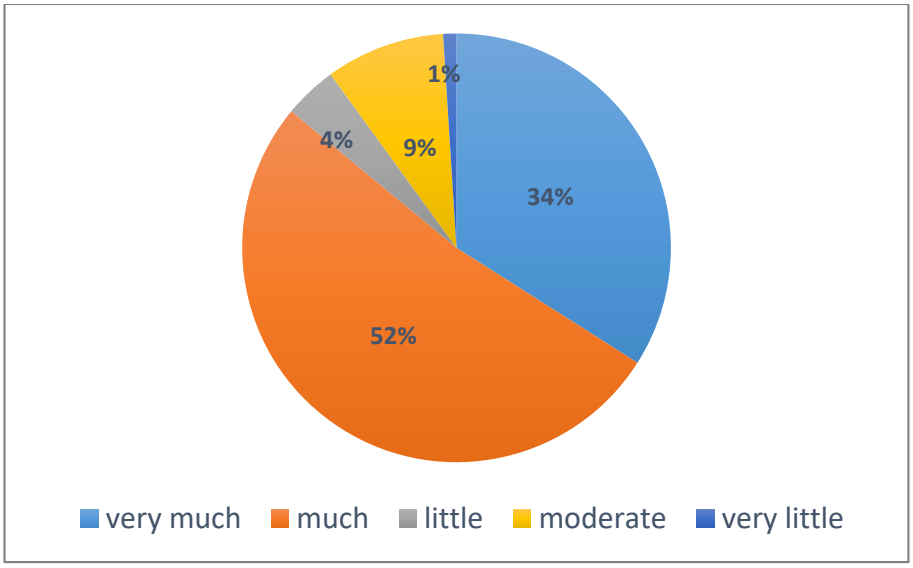

Fig. 4. Encourage and motivated the athletes by the coach in match

When asked about the use of positive words and encouraging expressions by the coach during the matches, the athletes answered that they are very satisfied with a percentage of 52%, and satisfied are 34% of the subjects who completed the questionnaire.

Inter-human relationships are strong when respect and trust are gained by those who interact. Thus, the athletes answered the question "Do you feel intimidated when you talk to the coach?" in a percentage of 83% that they are very little or not at all intimidated by the coach, and a percentage of 10%, knowing that the attitude of the coaches is positive and the children are very close to them having the respect and trust given to them.

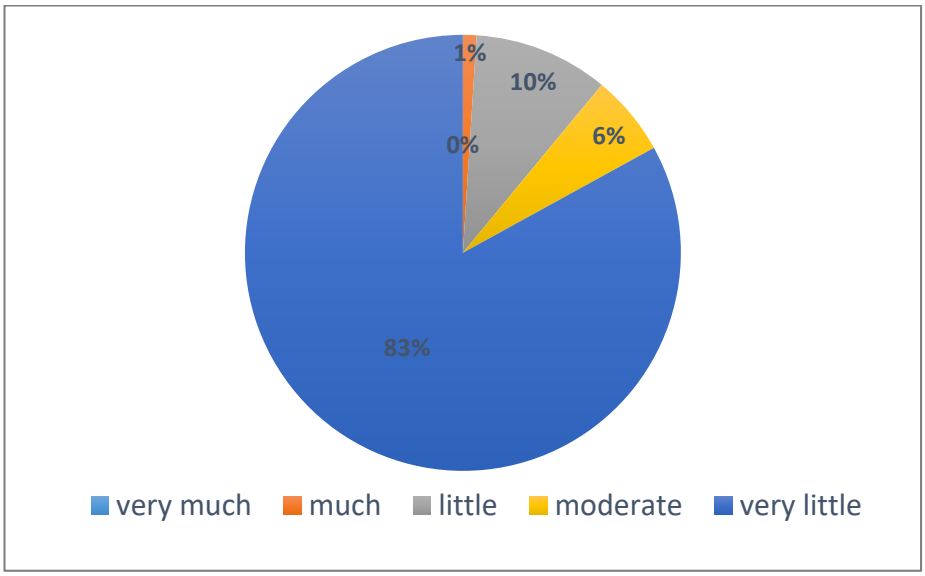

Fig. 5. Communication from athletes-coach outside from teaching act

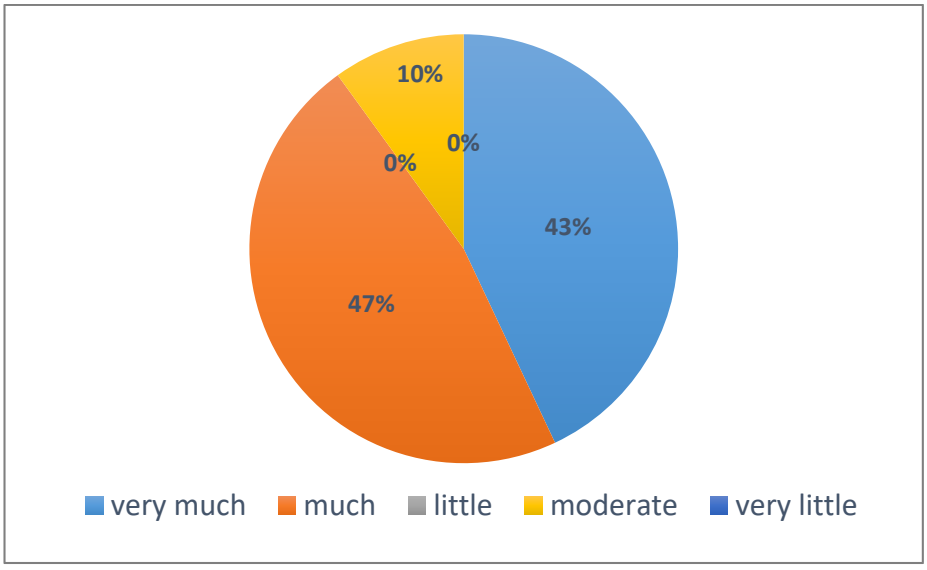

Fig. 6. Relationships between athletes within the team

Good communication relationships between the athletes within the team are beneficial for both them and the coach. They had to respond if they had a good relationship with the other team members, so 90% of the children answered that they have a good or very good communication relationship with the other teammates.

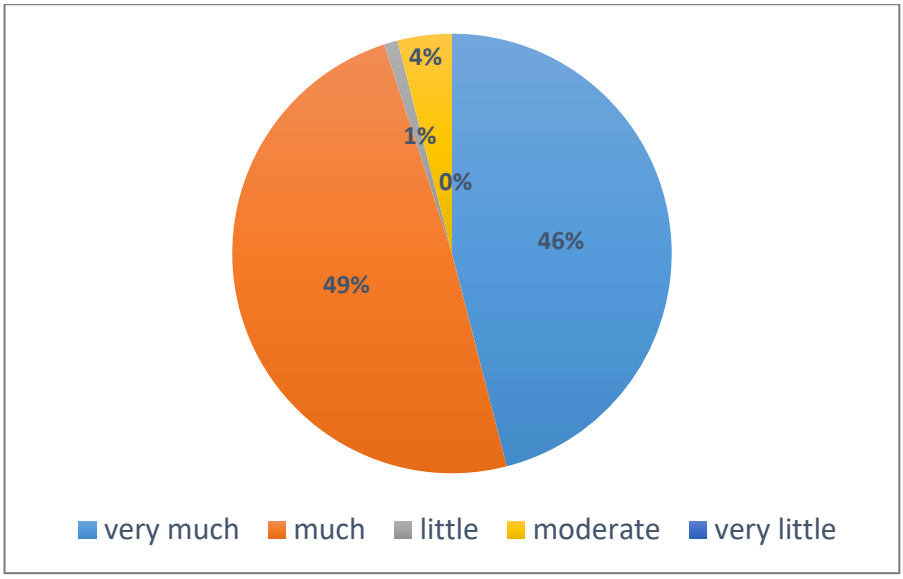

Fig. 7. Relationships between the athletes outside of training

Analyzing the answers to the question "Do you like to keep in touch with your colleagues and outside the team?", I found out that 95% of the subjects keep in touch after leaving the training, demonstrating that the process of interpersonal communication does not end with the completion of the training. Out of the total 70 athletes, only 4 said that they do not keep in touch with colleagues and outside of training. Claim relationships are strengthened and require continuous communication outside the sporting activity.

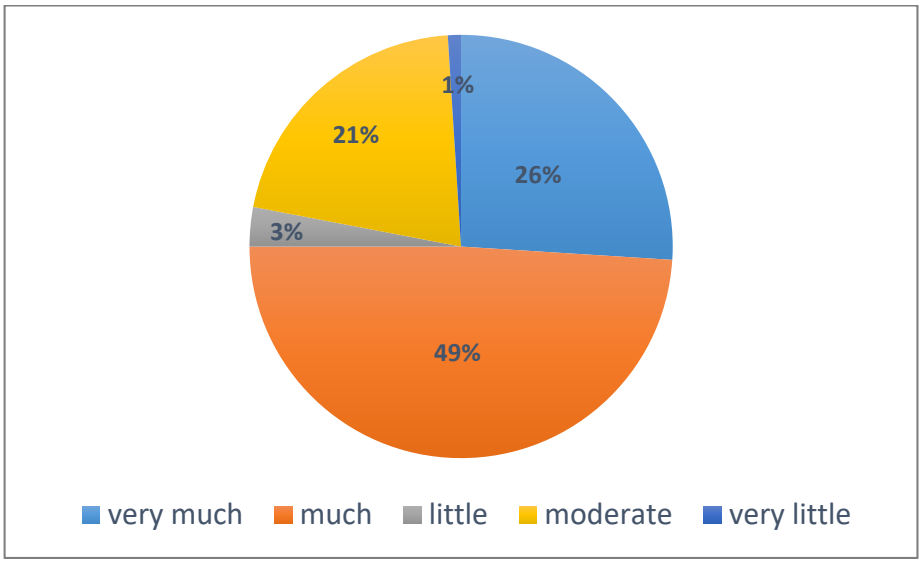

Fig. 8. The confidence gained by the coach within the team

It is known that any trainer, besides the baggage of specialized knowledge, also requires other knowledge from other spheres / fields such as pedagogy, psychology, anatomy etc. He should be able to offer advice to children who turn to his help in different personal problems that they encounter in their development outside the sporting activity. To the question "Does the coach get involved giving advice in solving problems outside the team?" 34 children responded with "a lot", 18 said "a lot", and 15 said that it was involved in a "moderate" way. Gaining the confidence of the children is very important in the teaching act, the coaches have to empathize with them more, to dedicate them to the extra sports life for a healthy development of them.

Conclusions

Due to the fact that care can be approached or you can communicate, it can be said that this process is busy or very much of human life. Communication has been the basis of society for thousands of years and is differentiated from one individual to another. Over time, communication has known several forms, so we can talk about several types of communication: verbal, nonverbal, paraverbal, interpersonal communication, group communication. Also, so that the

communication process is not influenced by certain factors, such as language, it is preferable for the interlocutors to have a common language. During a communication, we must also take into account the temperament of the interlocutor.

Within the team, the coach has an important role in communicating with and between his athletes. Thus, the way he communicates with the athletes, the language used, can give them a perspective on the coach. If the coach uses language accessible to children, uses positives communication, offering advices and encouraging them, the relationship between them can be strengthened. Once this relationship is strengthened, training becomes a pleasure for both athletes and coaches.

Therefore, communication proves to be indispensable in interpersonal relationships and is present in almost any human activity, regardless of the field.

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THE IMPACT OF AN AMATEUR SWIMMING COMPETITION ON THE DEVELOPMENT OF MASS SPORT AND ON THE PERFORMANCE EVOLUTION OF THE SWIMMING CHILDREN

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ABSTRACT. The first swimming competitions for children who practice swimming as a leisure sport organized at the "Universitas" Swimming Complex were held from 2013, these being only demonstrative for parents, as an open lesson at the end of each calendar year. Starting with 2017 these competitions were organized and monitored more closely not only as a demonstration lesson but as a sports competition for amateurs, the rules being adapted according to the F.I.N.A. This article will show graphically and statistically a substantial increase of participants in this type of activity, which is due mostly to emotions and feelings both before and after the competition. Feelings of joy, sadness, emotions experienced during the contest lead to an intrinsic motivation, which causes the child to come with pleasure to the training and to prepare more intensely for the next contest. The monitoring of the subjects started from the year 2017 by attending the swimming courses and it was proved that after each organized swimming contest the number of participants in the training courses increased and at the same time the results obtained were improved.

Keywords: *swimming, children, competition, mass sport, performance evolution*

REZUMAT. ***Impactul unei competiții de înot pentru amatori asupra dezvoltării sportului de masă și asupra evoluției performanței copiilor practicanți de înot.*** Înotul este o activitate care aduce o multitudine de beneficii, de la cele fizice până la cele mentale și sociale. Înotul oferă un excelent antrenament cardiovascular, are un rol important în tonifierea musculaturii și creșterea capacității pulmonare. Un sport recomandat tuturor categoriilor de vârstă, în special copiilor și persoanelor cu deficient de postură. Este o opțiune excelentă pentru a face mișcare în orice perioadă a anului, dar este o activitate mai populară mai ales pe timpul verii, când se poate practica în bazine descoperite sau chiar la mare. Pentru copii, înotul poate fi considerat un sport

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plictisitor, şi de aceea se încearcă diferite metode pentru a atrage copiii să practice acest sport. Ideea concursului a fost creată pentru a atrage mai mulţi copii care să practice înotul ca activitate de recreere. Un concurs de înot pentru amatori oferă copiilor satisfacţii care stimulează practicarea sportului în mod cât mai frecvent. Aceste satisfacţii constau în premiile oferite de organizatori, sentimentele obţinute în timpul concursului, sentimentul de reuşită, bucuria părinţilor etc. Toate aceste aspecte îi ajută pe copii să îndrăgească înotul şi să practice în mod constant această activitate sportivă. După organizarea primului concurs cu caracter mai oficial, numărul participanţilor la cursurile de înot a crescut semnificativ în cadrul Complexului de natație Universitas. Aici a început monitorizarea mai atentă a acestui eveniment. Timp de doi ani au fost monitorizate în permanenţă următoarele aspecte: numărul copiilor participanţi la cursurile de înot, frecvenţa de participare săptămânală, numărul copiilor care participă la concursurile organizate şi timpii obţinuţi de aceştia la concurs, la proba de 50 m liber. Pentru a avea date relevante, la calcularea timpilor au fost luaţi în considerare doar copii cu vârste cuprinse între şapte şi nouă ani, la fiecare concurs.

Cuvinte cheie: *înot, copii, competiție, sportul de masă, evoluţia performanţei*

Introduction

Learning how to swim contributes to children's development in many ways. Swimming benefits for children include mental and physical development (Vorob'eva, 2019).

Any activity in the pool has very low impact on their bodies, and the added resistance also means they use more energy than they would out of the water. It really gives the whole body a workout without any strain being put on your child's joints (Kaur, 2019).

Swimming keeps children's heart and lungs healthy due to the stimulation of cardiovascular activity, improves strength and flexibility, increases stamina. Moreover, it improves the balance of the body and posture. Due to exercise during swimming, children develop their mind-body connection, and due to the increase of endorphins in the brain, swimming help children to effectively relieve their stress (Bass, 2015).

Swimming benefits also include life-saving skills that every child should learn (Vorob'eva, 2019).

Swimming provides challenges, rewards and accomplishments, which helps children to become self-confident and believe in their abilities. They also

can have plenty of opportunities to make friends and grow in confidence (Day & Roberts, 2019).

Swimming can teach competitive values to children, mostly if they take part in swimming competitions, even if they are amateurs (William, 2009). Determination is another important trait swimming teaches (Porcar, 2012).

Competitive swimming for kids has many benefits, ones that will have a positive effect on the children's health throughout their lives (Kang, 2017). Here are the main benefits to competitive swimming for kids:

- Develop proper stroke techniques and become a stronger swimmer
- Exciting way to make friends and have fun
- Learn the importance of hard work
- Learn positive sportsmanship skills
- Learn the value of a healthy lifestyle
- A lifetime sport they can practice into their adult years
- Keeping track of the pace clock to determine speed is a great workout for the brain

Objectives

The aim of this research paper is the monitoring of the development of amateur swimming as a mass sport, after some competitions for amateur children and the impact of these on the children's obtained performance. We had followed four important factors. One of them is the number of participants at the competitions, the second factor is the time which was obtained by each child at 50 m freestyle. The third factor that we followed was the frequency of participations of the children at courses, and the most important factor, the number of children who practice amateur swimming weekly.

Materials and methods

The observed children practice amateur swimming at the "Universitas" swimming complex. They are members of the following sports clubs: Active Swim, Ego, ForXcape and Ebihalak.

Within this research four main factors were followed and measured. The first measurement in the research is the time obtained after the completion of 50 m freestyle swimming. For a valid result we used only the time obtained by the fastest 50 children aged between 7 to 9 years. The second mensuration

is the total number of participating children at our competitions. The third observed factor is the total number of children who attend the courses organized at "Universitas" swimming complex. Here we count the beginner adult classes too. This is the most important factor for our research. The fourth and the last mensuration is the frequency of participation at the courses.

The main method in our case is the observation method. We followed every group for two years, to get proper results.

The measurements were carried out between March 2017 and December 2019, at "Universitas" swimming pool, from Cluj-Napoca, during controlled training activities, and during the competitions organized at the same place.

Results

The times obtained by the children in the contest decreased significantly from the 2017 contest to the 2019 contest. For valid results, the best 50 times from each contest were considered. The times were obtained after completing 50 m freestyle swimming.

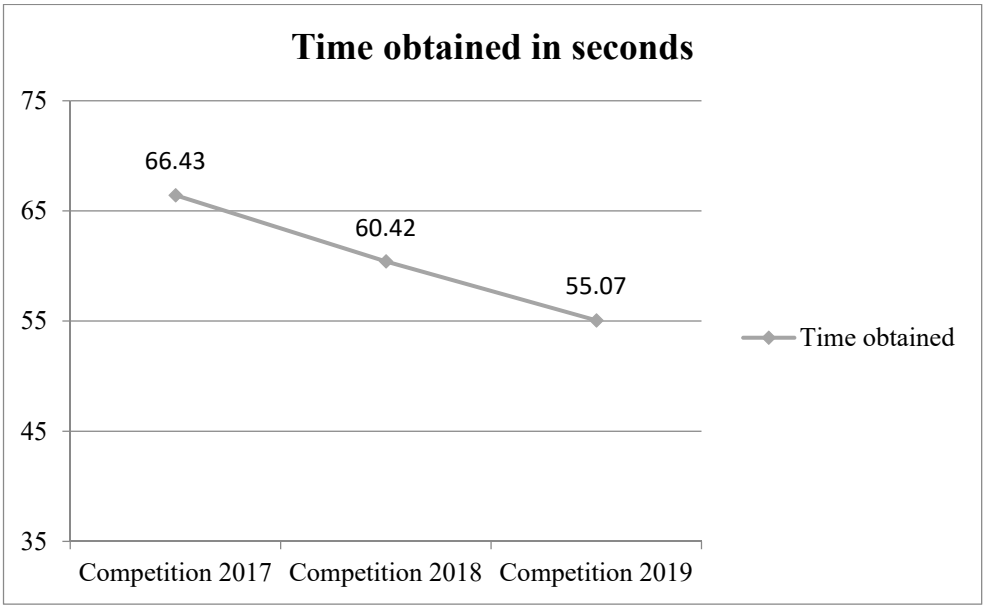

Fig. 1. Time obtained in seconds

The average time in the 2017 competition was 66.43 sec and in 2019 it decreased to 55.07 sec. We can say that it is a very good improvement.

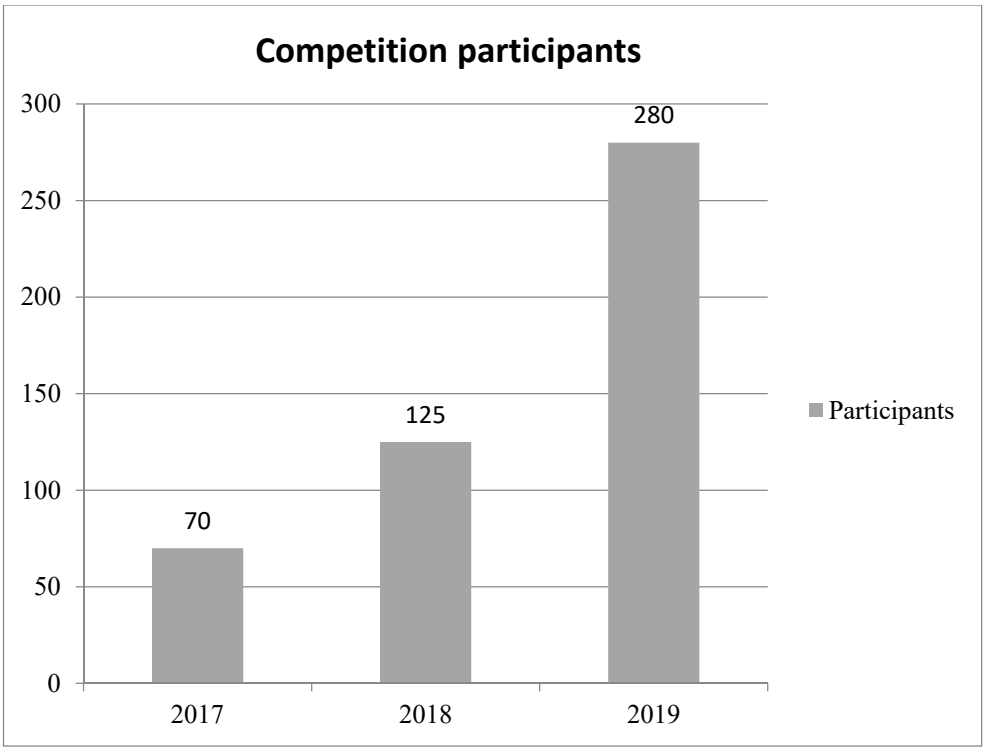

Fig. 2. Number of participants at the competition

The number of participants in 2017 was 70, in 2018 125 children participated and in 2019 the number increased significantly to 280 competitors. The increase of number of participants is very significant for each age group, but especially for children aged between seven and nine years.

From the first competition organized until the competition in 2019, the number of children who practice swimming has doubled. In 2017, the "Universitas" Swimming Complex had 800 children enrolled in swimming lessons, and in 2019 the number increased to 1700 children who practice swimming weekly. It is a significant increase.

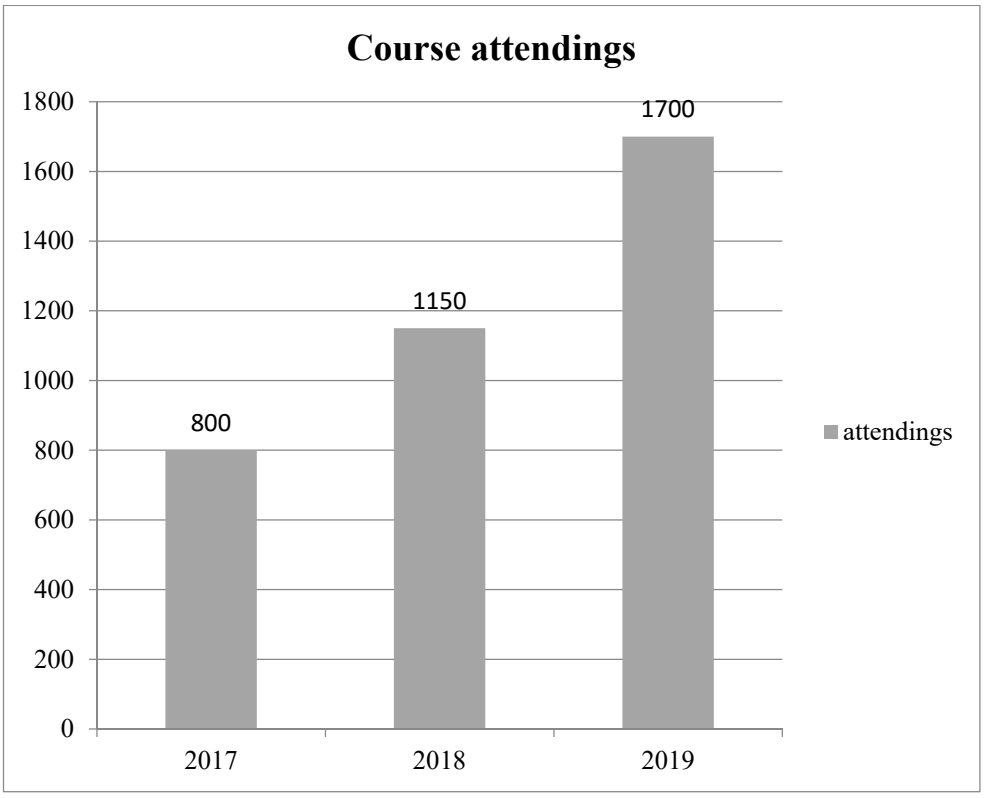

Fig. 3. Number of children who attend the courses at "Universitas" swimming pool

In 2017 children frequented swimming lessons one hour per week, in 2018 the frequency increased to 1.5 hours per week, and in 2019 to 2.06 hours per week. In the pre-contest periods this number is usually even higher (2.88 hours / week) which indicates that these events have an important role in promoting mass sports. The pre-competition period was set to 5 weeks.

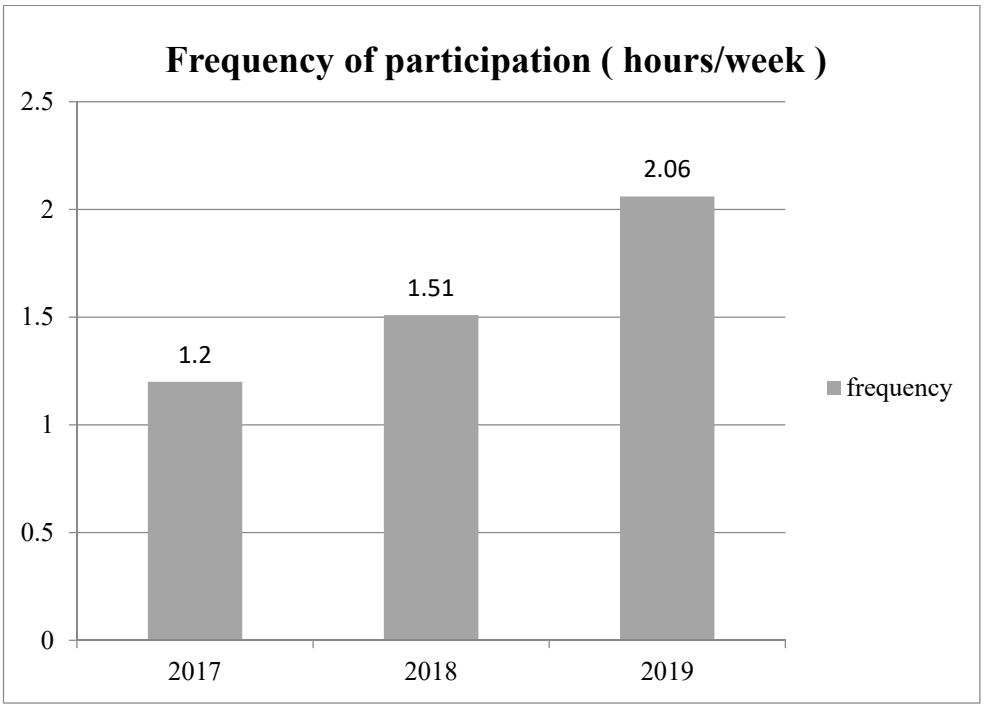

Fig. 4. The frequency of participation of courses

Conclusions

In conclusion, we can say that after analyzing the data obtained in the 2 years of observation, each indicator shows a significant increase. These amateur competitions have become increasingly popular. Along with the increase in the number of competitors, both the number of swimming practitioners and the frequency of weekly practice of this sport have increased. These competitions bring a benefit to mass sports by attracting children to practice swimming as a leisure activity.

By practicing more frequently, children also get much better times at the completion of a length of pool. This aspect can also be beneficial for swimming as a performance sport, because it motivates children to work harder and get better results.

Conflict of interest

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