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# THE ROLE OF DUAL-CAREER IN THE PROFESSIONAL INSERTION OF FORMER ATHLETES

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**Abstract**

The fact that sports have become professional affects each athlete, each sports branch, and the number of practices and competitions for young athletes increases every year. Such events have a major impact in the personal and professional life, in labour market insertion within the phase following the sports life. Consequently, for many athletes, sports career overlaps the studies. Indeed, this busy period of the adolescence and youth influences the path of each social actor, because athletes must begin their professional and high sports performance career early in their life, but also prepare for the profession of their adult life.

This study was carried out on a sample of 250 performance athletes, aged between 18 and 20 years old and try to identify the athletes' opinion on dual-career, a new and integrative concept in the media language.

*Keywords:* dual career, athletes, education

## 1. Introcution

The fact that sports have become professional affects each athlete, each sports branch, and the number of practices and competitions for young athletes increases every year. Such events have a major impact in the personal and professional life, in labour market insertion within the phase following the sports life. Consequently, for many athletes, sports career overlaps the studies. Indeed, this busy period of the adolescence and youth influences the path of each social actor, because athletes must begin their professional and high sports performance career early in their life, but also prepare for the profession of their adult life. Hence, major objectives, corresponds to individual needs, actually overlap. At that point, or in early youth, dual-career begins. Following a careful analysis of various Erasmus + projects (such as "Gold in education and elite sports", 2015; "Innovating clubs for dual-career", 2015; "Gaming and online activities for learning to support the dual-career of athletes", 2016; "Handball for dual-career", 2017; "Dual-careers for alpine skiers", 2017), it is important to identify the athletes' opinion on dual-career, and to find solutions for implementing the European guideline with support directions in this respect, thus creating the need to change behaviour and attitudes. The dual-career concept can be implemented successfully only if athletes and their entourage (from coaches to parents) are aware of its importance. Approaching the issue from various angles (EU, governments, sports management bodies) may convey the message faster and more of the success. The existing networks may bring an important contribution to the dissemination of the concept of dual-career.

Dual-career comprises more than simple academic / work or sporting experiences, while successful dual-career management differs from one athlete to another. While dual-career may be continuous and positive for some athletes during the studies, others may suffer from emotional instability and vulnerability, which may lead to school or sports dropout (Amsterdam University of Applied Sciences et al., 2016). Academic and sport success is an individual responsibility, but it requires a support environment to stimulate the athlete's engagement, self-discipline, perseverance, determination, focus, dedication and efficient organization of studies and daily practices (Knight & Harwood, 2015). On the other hand, social integration issues at the end of sports career may emerge when athletes

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reduce their educational objectives or drop out from school, while the loss of human resources representing national sports pride may merge when talented athletes give up on sport to get a degree. For this reason, The European Parliament and the Commission obviously encourage efficient systems based on dual-career, minimum services of dual-career and professional personnel (The European Parliament, 2017, The European Commission, 2012).

Education is mandatory for the intellectual profile of a performance athlete, with or without the choice of a dual-career. An important characteristic of sports education refers to an institutionalized activity, conscious, systematic and organized within the education system stated in school documents, developed on cycles, levels and years of study, projected pedagogically through curricula, school syllabuses and manuals, university courses, guides, practically applied in the education process, under the supervision of specialized teaching personnel.

From a theoretical perspective, the theories regarding social representation will help us, because they have the role of highlighting a social opinion, being a multivalent conglomerate and articulated between the individual-psychological dimension (perception, imagination, representation, thought, etc) and the collective-social dimension (family, socio-professional group, public field, social field). Unlike ideology, representation does not impose; it creates, stimulates thought and facilitates for the individual adaptability, innovation; it does not limit or reduce one's universe through standard formulas. Thus, we will also assess whether this concept had the chance of being disseminated, thus turning intro a tool, with a relation emerging. The relation of social representation with ideology suggests the existence of a system of ideas in interdependence, corresponding to ideology; on the other hand, there are a series of deviations, of specific modulations called social representations, habits and moods (W. Doise, 1997). A similar view is expressed by A. Neculau (1996) who postulates that representations are parts of the ideology, with a multiple status, of content and product, acting on the symbolical level, focusing ideology and such, representations become the subject of ideological applications.

In this context, the field of social representations focuses on the explanations of social actors when related to unknown phenomena of the world, with unpredicted and impressive events. O A representation is the result of a process of communication referring to unknown, with a social impact, ideas that circulate and form common sense. The cultural phenomena where we are born, for instance collective events, social practices, the way of thinking and acting according to unwritten rules, form our social reality, being found in common sense knowledge, from which one may extract social representations (Markova, 2004).

Three key-processes generate social representations, as stated above: the emergence of the unknown item and the introduction to the communication process, the wish to know the strange item and the saturation of the event with symbolical meanings existing in the culture. The fundamental function of the symbol is to determine people to decipher the meanings of the abstract contents within the experience accumulated; it allows the social actors to feel what they see as a complicated scenario and to make up a summary in a social framework. Thus, the object of a social representation is assimilated to the system of values and standards of an individual or of the group to which he belongs. In other words, the object of social representation does not have a determined meaning, like a model, but it represents the relation between subject and object. A representation restructures reality, reduces unfamiliar to familiar to allow the concomitant integration of the objective characteristics of the object, of the subject's previous experiences and of the system of attitudes and standards This aspect defines representation, provides it with the form of a view on a segment of the world, giving the individual the possibility of conferring meaning to his behaviours and of understanding the environment through one's own universe of principles, beliefs, of adapting to the community.

## 2. Design of research

The identification of the athletes' opinion on dual-career, a new and integrative concept in the media language.

### *2.1. Research sample*

This study was carried out on a sample of 250 performance athletes, aged between 18 and 20 years old.

*2.2. Method*

The interpretation of the results for the first 2 items of the questionnaire, specific to the identification of social representation of dual-career, was carried out through the technique of the association of words, developed by P. Vergés (2001: 213) and of an alternative method for determining the structure and organization of the elements of a representation, proposed by Prof. C. Havârneanu, PhD (2001). For the first technique, we used the occurrence of mentions and average occurrence ranks, while the second technique was based on the occurrence of mentions and average ranks of importance. The formula for the last technique is:

Social representation indicator = occurrence of mentions x rank mean

**3. Results**

Table 1. Occurrence and ranks of mentions and importance

| No. | Category | Occurrence | Occurrence rank | Importance rank | RS indicator-Havârneanu |
|---|---|---|---|---|---|
| | Work | 100 | 2.49 | 3.6 | 304.5 |
| | Lack of free time | 91 | 2.41 | 2.70 | 232.50 |
| | Disengagement | 71 | 3.25 | 2.75 | 213 |
| | Lack of communication | 50 | 2.55 | 3.26 | 145.25 |
| | Submission | 50 | 2.78 | 2.80 | 139.5 |
| | Exaggerated discipline | 22 | 2.95 | 3.02 | 65.67 |
| | Compromises | 19 | 3.49 | 3.58 | 67.16 |
| | Negotiation | 18 | 3.51 | 3.20 | 60.39 |
| | Lack of legislation | 17 | 4.66 | 3.29 | 67.57 |
| | Lack of support | 15 | 3.40 | 2.56 | 44.7 |
| | Exhaustion | 6 | 3.29 | 2.85 | 18.42 |

Table 2. Nucleus and peripheral system al of social representation a of dual-career

| | Occurrence rank | | |
|---|---|---|---|
| | | Less than or 3 | More than 3 |
| Occurrence | More than or 60 | (100) work<br>(91) lack of free time | (71) disengagement |
| | Less than 60 | (50) lack of communication<br>(50) submission<br>(22) exaggerated discipline | (19) Compromises<br>(18) negotiation<br>(17) lack of legislation<br>(15) lack of support<br>(6) exhaustion |

**4. Interpretation of the results**

The interpretation of the results of the questionnaire, specific to the identification of social representation of dual-career, shows that this phrase is not correctly interpreted. It does not have a real connotation in the psyche of performance athletes. Because sport is not professionalized, there is no legislation adapted to the rigours and specific of sports microcosm; there are no guidelines for implementing dual-career, the social representation of this phrase is manifested in work and only work.

We have highlighted the lack of a correlation between sports work and professional career, or between performance sport and life after the end of the sports career.

Most answers focused on the way an athlete is treated, his capacity during the sports career and the lack of clear support strategies for an athlete ending his sports career suddenly, due to injuries or age. Respondents talk about an unsafe environment and about the hours they spend in practices, about the lack of free time and about the impossibility of combining sports career and studies.

Thus, we note that the central nucleus of representation, the essence of the athletes' answers reflect their opinions on dual-career. Considered overall, the central nucleus or the words defining it means sacrifices without any purpose.

The peripheral system, the mobile system capable of modifying the crystallized opinion of athletes is highlighted by specifications that may lead to strategies, guidelines that may support the support of athletes: legislation, support policies and organizations that plead for, obtain, disseminate and implement codes, regulations, laws destined to this microcosm, different and important of life.

In order to ensure a holistic development of the talented and elite athletes and a future role for them in society at the end of their sports career, The European Parliament (2017) and the European Commission strongly recommend the balanced combination of higher education and sports career (for instance, dual-career) (The European Commission, 2017) and they argue for a minimum of services and facilities for dual-career (Amsterdam University of Applied Sciences et al., 2016).

Dual-career is a multidimensional field, with a multitude of interested parties acting on a micro level (for instance, an individual athlete), meso (for instance, parents, colleagues, teachers / employers, coaches, managers athletes), macro (for instance, sports federations/clubs, education establishments and labour force markets) and policies (for instance, the national and European leading bodies). These interested parties have different responsibilities in supporting the elite athletes during high performance competitive years and in facilitating their transition to an alternative professional career at the end of their sports career (Capranica & Guidotti, 2016).

Sport has known, in the most recent decades, a spectacular development in both qualitative and quantitative terms, which determined the emergence of new forms of management and modernization of the structures of sports organizations. The economic sector developed and attracted the development of the sports field, through an evolution of the industry of sporting materials and equipment, of the interest for setting up the practice and competition venues (sports arenas, gymnasiums, pools), of the wish for immediate recovery post-effort (because the number of competitions increased and the human body must resist under any circumstances), of specialists' training. All of them are based on a system of services legitimizing the implementation of the major principles of economic

rationality. In this context, it is mandatory to also develop straining strategies for the athlete in the post-performance period, to support him in his future professional endeavours (because he may not be able to access a professional career compatible with sport) and to provide legal financial and medical support during the unfortunate experiences caused by sports life.

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# PHYSICAL ACTIVITY AND EATING HABITS IN A SAMPLE OF TEENAGERS IN IAȘI

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**Abstract**

**Introduction**: balanced diet and systematically practiced physical activity represent the basic elements for preserving the health of young people. These two factors also play an important role in bodyweight control, an essential aspect for teenagers.
**Material and method**: the study was conducted on a sample of 167 students of the ninth grade, aged between 14 and 16. A questionnaire was applied to 78 students at the "O. Băncilă" Musical High School and 89 at the Economic High School in Iași. The teenagers filled out a questionnaire with questions concerning the time allocated to physical activity daily and the eating habits. The results were interpreted on collectives using Pearson's test.
**Findings and discussions**: in most cases, young people allocate daily to physical activity between 15 and 30 minutes (29.94%) or between 30 and 60 minutes (29.34%), with insignificant differences on collectives ($p>0.05$, $f=3$, $\chi^2=3.772$). Young people are recommended to allocate over 60 minutes daily for physical activity, which only occurs present in 20.95% of the situations. The dominant cheese intake is once (35.92%) or 2-3 times (31.73%) a week, an inadequate result because there is the risk of the onset of protein and mineral misbalances. The differences calculated on collectives are statistically insignificant ($p>0.05$, $f=3$, $\chi^2=1.628$) and they suggest the existence of similar eating habits. Meat products are featured in menus, mostly 2-3 times (37.12%) or once (27.54%) a week, with significant differences for $p<0.05$ ($f=3$, $\chi^2=8.201$), suggesting the possibility of modifying eating habits. Potatoes are featured in the menus, especially 2-3 times (40.11%) or de 4-7 times (32.93%), with statistically insignificant differences ($p>0.05$, $f=3$, $\chi^2=7.002$). Pasta/rice are consumed in most cases, 2-3 times (37.12% or once (33.53%) a week. The differences calculated on collectives are still statistically insignificant ($p>0.05$, $f=3$, $\chi^2=7.405$). This leads to a reduced intake of protein-rich products, an alarming element for the specialists in the field.
**Conclusions**: the teenagers are prone to reducing food intake and not to increasing the time allocated to physical activity when they wish to preserve bodyweight at a certain level. It is an alarming action that may have undesired effects on their health.

*Keywords:* sports activity; eating habits; health.

## 1. Introduction

Balanced diet and systematically practiced physical activity contributes to ensuring normal growth/development, to preserving health state and to the cognitive development of children. We have identified three basic areas for healthy school life represented by: education for health integrated in school curriculum, the school setting and proper educational intervention from the family, mostly concerning healthy diet (Sabinsky, Hostgaard Bonde, Wurr Sternqvist, Jessen-Klixbüll, Terkildsen Maindal &Tetens, 2018).

Systematically practiced physical activity contributes to the development of leadership qualities, the emergence of respect for authority, competitiveness, cooperation, self-discipline and respect for the personal forces. A child practicing sport will be capable to propose a certain target sand to make consistent efforts to attain it (Lisinkiene & Šukys, 2014).

Physical activity performed regularly contributes to the development of mental processes represented by planning, organisation and behavioural control. Numerous studies highlight the existence of a positive relationship

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between daily physical effort and the cognitive development associated with increased academic performances (Haapala, 2013). A recent report carried out by The Centre of Disease Control and Prevention (CDC) highlights the positive influence of physical activity practiced during school schedule on attention, attitude, behaviour and school performances (Chaddock, Pontifex, Hillman & Kramer, 2011).

We have identified a series of factors influencing the physical activity made by students. We refer to racial and ethnic influences on family dynamic and structure, the origin (urban – rural), the habitation setting and the school. Different research studies show differences related to practicing physical activity among persons of various ethnic groups (Gilman & Volpe, 2018). The presence of both parents in the family can stimulate a child to be active. The existence of a monoparental family can be associated with a lower stimulation of a child for physical activity. The background of the family is an essential factor of stimulation, children with a rural background record higher obesity values and lower values for height. Other factors may be involved, such as diet. The habitation setting is also important because in the areas with proper spaces for practicing physical activities and children's concern for them increases. School has an important forming role because students spend much time here. If the teaching staff members give up on the Physical Education classes in favour of mathematics, physics, a sedentary style is set to emerge.

Students in Malaysia were asked about the reasons for giving up on physical activity. Their answers regarded as follows: absence of leisure time necessary (41.7%), fatigue caused by the university schedule (41.5%), not enough sleep, so unable to get up early and exercise (37.90%) (Saleem, Bashaar, Hassali, Haque, Iqbal, Ahmad, Khan, Din Ahmad, Thawani &Hashemi, 2018).

Systematically practiced physical activity must be associated with balanced diet, adapted to the needs of a growing body. An essential aspect is the one of eating habits formed in the family sand perpetuated for the rest of a person's life or very hard to change. In a study carried out in the USA on college students, it was found that 44.00% maintained their eating habits, though they had left the family home. Practically, this study aimed at analyzing the reduced influence of parents on students' diet, but they did not find it among college students (Abraham, Noriega & Young Shin, 2018).

Eating habits can be modified, but the programs in this respect must be designed carefully. Among Dutch teenagers within vocational high schools, they propose the introduction of breakfast serving programs in school. In these clubs, they serve only healthy food, which allows the education of young people in the sense of healthy food. This makes it possible to have an educational intervention in socially vulnerable groups. A problem emerged related to the control of the program and to its adaptation to "the real world", namely population diet (Berg Cristensen & Egberg Mikkelsen, 2019).

It is essential to develop these programs in the present, when young people are more and more concerned with body image and with identifying with the current beauty ideal: of young people with coveted muscle masses and slender people (Abalasei & Trofin, 2016). Young people may go into exaggerated diets, which may affect their health severely.

The objectives of the study: knowing the time allocated daily to physical activity; appraising the differences emerging/not emerging among students, concerning the concern for systematically practiced physical activity; evaluating eating habits of the students within the study sample; learning the differences that exist/do not exist between the eating habits of students within the two collectives studied, an essential aspect because in the Moldavian area there is a strong anchoring in tradition; the evaluation of the correlation between physical activity and diet (chicken meat and sweets).

## 2. Material and method

The study was conducted on a sample of 167 students of the ninth grade, aged between 14 and 16 years old. A questionnaire was applied to 78 students at the "O. Băncilă" Musical High School and 89 at the Economic High School in Iași. The teenagers filled out a questionnaire with questions concerning the time allocated to physical activity daily and the eating habits.

To the question: "On a day when you do sports or other physical activities (in minutes)?" the choices are: less than 15 min. – 15/30 min. – 30/60 min. – over 60 min.

Eating habits are assessed using a questionnaire of weekly occurrence of food intake. We studied the animal product intake (cheese, chicken meat, cured meat) and vegetal intake (potatoes, pasta/rice, sweets). The choices are: zero – once – 2/3 times – 4/7 times a week. The evaluation was carried out comparatively on the two collectives studied. For chicken and sweets we also made the correlation between weekly product intake and the time allocated daily for physical activity.

The results were interpreted on collectives using Pearson's test.

## 3. Results

The study follows two directions represented by the time allocated daily for physical activity and eating habits.

Physical activity practiced constantly contributes to preserving health state and to bodyweight control. Among the study sample, 19.76% of the young people who exercise less than 15 minutes daily, this is far less than enough. Only 20.95% of the students allocate to physical activity over an hour daily, which corresponds to international recommendations (Table 1)

Table 1. The time allocated daily for physical activity

| Collective | Less than 15 min. | 15-30 min. | 30-60 min. | Over 60 min. |
|---|---|---|---|---|
| Music high school | 11 | 24 | 27 | 16 |
| Economic high school | 22 | 26 | 22 | 19 |
| Total no. | 33 | 50 | 49 | 35 |
| % | 19.76 | 29.94 | 29.34% | 20.95% |

On collectives, the differences calculated are statistically insignificant ($p>0.05$, $f=3$, $\chi^2=3.772$), which is alarming because they indicate certain habits of the students questioned.

The appraisal of eating habits is very important because teenagers are concerned with maintaining bodyweight, reason for which they go through uncontrolled diets. The study focuses on animal and vegetal products. For animal products, we studied the intake of cheese, chicken meat and cured meat.

Cheese products are featured in menus mostly once (35.92%) or 2- 3 times (31.73%) a week. Balanced diet (4-7 times) is mentioned only by 12.57% of the teenagers. An alarming figure is the 19.76% of negative answers, a result indicating the existence of eating habits not adapted to the needs of a body in growth (Table 2).

Table 2. Frequency of cheese products in menus

| Intake | Zero | Once | 2-3 times | 4-7 times |
|---|---|---|---|---|
| Music high school | 13 | 28 | 25 | 12 |
| Economic high school | 20 | 32 | 28 | 9 |
| Total no. | 33 | 60 | 53 | 21 |
| % | 19.76 | 35.92 | 31.73 | 12.57 |

The differences calculated on collectives are statistically insignificant ($p>0.05$, $f=3$, $\chi^2=1.628$) and they suggest the existence of similar eating habits among the students questioned.

Whereas cheese products are not consumed in proper amounts, the issue of animal protein intake may be solved by meat intake, especially chicken meat. It is present in menus mostly 2-3 times (43.11%) or 4-7 times (33.53%) (Figure. 1).

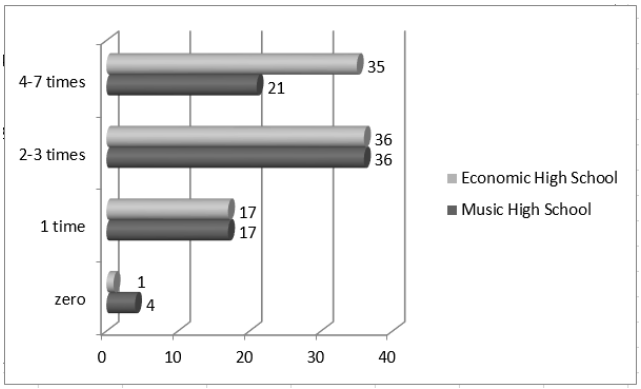


Fig. 1. Weekly intake of chicken meat

This is an acceptable result because other types of meat may be consumed. The differences calculated are statistically insignificant ($p>0.05$, $f=3$, $\chi^2=4.728$) and they suggest the existence of strong anchoring in family tradition within the study sample. Also concerning chicken meat, we assessed the correlation between weakly intake and daily physical activity. Normally, more effort should be accompanied by higher food intake. Unfortunately, we have not found this, the differences calculated being statistically insignificant ($p>0.05$, $f=9$, $\chi^2=3.579$) (Table 3).

Table 3. The correlation chicken meat intake – physical activity

| Intake | Less than 15 min. | 15-30 min. | 30-60 min. | Over 60 min. |
|---|---|---|---|---|
| Zero | 1 | 2 | 2 | - |
| once | 6 | 11 | 9 | 8 |
| 2-3 times | 17 | 23 | 19 | 13 |
| 4-7 times | 9 | 14 | 19 | 14 |

Meat products (cured meat) have been introduced in the diet of the Romanian population rather recently. In most cases, they are consumed 2-3 times (37.12%) or once (27.54%) a week (Table 4).

Table 4. The presence of cured meat in the diet of the teenagers

| Intake | Zero | once | 2-3 times | 4-7 times |
|---|---|---|---|---|
| Music high school | 15 | 24 | 25 | 14 |
| Economic high school | 6 | 22 | 37 | 24 |
| Total no. | 21 | 46 | 62 | 38 |
| % | 12.57 | 27.54 | 37.12 | 22.75 |

The differences calculated are statistically significant for $p<0.05$ ($f=3$, $\chi^2=8.201$) and they suggest the possibility of modifying eating habits. Modification is possible, but such nutritional programs must be coherent and adapted to the situation of the population.

The vegetal products taken into account within our study are represented by potatoes, grains and sweets. Potato is a traditional product for our country, and its production is large-scale. Ewe have also noticed it in the study sample, where the dominant answer is 2-3 times (40.11%) or 4-7 times (32.93%) (Table 5).

Table 5. Potato intake among the students questioned

| Collective | Musical high school | Economic high school | Total |
|---|---|---|---|
| Zero | 4 | 0 | 4 – 2.39% |
| once | 18 | 23 | 41 – 24.55% |
| 2-3 times | 35 | 32 | 67 – 40.11% |
| 4-7 times | 21 | 34 | 55 – 32.93% |

The differences calculated are also statistically insignificant ($p>0.05$, $f=3$, $\chi^2=7.002$) and they suggest the existence of similar eating habits in the families of the students questioned. This is not a problematic result, because besides potatoes they may have other vegetable intake.

The grains within our study are represented by pasta and rice. These products are rich in vegetal proteins and carbohydrates, thus providing a caloric intake exceeding 250 kcal/100 g of product. They are featured in menus, especially once (33.53%) or 2-3 times (37.12%) a week. An alarming figure is the 14.97% of young people who answered zero (Table 6).

Table 6. Weekly grain product intake

| Collective | Musical high school | Economic high school | Total |
|---|---|---|---|
| Zero | 10 | 15 | 25 – 14.97% |
| once | 34 | 22 | 56 – 33.53% |
| 2-3 times | 24 | 38 | 62 – 37.12% |
| 4-7 times | 10 | 14 | 24 – 14.37% |

The differences calculated on collectives are still statistically insignificant ($p>0.05$, $f=3$, $\chi^2=7.405$), which is easy to understand among teenagers, as they want to control their bodyweight.

A special attention should be given to sweets, which are important sources of carbohydrates, but with high caloric intake. Within the study sample, these products are consumed, especially 4-7 times a week (56.28%) or 2-3 times (29.34%) (Figure. 2).

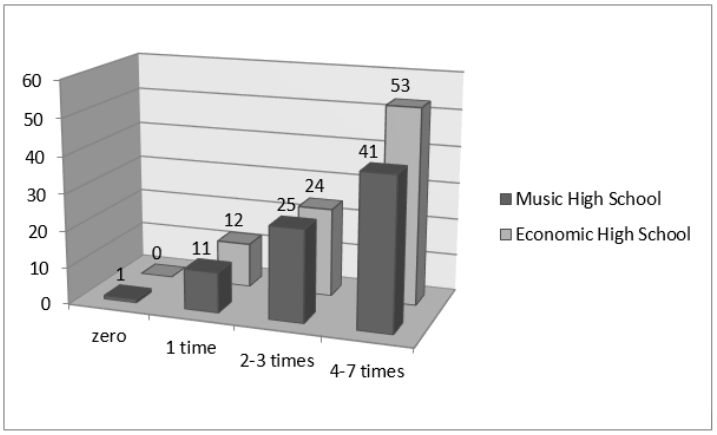


Fig. 2. The presence of sweets in the menus of the students within the study sample

Whereas there are concerns related to bodyweight control, sweets are still featured in menus, the differences calculated being obviously statistically insignificant ($p>0.05$, $f=3$, $\chi^2=1.765$).

We have made the correlation between physical activity practiced daily and sweets intake. They provide the energy necessary to exercise. At first glance, it would have been necessary to increase intake as the efforts are greater. Unfortunately, it is not the case, the differences calculated being statistically insignificant ($p>0.05$, $f=9$, $\chi^2=3.976$) (Table 7).

Table 7. The correlation physical activity- sweets intake among the teenagers questioned

| Intake | Less than 15 min. | 15-30 min. | 30-60 min. | Over 60 min. |
|---|---|---|---|---|
| Zero | 0 | 1 | 0 | 0 |
| once | 6 | 5 | 8 | 4 |
| 2-3 times | 9 | 15 | 14 | 11 |
| 4-7 times | 18 | 29 | 27 | 20 |

## 4. Discussions

The study follows two main directions represented by the time allocated daily for physical activity and by eating habits.

According to international recommendations, the time allocated daily for physical activity among students should be at least 60 minutes each day (Haapala, 2013). In the study sample, only 20.95% of the young people follow these guidelines. An alarming figure is the 19.76% of the students who answered less than 15 minutes which is worrisome

because they do not exercise, practically. Among the students in Suceava, 15.66% of the answers mark over 60 minutes daily and 23.49% – less than 15 minutes (Albu, Dima, Badaluta & Carausu, 2018).

The time allocated daily for physical activity is reduced among the students within both counties studied. This is easily understandable given the young people's concern for exercising. In a study carried out in Romania on a sample of adults aged between 35 and 74 years old, it is worth noting the presence of 43.4% persons aged 35-49 years, of 35.1% adults aged over 50-59 and of 21.6% persons aged 60-74 who exercise often. The interest for physical activity decreases by age. Men are more interested in exercising than women are (Rada, 2017).

This is a result worth considering because currently, researches study the correlation between physical activity carried out by parents and sports practiced by children. A parent exercising systematically will be a model for the child, who will be interested in sports (Tanaka, Okuda, Tanaka, Inoue & Tanaka, 2018; Bringolf-Isler, Schindler, Kayser, Suggus, Probst-Hensch, 2018).

Among teenagers in the Elhafeir area of Sudan, constant physical activity (over 60 minutes) is mentioned by 51.00% of the young people; 26.2% report not exercising (Misaa, Somiya & Siham, 2018).

Teenagers from a technical high school in Istanbul practice physical activity daily only in a proportion of 43.2%. Moreover, 14.9% report exercising 3-2 times a week and 12.6% answered never (Yüksel, Önal & Kurt, 2017). Negative answers include 7.7% of the boys and 4.9% of the girls. This is an interesting result because in the study carried out in Romania, in the Suceava County, we recorded 29.35% less than 15 minutes among girls and only 12.28% such answers among boys. The data provided by Add Health (National Longitudinal Study of Adolescent Health) in the USA highlight the existence of 48.79% among boys and 46.88% among girls who reported exercising during the last week two times and less (Jacobs, 2019).

Teenagers in Malaysia are not concerned with physical activity. The low level was reported by 44.8% of the boys and 69.2% of the girls, with significant differences by gender (Ng, Hairi, Jalaludin & Majid, 2019).

The second aspect studied is related to the eating habits of teenagers. This element should be studied thoroughly, because in the Moldavian area, there is a strong anchoring in family traditions. The correlation between mother's educational level – diet carried out in a high school of Iași has highlighted the existence of statistically insignificant differences, indicating similar eating habits in the families studied (Albu, Rada, Albu, Cracana, Lupu, 2011).

In the study sample, we have found a similar result, because the differences calculated on collectives are statistically insignificant, indicating the existence of the same eating habits. The situation is difficult, because a balanced diet is present among a small number of students. Awe have found many answers of zero (no intake) generated by the concern for maintaining bodyweight (pasta/rice), the lack of intake for a certain product in the family or simply not standing the taste of a certain food. In a study conducted on teenagers in Turkey, distaste was related to certain grain products (21.4%), to meat (13.2%), to vegetables (10.0%) (Demirici &Toptas Demirici, 2018).

Certain vegetables are not consumed because children ate the taste, smell, colour, texture, because they do not eat it in the family (Ragio & Gámbaro, 2018). A series of new elements were reported, which should be taken into account by the specialists in the field when initiating nutritional programs in schools.

An interesting result obtained in this study is related to the absence of the correlation between diet and the time allocated to physical activity. Diet is inadequate even if young people practice sport, which entails higher energy consumption. Unfortunately, they choose to cut from the diet and not to increase the time allocated to physical activity as a way to control bodyweight. This result indicates the lack of information from the students related to the risk of nutritional misbalances and to the beneficial roles of the systematic practice of physical activities. The students in the USA take their diet-related information from parents (82.5%), the Web (52.5%), school (42.5%) or friends (32.5%), not from the specialists in the field. There are also 7.5% of the answers attesting the absence of information in this respect (Partida, Marshall, Henry, Townseen & Toy, 2018). In Romania, there is no coherent information programs for young people related to the importance of ensuring a balanced diet and physical activity.

## 5. Conclusions

The time allocated by students to the practice of physical activity is frequently lower than the international guidelines, recommending over 60 minutes. In exchange, diet is often insufficient; in just a few cases, the body receives the adequate daily ratio or 4-6 times ratio per week of the various food groups. The correlation between food intake and physical activity highlights statistically insignificant values, thus no modification of the diet by the physical effort made daily.

Studies in this respect are scarce for Romania, but they have become increasingly important because they identify emerging issues and they shift the focus of educational programs in the right direction. For instance, fruit in school as part of a national program for a population that already consumes them is not a highly educational gesture.

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ICU 2019

# THE EATING HABITS OF STUDENTS IN A SPORTS HIGH SCHOOL AND IN A THEORETICAL HIGH SCHOOL IN IAȘI

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**Abstract**

**Introduction**: Diet is an environmental factor with a major impact on the normal growth and development of children and teenagers. It is even more important among students who practice performance sports, because it contributes to health and to increased sports performance.
**Material and method**: the sample within this research comprises 155 10th graders within two high schools in Iași. We examined 75 students at the Sports High School and 80 teenagers at the "G. Ibrăileanu" National College. They filled in a questionnaire concerning their weekly food intake. We have processed the results using Pearson's test.
**Findings and discussions**: the balanced (daily) dairy intake was reported by 8.38% of the teenagers, while an absence thereof by 12.90% of the students. The differences calculated on collectives are not statistically significant ($p>0.05$, $f=4$, $\chi^2=7.310$) and they highlight the students at the Sports High School, for whom a balanced diet is essential. The balanced egg intake (daily) was reported by 9.03% of the students, while the absence of such intake by 10.96% of the teenagers. The differences calculated are not statistically significant ($p>0.05$, $f=4$, $\chi^2=2.001$), which is hard to understand among sports students, for whom a balanced development of the lean mass is essential. Lean mass requires proteins for a harmonious development. Fruits are present in the menus, mostly 2-3 times a week (34.19%) or daily (30.96%). Only 2.58% of the students report no fruit intake. It is not necessary to use national programs in order to increase fruit intake, even among students who reported fruit intake once or 2-3 times a week, because most students eat fruits 2 or 3 times a day. The differences calculated are not statistically significant ($p>0.05$, $f=4$, $\chi^2=3.804$), which stands to show the existence of similar eating habits among the sample of students within this research. Sweets are present in their menus, especially daily (35.48%) or 4-6 times (21.93%) a week. The differences calculated on collectives are obviously not statistically significant ($p>0.05$, $f=3$, $\chi^2=3.208$).
**Conclusions**: the situation is alarming among sports students, because there is no adjustment of diet to physical effort, namely to the type of sports activity practiced.

*Keywords:* sport, performance, healthy eating habits.

## 1. Introduction

Balanced diet is essential for the normal growth/development of any teenager and for maintaining sports performances among persons who carry out a performance physical activity.
Among students within sports high schools, it is necessary to monitor carefully the diet and to have specialised nutritional education intervention. Unfortunately, in Romania there is not a nutrition specialist in each sports high school, reason for which diet remains a concern of the coach, of the family and of each student. A triangle emerges represented by the coach, athlete and parent (Lisinkiene & Šukys, 2014).

The relationship coach-athlete-family should be able to ensure to the student the best conditions for a positive sports educational experience. Efficiency increases when parents understand their role in ensuring the

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positive evolution of a child, when the athlete child is motivated to practice sport and when the coach looks for the best means to improve the technical and mental skills.

The collaboration between the coach and parents must exist during the entire period when the child practices performance sport (Lisinkiene & Šukys, 2016). The coach should present to the family the advantages of systematically practicing physical exercise, while the family must understand physical activity as a way to develop responsibilities and interpersonal relationships and not as a way to spend leisure time.

Within this relationship, it is also important to approach aspects related to balanced diet. Unfortunately, there are numerous problems associated because the athletes, coaches and parents have little information in this respect. Many times, they end up using "miraculous" diets and pharmaceutical supplements that the athlete may or may not need (Feili, Sabet, Mokhtari & Hejazi, 2018).

There are situations where the coach has little information related to the dietary intake of the athlete. In a study carried out in the USA on coaches in track and field, concerning the access to information related to nutrition; we note the presence of 43.5% answers of sometimes and of 34.0% answers of often. It is worth noting 7.00% answers of never (Guindon, Winkelmann, Eberman & Games, 2018).

Dietary information is essential because a misbalance may occur between daily energy output and ensured intake. In a study carried out in the USA on female tennis and soccer players, important energetic differences are pointed out, which should be corrected. Among female tennis players, the daily energetic expenditure reaches 2557 +/-113 kcal, while intake 2010+/-207 kcal. Thus, there is a daily caloric deficit of -540 kcal, which represents a great problem. In female soccer players, daily average consumption is 2485+/-208 kcal, while intake 1895 +/- 428 kcal. There is a difference of -590 kcal per day, which may represent a problem for maintaining the health state of the female players and of their sports performances (Yli-Piipari, 2019).

Another important element is related to ensuring the financial resources necessary to support balanced nutrition. In a study carried out in the Republic of Moldova, it was found that the amount of 220 Moldovan lei or 44 Romanian Lei or 12 US dollars were allocated per day for the diet of athletes attending international competitions (Rubanovici, Friptuleac & Cebanu, 2015). For sports high schools, these amounts are even smaller: in 2015, 38.90 Moldovan lei among students aged 12-15 and 51.80 Moldovan lei among students aged 16-19 for boarding high schools specialised in sports. In this context, the diet of the students and subsequently of performance athletes is not balanced, thus unable to cover all necessities required by the periods of practice, pre-competitive, competitive and of recovery.

## 2. The objectives of the study

The objective, identifying the diet of teenagers; relating the diet of the students to the standards of proper nutrition; comparative assessment of eating habits of the students within the two collectives studied; assessment of the differences emerging/not emerging between the diet of the students in the sports high school and the one of the students of the theoretical high school.

Material and method: the study sample comprises 155 tenth grade students from two high schools of Iași. We have examined 75 students of the sports high school and 80 teenagers of the “G.Ibrăileanu” National College aged between 15 and 17. The young students filled out a questionnaire on the weekly dietary intake. We have assessed the weekly intake of animal products (milk, eggs) and vegetal products (fruits and sweets). There were multiple choices: zero – once – 2/3 times – 4/6 times – daily. For fruits and sweets, we have also assessed daily intake: once – 2 times – 3 times – 4 times – more times. We have excluded the students who reported zero (4 students for fruit intake and 6 for sweets intake). We have also studied morning food intake “Have you had breakfast?” There were two choices: YES – NO. The results were processed using the test Pearson – CHI Square.

## 3. Results

The study focuses on two main direction represented by the weekly intake of animal products (milk, eggs), vegetal (fruits, sweets) and morning food intake.

In most cases, milk is featured in the menus de 2-3 times (32.90%) or once (32.25%) a week, which is totally not adapted to the nutritional needs of the students. Balanced intake (daily) is featured only by 8.38% of the teenagers. It is worth noting 12.90% negative answers, which should draw the attention of specialists in the field (Table).

Table 1. Weekly intake of milk

| Intake | Zero | once | 2-3 times | 4-6 times | Daily |
|---|---|---|---|---|---|
| Sports high school | 7 | 26 | 30 | 6 | 6 |
| Theoretical high school | 13 | 24 | 21 | 15 | 7 |
| Total no. | 20 | 50 | 51 | 21 | 13 |
| % | 12.90 | 32.25 | 32.90 | 13.54 | 8.38 |

The differences calculated are not statistically significant ($p>0.05$, $f=4$, $\chi^2=7.310$), an element suggesting similar eating habits among the respondents. This is an alarming result for the student athletes with increased dietary needs.

The absence of milk from the diet may be compensated by an increase in egg consumption. This should at least compensate for the intake of animal proteins and fat. In most cases, (40.00%) eggs are consumed 2-3 times a week, thus failing to meet the standards of proper nutrition. Balanced intake (6-7 eggs a week) is mentioned by 9.03% of the respondents, to which we add other 17.41% answers of 4-6 times (Table II).

Table 2. Frequency of eggs in the menus

| Intake | Zero | once | 2-3 times | 4-6 times | Daily |
|---|---|---|---|---|---|
| Sports high school | 7 | 18 | 27 | 15 | 8 |
| Theoretical high school | 10 | 17 | 35 | 12 | 6 |
| Total no. | 17 | 35 | 62 | 27 | 14 |
| % | 10.96 | 22.58 | 40.00 | 17.41 | 9.03 |

It is worth noting 10.96% students who mentioned zero. Negative answers are present among students within both groups, reason for which the differences calculated are not statistically significant ($p>0.05$, $f=4$, $\chi^2=2.001$).

Fruits are present in the menus mostly 2-3 times (34.19%) or daily (30.96%). It is worth noting 2.58% students who mentioned zero (Table III).

Table 3. The weekly intake of fruits

| Collective | Sports high school | Theoretical high school | Total |
|---|---|---|---|
| Zero | 3 | 1 | 4 – 2.58% |
| Once | 13 | 20 | 33 – 21.29% |
| 2-3 times | 29 | 24 | 53 – 34.19% |
| 4-6 times | 6 | 11 | 17 – 10.96% |
| Daily | 24 | 24 | 48 – 30.96% |

Such answers are featured in both groups studied, the differences calculated thus being not statistically significant ($p>0.05$, $f=4$, $\chi^2=3.804$).

Weekly intake of fruits is important, as well as daily intake, because a student that eats them 2-3 times a week, but on those days 2-3 times will have covered the proper dietary intake. The dominant result is 2 times (35.09%) or once (20.52%) per day, but there are 44.37% alarming answers of 3-4 or more times per day (Fig. 1).

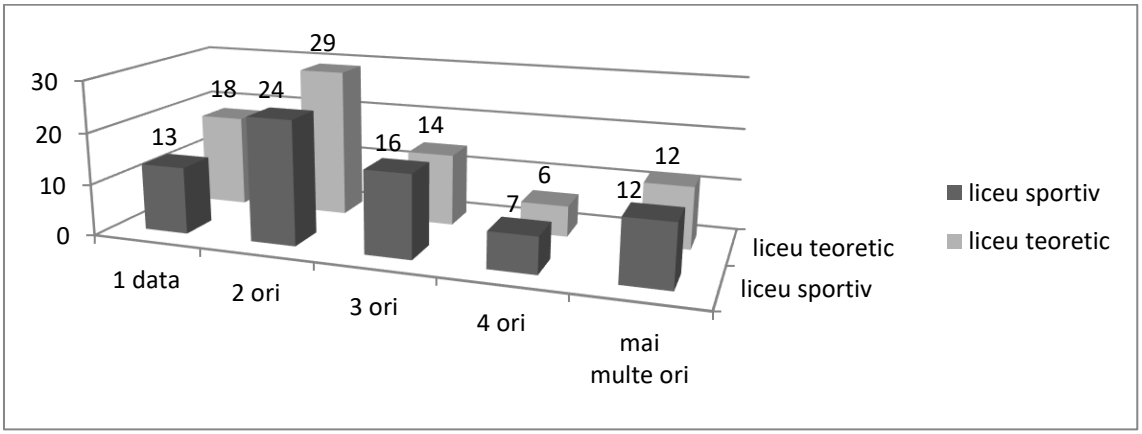


Fig. 1. Daily frequency of fruits in the menus

Sweets are consumed frequently by students due to their taste. The dominant answer is daily (35.48%) or 4-6 times, as well as 2-3 times (21.93%). It is worth noting 3.87% students who mentioned zero (Table IV).

Table 4. Presence of sweets in the menus

| Collective | Sports high school | Theoretical high school | Total |
|---|---|---|---|
| Zero | 5 | 1 | 6 – 3.87% |
| once | 12 | 14 | 26 – 16.77% |
| 2-3 times | 15 | 19 | 34 – 21.93% |
| 4-6 times | 17 | 17 | 34 – 21.93% |
| Daily | 26 | 29 | 55 – 35.48% |

Negative answers are present in both groups, the differences calculated thus being not statistically significant ($p>0.05$, $f=4$, $\chi^2=3.338$).

Sweets must be consumed, because they are the source of essential carbohydrates for the proper function of the nervous system. The important thing is not to exaggerate, because they may lead to overweight and obesity. Among the respondents, daily intake is mostly 2 times (28.85) or once (23.48%) per day. There are also 47.65% of the answers of 3-4 or more times per day, which is quite alarming (Fig. 2).

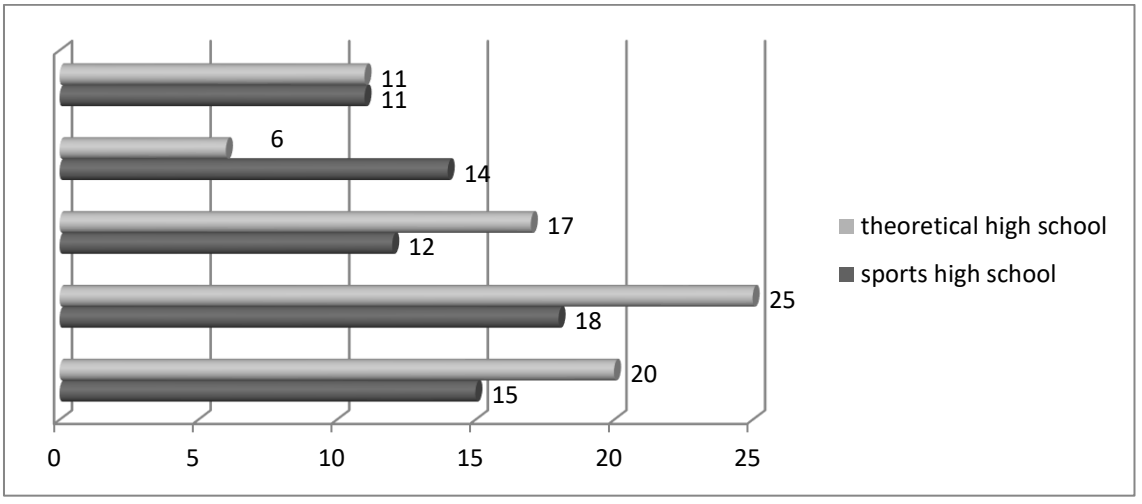


Fig. 2. Daily intake of sweets

We have made a comparison between weekly occurrence of fruits and sweets in diet of the students. In fruits, the dominant answer is 2-3 times (34.19%) while for sweets, daily (35.48%), the differences calculated being statistically significant ($p<0.05$, $f=4$, $\chi^2=12.020$). This is a questionable choice, because it highlights the preference for sweets by the respondents, even if they are also concerned with not gaining weight.

Morning food intake is essential for any student, but vital for those who practice performance sport. Unfortunately, it is absent in 38.06% of the students, which is alarming concerning the daily caloric needs and the preservation of health (Fig. 3).

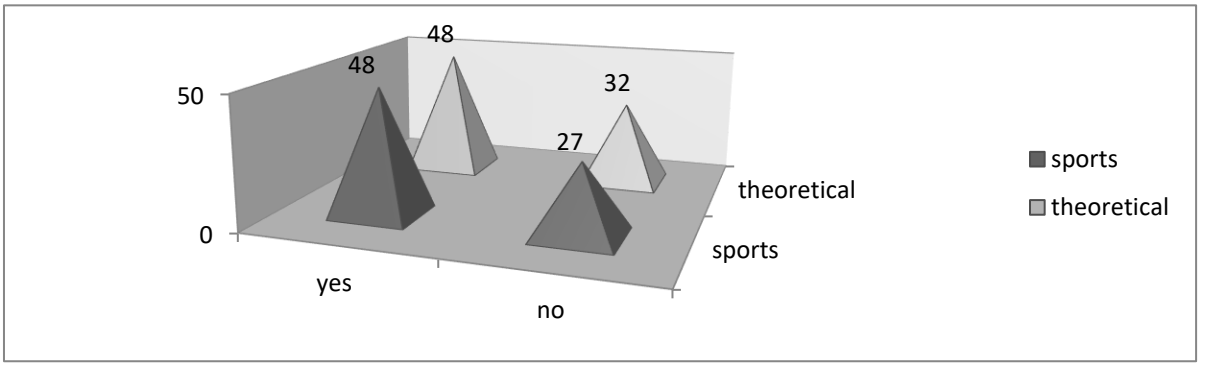


Fig. 3. Presence of morning dietary intake among the respondents

The results obtained for the two collectives studied are similar, the differences calculated being not statistically significant ($p>0.05$, $f=1$, $\chi^2=0.244$).

Discussions: balanced diet represents a factor for maintaining the trophicity of the muscles and bones, important elements for athlete students. They should have animal and vegetal proteins, animal and vegetal fat, carbohydrates, mineral elements and vitamins, practically diet must be adapted to the needs of the body.

Milk is rich in proteins, fat, carbohydrates and mineral elements. It is rich in quality proteins, namely proteins rich in essential amino-acids. The proportion of amino-acids in milk differs by its type, being greater in case of sheep milk (Ratu, Dolis, Hodorca, Onose & Usturoi, 2018). Milk, dairy and cheese products represent the best source of calcium. This is an important piece of information, mostly for the performance athletes who fail to ensure their intake of mineral elements. A study carried out on the female soccer players in Australia highlights the existence of numerous problems related to ensuring mineral elements. Furthermore, the female athletes hare better informed regarding compared to male athletes (Condo, Lohman, Kelly & Carr, 2019).

In the study sample, the answer adapted to the standards of proper nutrition (daily) is featured only by 8.38% students, to which we add 13.54% of the young people with an intake of 4-6 times a week. Thus, we have found 21.92% answers that may be considered acceptable. A study conducted in the sports high school in Iași on the students of the ninth and tenth grade highlights the existence of 11.33% answers of balanced intake, to which we add 9.33% of the teenagers with an intake of 4-6 times a week. Absence of intake is acknowledged by 12.90% of the students within the study sample, while at the ninth and tenth grade 10.66% of the teenagers (Albu, Grigoras & Abalasei, 2018). The result is alarming because diet is not modified by the type of collective, or by classroom at the sports high school, thus by the different needs of the young people.

The dietary investigation conducted in 2015 also in the sports high school in Iași underlines the existence of 28.72% of the students who mentioned 4-7 times a week and 10.63% without any intake (Albu, Hodorca, Onose, Cracana, 2015). This is an alarming result because we have concluded the absence of concern from the part of medical professionals, of coaches and of the family to adapt the diet to the real needs of the student. Furthermore, we note the existence of a strong anchoring in the dietary traditions of families in the Moldavian area, an element that should draw the attention of specialists in the field of nutrition. Eating habits can be modified, but under special circumstances, when we insist on problems and on the benefits for health.

In a study conducted in Iran on female teenagers, they found 35.90% negative answers and 19.39% answers of balanced intake (Shahraki- Sanavi, Rakhshani & Ansari-Moghaddam, 2017).

among the teenagers in Rawalpindi, they have reported a presence of 32.6% negative answers and of 46.7% answers of balanced intake (daily o data or two times per day) (Naseer, Mahmooud, Fazil, Bilal, Kulsoom & Hamid, 2018). The answers are different and they reflect the distinct eating habits of teenagers from various regions on Earth.

Eggs are rich in proteins, fat, vitamins and mineral elements. Proteins have a balanced content of essential amino-acids, being considered products of reference. Balanced intake is featured among 9.03% of the young people, while absent among 10.96% of the students. In the study carried out in the same high school, on the teenagers in tenth and eleventh grade, 8.66% of the answers were of balanced intake and 10.00% absence of intake (Albu, Grigoras & Abalasei, 2018). The situation is similar to the one of milk, namely nearly identical results, the same eating habits, though the necessary is different.

Among the teenagers in Rawalpindi, eggs are consumed daily in 38.5% of the cases, and negative result is featured in 15.6% of the young people (Naseer, Mahmooud, Fazil, Bilal, Kulsoom & Hamid, 2018).

Fruits require a special attention from nutritionists, because they are rich in vitamins and minerals, by providing only 100 kcal/100 g product. They are rich in vitamin C, vitamins B and mineral elements. In this context, fruits should not be absent from the diet of athletes, being possible to cover, through them, the proper intake of daily vitamins and minerals. Special problems emerge in relation to ensuring magnesium, calcium, iron, zinc. In case of higher metabolic demands, such as among performance athletes, we can add mineral and vitamin supplements, but this aspect should be applied with caution, because the risk of excessive use may emerge. The exact impact of these deficiencies and of supplement intake on sports performance is still unclear (Hima, Meenu &Priti, 2017; Hefferman, Horner, De Vito & Conway, 2019).

In the study sample, there are 2.58% answers of zero and 21.29% answers of intake once a week, fruits being consumed daily by 30.96% of the students. In a study carried out on the teenagers in Bucharest, daily intake of fruits is acknowledged by 69.86% of the boys and 68.44% of the girls. In the year 1977, among the adolescents in Bucharest, there was the following situation: 41.82% of the answers of daily intake among boys and 20.69% positive answers among girls (Baciu, 2011). Practically, in Romania fruit intake records rather high values and it is not necessary to supplement it through national programs. Among the teenagers in the south of Iran, a study reported 3.74% negative answers and 48.68% of the answers of daily intake (Shahraki- Sanavi, Rakhshani & Ansari-Moghaddam, 2017).

Among the respondents of Rawalpindi: 2.5% negative answers and 32.2% answers of daily intake (Naseer, Mahmooud, Fazil, Bilal, Kulsoom & Hamid, 2018).

We have also insisted on the daily intake of fruits, which in the study sample is mostly once (20.52%) or 2 times (35.09%). Among students in Uganda, daily intake is mostly once (24.96%) or 2 times (17.55%) (Ndagire, Muyonga & Nakimbugwe, 2019). Different results emerged, but they suggest daily intake once or more times for fruit.

The frequency of fruits in the menus depends on a series of factors, especially social factors represented by: the nutritional behaviour of the parents, their presence in the house, age, gender. It is worth noting the existence of a positive correlation between age and fruit intake. It increases by age among both genders. Furthermore, it depends on the educational level of the parents, mostly of the mother (Luszczki ,Sobek, Bartosiewicz, Baran ,Weres, Dereń & Mazur, 2019).

Sweets are sources of carbohydrates, by providing higher caloric contribution. In this context, intake is recommended, but with moderation. In the study sample, we highlight the presence of 3.87% teenagers who mentioned zero. Balanced intake (daily) is mentioned in 35.48% of the cases, to which we add other 21.93% of the young people who reported 4-6 times a week.

The dietary investigation carried out in 2015 in the sports high school and at the G. Ibraileanu National College in Iași reports 38.79% of the young people who mentioned daily and 2.18% with an intake of 4-6 times a week. On the other hand, "zero" is mentioned by 36.06% of the teenagers (Albu, Onose, Carausu, Hodorca, 2017). There is a drastic reduction of the frequency of teenagers who mentioned zero, a positive result because sweets have their role in the diet; the only aspect to be considered is related to the amount consumed. We can obtain a modification of eating habits, but it is a slow process to be analysed carefully.

In the study conducted on the teenagers in Bucharest, 38.76% of the boys and 42.97% of the girls reported daily intake. In the control group, (investigated in 1977) 32.73% of the boys and 24.14% of the girls reported daily intake (Baciu, 2011). Among the teenagers in the south of Iran, "zero" was reported by 10.35% of the young people, while daily by 18.72% (Shahraki- Sanavi, Rakhshani & Ansari-Moghaddam, 2017).

The athlete teenager must eat sweets because they are important sources of energy. Nonetheless, the amount consumed will be monitored carefully because excess is associated with the emergence of overweight/obesity, which may perturb sports performances.

The last aspect that was evaluated in this study is related to morning food intake. In the study sample, there are 38.06% negative answers. In the study carried out in the same high school on ninth and eleventh graders, there were 34.00% negative answers, thus a similar result (Albu, Grigoras & Abalasei, 2018).

Among the teenagers in the area of Tyrol, Austria, 52% positive answers were reported, namely daily breakfast (Drenowatz, Greier & Klein, 2018).

In a study conducted on the teenagers in the north of Iran, there were 93.3% of the boys and 90.1% of the girls who reported having breakfast. Those who do not get morning food intake motivate their choice by not being hungry, not getting their favourite products or not getting enough attention from their mother, (Vegari & Mansourian, 2012).

We should also monitor the frequency of breakfast skipping among girls with anaemia. In a study on the adolescents in Egypt, with anaemia, there were 55.00% of the answers of never, while among girls without anaemia, only 3.3% negative answers. The differences calculated are statistically significant and it is worth noting the correlation between breakfast skipping and the onset of anaemia (Naglaa & Marwa, 2018).

It is an important aspect that should draw the attention of the athlete, of the coach and of the family because the lack of morning food intake may aggravate the problems related to the presence of iron in the body.

## 4. Conclusions

The intake of milk and eggs is insufficient among most of our subjects. The insignificant differences calculated for the two collectives studied highlight the existence of similar eating habits. This is an aspect worth considering, because among students athletes there is no adaptation of diet to the needs of the body.

Fruits and sweets are consumed in proper amounts, sometimes even in excess. Excessive intake of sweets is problematic because there is the risk of becoming overweight.

Breakfast is absent for a third of the respondents, in both groups. This is especially alarming because they are young; these students exercise every morning, but the morning energy has no nutritional sources.

Such studies are important because they allow us to get a better insight into the diet of young people in Romania. They become essential for athlete teenagers, who must adapt their energy output to their food intake.

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ICU 2019

# OBJECTIVE ANALYSIS OF THE PHYSICAL TRAINING LEVEL OF YOUNG PEOPLE WHO WANT TO PURSUE A MILITARY CAREER

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**Abstract**

**Problem identification.** It is known that within the Ministry of Internal Affairs (MIA) there is a personnel crisis, which is trying to be covered from external sources or through schooling in the MIA's own units; but also the increased interest of young people who aspire to a career in MIA structures. We observe that many young people require additional training for passing the sporting tests, therefore we wanted to evaluate the physical capacity level of the candidates who attend the examination in the MIA structures. **The purpose** of this paper is to carry out an objective assessment of the level of strength development, which we consider to have a great importance for the success of the candidates in the admission exam at police schools. **Methodology.** The research was conducted during March-April 2019, at the AV University gym and research subjects were 45 young people who participated in training classes for sports tests, male n = 28, with age - 22.42 ± 3.65, and female, n = 17 with age - 20.64 ± 2.23. We used Takei Scientific Equipements dynamometers and jumpmeter, wich are in Physical Activity Research Center of PES faculty within the A. Vlaicu University of Arad. The results obtained were compared with reference data (according to age and sex), taken from Tokyo Metropolitan University, to determine the physical level (strenght) of the candidates. **Results.** The data obtained were: - arms strenght male - Sa m = 44.45 ± 5.58 (reference = 50), - Sa f = 29.93 ± 4.52 (ref. = 28.7); - dorsal strenght male - Sd m = 128.58 ± 21.02 (ref. = 145), - Sd f = 80.58 ± 8.39 (ref. = 85); - legs strenght male - Sl m = 48.73 ± 9.15 (ref. = 58.1), - Sl f = 38.3 ± 5.02 (ref. = 41.8). **Conclusions.** From the data presented we observe that in the males group all the data obtained are below the reference data, and in the group of females only a single parameter adhere to the reference value, the other values are below reference data. These results confirm the statistics, indicating that about 30% of the candidates fall in sports tests. One of the causes we consider to be the insufficient number of physical education clases realized in schools, another the quality of PE clases and a low interest of the students for the PE class in high school.

*Keywords:* sport tests/ admission/ police/ physical training

## 1. Introduction

The desire to pursue a military career is increasingly popular among students in national education. Given the current personnel crisis in the national police and army system, more and more students are opting for a military career. Withdrawals from the system, the integration of Romania as a full member in the North Atlantic Alliance, the new military strategy regarding the transformation, development and endowment of the Romanian Army are some of the reasons why the number of places in the training schools for the future military has increased considerably. Thus we observe in addition to the crisis of personnel in the military structures and the increased interest, especially of the young people for these occupations. But it is very important that they be well prepared from all points of view: psychological, medically, theoretically but also practically and physically.

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**2. Problem Statement**

If we take a look at the current situation in the military training schools we can see that the number of available places has increased. For example, the "Alexandru Ioan Cuza" Police Academy in Bucharest has competed for the 2019-2020 school year a number of 770 places, and the "Ferdinand I" Military Technical Academy over 300 places in the different specializations. In addition, there are places available at other schools and institutions designed to prepare future military personnel (police officers, gendarmes, prison officers). In total, over 2750 places were competed in 2019 for different military careers (https://mai.gov.ro/document/ education).

The discipline of physical education and sport is an important one, even eliminatory within the military structures, so PE is important for admission, but also later, in exercising the duties of service, especially for the operative personnel, but not only. This statement is reinforced and recognized in the Ministry of Internal Affairs, which considers physical education and sport as "the whole of the forms of collective or individual activity, which are carried out in order to train, develop and maintain the motor capacity, in order to perform the functional tasks, to strengthen the physical and mental health state. , as well as socializing the institution's staff. "(MAI, OM 154/2004).

It is well known that the sports sample in the examination for admission to the police schools, consists of an application circuit, performed on time, which requires from the candidates a good physical training based on a series of basic motor skills as well as some combined motor qualities or specific acrobatic gymnastics elements (Popa, 2008). This application circuit contains 11 obstacles, has a length of about 346 m, must be traveled in maximum 2,25 minutes and may attract penalties (if an obstacle is not crossed). This 11 subprobes/ obstacles are: - long jump from the spot - 1.80 m, - passing through the step jump over the mattress, - two successive rolls in front, - moving in balance on the gym bench with weight transport, - moving between saddlebags, - jumping in far support over the gymnastic goat, - passing under a marked obstacle, - climbing a gym crate (box), - transporting a mannequin by dragging, - throwing the handball into point, - shuttle 10 reps x 20 meters with milestone transport, running (https://www.academiade politie.ro/admitere.html).

Analyzing the physical education and sports school programs at the secondary and high school level, we observe that during the school, at the physical education and sports classes, all the obstacles presented above which are part of the application circuit for admission to the police schools, are included, and also in schools teachers do some application circuits (MEN, 2017). The problem could be the insufficient number of hours of physical education and sport. A possible alternative for this problem, in which not all the operational objectives can be achieved, could be the extracurricular activities, which in some situations can give good results (Bitang et al., 2017).

Also, some specialists present and describe the motor qualities and the applied utilitarian skills that are trained and educated during the physical education classes of the pre-university cycles, showing that by promoting control samples, the students should have a physical training at least of average level or above (Cârstea, 2000; Dragnea, 2006; Galea, 2014).

There are other authors, even within the structures of the Ministry of Administration and Interior Affairs who argue that for a future military environment, motility and physical skills must exceed the average performance of the population of the same age and show higher parameters of development of strength, speed and endurance but also of motor skills. specific (Torje, 2005; Greek, 2007; Hoffman & Collingwood, 2015).

By assessing the current situation at the admissions contests in the police schools and analyzing the passing rate for the candidates at sports samples, we can easily see that these tests represent a major obstacle, and many of them are rejected because they do not pass these tests.

As I said, there is a very high failure rate for sporting samples, over 30% of the candidates being rejected, the situation being worse for girls who have a non-passing rate of about 50% (https://observator.tv/, www.academiadepolitie.com/).

The poor preparation of the students can be put on account of their very busy schedule, the reduction of physical activities in daily life, the inadequate nutrition, the length of time spent in front of the computer or the TV, being able to appear obesity and other complications of the health of young people, as well as difficulties in performing certain physical or intellectual activities under optimal conditions, as already observed in other EU states (Campos et al., 2018; Bozo & Citozi, 2018; WHO, 2010; www.euro.who.int / en / health)

**3. Research Questions**

Based on the personal experience of the teacher in the field, as well as the direct observation, we found that there are many young people who require additional training hours in order to be able to attend the admission to the schools that prepare military personnel. Thus, we have the right to find out what is the cause of this situation, because we know that physical education and sport are a compulsory discipline in both pre-university and university education. Are pupils/ students insufficiently prepared during these classes? What is their level of strength development?, which have of major importance in the practical circuit for admission to the police schools.

**4. Purpose of the Study**

Thus the purpose of the present work was to obtain objective data regarding the level of physical development of the candidates present at the hours of additional sports training, by means of measurements made with specific equipment for measuring the strength of several muscle groups (dynamometers for the strength of the arms and for the back, jumpmeter for feet) and comparison the results with reference data, according to sex and age, valid for the population that does not practice performance sports.

**5. Research Methods**

The research was conducted during March-April 2019, at the Aurel Vlaicu University gym. Subjects were 45 young people, candidates for police schools, who participated in training classes for sports tests. Distribution of subjects was: - male = 28, with age = 22.42 ± 3.65; - female = 17, with age = 20.64 ± 2.23. We used some Takei Scientific Equipements, dynamometers, for back and hand muscles and jumpmeter for leg muscles, wich are in Physical Activity Research Center of Physical Education and Sport Faculty within the Aurel Vlaicu University of Arad. The results obtained were compared with reference data, valid for untrained persons (according to age and sex), taken from Tokyo Metropolitan University, to determine the physical level (strenght) of the candidates.

The initially calculated statistical parameters were the mean and the standard deviation, which best indicate the tendency of the group and the degree of dispersion, but for better accuracy we calculate the coefficient of variability and the median. We also considered a significance threshold $p < 0.05$ (Galea, Ardelean, & Istvan, 2010).

We also established the body mass index which has the following values: BMI = 25.23 kg / sqm in boys and BMI = 21.94 kg / sqm in girls, so we can consider that they are in the normal weight category with a slight exceedance in the group of boys.

In table 1 we present the data for male, where the differences between the obtained results and the reference data for each of the three measurements can be observed. So in the group of boys the level of force development is below the reference values indicated.

Table 1. Presentation of anthropometric data and the results obtained by the group of boys in dynamometry tests.

| Nr. | Subjects | Age | Sex | Height (cm) | Weight (kg) | Arms Strength (kg.f) | Back Strength (kg.f) | Legs Strength (cm) |
|---|---|---|---|---|---|---|---|---|
| 1 | R A | 18 | M | 184 | 100 | 48.3 | 167.5 | 58 |
| 2 | S C | 18 | M | 179 | 65 | 50.8 | 145.5 | 61 |
| 3 | T C | 22 | M | 184 | 95 | 58.5 | 158.5 | 60 |
| 4 | M A | 18 | M | 180 | 76 | 40.1 | 93.5 | 51 |
| 5 | S A | 19 | M | 182 | 92 | 39.7 | 103 | 34 |
| 6 | L O | 27 | M | 178 | 55 | 33.4 | 105 | 47 |
| 7 | R R | 21 | M | 188 | 78 | 54.3 | 149.5 | 67 |
| 8 | C C | 18 | M | 174 | 70 | 41.7 | 123 | 50 |

| Nr. | Subjects | Age | Sex | Height (cm) | Weight (kg) | Arms Strength (kg.f) | Back Strength (kg.f) | Legs Strength (cm) |
|---|---|---|---|---|---|---|---|---|
| 9 | B A | 29 | M | 176 | 71 | 41.1 | 92.5 | 35 |
| 10 | M M | 19 | M | 188 | 83 | 46.5 | 148 | 55 |
| 11 | I M C | 25 | M | 170 | 95 | 40.1 | 112.5 | 43 |
| 12 | D V | 21 | M | 169 | 60 | 49.7 | 147.2 | 58.6 |
| 13 | D C | 22 | M | 183 | 69 | 48.3 | 172.5 | 52 |
| 14 | C F | 21 | M | 176 | 69 | 38 | 129 | 63 |
| 15 | M D | 21 | M | 166 | 72 | 49.2 | 149 | 52 |
| 16 | P C | 23 | M | 178 | 76 | 50.1 | 143.6 | 58.3 |
| 17 | T D | 34 | M | 170 | 62 | 38.3 | 111.5 | 40 |
| 18 | V D | 21 | M | 174 | 84 | 50.8 | 126.5 | 54 |
| 19 | AO | 22 | M | 173 | 80 | 42.3 | 110.5 | 39.2 |
| 20 | PG | 24 | M | 175.5 | 78 | 43.1 | 116.2 | 42.4 |
| 21 | GP | 20 | M | 177 | 83.5 | 40.9 | 115 | 38.4 |
| 22 | IV | 24 | M | 178 | 88 | 42.8 | 120 | 41.2 |
| 23 | UM | 25 | M | 176.5 | 87.5 | 44 | 122.3 | 40.6 |
| 24 | VO | 20 | M | 175 | 84.5 | 41.7 | 124.2 | 39.6 |
| 25 | OD | 23 | M | 176 | 78 | 38.8 | 128.6 | 42.6 |
| 26 | AV | 25 | M | 179 | 92 | 43.3 | 123.4 | 43.8 |
| 27 | MV | 26 | M | 178.5 | 89 | 42.3 | 118.2 | 41.1 |
| 28 | AV | 22 | M | 177 | 80.5 | 46.5 | 144.3 | 47.2 |
| | **M** | **22.429** | | **177.30** | **79.036** | **44.450** | **128.589** | **48.733** |
| | S | 3.656 | | 5.261 | 11.346 | 5.589 | 21.026 | 9.153 |
| | CV | 16.300 | | 2.967 | 14.356 | 12.573 | 16.351 | 18.781 |
| | Med | 21.000 | | 176.500 | 78.000 | 42.800 | 124.200 | 50.500 |
| | | ***Reference data for Boys (22 years)*** *(according. Tokyo Metropolitan University)* | | | | ***50*** | ***145*** | ***58.1*** |

In table 2 are presented the data for females. Here we see that the strength of the arms exceeds the reference values and in the other two measurements, obtained values are weaker, but there are not very big differences.

Table 2. Presentation of anthropometric data and the results obtained by the group of girls in dynamometry tests.

| Nr. | Subjects | Age | Sex | Height (cm) | Weight (kg) | Arms Strength (kg.f) | Back Strength (kg.f) | Legs Strength (cm) |
|---|---|---|---|---|---|---|---|---|
| 1 | KI | 18 | F | 178 | 69 | 33 | 86.5 | 36 |
| 2 | Ș A | 18 | F | 165 | 57 | 28.1 | 82 | 46 |
| 3 | U B | 21 | F | 172 | 56 | 33.5 | 82.5 | 32 |
| 4 | M N | 21 | F | 158 | 51 | 31.5 | 77 | 42 |
| 5 | M A | 18 | F | 175 | 80 | 33.5 | 81 | 36 |

| Nr. | Subjects | Age | Sex | Height (cm) | Weight (kg) | Arms Strength (kg.f) | Back Strength (kg.f) | Legs Strength (cm) |
|---|---|---|---|---|---|---|---|---|
| 6 | M I | 20 | F | 162 | 68 | 25.1 | 69.5 | 36 |
| 7 | T L | 26 | F | 170 | 64 | 30.7 | 89 | 31 |
| 8 | B M | 18 | F | 166 | 63 | 31.2 | 81.5 | 44 |
| 9 | H E | 20 | F | 176 | 75 | 40.1 | 101 | 40 |
| 10 | B E | 21 | F | 168 | 59 | 35.5 | 95 | 38 |
| 11 | T I | 21 | F | 162 | 65 | 31.4 | 77.5 | 37 |
| 12 | P L | 21 | F | 160 | 45 | 30.3 | 70 | 51 |
| 13 | AG | 22 | F | 165 | 53 | 26.2 | 76 | 35.6 |
| 14 | PM | 20 | F | 164 | 55 | 25.4 | 74.3 | 34.8 |
| 15 | IG | 19 | F | 166.5 | 56 | 24.9 | 75.2 | 36.4 |
| 16 | CL | 23 | F | 167 | 58 | 24.5 | 75.5 | 37.3 |
| 17 | GN | 24 | F | 168 | 62 | 24 | 76.5 | 38 |
| | **M** | **20.647** | | **167.206** | **60.941** | **29.935** | **80.588** | **38.300** |
| | S | 2.23 | | 5.588 | 8.785 | 4.524 | 8.390 | 5.028 |
| | CV | 10.822 | | 3.342 | 14.416 | 15.111 | 10.412 | 13.128 |
| | Med | 21.000 | | 168.000 | 64.000 | 32.250 | 82.250 | 39.000 |
| | | ***Reference data for Girls (20 years)*** *(according. Tokyo Metropolitan University)* | | | | ***28.7*** | ***85*** | ***41.8*** |

## 6. Findings

We can see in the graph below that the average values for the three force tests of the group of boys are below the reference values, some with significant differences. This highlights the fact that these candidates have some deficiencies in terms of physical training, especially in the tested motor quality - strength.

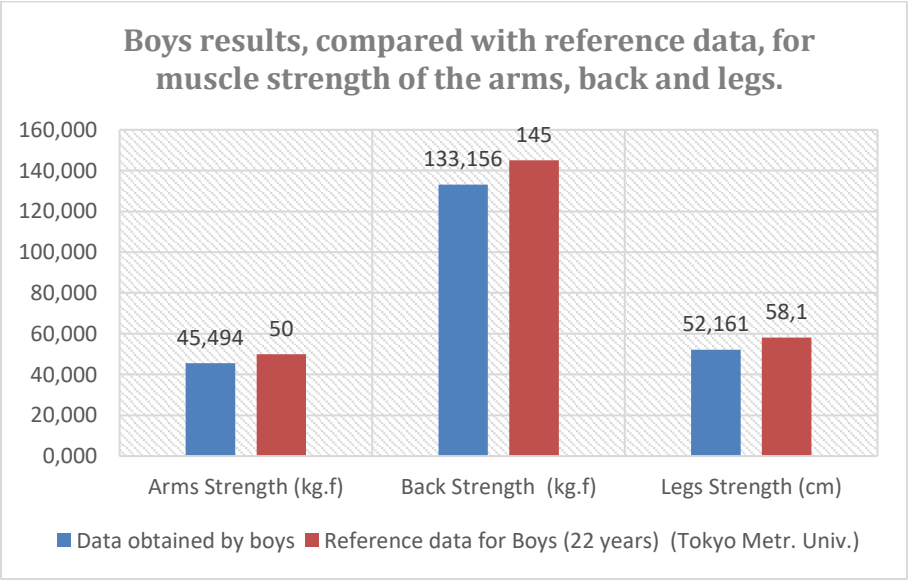


Fig. 1. Graph representing the results obtained by the group of boys in the dynamometry tests, compared with the reference data.

Analyzing the data obtained by girls, we observe that they are better at arm strength, meaning that the average of the obtained results exceeds the reference values for this age. In contrast to the other two tests, the performances obtained by the candidates are below the reference values for their age category, but the differences are small. We can see that the values obtained by girls are better than those obtained by the group of boys.

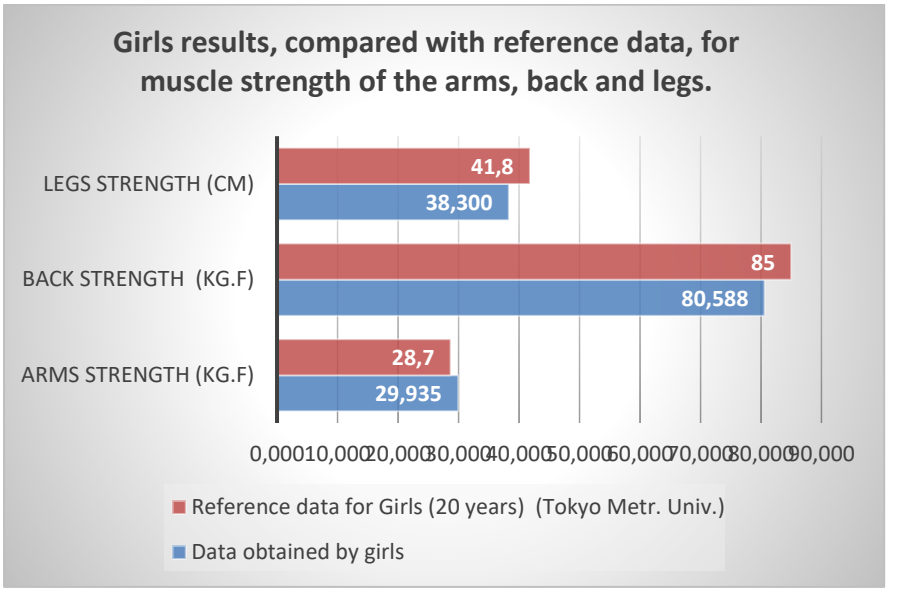


Fig. 2. Graph representing the results obtained by the group of girls in the dynamometry tests, compared with the reference data.

## 7. Conclusion

In our case these tests have indicated to us that the physical training of the candidates at the police officer schools is quite precarious, which leads to the possibility of losing the admission to these schools.

One of the reasons could be the very small number of hours of physical education and sports, especially in high school. There is also a low interest of students for physical education and sports clases.

Another cause of the low level of preparation is the poor material supply in schools. A good material base provides the support for a more varied area of exercises, meant to develop the motor qualities needed by the students.

Some proposals we make following the results of this study: - it is necessary that the physical education teachers pay more attention to the parts of the lesson in which the development of basic motric skills is pursued (strenght, speed, resistance, coordination), - it is necessary to increase the number of physical education and sports hours in schools, especially in the high school cycle, - better equipping schools with equipment and materials to be able to tackle a wider range of exercises and lesson topics.

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# RESPIRATORY MUSCLE TRAINING FOR BOXERS

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**Abstract**

The purpose of this research was to highlight the importance of the development of respiratory muscle training of athletes. In order to accomplish this purpose we selected 22 male boxers, aged between 14 and 18 year old, divided into two groups (experimental N=7 and control n=15) from three different boxing clubs in the municipality of Timișoara. All subjects, their coaches and the management of the clubs, gave their consent to participate in this study. A portable spirometer, Spiro Tube Primary was used to test the respiratory capacity of the subjects. Parameters evaluated in this research was: forced vital capacity (FVC), forced expiratory volume in one second (FEV1) and peak expiratory flow (PEF). Results: Significantly different values were observed between these group on all parameters evaluated as fallowed: FVC -t = 2.350, df = 20, p = 0.029, FEV -t = 2015, df = 20, p = 0.001, PEF – t = 5.399, df = 20, p =0.000. regarding pre and post intervention data, we could observe significantly improved differences among subjects who followed the respiratory muscle training program, in comparison with control group.

*Keywords:* train air, sports training, boxers

## 1. Introduction

Breathing is a fundamental physiological process, representing the function of the body that accompanies us from the beginning of life to the end (McConnell, 2011). Its purpose is to ensure the gas exchange between the body and the environment. The airflow that comes from atmosphere through the airways to the pulmonary alveoli and the expulsion of some of the alveolar air is called pulmonary ventilation. This is a process by which O2 is inhaled and co2 is exhaled and includes two stages: inspiration and expiration. Athletes performance can be improved by oxygen absorption, which is influenced by the proper functioning of respiratory system (Sabralieva & Abdyrakhmanova, 2014). Respiratory capacity is determined by gender, weight, height and age, but also the specificity of sports in which it is involved have an impact over physiological adaptation of respiratory system (Durmic et al., 2015).

During physical activity the main organs involved in process are heart and lungs. During intense physical activities, muscles involved in action needs a high quantity of oxygen for proper function, and this function is met by increasing the number of respirations per minute, from 15 in normal situation to 40-60 during effort, according to European lung Foundation. Lung capacity is the value that evaluates the functionality of respiratory system. Respiratory muscle training will have as effect increasing pulmonary ventilation (Sabralieva & Abdyrakhmanova, 2014). Guenette & Sheel (2007) observed that high load in respiratory muscles can induce fatigue, this kind of fatigue is more visible on endurance activities in which the loar of VO2 max is larger than 85%. During high intensity effort the load over respiratory function is high, thus there will appear the oxigen debt. This causes a lose of athletes yields with 15% (Guenette & Sheel, 2007, p. 346).

During intense physical efforts respiratory aparatus can contribuite to improve the performance 10-15 times, because the ventilation is increased, and this will modify respiratory cycle per minute making the gas exachange

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faster (Abramovich, 2010). The method used for examine the pulmonary volumes and flow is knowned as spironetry. The lung volumes are estimated according to the age, weight and height of subjects, but people who practice a performance sports branch have a higher volume than those that are physically inactive (Mazic et al., 2015; Plavsic, Djordjevic-Saranovic, Gavrilovic, Zlatkovic, & Mazic, 2011).

Decreased ability to perform physical exertion, in case of healthy people, can be caused by fatigue respiratory muscles (Mador & Acevedo, 1991; Verges, Sager, Erni, & Sprengler, 2007). Fatigue of respiratory muscles could affect performance by accumulating metabolites, triggering vasoconstriction at the level of the limbs (Dempsey, Romer, Rodman, Miller, & Smith, 2006; Sheel et al., 2000). Respiratory muscle Training has the effect of reducing fatigue of breathing muscles, but also the concentration of lactic acid during physical activity (McConnell & Sharpe, 2005; Verges, Renggli, Notter, & Spengler, 2009), and thus, by reducing or delaying the occurrence of metabolism products, performance capacity can be improved (Illi, Held, Frank, & Spengler, 2012).

## 2. Purpose and Objectives

The aim of this research was to highlight the effect of the development of respiratory musculature in the training of athletes practicing boxing.

Research objectives:

- Recording the effect of breathing muscles training on spirometry parameters;
- Implementation and integration of these workouts into the training lesson.

Hypothesis:

In order to achieve research, we have left the assumption that the introduction into the mesocycles of workouts for the development of breathing muscles will have the effect of increasing the parameters of spirometry.

## 3. Subjects and methods

In this study participated 22 athletes, aged between 14 and 18 years, from three boxing clubs in the municipality of Timisoara. The subjects, their coaches and the management of clubs gave their consent to participate in the study. Only those athletes who practiced boxing for at least one year were included in the research and participated in competitions at national or international level. The criteria for excluding athletes were: participation in training for less than one year, no participation in competitions, lack of regular attendance at training, outdated or unmet age limit.

The subjects included in the study were divided into two groups: 7 athletes in the experiment group and 15 in the control group. All subjects were subjected to the same types of testing using the same equipment, under similar conditions. The evaluation of the respiratory capacity was done before and after the introduction of the respirator muscles training, using the SpiroTube Primary portable spirometer. The parameters followed in this test were: forced vital capacity (FVC), expiratory volume in one second (FEV1/VEMS), peak expiratory flow (PEF).

After the initial testing the specific trainings continued in both groups, in experiment group was integrated a mesocycles of respiratory training with the help of Train Air machine. The implementation of the training programs was carried out during five weeks. Training planning was performed for both batches, following the same methods and means of training. The experiment group had included in the training plan a special section for respiratory training. This program was followed, during five weeks, with a frequency of three times per week by each participant. For respiratory training, TrainAir was used.

Before starting each workout, the subject executes three maximum inspirations for an initial assessment. Although the yield during the initial assessment must be maximum, the training will be reported to 80% of the potential. To maintain the training intensity at this level the subject is guided by a visual bio-feedback, rendered in the form of a mountain. The objective is to carry a balloon over the ridge of the created mountain, as far as possible. If the inspiration is too strong the balloon will touch the clouds and the participant must stop, and if the inspiration is too weak the balloon will hit the mountain. The participant can lose three times, after which the session stops and the level reached is automatically saved in a database. During training the subject must execute as many inspirations

as possible, followed by different periods of pause according to the level achieved, starting from 60 seconds and reaching 5 seconds, the average duration of a training session was approximately 30 minutes.

The data collected was statistically analyzed using SPSS software, (IBM SPSS Statistics 20) statistical analysis software. The descriptive analysis, data distribution and comparison of the averages between the two groups were performed.

## 4. Results

Initial (T1) and final (T2) measurements of somatic parameters and spirometry (table No 1) were performed, with recorded environments indicating homogeneity of the groups in initial testing and final differences.

Table 1. Descriptive analysis of somatic data and spirometric evaluation of subjects (N = 22)

| **Mesurements** | **Control group (N=15)** | | **Experimental group (N=7)** | |
|---|---|---|---|---|
| | Initial testing (T1) | Final testing (T2) | Initial testing (T1) | Final testing (T2) |
| Greutate (kg.) | 64.20 (±12.05) | 64.20 (±12.05) | 68.28 (+15.04) | 68.28 (+15.04) |
| Înălțime (cm) | 173 (±8.75) | 173 (±8.75) | 173 (±5.74) | 173 (±5.44) |
| FVC (L) | 4.97 (±0.63) | 5.01 (±0.59) | 4.85 (±0.54) | 5.77 (±0.92) |
| FEV1 (L) | 4.07 (±0.43) | 4.11 (±0.40) | 4.16 (±0.54) | 5.16 (±0.90) |
| PEF (L/sec) | 6.44 (±0.77) | 6.46 (±0.75) | 7.16 (±0.84) | 8.50 (±0.96) |

Table 2. Test of distribution

| | | Kolmogorov-Smirnov[b] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| Parameter | Group | Statistic | df | Sig. | Statistic | df | Sig. |
| FVC 1 (L) | Experiment | 0.220 | 7 | 0.200* | 0.946 | 7 | 0.689 |
| FEV 1 (L) | Experiment | 0.202 | 7 | 0.200* | 0.934 | 7 | 0.588 |
| PEF 1 (L/sec.) | Experiment | 0.152 | 7 | 0.200* | 0.958 | 7 | 0.803 |
| FVC 1 (L) | Control | 0.145 | 15 | 0.200* | 0.934 | 15 | 0.318 |
| FEV 1 (L) | Control | 0.288 | 15 | 0.002 | 0.890 | 15 | 0.068 |
| PEF 1 (L/sec.) | Control | 0.218 | 15 | 0.053 | 0.899 | 15 | 0.090 |

The final measurements were carried out after the intervention program was applied. In subjects included in research (N = 22) increases were recorded with regard to the results of the spirometry evaluation. However, in the control group (N = 15) the increase in the FVC case was 0.042 (±-0.039) versus 0.926 (± 0.378) in the experiment Group, at FEV of 0.025 (±0.032) compared with 0.994 (± 0.362) in the experiment group, and at PEF de 0.021 (± 0.018) compared to 1.343 (± 0.124) on experiment group, which reveals the positive influence of the respiratory muscle training on spirometry parameters.

To verify whether differences are significant, there have been realized signification test within groups and between the groups participating in the study. According to the data in Table No. 3, in the experiment group the differences between the spirometry parameters from initial and final testing are significant ($p < 0.05$), while the control group is not significant ($p > 0.05$), meaning that the research hypothesis was supported.

Table 3. Paired Sample Test

| Parameter | Mean Difference | Std. Error Difference | t | Sig. |
|---|---|---|---|---|
| Experimental group (N = 7) | | | | |
| FVC_i - FVC_f | -0.926 | 0.399 | -6.130 | 0.001 |
| FEV1_i- FEV1_f | -0.994 | 0.470 | -5.590 | 0.001 |
| PEF_i - PEF_f | -1.343 | 0.561 | -6.327 | 0.001 |
| Control group (N = 15) | | | | |
| FVC_i - FVC_f | -0.042 | 0.076 | -2.135 | 0.051 |
| FEV1_i- FEV1_f | -0.025 | 0.265 | -0.37 | 0.717 |
| PEF_i - PEF_f | -0.020 | 0.63 | -1.25 | 0.231 |

Comparing the averages of spirometry parameters to final testing (T2) in subjects in the two groups involved in the study, it follows that differences are significant in all three measured parameters (FVC – T = 2.350, df = 20, p =0.029; FEV – T = 2.915, df = 20, p =0.001); PEF – T = 5.399, df = 20, p =0.000). Thus, according to the results presented above, we can state that, as regards the experiment group, it recorded significant differences in all the parameters followed, while the results of the control group did not have significant differences.

## 5. Discussions

Researches conducted on performance athletes practicing contact sports branches (karate, taekwondo, kickboxing) reported an average of FVC of 5.8 L (± 0.8) (Lazovic et al., 2015), FEV1 = 5.1 (± 0.6), values close to those of the experiment group following the preparation program FVC = 5.77 (± 0.92), respectively FEV1 = 5.16 (± 0.90). They also claim that performance athletes record much high values from the prediction database of the device, this is due to the type of effort they undergo during training (Lazovic et al., 2015, p. 2273). The results recorded by the subjects included in the study are visible comparable to results from other studies, from which we can conclude that subjects that are following respiratory training can record higher values on spirometry parameters (Oke & Agwubike, 2015).

## 6. Conclusion

The recorded results have shown that an individualized plan can lead to improvement of major respiratory parameters interest in this sport branch. Although we have tried to conduct research in the best conditions, this study was not lacking in limitations. An important factor was the material basis that was made available to us. According to McConnell (2011) to achieve the maximum performance in respiratory training, two training sessions per day are required amounting to a total of 30 minutes over a period between five and eight weeks. Thus, we had to adapt the training plan to the subjects ' daily routine (e.g. school courses, time allotted for study), reducing the period to three workouts per week. However, the evolution of subjects was significant and close to the values recorded by Mazic et al. (2014).

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All authors contributed equally to this research.

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# THE CONNECTIONS BETWEEN GENERAL INTELLIGENCE AND PSYCHOMOTOR DEVELOPMENT IN CHILDREN AGED 6 TO 8 YEARS

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**Abstract**

**Introduction:** The psychological and physical connection is well-known and cannot be neglected when it comes to the holistic approach of a human's development. The two interact and influence each other, determining how the person adapts and relates to oneself and to the environment. The connection between general intelligence and psychomotor development in children is important to be studied and understood because of the crucial role it plays in the learning process, but also in achieving success on all areas of life. **Aim:** The purpose of this study was to identify and analyze the connections between general intelligence and psychomotor development in children enrolled in primary education. **Methods:** The study sample consisted of 120 pupils aged 6 to 8 years. IQ was measured using Raven's Colored Progressive Matrices (MPC Raven) and the level of psychomotor development with the Ozeretski-Guilmain Test.For data analysis IBM SPSS Statistics 20 was used (Spearman's rho coefficient**). Results***:*** Results indicate the existence of a significant and positive correlation between IQ and the level of psychomotor development for the whole sample($\rho$= .412, p= .000, $r^2$= .17), as well as for the groups involved. For 6 year old children the correlations found were positive, significant and strong ($\rho$= .384, p= .040 p= .04, $r^2$= .14), as well as for the group of subjects aged 7 years ($\rho$= .542, p= .000, $r^2$= .30) and the participants aged 8 years ($\rho$= .520, p< .001, $r^2$=.27). Furthermore, significant associations between IQ and the level of psychomotor development were found following gender-based analysis: ($\rho$= .517, p= .000, $r^2$= .26) it indicates a strong and positive correlation for the girl participants and ($\rho$= .258, p= .030, $r^2$= 06) – moderate association - for the boy participants. **Conclusions:** General intelligence and the level of psychomotor development in children aged 6 to 8 years correlates in a significant and positive way. Understanding this connection can help specialists in offering proper support.

*Keywords:psychomotor development, Ozeretsky-Guilmain Test, general intelligence, Q.I, Raven Coloured Progressive Matrices Test, Children*

## 1. Introduction

Intelligence has been in the attention of specialists over time and has been given several definitions. According to Oprescu (1991), intelligence is a component of the human personality that facilitates the adaptation of the individual to the environment by acquiring and integrating new information. Experts of cognitive psychology consider that intelligence is formed and developed as a result of the notions of learning and the processes of action characteristic of a certain domain, the result being the achievement of performances (Dumitru, 2001).Thus, one can understand, quantify, modify and develop information only by reference to a particular domain.

Gottfredson (1997) defines intelligence as "a very general mental capacity, which, among other things, involves the ability to reason, to plan, to solve problems, to think abstractly, to understand complex ideas, to learn quickly and to learn from experience".Another definition of intelligence has been given by Gudwin (2000), who considers that intelligence is "the ability of the mind, in particular to understand principles, truths, facts or meanings, to acquire knowledge and to apply this knowledge in practice; the ability to learn and to understand ".

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Human adaptation to the concrete data of a situationis achieved through practical intelligence (Horghidan, 2000). Psychomotricitystands at the base of this type of intelligence.

Psychomotricity brings together two inseparable components - the motor and the psychic side - and it materializes in any motor action, attitude or behavioral model, being influenced by the psychic processes (Gorgos, 1987-1992). A definition that has tried to integrate all the meanings of the term psychomotor ability is the one developed by De Lièvre and Staes (apud Berruezo, 2000), for which psychomotor abilities represent a global approach of the person. According to the same authors, psychomotricity can be understood as "a function of the human being that synthesizes psychism and motor skills to allow the individual to adapt in a flexible and harmonious way to the environment". At the same time, it can be represented as a whole, that contains the interactions between motor skills and psychism and between the person and the outside world.

Piaget (1956) emphasizes in his studies that "psychic activity and motor activity forms a functional whole which represents the basis of intelligence development"; motor activity is the starting point in the development of intelligence, considering that the first two years of the individual' slife are nothing but the sensory-motor stage " (Jimenes & Bishop, 2007).

Knowing and taking into account the connection between general intelligence (IQ) and the level of psychomotor development in children, offers the opportunity to fully approach them, to fully understand how they act. Also, the association between general intelligence and the level of psychomotor development allows to identify the deficiencies that must be corrected through specific intervention methods. Thus, in the teaching process it is imperative to consider the connection between psychomotor development and general intelligence, because it is extremely useful in shaping the child's psychomotor profile.

## 2. Purpose and Objectives

**Objective**: The purpose of this study was to investigate and analyse the possible connections between general intelligence and the level of psychomotor development among children in primary education, in order to obtain a more complete understanding of the way in which they manifest and act, as well as to identify the aspects on which it must be intervened.

**Hypothesis**: The level of psychomotor development of children is conditioned by the level of their IQ.

## 3. Materials and methods

The research involved 120 pupils, girls and boys from primary education, aged between 6 and 8 years, divided into three groups, as fallows: Group 1 - subjects aged 6years ( N= 29 representing 24.17% ), Group 2 - subjects aged 7 years ( N=58 representing 48.33% ) and Group 3 - subjects aged 8 years ( N= 33 representing 27.50% ).

After receiving the consent of the involved institutions and of the legal tutor of the children, the data were collected and analysed.

The research took place between November 6$^{th}$, 2017 and May 5$^{th}$, 2018 in Reșița. Three schools were involved in this research: School with Grades I-VIII No. 1, "Diaconovici-Tietz" National College and "Mihai Peia" High School.

In this study the questionnaire was used to obtain demographic data as well as data of another nature. The questionnaire was developed by us and was distributed to be filled out by the children's parents.

The Ozeretski-Guillmain test (Oprea, Nițu, Chiriacescu, Lungu Petruța, 2003) was used to evaluate the psychomotor development (PMD) of the subjects and to outline their psychomotor profile.

The level of general intelligence (IQ) was established using the Raven Colour Progressive Matrices (Raven, 2005).

The IBM SPSS Statistics 20 software was used to process and analyse the collected data (descriptive statistics, normality of distribution and rho coefficient of Spearman).

**4. Results**

Following the centralization of the demographyc data, it was found that 66 participants were girls (55%) and 54 were boys (45%). Of these, 91.66% livedin the urban area (N = 110) and 8.34% came from the rural area (N = 10).

Regarding the practice of sports activities outside school, according to the parents' statements, 44 of the children (36.67%) practice this type of activity as a sport discipline, while 76 (63.33%) are not engaged in such activities. Of the total participants, 15.83% (N = 19) allocate daily between 1 and 2 hours for playing, 52.50% (N = 63) spend between 3 and 4 hours playing and the remaining 31.67% (N = 38) spend more than 4 hours playing. Regarding the use of the phone / tablet / computer, 39 participants use them less than 1 hour per day (32.50%); 57 uses one hour per day (47.50%); 19 allocate 2 hours for this activity (15.83%) and 5 participants spend over two hours a day using their phone, tablet or computer (4.17%).

After evaluating the PMD and IQ in the sample involved, the data was analyzed descriptively as shown in Table 1:

Table 1 . Descriptive analysis for the entire sample (N=120)

| *Variables* | *Mean* | *Std. dev* | *Skewness* | *Kurtosis* | *Min value* | *Max value* |
|---|---|---|---|---|---|---|
| *IQ* | 92.48 | 23.67 | -2.35 | -1.06 | 31 | 139 |
| *PMD* | 7.31 | 0.96 | 0.08 | -0.37 | 5 | 9 |

In order to test the hypothesis, we started by checking the shape of the distributions for each variable. The results are presented below:

Table 2. Kolmogorov-Smirnov test of normality for the entire sample (N=120)

| | *Kolmogorov-Smirnov* | | |
|---|---|---|---|
| | Statistic | df | Sig |
| *IQ* | 0.141 | 120 | 0.000 |
| *PMD* | 0.420 | 120 | 0.000 |

Because the distributions of the studied variables do not meet the criterion of normality ($p < .05$), the hypothesis was tested using the Spearman coefficient. The obtained results are presented in table 3.

Table 3. Analysis of the correlation between IQ and PMD for the entire sample (N=120)

| | | *PMD* |
|---|---|---|
| IQ | *Spearman Correlation* | 0.412 |
| | *p* (2-tailed) | 0.000 |
| | N | 120 |

The existence of a statistically significant positive association was identified ($\rho = 0.429$, df = 120, $p = 0.000$, bilateral test, $r^2 = 0.17$). The Spearman coefficient value of 0.429 indicated that the association was positive and average. Thus, the higher the IQ scores, the higher the PMD level of the participants. The observed effect is strong ($r^2 = 0.17$).

These results support the hypothesis.

At the same time, statistical analysis was performed on age groups. The results are presented in table 4:

Table 4. Descriptive analysis for age groups

| | *Six years (N=29)* | | *Seven years (N=58)* | | *Eight years (N=33)* | |
|---|---|---|---|---|---|---|
| | IQ | DPM | IQ | DPM | IQ | DPM |
| *Mean* | 100.21 | 6.77 | 88.76 | 7.27 | 92.21 | 7.85 |
| *Std. dev* | 19.84 | 0.62 | 26.02 | 0.92 | 21.31 | 0.99 |
| *Skewness* | -0.80 | 1.26 | -1.24 | -0.28 | -1.52 | -1,62 |
| *Kurtosis* | 0.55 | 1.4 | -1.18 | -0.15 | -0.79 | 0.83 |
| *Min value* | 61 | 5.25 | 31 | 5 | 48 | 5 |
| *Max value* | 139 | 8.25 | 134 | 9 | 119 | 9.25 |

Tables 5 and 6 show the values of the normality tests that were applied.

Table 5. Shapiro-Wilk test of normality for 6- and 8-years groups

| | | *Shapiro-Wilk* | | |
|---|---|---|---|---|
| | | Statistic | df | Sig |
| *Six years (N=29)* | IQ | 0.949 | 29 | 0.176 |
| | PMD | 0.922 | 29 | 0.035 |
| *Eight years (N=33)* | IQ | 0.920 | 33 | 0.018 |
| | PMD | 0.944 | 33 | 0.088 |

Table 6. Kolmogorov-Smirnov test of normality for the seven years group

| | *Kolmogorov-Smirnov* | | |
|---|---|---|---|
| Variables | Statistic | df | Sig |
| *IQ* | 0.116 | 58 | 0.049 |
| *PMD* | 0.467 | 58 | 0.000 |

As a consequence of the normality tests showing that the distributions of the analyzed variables were asymmetric, the hypothesis was tested using Spearman's coefficient. The results are presented below:

Table 7. Analysis of the correlation between IQ and PMD

| | *Spearman correlation* | *Sig.* | *r²* |
|---|---|---|---|
| *Six years (N=29)* | 0.384 | 0.040 | 0.14 |
| *Seven years (N=58)* | 0.542 | 0.000 | 0.30 |
| *Eight years (N=33)* | 0.520 | 0.002 | 0.27 |

For six-year-old children, a statistically significant correlation ($p < 0.05$) between IQ and PMD was found ($\rho = 0.384$, df = 29, $p = 0.040$, bilateral test, $r^2 = 0.14$).The value of the Spearman coefficient of 0.384 shows that the association is positive, which means that participants with a higher IQ will also exhibit a higher level of psychomotor development associated with age. The magnitude of the observed effect is strong ($r^2 = 0.14$).

Regarding the group of seven-year-old, it was found that the association between the two variables has a high degree of statistical significance ($\rho = 0.542$, df = 58, p = 0.000, bilateral test, $r^2 = 0.30$). The ρ value of 0.542 indicates that the association is positive. Thus, the high scores obtained by participants in the IQ variable are statistically significantly correlated with the PMD. The effect size is strong.

For the last group, that of the eight-year-old children, the results indicate a statistically significant association between the IQ and PMD ($\rho = 0.520$, df = 33, p = 0.002, bilateral test, $r^2 = 0.27$). The ρ value of 0.520 shows that the association is positive. Thus, the higher the IQ scores are, the higher the value of PMD. The effect size is strong ($r^2 = 0.27$).

Analyzing the obtained values, it was concluded that the hypothesis is supported.

Gender based analysis

In order to obtain greater accuracy, the working hypothesis was also tested based on the gender of the subjects.

Given that both groups contained more than 50 participants, the normality of the distributions was verified using the Kolmogorov-Smirnov distribution normality test. In both genders it was found that none of the distributions belonging to the IQ variables and PMD meet the criterion of normality, which determined the choice of Spearman coefficient for testing the hypothesis.

The results for the Kolmogorov-Smirnov test and the Spearman coefficient values are presented below:

Table 8. Kolmogorov-Smirnov test of normality for gender-based analysis

| | | *Kolmogorov-Smirnov* | | |
|---|---|---|---|---|
| | | Statistic | df | Sig |
| *Boys (N=54)* | *IQ* | 0.152 | 54 | 0.003 |
| | PMD | 0.149 | 54 | 0.004 |
| *Girls (N=66)* | *IQ* | 0.135 | 66 | 0.004 |
| | PMD | 0.460 | 66 | 0.000 |

Table 9. Analysis of the correlation between IQ and DPM based on the gender of the participants

| | *Spearman Correlation* | *Sig.* | *r²* |
|---|---|---|---|
| *Boys (N=54)* | 0.258 | 0.030 | 0.06 |
| *Girls (N=66)* | 0.517 | 0.000 | 0.26 |

The hypothesis was supported by the results obtained for both genders. The results obtained by the boys, $\rho = 0.258$, df = 54, p = 0.030, bilateral test, $r^2 = 0.06$ indicate that the relationship between the two variables is statistically significant. In the case of the girls $\rho = 0.517$, df = 66, p = 0.000, bilateral test, $r^2 = 0.26$ the association is strongly statistically significant.

For boys, the association between IQ and PMD is positive and weak ($\rho = 0.258$), and the observed effect is of medium intensity - $r^2 = 0.06$.

The correlation between the two variables for girls is positive, considering the value of the coefficient ρ of 0.517. The observed effect is strong ($r^2 = 0.26$).

**5. Discussions**

The obtained results support the hypothesis for the whole group and for the age and gender groups. Thus, the data of the whole group indicated that the association between the two variables is statistically significant and average ($\rho = 0.412$, $p = 0.000 < .05$).For participants aged 6 years, the correlation is statistically significant and low ($\rho = 0.384$, $p = 0.040$).For children aged 7 years, there was a statistically significant association (p. 000) and a high association - $\rho = 0.542$.The participants aged 8 years present a very significant statistical and reasonable correlation between IQ and level of psychomotor development **(**$\rho = 0.520$, $p = 0.002$). In terms of gender analysis, the association between the variables in question proved to be strongly statistically significant and reasonable for girls ($\rho = 0.517$, $p = 0.000$); while in boys the correlation is significant and weak ($\rho = 258$, $p = 0.030$). The results are consistent with those obtained by Davis, Pitchford, and Limback (2011), who identified among children aged between 4 and 11 years a statistically significant association between cognitive and motor skills. Moreover, the mentioned study shows that the association is stronger for girls. Similar results were obtained after the analysis by gender of the subjects in the present study. Also, the results are similar to those from the study of Planinšec and Pišot (2006), which showed that participants with a medium level of intelligence obtain higher performances in motor coordination tests, compared to those with a lower level of intelligence**.** The positive and significant correlation between general intelligence and the level of psychomotor development was also identified by Gao, Gao, IQn, Dang, Zhang, IQan, Zeng, Xing, Zheng, Li, Guo, Chang, Feng, and He (2016) during a research which involved four hundred fifty Chinese children. Garaigordobil and Amigo (2010) also showed that intelligence and psychomotricity (especially coordination and body schema) are linked, after studying a sample of 74Spanish children. Galdin, D'Anna, Pastena and Gomez Paloma (2015) evaluated one hundred and twenty-three children, both boys and girls, between 3 and 6 years old and the results showed that their coordination skills and level of psychomotor development could contribute inincreasing the level of general intelligence.

Kenny, Hill and Hamilton (2016) conducted a study that involved 101 children in the primary school cycle. They also highlighted the correlation between the participant's IQ (measured using the Progressive Raven Color Matrices) and their motor skills. They also pointed out that the level of general intelligence is a predictor for performance on tests that measure motor development.

A significant association between psychomotor development and general intelligence was obtained by Campo Terrara (2010) during a research that involved 223 subjects aged 3 to 7 years.

A possible explanation of the result obtained, namely that the hypothesis was confirmed in the case of the entire sample, but also in the case of the subgroups analyzed, is related to the conclusions drawn by Jean Piaget. He has been studied many years the intelligence development in children. The strong connection between intellect and psychomotricity is, in Piaget's view, the result of the child's need to constantly represent and know the external environment through direct action with objects. Starting from those stated by Piaget, namely, from the sensory-motor stage as a starting point in the development of the child in general, and of his intelligence in particular, and starting with the evolution of the child in the aforementioned stage, it was observed that the connection between intelligence and psychomotor activity is maintained over the years and it is positive.

**6. Conclusion**

Analyzing the data obtained, it can be concluded that there is a significant association between general intelligence and the level of psychomotor development in children aged 6 to 8 years. The conclusion of the research highlights the relationship between general intelligence and the psychomotor development of children aged 6 to 8 years, which is important in achieving harmonious development, performance and success in academic, personal and professional life. Also, these findings help parents, teachers and other professionals to support children and to intervene where specific needs are identified.

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# DETERMINANTS OF PAIN IN EMPLOYED UNDERGRADUATE STUDENTS

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**Abstract**

The industrialization of lucrative activities led people to be employed in more sedentary working activities. ***Aim:*** The purpose of this research is to establish the relationship between the type of work performed and the degree of physical pain and discomfort. ***Methods:*** Data were collected via an anonymous questionnaire from 400 (200 female and 200 male) undergraduate students that are employed. Physical activity was assessed with the Occupational sitting and physical activity questionnaire (OSPAQ), and quality of life was assessed by RAND 36 Item Short Form Health Survey SF-36. ***Results:*** The results of the study indicate the existence of correlations between the time spent standing / sitting, during lucrative activities, and the appearance of various types of physical pain. ***Conclusion*:** The type of work performed, the time spent in stand and sitting position can influence the quality of life by the occurrence of pain and physical discomfort.

*Keywords:* quality of life; pain; employed; undergraduate students;

## 1. Introduction

Thinking about and constructing a career in the current socio-economic context characterized by job insecurity, continuous changing technology and increasing personal responsibility for constant upskilling, globalization, employability and lifelong learning are just a few of the key challenges that young workforce has to deal with (Baruch, 2004; Marshall & Bonner; Coetzee & Villers, 2012).

The trend for students to combine work and study has been increasing rapidly over recent years (Curtis & Sahani, 2002). College student employment has been on the rise steadily for at least four decades. At present approximately 80% of all college students are employed while completing their undergraduate education. Even among students under the age of 24 at 4 year collages, more than 50% are employed during the school year (Riggert, Boyle, Petrosko, Ash, & Rude-Parkins, 2006).

The student life combined with that of the employee, either full time or part time, can have certain financial and skill benefits as well as disadvantages in terms of fatigue, lack of time and physical and psychological stress.

Researchers emphasized that several factors such as the academic overload (Paro, şi alţii, 2010) in addition to the students' non-school activities (Pekmezovic, Popovic, Tepavcevc, Gazibara, & Paunic, 2011) were contributed to lower quality of life among university students general population.

Quality of life is defined as one's subjective perception of one's own well-being within one's socio-cultural context (WHO, 1995) or as the satisfaction of desires and pleasures (Tengland, 2006) and the accomplishment of the ideal of perfection (Sandoe, 1999). These definitions are characterised by individual, bipolar and multi-dimensional aspects of the perception of well-being. The term 'health-related quality of life' (HRQL) represents the influences of health status, medical treatment and health policies on these perceptions of well-being (Ebrahim, 1995).

As an employed student the individual must face different challenges that put their mark on the quality of life and its different domains: physical functioning, physical role, bodily pain, general health, vitality, social functioning,

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emotional role and mental health. Finding a balance between the two activities is very important. It's desirable that these components have the least to suffer in order to have good quality of life. One of the components that greatly influences HRQol is bodily pain.

## 2. Purpose and Objectives

The purpose of this research was to evaluate health-related quality of life (HRQoL) among employed students of West University of Timișoara and to establish the relationship between the type of work performed and the degree of physical pain and discomfort

Hypothesis: The volume and type of work performed by the employed undergraduate students influences the degree of pain and discomfort.

## 3. Material and methods

Data were collected via an anonymous questionnaire from 400 (200 female and 200 male) undergraduate students that are employed. Physical activity was assessed with the Occupational sitting and physical activity questionnaire (OSPAQ) (Chau, Van der Ploeg, Dunn, Kurko, & Bauman, 2012), and quality of life was assessed by RAND 36 Item Short Form Health Survey SF-36. The short form 36 (SF-36) health survey instrument is a self-administered general health questionnaire, which generates a profile of scores across eight dimensions of health (Ware & Shelbourne, 1992). It is comprised of 36 items that assess eight health concepts: physical functioning, role limitations caused by physical health problems, role limitations caused by emotional problems, social functioning, emotional well-being, energy/fatigue, pain, and general health perceptions. Physical and mental health summary scores are also derived from the eight RAND-36 scales (Hays & Morales, 2001).

After the exclusion of the students that did not meet the criteria, 143 females and 149 males remained.

We divided the students into 4 groups, judging by work hours. The first group had a full-time job working 40 or more hous a week. The second group was an intermediate one, working between 35-24 hours. Third group was working a part time job with 20 to 14 hours. The last group was working less then 10 hours.

## 4. Results

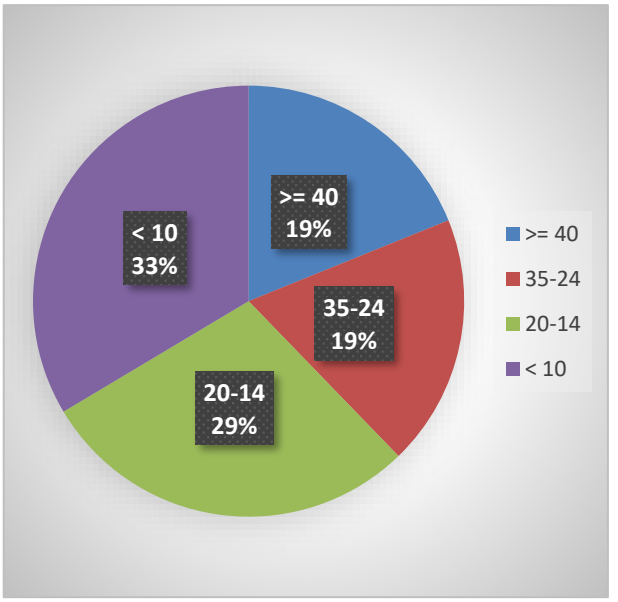


Fig. 1. Male distribution according to working hours

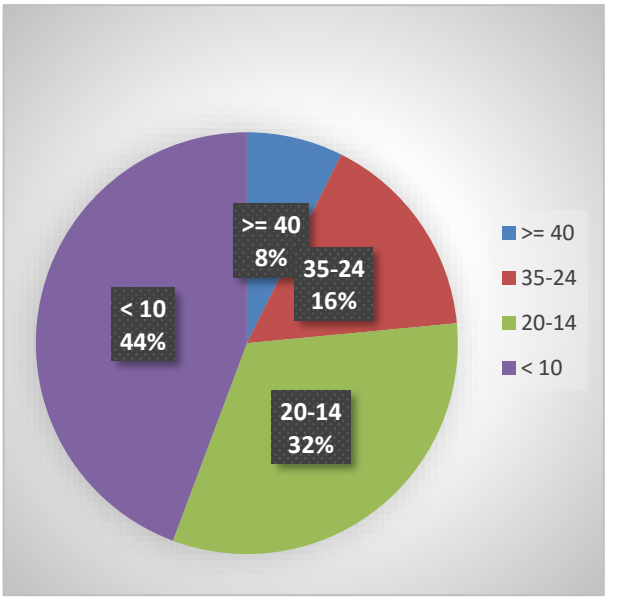


Fig. 2. Female distribution according to working hours

For the male students we had the following distribution by working hours: 19% (n=27) of the males had a work program of 40 or more hours a week. The group that worked between 35 and 24 hours also represented 19% (n=27) of the total. 29% (n=41) were part time job students working 20-14 hours. The remaining 33% (n=48) worked less than 10 hours a week. Fig. 1.

As presented in Figure 2, far fewer female students had a full-time job implying a program of 40 or more working hours with a percent of 8% (n=11). 16% (n=24) were working 35 to 24 hours. A similar percent as in the case of the male students, 32% (n=48) of females had a part time 20-14 hour job. 44% (n=66) of the female students worked less than 10 hours per week.

In the case of female students, a positive correlation has been found p=0.0147, r=0.72 between pain and hours of work in the last 7 days for the group with a full-time job, working 40 or more hours a week as seen in Table 1.

Table 1. Female correlation of pain

| | Pain vs Hours of work in the last 7 days ≥ 40 hours |
|---|---|
| Spearman r | |
| r | 0.7249 |
| 95% confidence interval | 0.2015 to 0.9263 |
| P value | |
| P (two-tailed) | 0.0147 |
| P value summary | * |
| Exact or approximate P value? | Exact |
| Significant? (alpha = 0.05) | Yes |
| Number of XY Pairs | 11 |

After analyzing the results obtained from the male students group, the following correlations have been found and represented in Table 2.

Table 2. Male correlation of pain

| | Pain vs Hard work 35-24 hours | Pain vs Hours of work in the last 7 days 20-14 hours | Pain vs Hours of sitting in the last 7 days <10 hours |
|---|---|---|---|
| Spearman r | | | |
| r | 0.4307 | -0.3403 | 0.3004 |
| 95% confidence interval | 0.04872 to 0.7028 | -0.5928 to -0.02704 | 0.009055 to 0.5447 |
| P value | | | |
| P (two-tailed) | 0.0249 | 0.0295 | 0.0380 |
| P value summary | * | * | * |
| Exact or approximate P value? | Approximate | Approximate | Approximate |
| Significant? (alpha = 0.05) | Yes | Yes | Yes |
| Number of XY Pairs | 27 | 41 | 48 |

In the 35 to 24 hours of work per week group, there is a positive correlation between pain and hard work (heavy labour) p=0.024, r=0.4307. The surprise comes form the male students working part time where pain is negatively

correlated with hours of work in the last 7 days p=0.0295, r=0.34. Pain was positively corelated with hours of sitting in the last 7 days for students who worked less than 10 hours per week.

## 5. Discussions

Ismail and Othman (2006) investigated effect of students gender and past performance on their performance during the first year of the university. Data about students were collected from male and female students from three faculties. Research results showed that female students were found to have better results than their male counterparts and that gender played an important rule in influencing success in the university. This could be one of the reasons why female students tend to have part time jobs and male students full time jobs. Females focus more on academic activity but at the same time try to make a living by having a part time job. On the other hand, male students search for better payed full-time jobs, sometimes neglecting academic results.

Most of the students, regardless of the time spent working, have jobs that involve either sitting at a desk in an office or physical labor. In both cases physical pain is reported. On top of that, academic activity implies sitting in the bench which is also a contributing factor that increases the pain score.

Stressors in the family and job environments have been proposed to play a role in the modulation of pain, yet direct empirical support for such a role is limited (Feuerstein, Sult, & Houle, 1985).

The level of leisure physical activity among students is rather low. It should be taken into consideration increasing the level of this kind of activity for lowering stressful factors and thus rising HRQoL, at the same time reducing the pain score.

## 6. Conclusions

The following conclusions have been drawn as a result of this study:

More male students tend to be employed full time with 40 or more working hours per week than female students, while women included in this study that worked less than 10 hours outnumber men from this category by 11 percent.

Correlation between pain score and working hours has been found in the case of full time employed female students p=0.0147, r=0.72. This also reflects from the fact that there is a reduced number of female students that work 40 or more hours a week.

In the case of male employed students working 35 to 24 hours, pain corelates significantly with hard work (heavy labor) p=0.024, r=0.4307. We could not find the same correlations in the other work groups.

We have found a single negative correlation between pain and hours of work in the last 7 days for the male students that work part time jobs p=0.0295, r=0.34, meaning that fewer hours at the job imply a higher labor density.

Sitting was correlated with pain for males that worked less than 10 hours in the last 7 days. The static nature of the job combined with classes at the university has this effect on the students.

## Ethical Issues

All students who participated in the study were informed about the purpose of the study and full free and voluntary consent was taken before their inclusion. Each student who participated in the study was free to withdraw from the study at any point in time and was ensured confidentiality of the responses.

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# INVOLVEMENT OF TEENAGERS IN SPORTS ACTIVITIES - A SOCIOLOGICAL APPROACH

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**Abstract**

Socialization in and through sport is the main responsible for the place occupies by sport in a society. A high standard of living diversified lifestyle of families and a regular practice of sport at all age categories is an indicator of the quality of life. The future of a country is determined by his future adults. It is therefore important for the society to invest in children, both institutional-formal, and values induced by the family, school, etc. Among the most "healthy" values are included those which sport brings with itself, directly and indirectly: team spirit, fair-play is, the ability of organization and coordination of activities, and knowledge of the rules. In our opinion that sports to become really a powerful factor of social integration, it is necessary for those who are involved in the process of education and training of the young generation to know the attitudes and opinions of youth about sport.

*Keywords:* Sport, teenagers, social integration, lifestyle.

## Introduction

Socialization in and through sport is the main responsible for the place occupies by sport in a society (Coakley, 1993). A high standard of living diversified lifestyle of families and a regular practice of sport at all age categories is an indicator of the quality of life. Physical fitness can be thought of as an integrated measure of most of the body functions involved in the performance of daily physical activity and/or physical exercise, which has been considered an important health-related marker in childhood (Ortega, Ruiz, Castillo & Sjöströsm, 2008a). Health-related physical fitness refers to those components of fitness that have a relationship with health such as cardiovascular endurance, muscular strength, flexibility, and body composition (American College of Sport Medicine, 2011).

The future of a country is determined by his future adults. It is therefore important for the society to invest in children, both institutional-formal, and values induced by the family, school, etc. Like adults, children can have mental health disorders such as depression, anxiety or a low self-concept. Childhood has been considered a crucial period of life, since dramatic physiological and psychological changes take place at these ages (Harter, 1999). Physical self-concept is regarded as a multidimensional subdomain of overall self-concept that incorporates different characteristics such as fitness, health, appearance, and physical activity (Marsh & Redmayne, 1994). For these reasons, physical self-concept has been considered to play a crucial role in health during childhood. Physical self-concept attains great relevance due to its impact on the levels of physical activity (Chan, Au, Chan, Kwan, Yiu & Yeung, 2003; Crocker, Eklund & Kowalski, 2000; Planinsec & Fosnaric, 2005), use of leisure, and social relationships (Alfermann & Stoll, 2000).

There is a broad consensus that the principal goals of children's sport are to provide intrinsically rewarding experiences, and to maintain interest so that they are inclined to continue playing throughout their lives (Kirk, 2005). It is widely believed that taking part in sport and other physical activities from an early age is important if children are to develop a foundation for lifelong physical engagement in healthy sporting experiences (Bailey, et al., 2009;

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Kirk, 2005). In order to achieve this, a social environment is needed that reflects children's motivations for taking part in, and remaining involved in, sport for these goals to be achieved.

Studies have identified a number of factors that facilitate participation in sport, including such things as a supportive family, accessibility to local sports clubs, and the construction of appropriate learning environments (Bailey & Toms, 2010). Among the most "healthy" values are included those which sport brings with itself, directly and indirectly: team spirit, fair-play is, the ability of organization and coordination of activities, and knowledge of the rules.

In our opinion that sports to become really a powerful factor of social integration, it is necessary for those who are involved in the process of education and training of the young generation to know the attitudes and opinions of youth about sport.

We also tried to find out if between the profession of the teenager's parents and the attitude towards the sport of those, there is a significant relationship.

**Method**

To find out which are the opinions, attitudes and behaviors of adolescents regarding sport, we used the technique of standardized questionnaire. This method has inherent disadvantages, like any survey: the possibility of answers inconsistent with reality, tend to go over the top, social desirability etc. We tried to reduce these shortcomings through some control questions.

The questionnaire consists of 28 items has been applied to a number of 181 adolescents (106 girls and 68 boys), school students in the city of Cluj-Napoca.

The selection of subjects in the young population in respect of contrasting samples principle for two aspects: types of schools and age (15-16 years, 18-19 years).

**Results and discussion**

Selecting some of the results from the first question of opinion, we present below those relevant.

Table 1. Which of the following sports they valued most?

| No | Sports appreciated (in order of frequency) | Options (%) |
|---|---|---|
| 1 | Voleyball | 37.6 |
| 2 | Football | 34.8 |
| 3 | Handball | 28.7 |
| 4 | Gymnastics | 27.1 |
| 5 | Field Tenis | 24.9 |
| 6 | Basketball | 23.8 |
| 7-13 | Martial arts, ... rugby | 19.9 – 7.2 |
| 14 | Swiming* | 5.0 |
| 15 | Track and field* | 2.8 |
| 16 | Motor race * | 2.8 |
| 17 | Snooker* | 2.2 |
| 18 | Skating * | 1.7 |
| 19 | Others ** | 5.5 |

* *Sports not mentioned in questionaire*

** *Others sports mentioned: country cross, roller,chees, horse race, fitness, ski, extreme sports, dance, judo*

It can be seen that were mentioned on the first places sports practiced traditionally in Romania (volleyball, soccer, gymnastics). The sports which have begun to be known in recent decades (martial arts, kick box, and motocross) occupied places 7-13. The results show a certain specific national in teenager's preferences.

The results obtained traditionally by one of the nation at a particular sport and the practice with priority in schools of some sports in schools or sports clubs (more football, volleyball, handball) provides a specific profile of such ranking.

The specific of age is evident in free options (unmentioned in the questionnaire) for sports with smaller scale in the Olympic movement, but attractive and fun: kikbox, motocross, roller, extreme sports).

The question about the sport practice by teenagers now we have obtained the following frequencies, in descending order.

Table 2. What sport you practice now (a single preference) ?

| No. | Sport | Preferences(%) |
|---|---|---|
| 1 | Basketball | 19.3 |
| 2 | Football | 11.0 |
| 3 | Voleyball | 8.8 |
| 4 | Handball | 7.7 |
| 5 | Cycling | 3.9 |
| 6 | Swiming* | 3.9 |
| 7 | Gymnastics | 3.3 |
| 8 | Field Tennis | 3.3 |
| 9 | Table Tennis | 3.3 |

The last options are for the martial arts (2.2%), dance sport and athletics and dance (2.2 % and 1.7 %), kikbox, box and rugby (1.1 %, 0.6%). For „other sport" with 4.4 % it was mentioned : snooker, cross country, chess, fitness, extreme sports, wrestling, judo, water polo.

While are diverse, the latter is not a significant movement or fashionable sports for the young adolescents of our country.

The fact that on the first places are sports like basketball, football, handball and volleyball, highlight a specific reality: these sports are not very expensive at this level. On the other hand they are team sports, where both young people can be part in a competitive environment.

In these sports the trainers may exercise their profession with a greater number of players in the same period of time, and employing institutions save money and time. It is an explanation for the occupied by tennis field (instead of 7, along with gymnastics and table tennis) or dance sports. These are sports that need quite high costs, even at beginners (equipment and travel to competitions or shows, pay teachers, etc.).

May watched sports on TV than they are - as expected - ranked according to national popularity: football (43.1%), gymnastics (17.1%), handball (11.6%), tennis field (9.4%), basketball (8.8%), and box (7.2%). It is interesting that motor race or track and field obtained a percent quite small, although they are quite media on TV (3.9% and 2.2%). It is clear that the emergence of great sportsman can lead to a revitalization of youth sports in the options. The fact that the tennis players Ilie Năstase, Ion Ţiriac, the football players Gheorghe Hagi, Cristian Chivu, the gymnasts Nadia Comăneci, Andrea Răducanu (to mentioned only some name) have become true symbols of national generates a current strength of young people in such sports.

Opinion about "the practice of sport by young people in Romania compared with those from other countries" is mainly directed towards variant "the same extent "(48.9%). The variant "less" was choose by 26.7%, and 24.4% have the opinion that the Romanian youth practice sport more than others. In the same order theme, the young respondents considered in proportion of 71% the teenagers practice not enough sports. Only 29% stating that the practice of sport is quite adequate.

At physical education classes the sport most practiced is basketball. The next sports practices in schools are also team sports, in fact, most of them popular among high school: volleyball, soccer, table tennis, and handball. The opinion about what sports would they to practice has broadly the same hierarchy.

We tried to establish a relationship between leisure time (hobby s) and place it occupies in this sport category. We found that 61.1% put on first place the music, the dance 60%, only 14.9% the trips, 13.1% Internet / computer, 10.3% activities with friends, watching TV 6.3% / movies, sleep 2.9%, 2.3% fishing, 1.1% photography, 36 % other activities not mentioned in questionnaire.

It is noted that, at least as declare the practice of sport occupies the place 2, which gives account of the important position that it occupies an extra activities in the high school. It is possible that the profile of the sport focused on the questionnaire to provide more statements in favor of practicing sport than it is in reality. Even with a great potential of distortion, this fact cannot significantly change the orientation of pro-youth sports, from an obvious reason: the practice at least the hours of physical education, sports is obviously an occasion of joy for students. This aspect emerged from the comparative analysis for several sets of questions of those questioned. We consider interesting to watch how the polarizing is subsequent to more coordinates. In the below table are presented some of these aspects:

Tabelul 3. What are yours hobbies ?

| *Category* | ***Music, dance %*** | ***Sport%*** | ***Trips %*** |
|---|---|---|---|
| Girl | 75.0 | 52.9 | 20.2 |
| Boy | 36.4 | 72.7 | 7.6 |
| High School | 51.3 | 60.0 | 22.5 |
| Professional school | 69.5 | 60.0 | 8.4 |
| Parents intelectuals | 45.7 | 67.4 | 21.7 |
| Parents with a special profession | 70.8 | 64.6 | 18.8 |
| Parents qualified worker | 57.6 | 48.5 | 12.1 |
| Parents inqualified worker | 66.7 | 55.6 | 11.1 |
| Parents dead or not active social | 93.3 | 60.0 | - |

The fact mentioned in most statistics and worldwide surveys, that the quality of life and the practice of large-scale sports there is a close correlation, is demonstrated in our research also. It notes that significant differences are recorded in the practice of sport by teenagers coming from families of intellectuals, much more than by those who come from families of workers. A standard of living higher induce, is quite clearly, an attitude of awareness of the importance of physical activity and the ranking of priorities regarding the practice of sport in the free time.

## Conclusion

Knowledge and application of the principle of "mens sana in corpore sano" is not a simple good idea, but one which can verify the attitudes and behaviors of teenagers. Practice of sport needs years of hard work, capacity of concentration and responsibility. These qualities once formed contribute to the formation of strong and balanced personality to young people who practice it. It is a conclusion to which some have come much, but that others, and strengthens the only one now. But whatever sport make the teenagers, it is clear that without it, they would have lost a lot in physical training, psycho-emotional and ability to adapt to others, to society.

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# PREDICTORS OF COMPETITIVE ANXIETY IN YOUTH TEAM SPORT PARTICIPANTS

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**Abstract**

Competitive anxiety is a well-known concept in the field of sport psychology and it has been a widely studied in the recent years. This paper aims to examine the determining factors of competitive anxiety. To accomplish this, we have focused on existent models and theories that have a strong empirical base. We have studied the predictive value of relevant factors, such as: coping strategies (Gaudreau, Lapierre, & Blondin, 2001), task-oriented goals (Duda & Nichols, 1992) and self-confidence (Vealey, 1986) and their role in determining competition anxiety. The study sample included N=139 professional athletes, with ages ranging from 13 to 19 years old (m=16, sd= 1.63). They were selected from team sports such as handball and volleyball. The results analyzed by using a multiple linear regression model are discussed in the context of the multidimensional model of anxiety. The final section presents the practical implications and future directions for research, with high relevance for therapeutic intervention in sports anxiety.

*Keywords: competitive anxiety, achievement goals, coping strategies;*

## 1. Main text

The issue of anxiety has been debated for a long time and has aroused the interest of coaches, athletes and researchers. For this reason, in the specialized literature, we can find the answer to a wide range of questions regarding competitive anxiety. Even so, competitive anxiety continues to attract the attention of sports psychology researchers (Hanton, Neil, & Mellalieu, 2008; Mellalieu, Hanton, & Fletcher, 2006), a series of important questions still needs to be answered.

Thus, in the present study, our intention is to complete existing theoretical insights and provide new answers to questions regarding the determinants of competition anxiety. Our goal is to focus on a certain model of anxiety, a model that has strong empirical support and, on its basis, to provide further insights into the variables that predict competitive anxiety. In the followings we will present a model of anxiety that has the potential to explain competitive anxiety, and then, based on the literature, we will define the variables that can support a predictive relationship with anxiety.

Competition anxiety, can be conceptualized as a negative emotional response to competitive stressors (Fletcher et al., 2006). This definition refers to a particular case, but to provide a broader view of anxiety, we will start from Spielberger's one-dimensional theory. According to his theory developed in 1966, anxiety is a state and a feature. State anxiety – as he describes it - is varying from moment to moment and is fluctuating proportionally to perceived

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threats in a particular situation. Anxiety as a trait refers to a predisposition to assess a situation as threatening, resulting in anxiety as a condition (Spieleberger, 1966).

The next major step in anxiety research was the differentiation between cognitive and somatic anxiety (Borkovec, 1976; Davidson, 1978). Starting from this differentiation, Martens et al., (1990) has developed the multidimensional theory of anxiety, that suggests that anxiety has two components: somatic and cognitive. According to this theory, the cognitive component is defined as the "mental component of anxiety and is caused by negative expectations in terms of success and negative self-evaluations" (Martens et al., 1990, p. 6). Somatic anxiety on the other hand is defined as "exertion of anxiety at physiological and affective level" (Martens et al., 1990, p. 6). For the multidimensionality assessment of anxiety, the Sports Anxiety Scale - SAS was built (Smith et al., 1990). In 2006 Smith develops a revised scale for the assessment of anxiety in children, Sports Anxiety Scale 2 (SAS 2).

In the followings, we will focus on the other two important variables, that according to the recent literature, are closely related to anxiety. In the last few years, a great deal of attention has been directed towards the goals of accomplishment (Duda et al., 1995; White & Duda, 1994). This theory was originally developed to explain academic achievement (Nicholls, 1984) and only later was applied in the context of sport and physical exercise. According to Dweck (1986) The theory of achievement targets assumes that individuals engage in situations of accomplishment to demonstrate competence or capacity, or to avoid incompetence. The underlying principle of this theory is that individuals in the context of realization have two goals: ego orientation goal and a task orientation goal.

Engaging in a task orientation involves self-reporting, where the person focuses on improvement and mastery skills (Lavell, 2004). Behaviors associated with task orientation are persistence, optimal effort, and the selection of competitive settings that will allow feedback on performance. The motivational results for such a person are as follows: high efficacy and persistence in task (William & Gill, 1995), fair play (Smith, Hall & Wilson, 1999; White & Zellner, 1996), high pleasure (Duda et al., 1995), low level of anxiety (Ommundsen & Pedersen, 1999, apud. Barkoukis, 2007). It is also assumed that a task-oriented person is less prone to experience performance anxiety.

On the other hand, ego-orientation refers to a normative evaluation of the results, the individual being focused on demonstrating his or her abilities in relation to others (Lavalle, 2004). Lavalle (2004) also points out that in situations where this cannot be achieved, a person tends to choose objectives, that are very difficult or tends to avoid failure. Regarding the relationship between ego-orientation and anxiety, there is evidence that shows, that an ego orientation is positively associated with cognitive anxiety two days, a day and even half hour before the competition (Hall, 1997, apud. Duda, 2005). Also, there are studies that highlight the existence of coping strategies that could explain the relationship between achievement goals and impact.

As far as the problem of coping strategies is concerned, they have also been defined as a multidimensional construct. Coping strategies are cognitive and behavioral actions that can be used to manage internal and external demands during a particularly stressful situation (Lazarus & Folkman, 1984). Being conceptualized as a multidimensional construct, we will focus our attention on explaining coping strategies from this perspective. Thus, they can be conceptualized at different levels of analysis. Skinner (2003) proposed the hierarchical organization of the coping construct, that is the concept scale model used in this study. Coping constructs will be measured by the Coping Inventory for Competitive Sports, that is based on Skinners model. In this study we will focus on second-order dimensions that are conceptualized in Skinner's theory. This model has three dimensional dimensions: task-oriented coping, distraction-oriented coping and disengagement-oriented coping. Task-oriented coping is a strategy that can be used to manage the internal and external demands of a sporting competition (Gaudreau & Blondin, 2002). Distraction-oriented coping corresponds to strategies that can be used to momentarily direct attention to non-sport related issues (Gaudreau & Blondin, 2002). Disengagement-oriented coping is the strategy that is used to disengage from a process that generally can lead to a goal (Gaudreau & Blondin, 2002). The main purpose of the present study is to analyze the predictive value of a model that includes coping strategies and performance objectives as determinants of competitive anxiety.

### 1.1 Methods

#### Participants

Participant were male and female athletes practicing team sports such as handball and volleyball. All athletes were affiliated to the Romanian Handball Federation or the Romanian Volleyball Federation. The sample used in this study consisted of 139 athletes. Participants age ranged between 13 and 19 years with an average age of 16 (sd =

1.63). The selection of teams was randomized, including two teams of the Olympic Handball Feminine Center. To ensure an elite sample, only those athletes who competed nationally and above during their sports career were selected.

### 1.2 Instruments

Coping Inventory for Competitive Sports- CICS (Gaudreau, Lapierre, & Blondin, 2001) measures 10 coping strategies that are commonly used by athletes in sports competitions. The 10 coping strategies can be organized into three secondary dimensions, including: task-oriented coping, distraction-oriented coping and disengagement-oriented coping.

Athletes' coping strategies are linked with variables such as perceived control ("I have seen that I have total control over the situation"), self-efficacy ("I watched myself doing a good performance"). Other examples of these scales are: "I tried to relax my body" - for relaxation; "I repeated in my mind the way I perform my movements" - mental imagery; "We kept the distance from other athletes" - distance. The responses of the subjects are evaluated from 1-5 on the Likert scale (1 = it does not correspond in any form what I did or thought, 5 = corresponds very strongly to what I did or thought). In the present study the adapted Romania version was used.

Sport Anxiety Scale 2- SAS-2 (Smith et al., 2006) is a self-report questionnaire with 15 items that are built to measure the cognitive component and the somatic feature of competitive anxiety as a feature (Smith et al., 2006). SAS-2 has three subscales: somatic anxiety, worry, and concentration disruption. The answers provided by the participants are quoted on the Likert scale from 1 to 4 (1 = not at all 4 = very much). SAS 2 is a valid multidimensional instrument of sports anxiety that is based on the original scale structure of SAS, but measures its dimensions more precisely (Smith et al., 2006). The main reason why a new scale was built was the assessment of multidimensional anxiety in children.

The items are formulated so that, when responding to the questions, the participants can relate to the pre-competition or competition period: "Before or during sports competitions ...". As an example of item are: "I feel my body tense", "I worry I will not play well", "It's hard for me to focus on what I have to do". The scores on each subscale are rated between 5 and 20 and the total score, which is the sum of all items, ranges from 15 to 60. In the present study the Romanian adaptation of the scale was used.

Task and Ego Orientation in Sport Questionnaire- TEOSQ (Duda & Nicholls, 1992) was developed to evaluate both ego orientation and task orientation in athletes. Task orientation was measured with 7 items (for example "I feel like I'm successful in sports when ... A new skill I'm learning makes me feel good") and ego orientation was evaluated with 6 items (for example. "I feel that I am successful in sports when ... The others cannot get as good as me"). Responses are evaluated on a Liker scale with 5 points from 1 (strong disagreement) to 5 (strong agreement). The task orientation scale includes items that relate to effort and feelings of pleasure and joy during the practice of sport. The ego-orientated scale is made up of items that reflect a combination of results and normative abilities. In the present study the Romanian adaptation of the scale was used.

### 1.3 Design

In this study a non-experimental design was used. Like predictive variables we chose: achievement goals and coping strategies. For objectives we chose two dimensions: task oriented goals and ego oriented goals. Then, with regard to coping strategies, we chose three dimensions: task-oriented coping, distraction-oriented coping and disengagement-oriented coping.

As a variable criterion we chose competitive anxiety, which I have functionalized as follows: somatic anxiety and cognitive anxiety.

### 1.4 Procedure

Prior to applying the scales, participants were informed about data confidentiality and responses. Testing was conducted during the competition period. Demographics were gathered from those individuals who agreed to participate. Then a convenient time for data collection was set. In addition, for the participation of the athletes, the permission of the team officials as well as the coaches was requested. The questionnaires were completed by the members of each team. Before completing the scales, participants were told that there were no right or wrong

answers, and participants were asked to check whether they understood the scale items. Participation in the study was voluntary. The questionnaires were completed by most athletes outside the competition environment and others before training.

### 1.5 Results

In order to verify the predictive value of the model presented above, multiple regression analysis was used for statistical data processing. Two models of regression were tested, the first model having as a criterion the somatic component of anxiety, while in the second model the criterion variable was the cognitive dimension of anxiety. In both models, the predictor variables were: coping (focusing on: task, distraction, and disengagement), or goal orientation (self or task). The alpha threshold set for values considered to be significant was 0.05.

The overall matching indicators of the prediction model of somatic anxiety are presented in table no. 1. The calculated value of the predicted variant variance in the variance of the criterion is $R^2 = 0.31$, which means the prediction model (with load-orientated coping predictors, attention-oriented coping, disengagement-oriented coping, task- self-explanatory) explains 31% of the variance of the somatic dimension of anxiety. This model explains a significantly larger variance than a model based on the mean variable criterion. Calculated value of statistical test $F(5,11) = 10.26$ ($p < 0.001$).

Table 1. Explained criterion variance indicators for model of somatic anxiety

| R | R square | R square adjusted | Standard error estimate |
|---|---|---|---|
| 0.564 | 0.318 | 0.287 | 1.99948 |

The analysis of results presented in Table 2 allows us to identify the predictor variables that contributes in a statistically significant way to the explanation of the criterion variable (see Table 2). The results presented in Table 2 shows that only three of the five predictors contribute to the prediction of the somatic anxiety, namely: task-oriented coping ($t = -3.33$, $p < 0.001$), ego-oriented goals ($t = 3.51$, $p < 0.01$) and task oriented goals ($t = -2.24$, $p < 0.005$). The statistical comparison of the standardized regression coefficients shows that the highest contribution to the regression model has the Ego-oriented objective variable.

Table 2. Standardized and non-standardized regression coefficients (criterion variable - somatic dimension of anxiety)

| Model | *Non-standardized* coefficients | | *Standardized* coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| Task-oriented Coping | -0.079 | 0.024 | -0.276 | -3.332 | 0.001 |
| Distraction Oriented Coping | 0.080 | 0.049 | 0.137 | 1.613 | 0.110 |
| Disengagement Oriented Coping | 0.027 | 0.038 | 0.061 | 0.700 | 0.485 |
| Ego-oriented goals | 0.158 | 0.045 | 0.306 | 3.511 | 0.001 |
| Task-oriented goals | -0.090 | 0.040 | -0.182 | -2.249 | 0.027 |

In the prediction of Task-oriented coping variable, the value of the standardized regression coefficient was ß = -.27, which means that if the value of this variable increases with a standard unit (a standard deviation), the value of the variable criterion will be reduced by 0.27 standard deviation units. For the task-oriented goals variable, this

coefficient is also negative: ß = -18. An increase with a standard unit of scores on the task-oriented goals variable results in an average decrease of 0.18 standard deviation of the variable criterion. Finally, for the ego-oriented goals predictor, the regression coefficient is a positive one ß = 0.30, which means that a standardized unit increase of these scores leads to an average increase of .30 of the somatic anxiety variable scores.

Table 3 presents cognitive anxiety prediction model matching data with questionnaire data. The variance explained by the predictors included in the model is $R^2 = 0.19$, which means the prediction model (having as predictors task-oriented coping, distraction-oriented coping, disengagement-oriented coping, task-oriented goals and ego-oriented goals) explains 19% of the variance in the cognitive dimension of anxiety. This model explains a significantly greater variance from a model based on a hypothetical model in which the only predictor is the average variability criterion. Calculated value of statistical test F (5, 11) = 5.16, (p <0.001).

Table 3. Explained criterion variance indicators for model of cognitive anxiety

| R | R square | R square adjusted | Standard error estimate |
|---|---|---|---|
| 0.436[a] | 0.190 | 0.153 | 3.38774 |

The statistical significance results presented in Table 4 show that only four predictors, out of the five included in the prediction model, contribute significantly to the explanation of the variable criterion. These are: task-oriented toping (t= -2.28, p<0.001), disengagement oriented coping (t= 2.67, p<0.005), ego-oriented goals (t= 3.69, p<0.01) and task-oriented goals (t= -2.19, p<0.005). The statistical comparison of the standardized regression coefficients shows that the largest contribution to the regression model has the Ego-oriented goals variable.

For the prediction model of cognitive anxiety, the predictive variable task-oriented coping has a standard regression coefficient of ß = -.21, which means that if the value of this variable increases with a standard unit (a standard deviation) the value of the variable criterion will be reduced with 0.21 standard deviation units. For the Task-oriented goals variable, this coefficient is also a negative one ß = -15. An increase with a standard unit of scores on the Task-oriented goals variable results in an average decrease of 0.15 standard deviation of the variable criterion.

Table 4. Standardized and non-standardized regression coefficients

(criterion variable - cognitive dimension of anxiety)

| Model | *Non-standardized* coefficients | | *Standardized* coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| Task-oriented Coping | -0.095 | 0.040 | -0.215 | -2.385 | 0.019 |
| Distraction Oriented Coping | 0.043 | 0.084 | 0.047 | 0.508 | 0.612 |
| Disengagement Oriented Coping | 0.172 | 0.064 | 0.252 | 2.676 | 0.009 |
| Ego-oriented goals | 0.162 | 0.036 | 0.319 | 3.694 | 0.001 |
| Task-oriented goals | -0.073 | 0.038 | -0.153 | -2.191 | 0.042 |

The predictor disengagement oriented coping records a coefficient ß = 0.25, which means that a standardized increase of these scores results in an average increase of .25 scores of the somatic anxiety variable. Finally, for the ego-oriented goals the standardized value of the coefficient is ß = 0.31, an increase with a standardized unit of these scores leads to an average increase of .30 of the somatic anxiety variable scores.

### 1.6 Discussion

This study aims to analyze the predictive value of a set of predicted variables based on the multidimensionality model of competitive anxiety. In this respect we investigated the predictive value of the variables: having predictors Task-oriented Coping, Distraction Oriented Coping, Disengagement Oriented Coping, Ego-oriented goal and Task-oriented goal. The results obtained are in accordance with the conclusions of the studies in the specialized literature.

The study shows that the Ego-oriented goals is the strongest predictor of anxiety, whether we are talking about its somatic or cognitive dimension. According to Duda & Nicholls (2005) athletes who are self-directed tend to experience greater anxiety in a competitive context. Duda & Nicholls (2005) also stress that task orientation is negative in relation to competitive anxiety. The more concerned an athlete is with achieving mastery, focusing on technical improvement of the execution, the less anxious he will be in the competition.

Concerning the coping mechanisms involved in competitive anxiety, the results shows that disengagement oriented coping is a predictor of both somatic anxiety and cognitive anxiety. In each model, the value of the regression coefficient according to this variable is a positive one, which essentially marks a maladaptive behavior. This type of coping is strongly associated with avoidance behaviors, as the athlete applies more often such coping strategies, the greater the anxiety experienced. Avoiding confrontation with an emotional experience (in this case anxiety) generates the impossibility to cope with this state, implicitly an anxious reaction and more accentuated upon its occurrence. Results of the current study, in concordance with the literature, shows that athletes generally prefer to apply coping strategies oriented to task (eg. effort planning, attention to task), to those focused on emotion or avoidance (for example behavioral or mental disengagement, distancing, "ventilation of emotions").

In the present study we have chosen only two predictors that, based on the literature, are the most important in determining competitive anxiety. However, the data presented shows that this set of predictors proved to be more effective in prediction of somatic anxiety, and less predictive of cognitive anxiety. We consider that the inclusion of new predictive variables in the model (eg. motivational climate or self-confidence) would lead to an increase in the variance explained, both in the somatic and cognitive dimensions of anxiety. Also, extending the study to individual sports could further validate of the findings of the present study.

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# AN ANALYSIS OF PARENTS' OPINIONS REGARDING ACTIVITIES UNDERTAKEN BY ADOLESCENTS IN FITNESS CENTERS

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**Abstract**

Fitness centers are ever more sought after for physical exercise for both adults and children alike. The aim of this study is to analyze and compare parents' outlooks on the opportunities for psychomotor development that adolescents doing physical exercise in fitness centers have. We have used questionnaires developed and distributed through www.isondaje.ro to perform the research for this paper. The questionnaire numbered 14 closed questions, most of them with multiple choice answers. Its questions relate to both performing sports activities within fitness centers, as well as what offers parents look for when choosing a fitness center to send their child to. Standing out from among the conclusions were the possibility of attending multiple sports in the same fitness center, how specialized the instructors were in teaching children, as well as parents' expectations that their children's psychomotor abilities would improve as a result of taking up physical activities in a fitness center.

*Keywords: fitness, physical activity, adolescents, psychomotor skills*

## 1. Introduction

The 1990s brought a new historical perspective on physical exercise, fitness and physical activity, by moving on from strict, intense exercise to a wide range of physical activities meant to improve health (Luca, 2001).

In Anglo-Saxon literature, the term for motor ability is fitness. From another point of view, we can say that it is an overall state of wellbeing, which would include the absence of illness, as well as preventing some afflictions. In short, fitness may mean being in shape or having a good physical condition. Nevertheless, the Romanian term fitness relates to a sport akin to bodybuilding, reason enough for a specialized federation to exist, which promotes harmonious muscle development using weightlifting exercises (Șerban, 2006). The principal difference between the two sports become clear when studying the components being focused upon in training and analyzing their end goal (Bull, 2011).

Allsen P., Harrison J. and Vance B. (1996) consider physical fitness to be a reflection of one's ability to work with vigor and pleasure, without growing tired, and having enough energy for hobbies or for unforeseen situations, which will relate to both mental and physical states. Fitness represents one's capacity to reach optimal life quality, and is therefore a multidimensional, dynamic condition, centered upon positive health (Sharkey & Gaskill, 2013).

## 2. Purpose

The purpose of this research is to analyze what parents whose children are adolescents think of sports activities meant for kids in fitness centers and determine their expectations.

The questions refer to both performing sports activities within fitness centers, as well as what offers parents look for when choosing a fitness center to send their child to.

## 3. Materials and methods

Research was performed in the SmartFit Timișoara centers between December 2018 and May 2019. The questions were developed by the authors of this paper and published online on www.isondaje.ro, to be answered by parents. The questionnaire numbers 14 closed questions, most of them with multiple choice answers (Ciosici, 2009). They relate to both performing sports activities within fitness centers, as well as what offers parents look for when choosing a fitness center to send their child to.

## 4. Results

Thirty-five parents completed the questionnaire, 23 of which female and 12 male, aged between 35 and 53 years old, averaging at 42.17±5.43 years of age.

Table 1.

| | | |
|---|---|---|
| M | 12 | 34.3% |
| F | 23 | 65.7% |
| Total answers | 35 | |

When asked which the reasons are for taking their children to a fitness center, parents had a multiple choice answer. By analysing their choices, we notice that they mainly pursue their children's physical fitness – 17 answers (48.57% of the total 35), their initiation or consolidating skills in a certain sport – 15 answers (42.85%), while 12 answers mostly targeted social interaction (34.28%). The table counts total answers as the sum of answers selected by the participants to a certain question, and each option's percentage is calculated by dividing the sum of identical answers to the total.

Table 2

| | | |
|---|---|---|
| Physical fitness | 17 | 31.5% |
| Weight issues | 6 | 11.1% |
| Physical deficiencies | 2 | 3.7% |
| Time filler | 2 | 3.7% |
| Initiation / Consolidating skills in a specific sport | 15 | 27.8% |
| Socializing with kids of the same age | 12 | 22.2% |
| Total answers | 54 | |

Regarding the location of the fitness center your child would attend, you consider the following statement important:

Table 3

| | | |
|---|---|---|
| Fitness center located close to the child's school | 4 | 11.4% |
| Fitness center located close to your workplace | 6 | 17.1% |
| Fitness center located close to your home | 17 | 48.6% |
| Location does not matter | 8 | 22.9% |
| Total answers | 35 | |

A proportion of 48.6% of parents (17 respondents) want the fitness center close to home, 11.4% (4 respondents) want it close to the school their child is attending, and only 17.1% (6 answers) want it close to their work, while 22.9% (8 answers) consider that the fitness center's location does not matter.

Do you want a fitness center that provides your child with only one type of physical activity, or would you prefer one that offers the possibility of multiple activities? For this question we got 31 answers (88.6%) in favour of a choice of multiple activities.

Table 4

| | | |
|---|---|---|
| Only one physical activity | 4 | 11.4% |
| The possibility of choosing from multiple activities | 31 | 88.6% |
| Total answers | 35 | |

You consider the following as most important in chosing a fitness center for your child:

Table 5

| | | |
|---|---|---|
| How well prepared the coach is | 27 | 31.8% |
| The attitude of the personnel working in the fitness center | 24 | 28.2% |
| The quality of the workout machines | 22 | 25.9% |
| Events catering especially for children | 12 | 14.1% |
| Total answers | 85 | |

This question had multiple choice answers, of which the one considered most important by 27 respondents (31.8% of the total 85) was the coach's skill level. Second to that came the general attitude of the personnel at 24 answers and the workout machines' quality at 22 answers. Less than half of the respondents (12) considered children-oriented events important. The table counts total answers as the sum of answers selected by the participants to a certain question, and each option's percentage is calculated by dividing the sum of identical answers to the total.

You choose a fitness center for your child after:

Table 6

| | | |
|---|---|---|
| Seeing some social media pages | 6 | 17.1% |
| Consulting the opinions of other parents, friends, acquaintances | 28 | 80% |
| Viewing TV ads | 0 | 0% |
| Receiving promotional materials | 1 | 2.9% |
| Total answers | 35 | |

Analyzing the answers to this question we see that 80% of parents will choose a fitness center for their children under the influence of other parents', friends or aquaintances' opinions (28 answers out of a total of 35). The least importance was given to promotional materials (2.9%, 1 answer).

Do you want your childs workouts to take place:

Table 7

| | | |
|---|---|---|
| Individually | 7 | 20% |
| In groups of maximum 6 to 7 children | 19 | 54.3% |
| In groups of 15 children | 4 | 11.4% |
| The number of participants does not matter | 5 | 14.3% |
| Total answers | 35 | |

54.3% of parents want their children to participate in group classes with 6 to 7 children, while 20% (7 respondents) want individual training, 4 parents want activities with groups of 15 children, and for 5 parents, the number or class participants does not matter.

When asked about subscription price, we notice that 57.1% (20 parents) will opt for prices between 100 and 200 RON / month.

As for the preferred time interval for the child's workout, 85.7% of parents (30 answers) preferred it take place after 16:00.

For how long do you want your child to attend classes in a fitness center?

Table 8

| | | |
|---|---|---|
| Less than 1 year | 1 | 2.9% |
| For 2 to 3 years | 3 | 8.6% |
| For as long as I consider it appropriate for my child | 31 | 88.6% |
| Don't want to take my child to one place for an extended period | 0 | 0% |
| Total answers | 35 | |

We notice that 88.6% (31 respondents) of parents have not defined a fixed time interval for the child to attend fitness center activities, but rather consider they will allow any fitness activity to go on while it proves appropriate for the kid.

During which season do you want your child to participate in fitness center activities?

Table 9

| | | |
|---|---|---|
| Winter | 31 | 28.2% |
| Spring | 30 | 27.3% |
| Summer | 18 | 16.4% |
| Autumn | 31 | 28.2% |
| Total answers | 110 | |

For this multiple choice question we notice that the overwhelming majority – 31 (88.57%) and 30 (85.71%) respondents, respectively, of the 35 total will go for fitness center activities during winter, spring and autumn, while only 51.42% (18 respondents) will consider it necessary during summer.

How many times a week do you want your child to participate in fitness center activities?

Table 10

| | | |
|---|---|---|
| 1 day | 2 | 5.7% |
| 2 to 3 days | 24 | 68.6% |
| 3 to 5 days | 4 | 11.4% |
| Daily | 5 | 14.3% |
| Total answers | 35 | |

The number of days parents considered efficient was 2 to 3 times a week (24 respondents).

You expect the coaches at your child's fitness center to be:

Table 11

| | | |
|---|---|---|
| Qualified in their area of expertise | 24 | 30% |
| To be good teachers | 21 | 26.3% |
| To have many years' experience in teaching children | 17 | 21.3% |
| To be young and liked by the children | 18 | 22.5% |
| Total answers | 80 | |

Thirty percent of parents chose for coaches trained in their area of expertise, while 26.3% wanted them to be good teachers. 21.3% consider it important for the coach to have experience in training children, while 22.5% of parents want the coach to be young.

What are your expectations after a period in which your child attended fitness center activities?

Table 12

| | | |
|---|---|---|
| To get better in a certain sports branch | 8 | 9.9% |
| To develop motor skills (speed, dexterity, strength, endurance) | 26 | 32.1% |
| Benefits regarding body weight | 13 | 16% |
| Better health and improvements regarding physical deficiencies | 23 | 28.4% |
| Better behavior and attitudes in a social context | 11 | 13.6% |
| Total answers | 81 | |

Most parents – 26 respondents (74.28%) hope that their child's motor skills improve due to participation in fitness classes, 23 (65.71%) answered that they aim for better health and correcting physical deficiencies, while 13 (37.14%) consider that the physical activities their children undertake in the fitness center will help with maintaining a weight appropriate to their age.

## 5. Conclusions

After interpreting and analyzing the above answers, we drew the following conclusions:

1. Parents prefer fitness centers close to home.
2. They also prefer a choice of multiple activities in the same fitness center.
3. The coach's skills are an important element in choosing a fitness center for their child.
4. Deciding upon a fitness center depends mostly on the opinions of friends, acquaintances and other parents.
5. Parents prefer activities in groups of 6 to 7 children that take place after 16:00 hours.
6. Most respondents consider that physical activity is necessary 2 to 3 times a week, and the total period of attendace varies according to what the parent considers appropriate for the child to develop motor skills, learn to practice a specific sport, maintain optimal body weight or learn a correct upright position.

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# THE INFLUENCE OF NEUROMUSCULAR TRAINING IN LIGAMENT INJURY PREVENTION IN SPORTS

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**Abstract**

**Aim.** The aim of this study is to determine the effect of a physical therapy program in the primary and secondary prophylaxis of knee injuries in female athletes. **Materials and methods**: The study included 8 women (mean age 30.4 year) who are practicing soccer 1-3 times a week. The risk of knee ligament injures was determined by identifying the existence of a neuromuscular control deficit. The type of the deficit was investigated using video analysis. The test consisted of repeated jumping with knees up, within 10 seconds, the "tuck jump assessment". The participants were divided into four groups according to the type of the neuromuscular control deficit identified. Each group was assigned a specific neuromuscular training consisting of exercises that precisely aimed achieving certain goals such as correct the technique, improve neuromuscular control, hamstring co-contraction, normalize coordination discrepancies between limbs, respectively enhance recruitment of posterior chain muscles while activating the abdominal muscles and hip stabilizers. Other tests used to evaluate the progress of the participant: goniometry to measure the range of motion in the knee joints and a manual test to evaluate the strength of the quadriceps and hamstrings. The length of the program was 12 weeks. **Results:** The results of the study showed that even if the range of motion in the knee joint was within the normal values, 87.5% of participants were identified with faulty movement patterns which means a raised risk of ACL injury. The final assessment also showed the increase of knee flexors and extensor strength. **Conclusion:** The neuromuscular training induced corrective changes in the faulty movement patterns identified by tuck jump assessment. The effectiveness of the prophylaxis program could also be appreciated by an increase in the quadriceps and hamstrings strength.

*Keywords: physical therapy, prophylaxis, knee ligament injures, neuromuscular training.*

## 1. Introduction

About 14-15 % of the total injuries suffered by athletes are determined by playing football. This high percentage is due both to the large number of practitioners and the presence of risk factors. Although contusions are the most common, 30 % of all traumas are sprains with varying degrees of severity, particularly affecting the knee and ankle joints (Drăgan, 2002).

Most studies on injuries among football players highlight the high rate of injuries at the knee joint, especially the anterior cruciate ligament. It is widely recognized the risk of knee ligament injury without contact of another player, in a sport such as football, where pivoting is common (Junge & Dvorak, 2007). Increased attention is being paid to the prevention of injuries in women's soccer, in particular, as it has been found that in women, the risk of injury of the anterior cruciate ligament without contact is 6 to 8 times greater than that of male athletes (Meyer, Ford, & Hewett, 2008).

In football sport, the most common injuries are bruises and sprains, the latter especially affecting the knee and ankle. Due to the capsule-ligamentous complexity of the knee, the sprains have various clinical forms. The most

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common are capsule-ligamentous lesions present in the collateral ligaments, especially the internal ligaments and tear or rupture of the cruciate ligaments, the latter having a special impact because it can limit the functional and biomechanical capacity of the knee even after a correct treatment (Drăgan, 2002).

The ligaments have a particularly important neuro-muscular role due to the proprioceptors located in these structures, which ensure a rich sensory flow to the central nervous system (Williams, 2018).

As a result of the traumatic injuries with immobilization, there are important losses of this feed-back, the complete recovery being a complex process. Thus, an even greater emphasis is placed on identifying the risks of producing ligamentous injuries at the knee level and applying individualized training programs in order to prevent those lesions (Bulduș & Mureșan, 2013).

### *1.1. Hypothesis*

Ligamentous injuries at the knee level, in football players can be prevented, through a kineto-prophylaxis program that increases the active stability, strength and muscular coordination.

### *1.2. Aim and objectives*

The aim of this study is to determine the effect of a physical therapy program in the primary and secondary prophylaxis of knee injuries in female athletes.

The research objectives are:

• to study information from the specialized literature to deepen the theoretical knowledge regarding the biomechanics of the injuries of the knee joint;

• to research the ligamentous lesions of the knee that may occur in football players and the causes of their production;

• to identify the risk factors of producing ligamentous injuries of the knee in football players;

• to design individualized neuromuscular training programs and a general program for the development of muscle strength;

• to apply the program, for three months, on a group of 8 women who play football;

• interpretation and evaluation of research results.

## 2. Materials and methods

The study included 8 women (mean age 30, 4 year) who are practicing soccer 1-3 times a week. The program was implemented for 12 weeks.

### *2.1. Methods*

The experiment is a complex system of knowledge of reality, characterized by the use of experimental reasoning, which processes both facts from observation and experiment. The experiment is the provoked observation (Epuran, 2005).

In order to carry out the research, the accumulation of data, the processing and the interpretation of the results that led to the formulation of the final conclusions, we used the following methods:

• the method of bibliographic study
• the interview method
• the observation method
• the experimental method
• the functional test method
• the video analysis method
• the statistical method
• the method of graphic interpretation
• the method of kinetotherapy and kineto-prophylaxis

*2.1.1. The "tuck jump assessment"*

The test consisted of repeated jumping with knees up, within 10 seconds. The risk of knee ligament injures was determined by identifying the existence of a neuromuscular control deficit. The test was proposed by Meyer et all. (2008) and it consists of repeated jumps with the knees up, within 10 seconds. The test interpretation made by video analysis show the presence or absence of one of the four defects in jumping, which can suggests ligament dominance, quadriceps dominance, lower limb dominance or trunk dominance (instability).

The subjects with ligament dominance land with a medial deviation of the knees. For this reason, the absorption of the reaction forces of the soil is taken up by bones, tendons and ligaments instead of the muscles of the lower limbs. These large forces that manifest themselves in a short period of time can lead to rupture of the anterior cruciate ligament.

The subjects with quadriceps dominance land with the knees slightly bent. In addition, the landing is hard and noisy. In this case, the stabilization of the knee is done by the contraction of the quadriceps muscle. The contraction of the quadriceps pulls the anterior tibia relative to the femur. The resulting biomechanical problem is that the anterior cruciate ligament maintains the tibia in posterior and when the athlete uses the quadriceps to stabilize the joint, it induces anterior tension in the tibia and hence also the anterior cruciate ligament.

In the lower limb dominance, during the flight, the position of the lower limbs is not synchronized and the subject does not land with both legs at the same time. This shows that there are differences between the two lower limbs in terms of muscle strength and muscle recruitment patterns. People with this asymmetry are at increased risk of injury.

In the trunk dominance, at the maximum flight height, the subject does not reach the thighs in a position parallel to the ground (Meyer, Ford, & Hewett, 2004).

*2.1.2. Video analysis*

The type of the deficit was investigated using video analysis. To identify neuromuscular imbalances, the study participants were videotaped during the tuck jump test. According to the type of the neuromuscular control deficit identified the participants were divided into four groups.

The shooting was done from the front and the sagittal plane, with the cameras of the Motorola G6 and Huawei lite 10. In order to highlight the neuromuscular deficiencies we used consecutive stop-frames from the video recordings made, using the VLC media player program.

*2.1.3. Functional tests*

The functional tests used to evaluate the progress of the participant were goniometry to measure the range of motion in the knee joints and a manual test to evaluate the strength of the quadriceps and hamstrings (Cordun, 1999).

In flexion we tested the strength of the hamstrings: semitendinosus, semimembranosus and biceps femoris. During the test we stabilized the thigh in the anti-gravitational position, in ventral decubitus, with the hips and knees extended. We applied the resistance on the posterior face in the distal third of the calf (Sbenghe, 1987).

In extension we tested the strength of the quadriceps: the rectus femoris, the vastus medialis, the vastus lateralis and the vastus intermedialis. We stabilized the thigh and tested from the sitting position with the leg hanging on the edge of the bed, with a small pillow under the thigh. We applied the resistance on the anterior face in the distal third of the calf (Sbenghe, 1987).

*2.1.4. Kinetotherapy and kineto-prophylaxis*

The study participants were divided into four groups. The four groups were established based on the neuromuscular control deficit identified in the "tuck jump assessment". Each group received an exercise program that aimed at both increasing strength and muscular coordination and correcting the wrong movement pattern

observed with the help of video analysis. Part of the exercise program focused on increasing the strength of all muscle groups. Each group also received individual exercises, depending on the neuromuscular control deficiency identified.

Each group was assigned a specific neuromuscular training consisting of exercises that precisely aimed achieving goals such as correct the jumping technique, improve neuromuscular control, hamstring co-contraction, normalize coordination discrepancies between limbs and respectively enhance the recruitment of posterior chain muscles while activating the abdominal muscles and hip stabilizers.

The subjects with ligament dominance followed the training for increasing lower limbs muscle strength. The individualized neuromuscular intervention consisted of exercise which aimed to correct the technique and recruiting the posterior kinetic chain musculature: the glutes, the hamstring and the sural triceps.

The subjects with quadriceps dominance made exercises to improve the recruitment of the posterior chain at the same time by activating the abdominal muscles and hip stabilizers.

At the weight training dedicated to the lower limbs, the exercises were performed unilaterally and alternatively with both lower limbs.

## 3. Results

### *3.1. Video analysis results*

Table 1. The video analysis results

| Neuromuscular deficit | Number of subjects | Percentage % |
|---|---|---|
| Ligament dominance | 3 | 37.5 |
| Quadriceps dominance | 1 | 12.5 |
| Lower limb dominance | 2 | 25 |
| Trunk dominance | 1 | 12.5 |
| No neuromuscular deficit | 1 | 12.5 |

In the present research 87. 5% of the participants presented one of the defective movement models. The ligament dominance was identified in 37, 5% of the subjects.

### *3.2. The range of motion testing results*

The initial values of the knee range of motion determined by goniometry are presented in figure no.1.

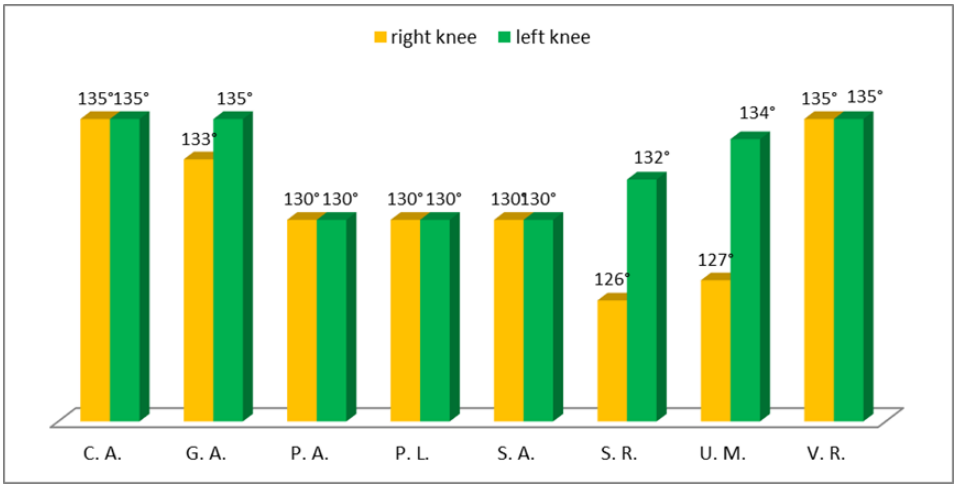


Fig. 1. Comparative analysis of knee flexion values between the two limbs

The results of the initial articular testing show that 5 participants in the study have normal values regarding the amplitude of movement in the knee joint. Three subjects have lower values in the right knee flexion as compared to the left. Following the interview we identified two factors of these differences in the knee flexion amplitude, between the two lower limbs:

- two subjects had previously suffered a cruciate ligament rupture;
- one subject presents pain during flexion of the right knee.

The initial and final values of the knee range of motion determined by goniometry are compared in figure no.2 and figure no.3.

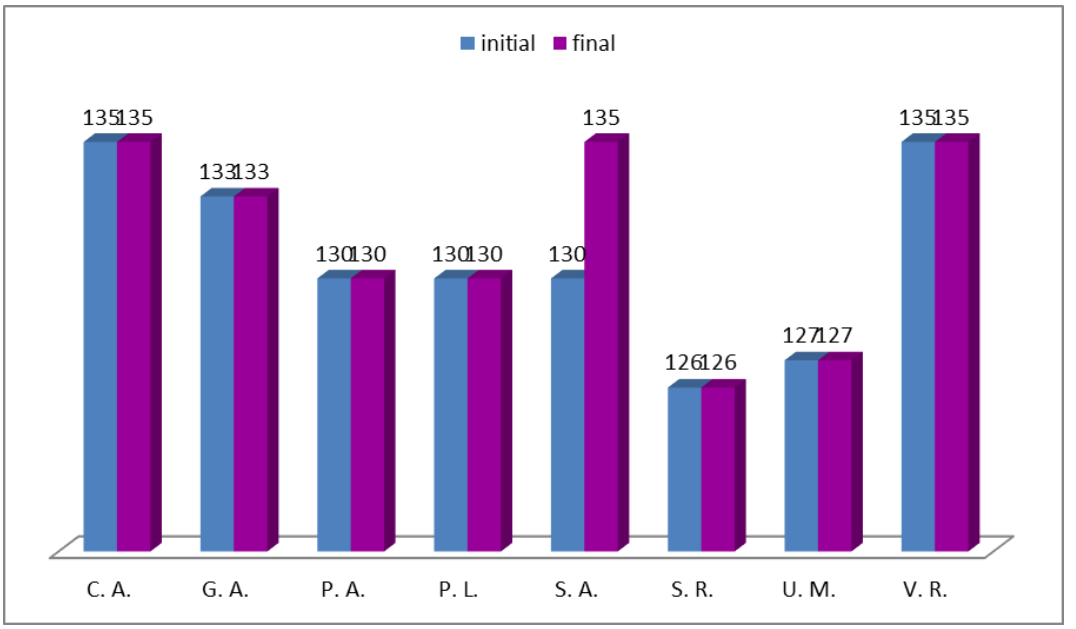


Fig. 2. Comparative analysis of knee flexion values in the right limb

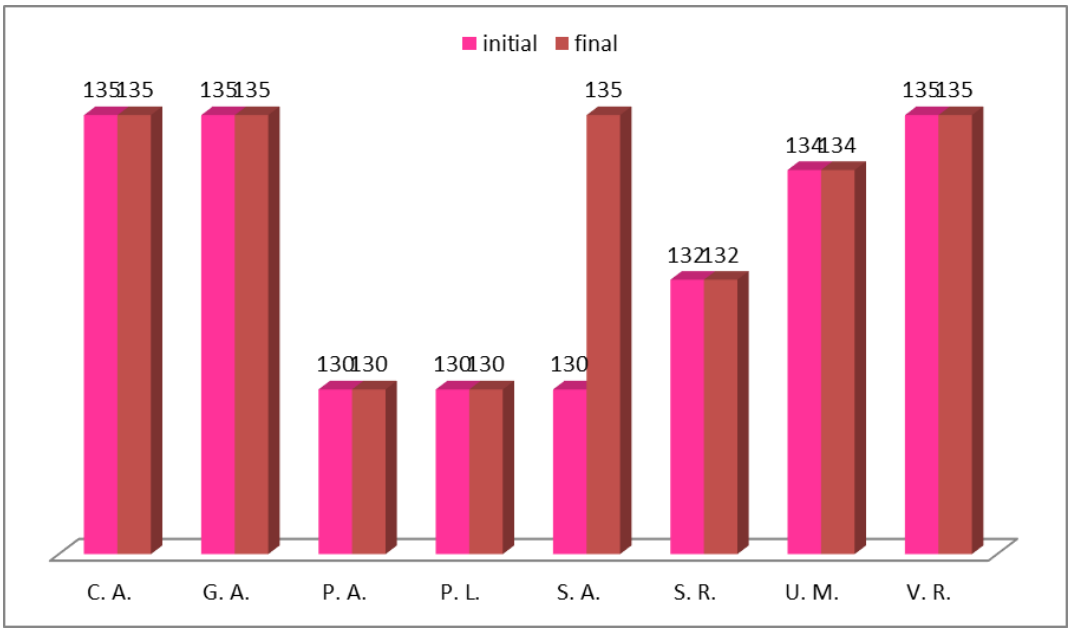


Fig. 3. Comparative analysis of knee flexion values in the left limb

From figures 2 and 3 it is observed that only one of the research participants gained 5 ° of flexion in the knee joint. The other subjects didn't have a restricted range of motion so the kinetotherapy program was oriented to correct the neuromuscular imbalance rather than to enhance mobility.

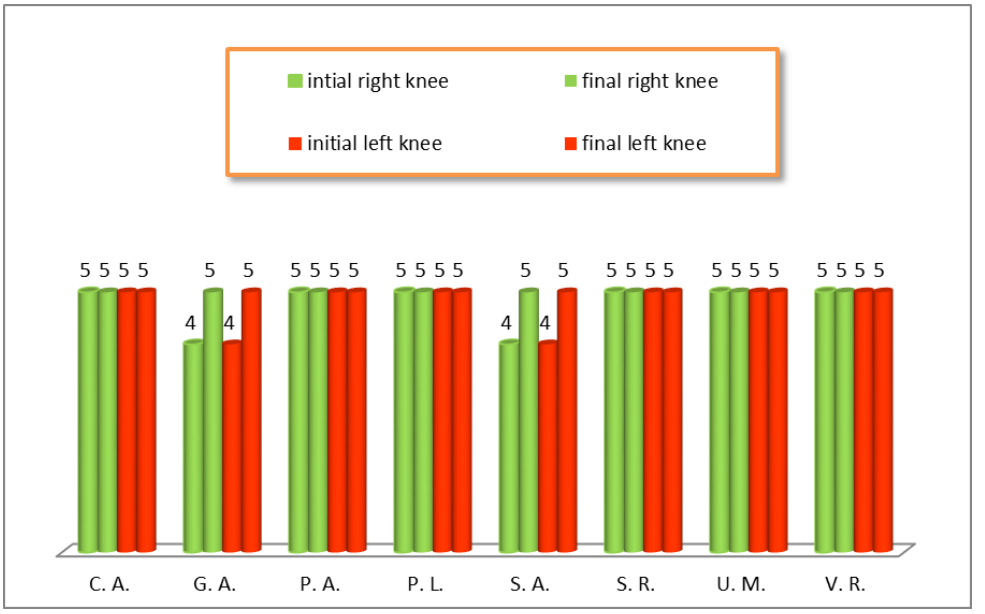


Fig. 4. Comparative analysis of knee flexors muscular testing values

*3.2.2. . Muscular testing results*

The comparative analysis of the initial and final muscular testing results is shown in figure no.4 for the knee flexors and in figure no.5 for the knee extensors

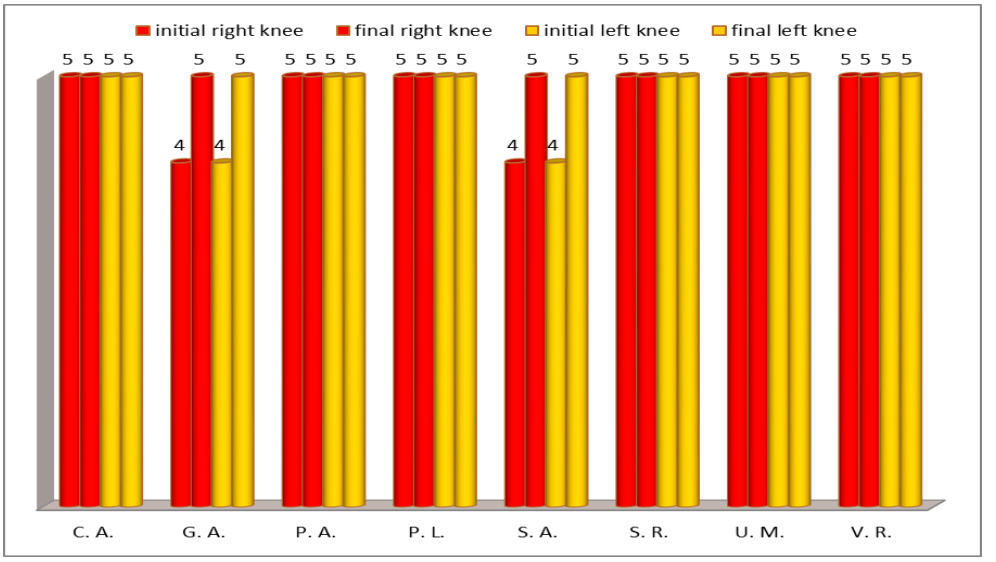


Fig. 5. Comparative analysis of knee extensors muscular testing values

## 4. Conclusions

From the tests performed it can be concluded that the subjects may have a deficit of neuromuscular control even if the values of the articular and muscular testing fall within normal limits. In the present research 87.5% of the participants presented one of the defective movement models described.

The identification of the neuromuscular control deficit allowed us to design kineto-prophylaxis programs specifically addressed to each subject in the study.

The participants in the study followed, for 3 months, the proposed neuromuscular training programs. At the final evaluation, there was an increase in the muscular strength of the knee flexors and extensors.

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# BALANCE DISORDERS INDUCED BY WORKING POSTURE IDENTIFIED USING POSTUROGRAPHY

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**Abstract**

**Background**. Restricting physical activity to the necessary movement patterns in daily work, inadequate eating, prolonged sitting in the office, shallow breathing, overuse of the visual analyser are factors that favour obesity and the appearance of Postural Deficiency Syndrome. **Aim**. The purpose of the study is to obtain quantifiable data with the help of posturographic analysis to identify the deconditioning syndrome in adults who are professionally involved in activities that require prolonged sitting in the office. **Subjects.** The study was carried out on 130 subjects between the ages of 28 and 45, employed in different specializations involving office work for a period of 6-8 hours per day. **Methods.** The methods used were posturography, made using the GPS 600 system, the statistical method, the screening method. The analysed parameters were the head position, the centre of gravity position, the weight loading on both legs and the orientation of the transverse axis of the trunk. **Results.** The results highlighted the anteriorization of the head, the deviation of the centre of gravity, the unequal loading of the weight on both legs and the torsion of the trunk. **Conclusion.** The data obtained from the measurements showed the existence of the elements of physical deconditioning in 73% of the investigated persons and the predominant element was the head anteriorization.

*Keywords:* balance, posturographic analysis, center of gravity, head anteriorization

## 1. Background

The lifestyle in today's society involves the restriction of physical activity to the necessary movement patterns in daily work, inadequate nutrition, prolonged sitting in the office, superficial breathing, overloading the visual analyser, etc. All these aspects are factors that favour obesity and the appearance of physical deconditioning syndrome. The existence of a dysfunction in the musculoskeletal system leads to compensations that require high energy consumption and which in time can cause injury and wear.

With the help of the technology offered by the posturograph, we can identify the deviations of the centre of gravity, the support points, the distribution of the weight on the soles, the anterior, posterior or compressed posture and the asymmetries of the body. Through an interpretation in biomechanical context we can identify the possible compensations.

### *1.1. Postural control*

The posture is a function of the locomotor apparatus driven by the nervous system. It represents the infinity of positions and movements that permanently duplicate the psychic activity of the individual. Posture is a function of the body, it is the result of synergistic action between the central and peripheral nervous system and the locomotor apparatus. The postural system is a unitary structure with multiple inputs and having several complementary functions, to combat gravity by maintaining an erected station, to oppose the external forces, to place the individual

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in space and time, to balance the body in movements, to guide them and to strengthen them. The correct posture of the body is a sign of psycho-physical balance of the individual (Bronstein et al., 2004).

The postural system has different sensorial inputs. The most important ones are from the inner ear (vestibular system), the eye (visual receptors), central - orientation in the environment, the state of verticality, environmental and peripheral conditions as own movements in relation to the environment and the foot (the peripheral somato-sensitive system), joints, muscles, tendons, ligaments, skin (Slobounov, 2005; Taube et al., 2006).

Correct posture refers to the position of body parts in space and time. It is characterized by minimal effort in the distribution of body weight, does not create overload on the muscles, bones and joints of the body and allows high efficiency of movements, mechanical and physiological organization of internal organs and soft tissues and skeletal muscles (Kendall et al., 2005).

In the past, postural control was assumed to be mainly related to the inferior neurological centres, recent studies have shown that they involve the high cortical regions. Researchers have found that when balance is compromised, activation occurs in the frontal and prefrontal areas (Tokuno, Taube, & Cresswell, 2009). In addition, when additional cognitive requirements such as attention, memory, or spatial perception are added to the task of stability, the quality of posture control is reduced (Jacobs & Horak, 2007).

A human maintains his body balance through sensorimotor controls based mainly on information obtained from vision, proprioception and vestibular systems. The role of the pedunculatopontine nucleus is important in activating higher regions to induce arousal and descending pathways to modulate posture and locomotion (Garcia-Rill, 2019). When there is a lack of information, caused by pathologies, diseases or aging, the continuous stimulation of the pedunculatopontine nucleus may improve motor disabilities (Vitale, 2019).

### *1.2. Postural Deficiency Syndrome*

Circumstances such as prolonged, repetitive poor posture or trauma can decompensate the postural system. Additionally, asynchronies in the postural sensors, such as mandibular or visual asymmetry or even asymmetry in postural support, will produce a postural imbalance responsible for a number of pathologies.

Postural Deficiency Syndrome (PDS) occurs when the regulatory centres are unable to effect a congruent synthesis of the information received by the various sensors. This syndrome indicates the damage to the sensory, transmission or information integration systems required to effect postural balance.

Postural Deficiency Syndrome (or Plumb Line Postural Disorder) was described by Martins Da Cuhna in 1979. This syndrome occurs as a result of an alteration in muscle tone balance and postural balance.

PDS is characterized by a clinical picture comprising stabilometric and clinical symptoms and signs:

- The patient complains of feeling ill on standing: he either staggers or experiences pain in this posture.
- The stabilometric recording confirms that its performance falls outside normal limits (control of postural oscillations is abnormal).

The clinical examination reveals abnormal symmetry of the postural muscle tone (regulation of the muscle tone activity is abnormal).

There is a fourth criterion which is indispensable for diagnosis and which clearly distinguishes the approach taken by the posturologist from the conventional approach: by manipulating one or more sensory inputs from the system, certain signs of asymmetry are immediately modified before the signs and symptoms of the syndrome are eventually eliminated.

The Patients suffering from Postural Deficiency Syndrome (PDS) have pains or present balance disorders. Their pains are generally not easy apprehended by the medical and paramedical profession. These musculoskeletal pains remain not well systematized and are secondary to a functional defect of the neurosensory balance system. The differential diagnosis is critical and is associated with stabilometric records that testify balance disorders. The medical care of these patients requires a multidisciplinary specialist team to define a treatment strategy and then a postural stabilization with adapted musculoskeletal upgrading and sensory stimulation (da Cunha, 1987).

## 2. Research framing

The study included a screening phase attended by 150 subjects aged between 18-42 years, which aimed to identify the signs of physical deconditioning in the persons holding the position for 6-8 hours/day.

The initial and final evaluation included testing with the GPS 600 posturograph.

Of the total number of investigated subjects, 130 were included in the statistical analysis of this article with the including criteria of age between 28-45.

### *2.1. Hypothesis*

The use of the posturograph in the analysis of the posture helps to the deconditioning syndrome in adults who are professionally involved in activities that require prolonged sitting in the office.

### *2.2. Aim*

The aim of the study is to obtain quantifiable data with the help of posturographic analysis to identify the postural changes of the adults deconditioning syndrome.

### *2.3. Materials*

The Posturograph or Global Postural System (GPS) is an advanced postural analysis system that uses noninvasively diagnostic and evaluation techniques and methods in the field of medical recovery.

The posturograph includes 2 diagnostic units and one software:

- Podoscope - is used in the analysis of static foot disorders and the position of the centre of gravity; with his help are processed the captured images, determining the exact length of each leg, the existence of static plantar disorders (flat foot, hollow, etc.), as well as possible deviations at the ankle level.
- The unit of postural analysis - is used to determine the deficiencies in the spine, through a system of videocameras that allow the acquisition of high resolution images, images that are then processed through the software, in order to analyse all segmental or global deviations of the body.

Postural analysis is performed from the front, back and profile and can diagnose the deficiencies of the spine in the sagittal or frontal plane (scoliosis, kyphosis, hyperlordosis).

The software allows the storage of the patient's medical data, both of those resulting from the posturographic tests, as well as those related to the medical history or the medical treatments that the patient follows. It is useful for monitoring the evolution of patients and the effectiveness of the recommended therapies.

Based on the data obtained from a complete posturography, customized kinetotherapy and medical recovery programs are developed.

### *2.4. Methods*

We used the following methods:

• the method of bibliographic study - the study of the specialized literature in order to update the theoretical basis

• observation method - intentional tracking, accurate and systematic recording of manifestations and situational context for each subject

• the measurement method - the evaluation of the subjects using the posturograph provides somatometric and functional data

• experimental method - application of the program proposed by the working methodology

• statistical method - data processing and interpretation using SPSS program, descriptive statistical analysis, ANOVA test

## 3. Results

### *3.1. The results of the center of gravity projection determination*

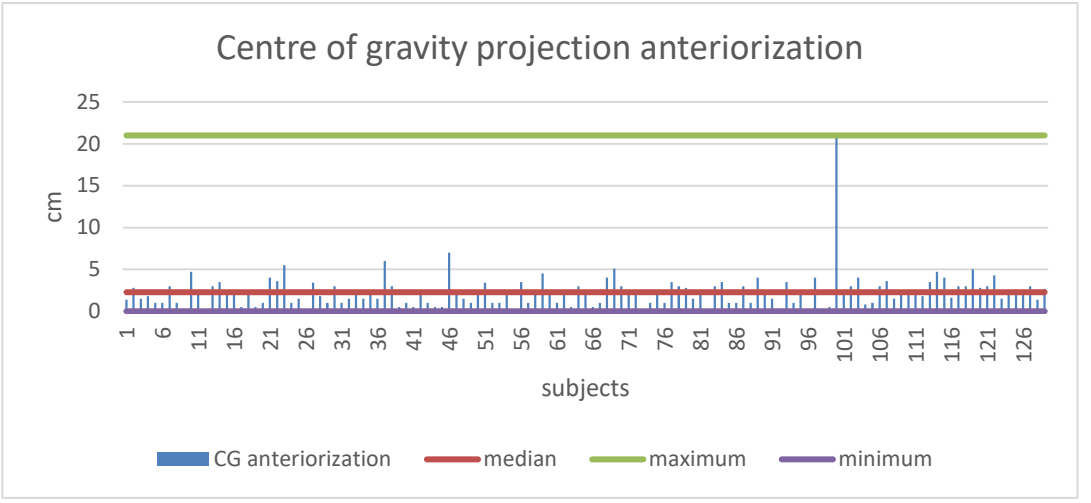


Fig. 1. The centre of gravity projection determination

### *3.2. The loading on both feet determination results*

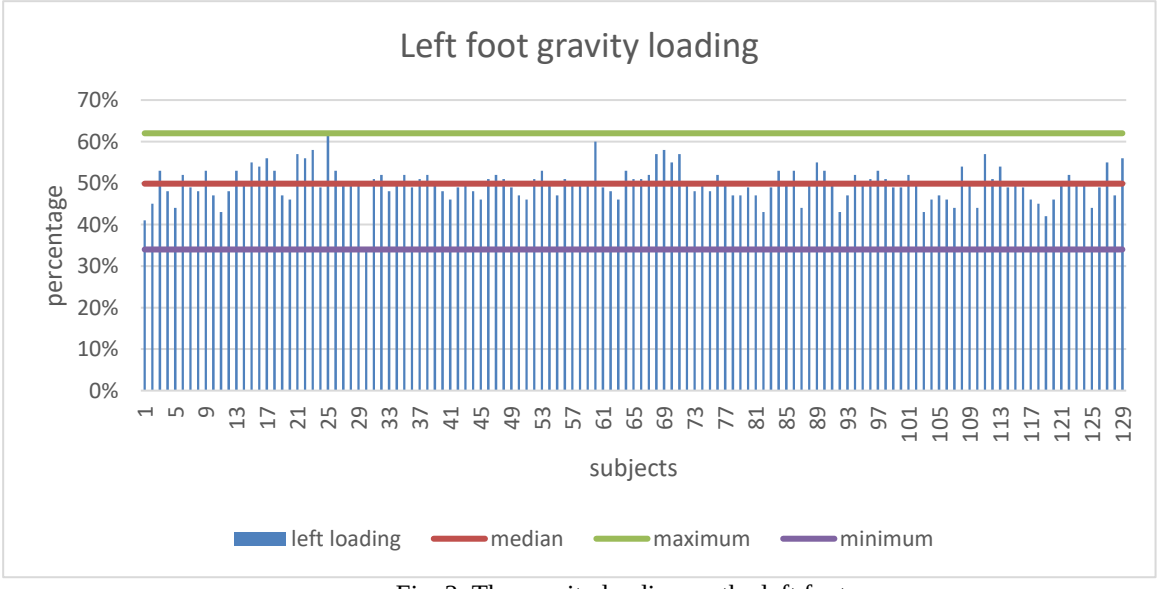


Fig. 2. The gravity loading on the left foot

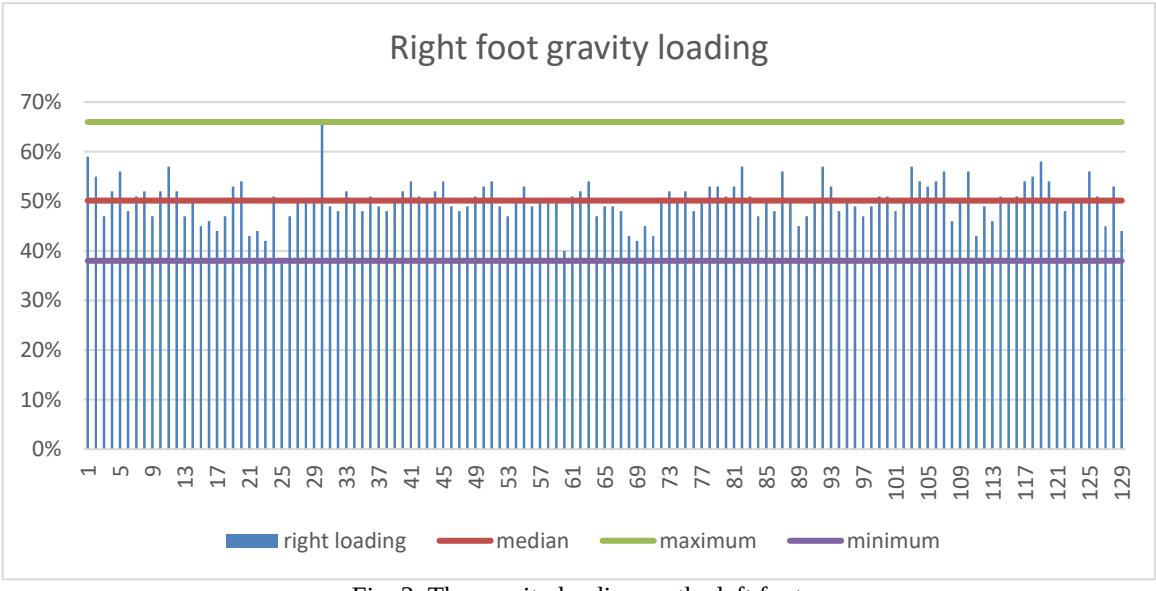


Fig. 3. The gravity loading on the left foot

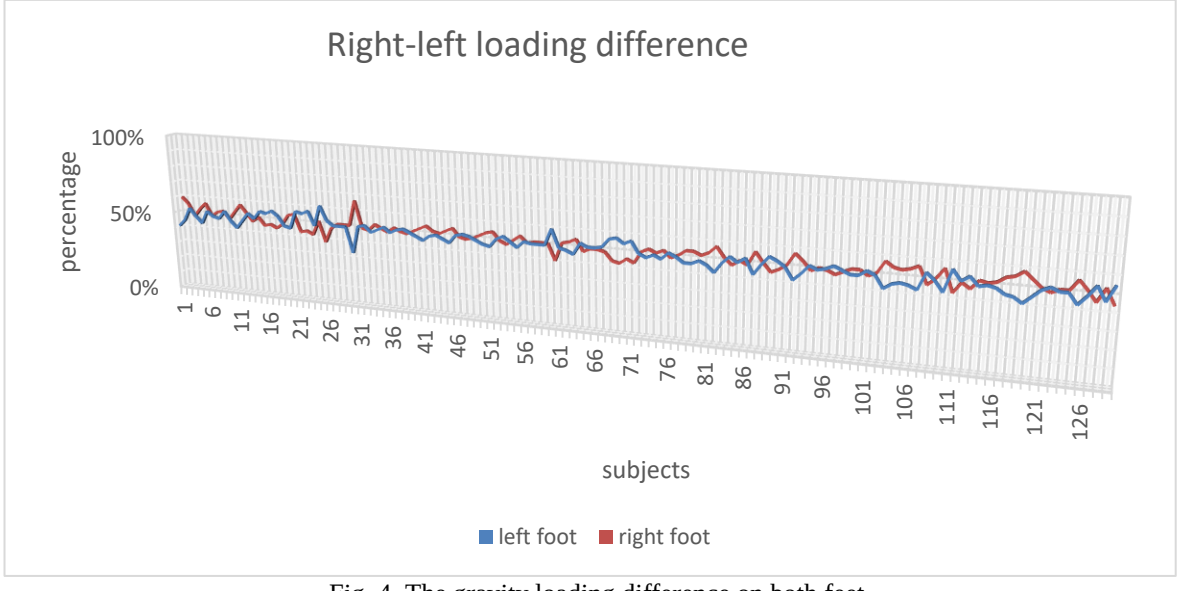


Fig. 4. The gravity loading difference on both feet

*3.3. The head anterior posture evaluation results*

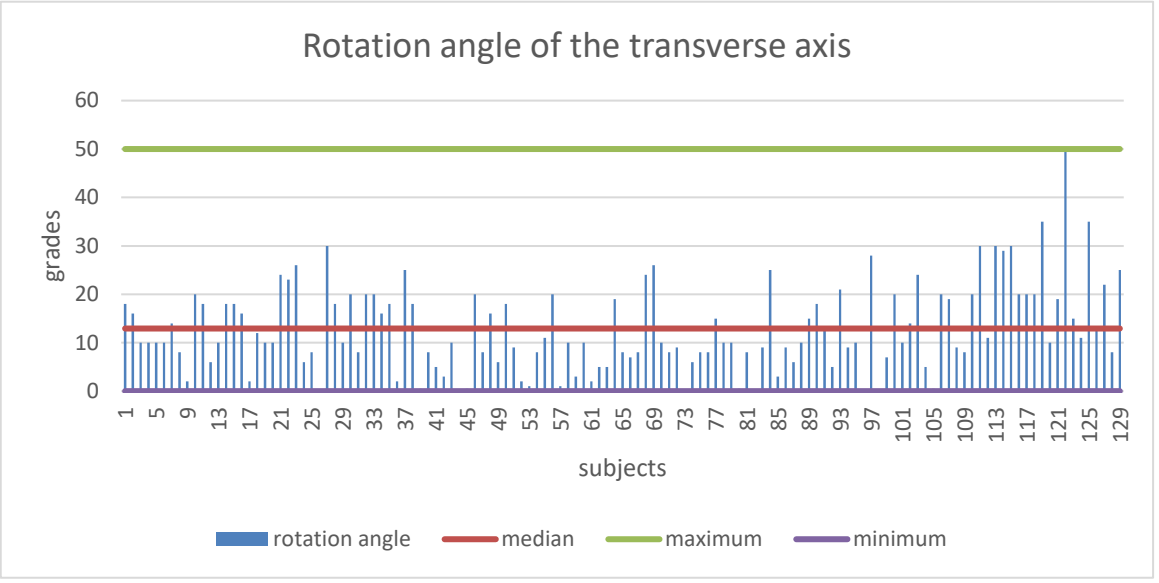


Fig. 5. The head anterior posture evaluation

*3.4. The transverse axis rotation angle results*

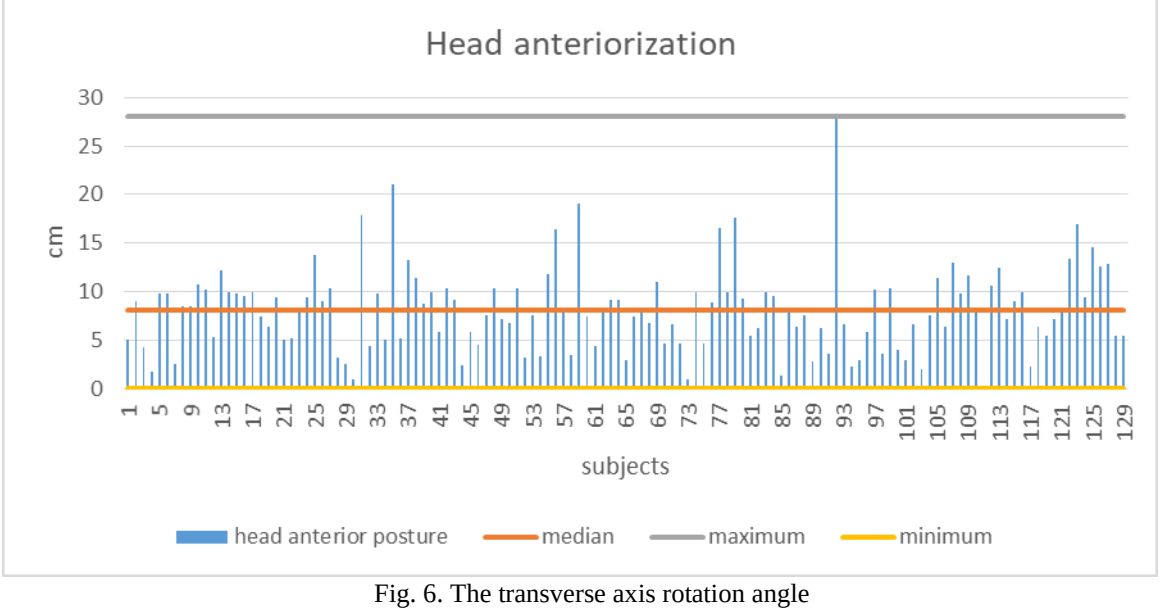


Fig. 6. The transverse axis rotation angle

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The results analysis reflects that 96% of the subjects present the anteriorization of the head: 32% in a range between 3 to 7cm and 64% over 7cm.

The projection of the gravity centre is anteriorized with 1 to 7cm in 62% of the subjects.

The subjects have a difference in loading the body weight on both feet: 46% overload the left foot and 38% overload the right foot. In total, 84% of patients have a predominant balance to the left or right foot, which means an imbalance of the weight bearing. 16% of the patients have a rotation between 0-5 degrees which is a normal rotation and the rest of 84% of the patients represent a rotation that causes the spine to rotate transversely.

The transverse axis is rotated with an angle that has a median value of $13^0$. Only 16% of the patients have a rotation between 0-5 degrees which is a normal rotation and the rest of 84% of the patients the angle values represent a rotation that causes the spine to rotate and in time can produce spine lessions.

## 4. Conclusions

Posturography is a mean to detect posture modifications in people who spend more than 6 hours in the sitting position at the desk during working time.

A large number of the subjects investigated in this study present alterations of the posture and those are for the most part multiple ones.

The most encountered dysfunction is the head anterior posture and this is accompanied with anterior projection of the gravity centre.

Other deficits identified were the imbalance between weight loading on both feet and the torsion of the body identified by a rotation angle of the transverse axis.

The postural deficits identified can produce over time musculoskeletal lesions associated with working posture at the desk in a prolonged sited position.

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# DEMOGRAPHIC UPDATE OF THE ROMANIAN SPORTSMEN

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**Abstract**

Nowadays, practicing sports became a critical necessity for an important a category of the population due to the specificity of the professional activities. The study monitors the demographic evolution of the sportsmen during the years 1992 - 2014 as well as the present situation of the sporting pupils from the integrated sporting education and from the one specialized. The data have been collected both from Sports Encyclopedia and from Sporting Annuals issued by the Sports and Youth Minister, and also from the data base of the Scholar and Universitary Sporting Federation of the Notional Educational Minister. The results showed a serious decrease of the licensed sportsmen and they were reported at the county level, even the incorrect report according with reality about the sports students. We think that this situation is due to the concept of financing and supporting the practice of sport but also the outdated mentality of a large category of the population.

*Keywords:* sportsmen, evolution, present, context

## 1. Argumentation

At present, the term *athlete* is assigned to any person who practices more or less constant physical activity, whether or not participating in a sports competition, who is or is not legitimized in a club (sports association). Our study refers to persons (regardless of age) who practice physical activity, are legitimized or are part of training groups in clubs financed from the state budget.

The future concerns of the Romanian sport, in order to increase the health of the population and at the same time of the sports performances, can be found in the "Protocol on ensuring the collaboration framework for the continuous development and the high functioning of the national system of physical education and sports", concluded protocol in July 2007 between the Ministry of Education, Research and Youth, the National Agency for Sport and the Romanian Olympic and Sports Committee (Government of Romania, Political Analysis and Planning Department, Associative Environment in the Press, 2007).

Performance sports activity mainly aims recruitment and training of students with special qualities for the sport performance for the purpose of legitimizing and promoting them in the sections of sports clubs and, subsequently, in national groups (Ungureanu, 1995).

In the sports structures subordinated to the Ministry of Youth and Sport, the priority is to support the branches of sports and tests of interest for the representation of Romania at the Olympic Games, the World Championships and the European Championships and the establishment of National Centers of Excellence for the sports disciplines, both at the level of pre-university education are pursued. , as well as at the university level (Dragu, 2010). At the same time, the Ministry of Education and Research supports the initiative regarding the improvement of the national curriculum, employment of highly qualified specialists and development of the specific materials to prepare student-athletes and increase their performance, providing the basis for the selection of sport performance by two types of education: sportsman integrated (LPS and special classes) and additional sports -CSS and PC -, (Scarlat & Scarlat, 2002).

Before 1989, communist society viewed sport as a means of asserting itself against capitalist societies in order to demonstrate the efficiency of the system. This theory proved to be wrong, as sporting results could not

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defeat a system, but it was proven that sport creates human values (Marinău, 2012).

The post-1989 sport requires the creation of social policies, both at the level of mass sport and at the level of the high-performance sport regarding the integration of the performance athletes in the post-competitive social life, especially those without special results and the prevention of the failures of social integration in the active life as a result of unwanted events, such as accidents.

As far as mass sports are concerned, social policies are aimed in particular at the access to sports activities of people from precarious social backgrounds. The survival of the school sports clubs at the level of the municipalities and their permanent relation to the MTS structures denotes the legacy in sports since 1989.

In the present in our country we can observe an insignificant or only formal involvement of the sport policy, because we are still in the transition period, of forming a correct mentality in the motivation of practicing the sport (Marinău, 2012).

Between 1989 and 2000, there is a lack of sporting politics, as well as a reduction of communist ideologies regarding physical activities. Also, we can see a minimal interest given to the sport at national level. However, a first initiative in this regard was recorded in the government program from 2000-2004, which provided for the construction of 400 sports halls within educational institutions. But the idea of this project was not a result of the existence of a social policy but of a bet between a politician and a businessman (Miron & Ionescu, 2007).

In Romania, no institution with responsibilities in the field of sport has initiated a national investigation to centralize the number of practitioners. An opinion poll conducted by the European Union in 2001 for young people aged between 15 and 24 in Romania, indicates that 25% of the surveyed people practice in an organized or not sport way, while in most European countries. this percentage exceeds 50%. Another opinion poll conducted by the Romanian Federation of Sport for All offers some data on the practice of sports activities. Thus: 32% of the surveyed people play sports games (Miron & Ionescu, 2007).

**2. Method and methodology**

In the demographic research of the sports movement there are some difficulties related to the definition of the sports concept, delimitation or establishment of a sampling framework:

1. The boundary between the competitive and the amateur activity is difficult to establish;

2. Some federations and funded structures may artificially increase the number of legitimates, especially if the funding is proportional to the number of legitimate persons.

**3. Hypotheses**

The study started from the idea that the number of legitimized athletes decreased very much during the period 1992-2014 as a result of the national economy slowing down.

We also consider that false values of sports students are declared at the School Sports Clubs.

To create and analyze the database of the monitored indicators, the TEMPO database, from INSSE, was processed in Microsoft Office Excel and used to create graphical materials using Philcarto and Adobe Illustrator software. The number of legitimized athletes was identified in the MTS directories for 1992 and 2014.

**4. Discussions**

*4.1 The evolution of the legitimate sportsmen in Romania*

In 1992 it is observed that in the municipality of Bucharest (Fig.1) the number of athletes legitimized in Romania (Encyclopedia of physical education and sports in Romania, 2004) is the largest, having 307 athletes legitimized / 1000 inhabitants, while in the other counties do not record more than 121 athletes legitimated / 1000 inhabitants (Cluj).

But also at this level there are differentiations, and the counties with a larger population and a developed industrial sector have higher values between 24-43 legitimate sportsmen / 1000 inhabitants. The fewest legitimized sportsmen / 1000 inhabitants are found in the counties along the Danube, such as Braila, Mehedinti, Tulcea or Calarasi.

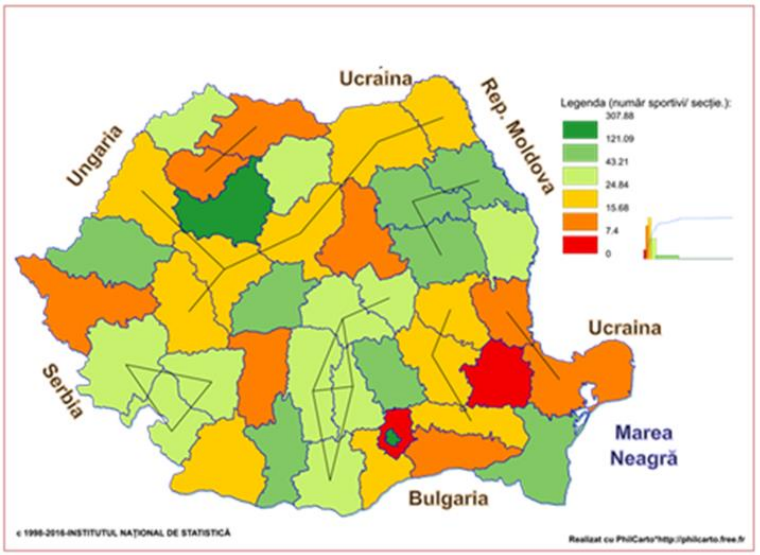


Fig. 1 Distribution of athletes legitimated in Romania in 1992

From the analysis of the map below, (fig.2) it is noted that in 2014, the number of legitimized athletes / 1000 inhabitants in Romania has decreased exponentially in Bucharest (140 legitimized athletes / 1000 inhabitants), and in the other counties such as Valcea, Timiș, Alba, Suceva, Vaslui it have been registered value range going from 16 athletes legitimated / 1000 inhabitants. The fewest people who practice sports are registered in Neamț and Bacău counties. The large gap between the maximum value in the capital and the rest of the country can visually induce an over-appreciation because the situation is, in absolute figures, a dramatic one if we compare during the period 1992 to 2014, in total, according to the NIS data, a strong downward trend of the legitimized athletes is felt over 35%: 380000 in 1992 to 243,000 in 2014.

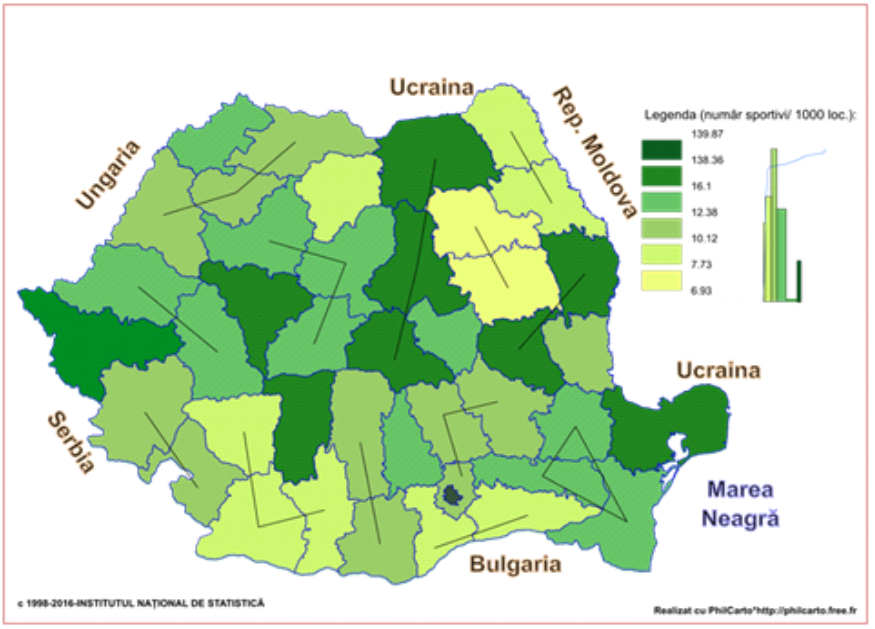


Fig. 2 Distribution of athletes legitimated in Romania in 2014

In other words the new social values are handled by current generations influencing behaviors athletes. Sport loses its educational and cultural attributes by emancipating itself from its traditional values and becomes a consumer product (Miron & Ionescu, 2007). One of the disadvantages of NIS data processing is the fact that athletes are not classified by age category and the performing of some interpretations would be at least without scientific basis.

*4.2 The situation of sports students reported*

The organized practice of sport in Romania is carried out in three broad categories of structures:

- departmental sports clubs, financed from: MTS, mayors, other ministries (MAN, MAI);
- school sports clubs (LPS, CSS, PC, CSU) funded by MEN through the Federation of School and University Sports;
- private sports clubs (under different organizations: associations, foundations, etc.).

The first two categories are the sports clubs in Romania for most individual and team sports with a few exceptions: football, basketball and handball few teams in the category of team sports and lawn tennis in individual sports category. Thus, after 1944 in Romania operates sports structures subordinated to and under the direct funding of the Ministry of Sports and Youth, a number of employees coaches, support staff and management and own material base. At the moment, at the level of Romania, MTS finances a number of 1100 coaches positions throughout the country through the Municipal Sports Clubs at the level of each city county residence (www.mts.ro).

From the last centralization requested by the Ministry of National Education in 2015, a number of 70,102 sports students enrolled in both LPS and CSS. These students are included in a number of 2345 norms supported by 1937 tenured professors with the related specialty. Although the number of sports students may seem high, it represents 2.19% of the total number of students in Romania (approximately 3.2 million). At the same time it should be noted that the 70,102 sports students are from urban areas only because in the rural area there is no CSS. As can be seen, in table 1 as well as in fig. 3 we used the expression "reported sports students" because the data are extracted from a request of the MEN to all the structures in the integrated and supplementary sports education. In fact, in a press conference held on April 28, 2016, the deputy director of the Federation of School and University Sports within the MEN stated that within the sports federations of the Ministry of Youth and Sport there are only 12,474 legitimate sports students who participated in the official competitions. organized by them.

If the economic situation of a country is reflected in all fields of activity, it is expected that in the field of sport there will be a similarity. Thus, if in Romania there was a dramatic decline of the economy between 1992 and 2014, the situation in sports is characterized by the dramatic decrease in the number of sports practitioners. It is definitely about senior level sports practitioners if we consider that at junior level (up to 18 years) most are enrolled in LPS and CSS.

From the analysis of the weighted data (tab. 1) at the level of individual sports, only three sports show a positive evolution in the sense of increasing the number of practitioners (athletics, swimming and archery), while some sports with intentional results such as boxing, kayaking, judo shows a visible decline.

As we can see from Table 1 the most practiced individual sports are athletics (in all the counties - 42), Wrestling (31) and Judo (24). Having such a wide range of spreading, we can call them national sports although the present national and international results are far from justifying the big sums of money assigned. We can also observe some irregularities in the presented numbers (Fig. 3) like the fact that there were reported more sporting pupils than those licensed in gymnastics, wrestling, table tennis, rowing. We think that the report was done in such a way to achieve the number of financed norms having in consideration the fact that for each norm there is a number of groups and a number of pupils according to the particularity of the sport and to the practicing level.

Table 1. Comparative situation of the sportsmen legitimized and related to several individual sports

| *Type of Activity* | *INS Year* | | *2012 CSS/LPS reported pupils* | *Sections no. at the RO level* |
|---|---|---|---|---|
| | *1992* | *2014* | | |
| Athletics | 7566 | 10.135 | 9094 | 42 |
| Boxing | 7023 | 1017 | 310 | 8 |
| Kayak - canoe | 2022 | 948 | 800 | 11 |
| Cycling | 646 | 123 | 0 | 0 |
| Fencing | 3532 | 1400 | 653 | 11 |
| Gymnastics | 1608 | 1248 | 1677 | 14 |
| Rowing | 660 | 651 | 724 | 10 |
| Natation | 1195 | 5988 | 3357 | 19 |
| Weight Lifting | 3900 | 316 | 198 | 5 |
| Wrestling | 5001 | 2685 | 2922 | 31 |
| Judo | 6058 | 3233 | 2224 | 24 |
| Shooting | 933 | 837 | 98 | 2 |
| Archery | 116 | 608 | 62 | 2 |
| Field Tennis | 3800 | 3370 | 866 | 17 |
| Table Tennis | 3334 | 1172 | 1710 | 13 |

Moreover there are sports that are not present in the list of those financed by MEN like cycling (probably because it is a costing sport), sports that are weakly represented in CSS such as field tennis, shooting and archery, but also sports that are mostly supported by pupils (athletics, kayak-canoe). From the list reported to MEN we can find "exotic" financed sports like yachting, softball, baseball, grass hokey, sky jumping.

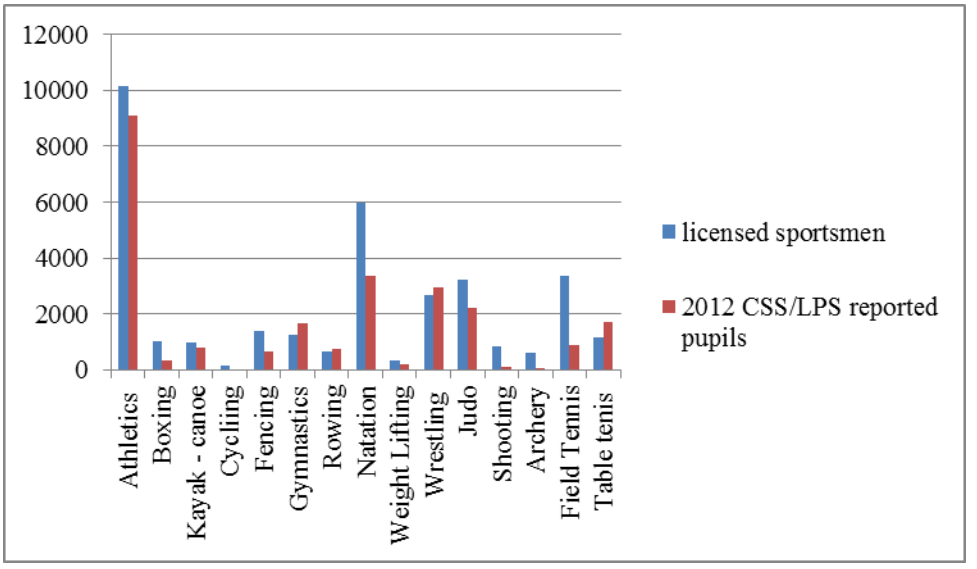


Fig. 3. The ration between the licensed sportsmen and sporting pupils declared

**5. Conclusions**

The number of practioners of sport at the senior level has dropped drastically. This was something to be expected taking into consideration the fact that before 1990 there were many working sporting clubs where young people over 20 were active, they were employed at the respective economical company and although they had an amateur status, they received a salary just because they were going to trainings.

In Scholar Sporting Clubs the situation is presented statistically, officially the way it should be but not as it

is in reality. This statement is proved by the decreased number of sporting pupils that participate in the competitions designated for them, by the low level of the sporting achievements as a result of the lack of valuable competitors. These scholar structures are characteristic to the former communist countries and they are big consumers of financial resources considering that there are needs of payment of the didactical norms, support of the preparation costs (rents, equipment, cantonment, etc.), payment of the participation in official and unofficial competitions. In conclusion, by practicing sport in these scholar structures young people form the idea that they should be paid in order to come to trainings and that they are professionals.

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# IMPROVING KUZUSHI. THE DEVELOPMENT OF UPPER LIMBS STRENGTH IN JUDO USING ELASTIC BANDS

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**Abstract**

Our analysis deals with one aspect we consider very important for the unbalancing of the opponent in Judo: the development of physical factors, especially of the physical strength. Although the application of a technique requires a pure momentum/force couple determined by muscle groups, we chose to study only the brachial biceps which we consider essential. When it comes to training for Judo with elastic strings, slow twitch muscle fibers develop better than when using weights. Strength training using elastic devices (elastic bands, elastic strings, ropes, cords, and belts) should occupy a greater share than strength training with dumbbells and weights. In our research we included a group of 8 judoka from the "Universitatea" Sports Club for a period of 8 weeks. At the end of each training session the subjects performed 10 series of 15 repetitions of simulated Kuzushi (unbalancing of the opponent) using elastic bands. The research subjects, all right handed, had to perform the Kuzushi on the right side. We measured the peak EMG signal for one execution at the beginning and the end of the experimental period. The results from the post test showed a statistically significant increase in the peak EMG signal as compared to the pretest.

Key words: Judo; Kuzushi; EMG; strength; elastic bands.

## 1. Introduction

As many other researchers who studied and analyzed the Kuzushi (unbalancing of the opponent) (Asami, Matsumoto, & Kawamura, 1972; Imamura, Hreljac, Escamilla, & Edwards, 2006), our analysis deals with one aspect we consider very important: the development of physical factors, especially of the physical strength. The unbalance (Kuzushi) is only an extremely short stage, which, if delayed, makes the Tsukuri (Set-up) stage impossible to reach (Sacripanti, 1987).

Although the application of a technique requires a pure momentum/force couple determined by muscle groups, we chose to study the brachial biceps.

The two judoka keep semi-flexed arms, avoiding coming close to each other. In order to achieve the first moment of imbalance, which lasts several hundreds of a second, it is necessary to flex at least one arm. With the tense wrist, Tori triggers the Kuzushi moment by flexing the brachial biceps to the point of 90 degrees, enough to cause Uke to tilt the upper body forwards by a few degrees. It is the moment called Hikidashi or Biki and it is achieved starting from an isometric contraction (Sacripanti, 1989).

The actual fight in competitive judo is quite short and lasts for only 10-20 seconds. During this time the muscular effort reaches maximum parameters.

Slow twitch muscle fibers have greater aerobic capacity than fast twitch fibers, due to higher levels of mitochondria and oxidative enzymes. Mitochondria are the muscles' main organic substances, in charge with fiber colors and the place where oxidation phenomena happen. The more slow-twitch fibers present in the muscle, the higher the oxidation concentration. It has been found that resistance training increases the oxidative capacity of all fibers, especially those with rapid contraction by increasing the amount of mitochondria and oxidative enzymes and by increasing the ability to extract energy from lipids as well (Bacon & Kern, 1999).

When it comes to Judo training with elastic strings, slow twitch muscle fibers develop better than when using weights.

Oxygen intake is the most important factor of the oxidative metabolism. At rest, the body's need for ATP is reduced, therefore the need for oxygen is also reduced. When it comes to judo competitions, the athlete stops his activity after a maximum of 20 seconds of fighting. At this point, the restoration of oxygen debts at cell level begins and the body starts accumulating oxygen reserves (Green, Halestrap, Mockett, O`Toole, Grant, & Ouyang, 2002).

Taking into account at least these two factors, i.e. muscle fiber and the need for oxygen, when it comes to muscles and the other organs, especially the lungs, the judo force training must strive to come as close as possible to the real competitive situations. This means that strength training with elastic devices (elastic bands, elastic strings, ropes, cords, and belts) must weigh more than training with dumbbells and weights.

## 2. Method

In our research we included a group of 8 judoka from the "Universitatea" Sports Club and conducted the study for a period of 8 weeks. At the end of each training session, the subjects performed 10 series of 15 repetitions of simulated Kuzushi (unbalancing of the opponent) using elastic bands. After two weeks' time we used higher strength elastic bands.

In order to evaluate the strength we used the TeleMyo 2400T G2 by Noraxon to measure the peak EMG signal of the brachial biceps for the right arm of the judoka which we consider is a good indicator of strength.

The TeleMyo 2400T G2 is one of the portable Noraxon telemetry products. Each transmitter can accommodate up to sixteen (16) channels of any combination of SEMG and a variety of analog signals. Two transmitters can be coupled together to provide up to 32 channels. The active electrode leads use Noraxon's patented signal processing technology to provide clear, consistent and reliable data. The communication between the transmitter and the receiver is bi-directional, using an internationally accepted direct sequence spread spectrum 2.4GHz radio channel.

The research subjects, who were all right handed, had to perform the Kuzushi on the right side. We measured the peak EMG signal for one execution at the beginning and at the end of the experimental period.

For the interpretation of the results we used SPSS 20 to calculate the T test for paired groups. We analyzed the normality of the distribution with the Shapiro-Wilk test and searched for outliers using the boxplots.

## 3. Results

Two sets of measurements were conducted, one for each arm. We measured the mean and the peak EMG signal. All the results are expressed in µV (micro Volts). We analyzed the results using the T test for paired groups.

Table 1. Tests of Normality Peak EMG signal for the right brachial biceps

| | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|
| | Statistic | Df | Sig. | Statistic | Df | Sig. |
| Difference | 0.189 | 8 | 0.200* | 0.914 | 8 | 0.380 |

The differences between the peak EMG signal for the right brachial biceps before and after the training period were normally distributed as assessed by the Shapiro-Wilk test (p=0.380).

There were no outliers in the data, as assessed by the inspection of the boxplot.

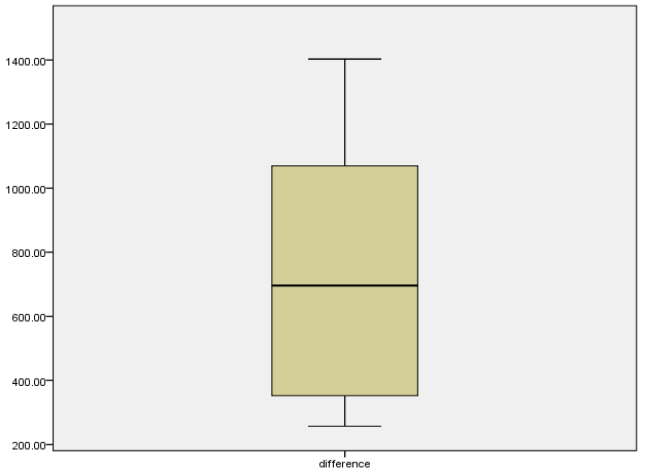


Figure 1. Difference between final and initial results boxplot

The peak EMG signal for the right brachial biceps at the beginning of the research is 3294± 1309.25, a smaller value as compared to the end of the research 4031.75±962.77

Table 2. Paired Samples Correlations Peak EMG Signal for the right brachial biceps

| | | N | Correlation | Sig. |
|---|---|---|---|---|
| Pair 1 | final & initial | 8 | 0.975 | 0.000 |

There is a strong correlation between initial and final results r=0.975 p<0.0005

Table 3. Paired Samples Test Peak EMG signal for the right brachial biceps

| | Paired Differences | | | | | T | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | Lower | Upper | | | |
| Pair 1 final - initial | 737.00 | 427.161 | 151.02 | 379.88 | 1094.11 | 4.88 | 7 | 0.002 |

The training program showed an increase in the peak EMG signal for the brachial biceps after the training period of 737.00±427.16.

## 4. Discussions

A paired-samples T-test was used to elucidate whether there is a statistically significant mean difference between the peak EMG signal values for the brachial biceps performing a Judo unbalancing obtained pre and posttest by the participants in our experiment. Our assumption was that elastic bands training can play a major role for the increase in strength necessary for a better KUZUSHI (unbalancing of the opponent). There were no outliers in the data, as assessed by inspection of the respective boxplots. The difference for the post test and pretest values were normally distributed, as assessed by Shapiro-Wilk test ($p = 0.380$).

The results from the post test showed a statistically significant increase in the peak EMG signal as compared to the pretest: $t(7) = 4.88$, $p<0.05$ $d= 1.72$ for the right biceps.

## 5. Conclusions

We were able to outline our finding with the help of the TeleMyo 2400T G2 by Noraxon which proved to be a very reliable tool for the evaluation of the strength of the brachial biceps.

The use of the elastic bands proved to be a valuable tool in increasing the strength of the upper limbs (in our case of the brachial biceps especially).

The end result was a better unbalance of the opponent (Kuzushi) and it was decisive for the technique improvement in a short period of time for all the subjects included in the experiment.

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# NUTRITION PARTICULARITIES WITHIN SPORT TRAINING IN MARTIAL ARTS

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**Abstract**

As a review from the literature, the current paper aims to identify the means to facilitate the physical preparation, through adequate nutrition, for some martial arts which have a similar competition effort required, being mostly anaerobic.
From the physiological point of view, the sportsman has to have the chance to show his maximal speed and force-speed capabilities in competition; he should also have a very good level regarding the anaerobic capacity and power, both alactacid and global, and also a good anaerobic capacity, that may allow the rapid recovery of the anaerobic energetic reserves for the following effort.
The nutrition in martial arts is necessary through weight stability and body composition stability, and also through an increase in the specific effort capacity. In this field, there are some general recommendations in the literature which are partially applicable in martial arts athletes' life regime.
Thus, the possible nutritional deficits in karate and taekwondo competitive athletes suggest this component is often not taken into consideration by coaches, with their implications in health status and level of performance.
The future researches should put in evidence the athletes and coaches attitudes regarding nutrition, and also the caloric necessary in training and competition of martial arts.

*Keywords:* physical training; diet; effort capacity.

## 1. Introduction

The issue of scientific research in the direction of optimizing physical training in martial arts is more recent. Nutrition is an essential component of the athlete's life regime, which takes particular notes, depending on the training and competition demands.

As a review from the literature, the current paper aims to identify the means to facilitate the physical preparation, through adequate nutrition, for some martial arts which have a similar competition effort required, being mostly anaerobic.

## 2. Physical training in martial arts

Martial arts belong to the category of sports with direct contact with the opponent. In some martial arts the competition is carried out on weight categories (for example judo). At the same time, the duration of the fight varies from 2, to 3 or 5 minutes to a number of rounds (usually 3) of 2-3 minutes each. Therefore, the variable stress from one style to another determines the somehow different involvement of the energetic sources, anaerobic or mixed.

Nevertheless, we can say that, in general, in the competition specific effort in martial arts, mainly the anaerobic

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system is put in action, especially the alactacid one that is necessary for the rapid and spontaneous execution in order to surprise the adversary, cases in which the neuromuscular stress is especially intense.

From the point of view of the competition biological training, a superior training for the specific physical practice will allow to the sportsman to deal more easily with the competition effort. As regards the progress of the energetic systems, the organization of the training in martial arts should take into account the principle according to which the initial training will be focused on the progress on the aerobic processes, then it will continue with influencing the lactacid anaerobic processes and finally with the alactacid ones (Zaţiorski, 1967).

This organization is necessary, as only a good aerobic capacity will allow the sportsman to deal with more effort during training, and also with favoring a rapid recovery of the anaerobic reserves (mostly solicited by the specific effort). Also, the progress of the lactacid anaerobic metabolism positively influences the alactacid processes (table 1); this is the reason why these actions should take place in the succession described above (Costill and Wilmore, 1998).

The pre-competition period coincides with the period in which the biological competition training should take place. This period usually starts with 1.5 - 2 months before that competition (table 1). During this time, the competition specific training should be dominant (specific physical training), the volume effort is much reduced the effort intensity increases considerably (there are also maximum intensity exercises) (Drăgan, 1994).

From the metabolic point of view, it is the period in which the purpose is developing the anaerobic energetic sources, intensely solicited in this category of martial arts. We have to mention the progressive use of the exercises which develop the reaction and the execution speed, as well as the exercises for the speed-force couple, main motor qualities within martial arts.

During this period, the specific physical training may be accomplished in a dissociate manner (with independent means in relation to the other training factors), at the beginning of the phase, and also in an integrate manner with the other factors (by exercising technical procedures and by the competition fight etc).

The competition period (about 1-2 weeks) is the period for valorizing the accumulations during the pre-training period (table 1). The sportsman's organism has to be at its best from the effort capacity perspective. During this short period of time, as towards the end of the pre-competition period, the intensity of the exercises reaches its maximum, the volume of the effort is strongly reduced, and we see also the integrated exercises for the competition field (technical or fighting tests).

From the physiological point of view, the sportsman has to have the chance to show his maximal speed and force-speed capabilities; he should also have a very good level regarding the anaerobic capacity and power, both alactacid and global, and also a good anaerobic capacity, that may allow the rapid recovery of the anaerobic energetic reserves for the following effort.

Table 1. Example of double periodization of the training in Qwan Ki Do, as regards the progress of the energetic processes.

| **Energetic processes primarily solicited** | Aerobic and lactacid capacity | | Anaerobic capacity | | Power anaerobic | | | | Aerobic and lactacid capacity | | Anaerobic capacity | | Power anaerobic | | | | Maintaining aerobic and anaerobic capacity | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Period** | **PPG** | | | | **PPr** | | **PC** | **PT** | **PPG** | | | | **PPr** | | | **PC** | **PT** | **PD** |
| **Month** | **Aug** | **Sep** | **Oct** | | **Nov** | | **Dec** | | **Jan** | | | | **Feb** | | **Mar** | **Apr** | | **May** | **Jun** |

Legend:
PPG – general preparing period
PPr – pre-competition period
PC – competition period
PT – transition period
PD – development period

## 3. The nutrition in martial arts

The literature in this specific topic is relatively poor and it is often focused only on weight loss or rapid weight loss among martial arts athletes during the pre-competition and competition periods, with their harmful biological implications (Anyżewska, Dzierżanowski, Woźniak, Leonkiewicz & Wawrzyniak, 2018; Berkovich, Stark, Eliakim, Nemet & Sinai, 2019; Mata-Ordoñiez, Sanchez-Oliver & Dominguez-Herrera, 2018; Papadopoulou, Dalatsi, Methenitis, Feidantsis, Pagkalos & Hassapidou, 2017).

In order to identify the nutritional strategy for martial arts athletes, we studied some general and specific sources from the literature in sport training nutrition.

So, in the speed-force sports (wrestling, boxing, martial arts), the daily consumption recommendation is between 3600-6000 kcal (according to the weight category), with the following ratios: proteins – about 18% (of which about 75% should be of animal origin); carbohydrates – circa 55% (especially monoglycerides and diglycerides); fat – up to 28% (of which 50-70% should be vegetal fat) (Alexe, 1993). Petrie et al. (2004) recommend about the same amount: proteins between 12-15 %, sugar over 50%, fat between 25-30%.

Besides proteins, fat and sugar, the nutrition should also contain vitamins, mineral salts, vegetal fibers and water. It is metioned (Alexe, 1993) a caloric consumption per hour of physical effort for this type of sports, about 60-65 kcal.

These are the aspects that should be considered when establishing the ratio for supporting the martial arts' athletes, in order to cover the necessary energetic value and in order to prevent lacks of balance (weight variations, level of performances etc.).

On the other side, the special literature (Alexe, 1993; Drăgan & Baloescu, 1994) also mention two types of nutrition ratios having an energetic effect; the first has less sugar (mostly for endurance sports); the second has more proteins, leading to an increase in the force indices (mostly for force sports or for sportsmen for which the most important is an increase in the muscle amount). For martial arts, which are speed-force types of sports, we can sometimes use (mostly during the general training period), the hyper-protein ratio.

The effort-supporting medication or the growing-effect medication refers to a series of natural or synthetic elements that directly or indirectly influence the energetic reactions once they are introduced in the organism. For the specific effort in martial arts, the following vitamins are essential: $B_1$, $B_6$, $B_9$, $B_{10}$, $B_{12}$, C and E. (Drăgan&Stroescu, 1993).

Among the most important minerals for the anaerobic effort, for the martial arts we should mention (Ionescu&Anton, 2004): the phosphorus – daily ratio for sportsmen – 3-3,5 g; calcium – daily ratio for sportsmen – 1,5-1,8 g; magnesium – daily ratio for sportsmen – 1 g; sodium and potassium – daily ratio for sportsmen – 8-15 g for sodium, 2-3,5 g for potassium.

The sugar composites ensure a supplement of the reserves in case the effort takes longer. During the training specific for martial arts, we often get to a significant decrease in the glycogen reserves in a relatively short period of time. In order to get them back, we can use, during intense training, vitamin glucose or fructose pellets (Drăgan& Stroescu, 1994).

Among the most important amino-acids for the anaerobic effort, we should mention (Drăgan&Stroescu, 1993): the glutamic acid, more precisely sodium glutamates, potassium – for supporting short-time effort; the aspartic acid – favors the myosin and actiniae synthesis; tyrosine – in the presence of iron, copper and $B_6$ and C vitamins se it turns into catecholamines, with growing effects in the repeated short-time and intense efforts, as in the case of the martial arts. The protein components can also be used, contributing to the hyper-protein ratio.

The literature (Campbell, La Bounty & Wilborn, 2011; Ionescu & Anton, 2004) also mentions several classes of dietary supplements, as follows spiruline (with great effects on the liver), Pirivit (in the neuro-psychic sports), ATP, CP, creatine, b-alanine, branched-chain amino acids, and carbohydrates.

Regarding the recovery diet, this must include many vegetables and fruits, but also foodstuff rich in carbohydrates and proteins. Thus, it is recommended to maintain de foodstuff rich in carbohydrates diet 1-2 days after the competition, in order to fully restore the energy resources (Oprendek-Roudey, 2000).

There are two directions identified in link with the vitamins role during de recovery (Guilland, 2000): energetic, participating as cofactors in producing the energy, and protector (C and E vitamins), defencing the body cells against the free radicals action.

Thus, during the recovery period, the supplementation of the mineral intake with potassium, iron (Pilardeau, 2004), calcium and magnesium (Ionescu & Anton, 2004) is very necessary, through alimentation and not only.

On the other hand, there are some studies who reveals the nutritional deficits in karate and taekwondo competitive athletes, especially in vegetal items, also including vitamins, minerals and vegetal fibers (Anyżewska, Dzierżanowski, Woźniak, Leonkiewicz & Wawrzyniak, 2018; Dubnov-Raz, Mashiach-Arazi, Arieli, Raz & Constantini, 2016; Miyahara et al., 2005; Teshima et al., 2002)

**Conclusions**

Taking into account the aspects mentioned above, we can conclude that it is necessary to select the most effective means for the competition biological training in martial arts, which would lead to manifesting at the highest level the effort capacity of sportsmen within high performance competitions.

Regarding the nutrition, there are some general recommendations in the literature which are partially applicable in martial arts training, taking into account the training and competition particularities. The literature in this specific topic is relatively poor.

The nutrition ratio and the effort-supporting and recovery medication in martial arts, necessary through weight stability and body composing stability, and also through an increase in the effort capacity, must include respecting the training and competing effort regime, according to the training period.

Weight loss or rapid weight loss among martial arts athletes during the pre-competition and competition periods, with their harmful biological implications, is a subject of some researches.

The possible nutritional deficits in karate and taekwondo competitive athletes suggest this component is often not taken into consideration by coaches, with their implications in health status and level of performance.

The future researches should put in evidence the athletes and coaches attitudes regarding nutrition, the caloric necessary in training and competition of martial arts and also how to prevent the nutritional deficits in competitive athletes and not only.

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ICU 2019

# PHYSICAL AND PERFORMANCE PARAMETERS EVOLUTION DURING A SEASON IN U16 FOOTBALL PLAYERS

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**Abstract**

In this study we aimed to identify the evolution in terms of performance and body composition during a competitional season, in U16 football players and we tried to identify the role of different types of sport motivation in this process. We also wanted to evaluate the effectiveness of the physical preparation training program, determining whether this is appropriate for the age category studied.

**Methods**: This study followed the evolution of 25 football players aged between 15 and 16 years during an entire season. They were tested four times: preseason, after the first half of the season, after the first competitional break, and at the end of the study (second half of the season).

We monitored the evolution of the parameters related to: body composition, aerobic capacity, speed, strength and power of the lower limbs. For this, we used InBody 720, the 10 and 30 meter sprint test, the Counter movement jump test (Myotest), the Yo-Yo test (high-intensity aerobic work capacity) and we applied the SMS2 scale (Sport motivation scale).

**Results**: Contrary to our initial belief and different from other studies results, we found no correlations between the physical parameters or sport performance and the overall motivation score. Also, the type of motivation does not seem to influence these parameters, which are probably influenced by biological or nutritional factors rather than motivational factors.

There are fluctuations in the parameters tracked during a season with obvious but not statistically significant depreciation during holidays. The progress of physical form (body composition) and performance between initial and final assessment is significant and indicates that the physical training program was well suited to the age and requirements of the football game.

*Keywords: performance; U16 football players; motivation;*

## Introduction

Physical fitness, anthropometric characteristics and motivation are variables with a key factor in a football team's success. This sport is characterised by numerous sprints, sharp stops and rapid and frequent changes of movement direction. (Váczi,Tollár, Meszler, Juhász, & Karsai, 2013). Therefore, regardless of the position occupied in the team, speed, in all its forms (execution, repetition, reaction, acceleration and movement) is an essential characteristic for these athletes. By its specificity this sport requires the ability to execute repeatedly, short sprints, at high speeds and with reduced recovery periods. It is said that speed is mostly conditioned by genes, but muscle strength and endurance can be listed among the factors that can influence this parameter (Kovacevic, Zuvela, & Kuvacic, 2018).

Monitoring throughout the season, all the parameter listed above, can provide sports specialists important informations on the quality of their interventions and guidelines for proper adaptation of the training.

Besides the physical characteristics and parameters related to the physical performance, motivation is thought to be an essential factor in sport performance.

Understanding motivation, and the means to increase it, is one of the most titled topics in the psychological and sports literature. Its role in achieving performance is fully recognized but the methods by which it can be

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influenced and the importance of the different components of motivation are details that are not yet fully explained (Richard, Deci, & Edward, 2000).

In this study we aimed to identify the evolution in terms of performance and body composition during a competitional season, in U16 football players. We also tried to determine the role of different types of sport motivation in this process. Effectiveness of the physical preparation training program during the competitional season and the role of a vacation conditioning program were also investigated with the purpose of finding out if this interventions are appropriate for the age category we studied.

**Methods**: This study followed the evolution of 25 football players aged between 15 and 16 years during an entire season. They were tested four times. The first test was conducted in July before the preseason. The second test was done in September, in the season, after 6 weeks of preseason training. The third test was conducted in January after 6 weeks of vacation and the final test was conducted in March after 4 weeks of preseason.

We monitored the evolution of the parameters related to: body composition, aerobic capacity, speed, strength and power of the lower limbs. For this, we used InBody 720, the 10 and 30 meter sprint test, the Counter movement jump test (CMJ, using a Myotest device), the Yo-Yo intermittent recovery test (YIRT; high-intensity aerobic work capacity) and we applied the SMS2 scale (Sport motivation scale 2).

Bioelectrical impedance analysis with InBody 720 (Korea) offers a wide range of results, regarding the body composition, but we chose to follow just skeletal muscle mass (SMM) and percentage of body fat (PBF%), considering that it is the most appropriate for our study. The assessment of body composition was made at the same time of the day in accordance with the recommendations of the InBody 720 user manual.

Performance related parameter evaluation was performed at the same time of the day (late afternoon), on the same surface (artificial grass) using the same shoes (football shoes).

For the YIRT1, the athlete starts on, or behind the middle line, and begins running 20 m at a sound signal. The subject turns and returns to the starting point when signalled by the recorded beep. There is an active recovery period (5 and 10 seconds respectively for the endurance and recovery versions of the test) interjected between every 20 meter (out and back) shuttle, during which the subject must walk or jog around the other cone and return to the starting point. A warning is given when the subject does not complete a successful out and back shuttle in the allocated time, the subject is removed the next time they do not complete a successful shuttle.

The Myotest is a wireless hand-held device weighing just a few ounces. It provides quantitative measures of an athlete's muscular performance using three-dimensional accelerometery to determine power, strength and speed information of athletic movements.

For CMJ test the athletes began in an erect standing position, moved into a semi-squat position and then used a vigorous double-arm swing before jumping as high as possible for 3 consecutive repetition.

**Training protocols**

The first preseason phase lasted six weeks—from the beginning of July to the middle of August—while the in-season period lasted 3.5 months—from the beginning of September to the middle of December. A typical weekly schedule of the pre- and the in-season training program is presented in Tables 1 and 2. As can be seen, the total volume and the number of training sessions during the preseason is much higher than in the in-season phase (10 vs. 5 sessions), including strength and endurance-type training that was performed almost solely in the preseason.

Table 1. Pre-sesson training

| Day | Mon. | Tues. | Wed. | Thurs. | Fri. | Sat. | Sun |
|---|---|---|---|---|---|---|---|
| Morning | ET 70%<br>CD 20% | ST 80%<br>CD 20% | FM 90%<br>CD 10% | ET 90%<br>CD 10% | ST 90%<br>CD 10% | FM 90%<br>CD 10% | REST |
| Evening | TE 70%<br>TA 30% | TE 70%<br>TA 30% | REST | TE 70%<br>TA 30% | TA 70%<br>TE 30% | SG 70%<br>TE 30% | REST |

Table 2. In-season training

| Day | Mon. | Tues. | Wed. | Thurs. | Fri. | Sat. | Sun |
|---|---|---|---|---|---|---|---|
| | Recovery | ST 90%<br>CD 10% | ST 50%<br>ET 50% | TE 70%<br>TA 30% | TE 50%<br>SG 50% | TA 70%<br>TE 30% | MATCH |

ST strength training, TE Technical training, TA Tactical training, SG small sided games, CD Cooldown, FM friendly match, ET Endurance training.

The strength training in the preseason included a weight lifting program (4 sets of 5–15 repetitions in 60–80% of one repetition maximum) (Table 3). At the advanced stages of the season phase, dynamic power training sessions, including plyometric jumps were incorporated (1 per week) without replacing weight lifting sessions. The endurance training part was taken from the technical games, tactically completing the physical training with sprints to improve the ATP-CP energy system (Table 4).

The second preseason phase lasted four weeks—from end of January to the beginning of March—while the in-season period lasted four months—from the beginning of March to end of June. In the second part of the preseason and the season, the same training protocol was followed, with the note that preseason 2 was shorter (4 weeks).

Table 3. Strength Training pre-season

| Exercise | Intensity | Sets | Reps. |
|---|---|---|---|
| Squat | 60 -80% 1RM | 4 | 5-15 |
| Chest press | 60 -80% 1RM | 4 | 5-15 |
| Deadlift | 60 -80% 1RM | 4 | 5-15 |
| Barbell row | 60 -80% 1RM | 4 | 5-15 |

1 RM -one repetition maximum

Table 4. Endurance Training pre-season

Multidirectional Intensive Interval training

| Exercise | Sets | Reps. | Target | Recovery |
|---|---|---|---|---|
| 150 m Sprints | 2 | 6 | <30 | 60 sec. |
| 200 m Sprints | 1 | 6 | <40 | 60 sec |
| 400 m Sprints | 1 | 8 | <80 | 90 sec |

TOTAL 6.200 m

For the transition phase (vacation) we recommended our athletes a strength training in order to avoid deconditioning (Table 5,6).

Table 5. Vacation Program -Resistance Training (3 times\week)

| Exercise | Sets | Reps | Rest |
|---|---|---|---|
| Plank | 3 | 45 sec | 0-30 sec |
| V-ups | 3 | 20 | 0-30 sec |
| Trunk Extension | 3 | 20 | 0-30 sec |
| Lunges | 3 | 20 | 0-30 sec |
| Hip Bridge | 3 | 20 | 0-30 sec |
| Push ups | 3 | 20 | 0-30 sec |
| Triceps push ups | 3 | 20 | 0-30 sec |

Table 6. Aerobic Vacation Program (3 times\week)

| Exercise | Sets | Reps | Intensity | Rest |
|---|---|---|---|---|
| Run | 1 | 3 of 5 min. | 70-80% FCmax | 90 sec. |

**Results and discusions**

Datas presented in this chapter were analysed with the help of GraphPad Prism Software, applying the paired t test or Anova (depending on the case).

Contrary to our initial belief and different from other studies results, we found no correlations between the physical parameters or sport performance and the overall motivation score. Also, the type of motivation does not seem to influence these parameters, which are probably influenced by biological or nutritional factors rather than motivational factors.

Most of the studies corelate sports success with self-determination and intrinsic motivation (Frederick & Ryan, 1995).

Age of athletes can be considered as a variable that influenced the outcome of this study, as we are not sure that they fully understood the questions and their purpose. (Aktuğ et al., 2014; Frederick & Ryan, 1995).

The literature presents more than 32 theories of motivation. Motivation-performance relationship is a very important concept in sports training and deserves special attention. Understanding this concept and the mechanisms by which the components of motivation can be influenced, is a necessity in performance athletes training and deserves more rigorous and wide studies (Tenenbaum & Eklund, 2007).

We observed fluctuations in all the parameters tracked during the season, with obvious but not statistically significant depreciation during holidays (in some parameters). The increase of SMM is significant ($p < 0.0001$) and indicates that the physical training program (and also the nutrition ) was well suited to the age of the athletes (Fig.1).

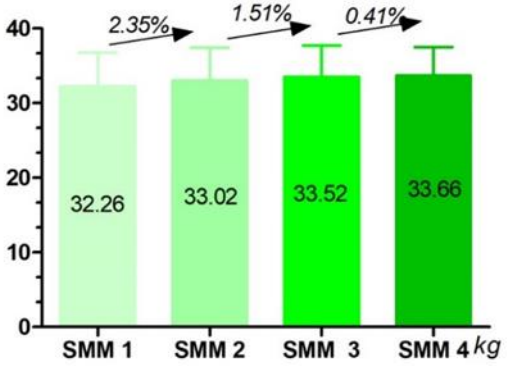


Fig.1 Evolution of the skeletal muscle mass

SMM 1 Mean value of the skeletal muscle mass at the initial evaluation; SMM 2 Mean value of the skeletal muscle mass at the second evaluation; SMM 3 Mean value of the skeletal muscle mass at the third evaluation; SMM 4 Mean value of the skeletal muscle mass at the final evaluation

Initially, the PBF decreases with over 1% but it increases with almost 2% in the competitional break, probably due to the decrease in volume (3 days/week from 6 days/week) and intensity in training (from the season to the transition period) while maintaining the eating habits of the season. However, their values remain within the specific norms for the age and the sport practiced. Without an obvious explanation, despite the heavy trainings (as they report on their perception questionnaires-short forms completed after each training session) the PBF, recorded a slight increase (+0.4% in the last period) (Fig.2). PBF increased due to the decrease in volume and intensity in training from the season to the transition phase.

While an increase in fat-free mass, may be a desired goal, a body fat increase, as large as 2% may lead to decreased performance, for example in vertical jumping (Miller et al., 2002). Our study showed an increase in vertical jump even with a 1.29 % increase of PBF.

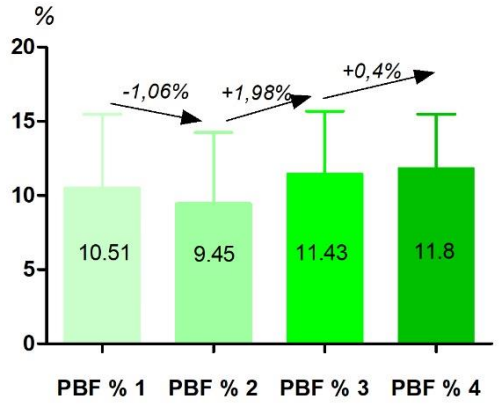


Fig.2 Evolution of the percentage of the body fat
PBF % 1 Percentage of the body fat at the initial evaluation; PBF % 2 Percentage of the body fat at the second evaluation; PBF % 3 Percentage of the body fat at the third evaluation; PBF % 4 Percentage of the body fat at the final evaluation

For the 10 meters sprint test and 30 meters sprint test we observed an improvement from the first to the second evaluation. Both tests show a decrease of speed after the competitional break. Despite that the SMM showed a constant improvement during the study, the speed sprint decreased in the competitional break. This fact is easy to understand considering that the vacation program was a strength and aerobic program and did not include a sprint/ speed training.

This two tests show that speed and acceleration capacity can significantly ($p=0.0244$ for 30m sprint test, $p= 0.0002$ for 10m sprint test) improve based on the training protocol proposed by us, but, in the absence of a specific program, they depreciate ($p= 0.3509$ for 10m sprint test , $p=0.0075$ for 30m sprint test) during the competitive break despite the fact that the muscle mass does not follow the same trend (it continues to grow during the break period, probably due to the proposed vacation program, which is based only on strength exercises and aerobic conditioning) (Fig.3; Fig.4).

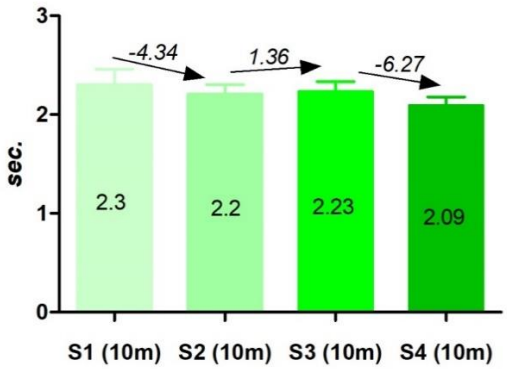


Fig.3 Evolution of the 10 meters sprint test
S1(10 m) results of the 10 meters sprint test at the initial evaluation; S2(10m) results of the 10 meters sprint test at the second evaluation; S3(10m) results of the 10 meters sprint test at the third evaluation; S4(10m) results of the 10 meters sprint test at the final evaluation

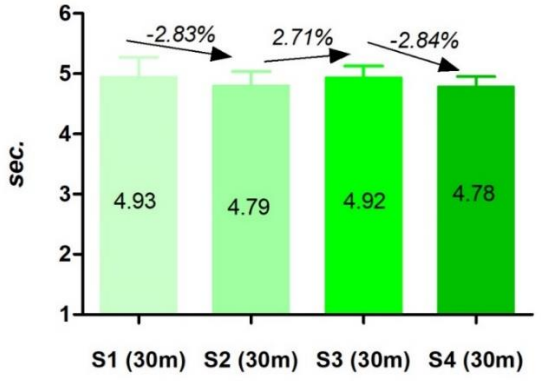


Fig.4 Evolution of the 30 meters sprint test
S1(30) Results of the 30 m sprint test at the first evaluation; S2(30) Results of the 30 m sprint test at the second evaluation; S3(30) Results of the 30 m sprint test at the third evaluation; S4(30) Results of the 30 m sprint test at the final evaluation

The CMJ test is considered to be an appropriate way to assess lower body power and strength and is commonly used in studies on the football topic (Young et al., 2001). In football, sprinting and the ability to perform at high speed is very important.
Muscle recruitment and force production are similar in vertical jumping and sprinting and hence the importance of testing the players ability to jump (Cormack et al., 2008).
Our results show significant (p= 0.0003) evolution of the jump ability in one season, without depreciation during vacation (Fig.5).

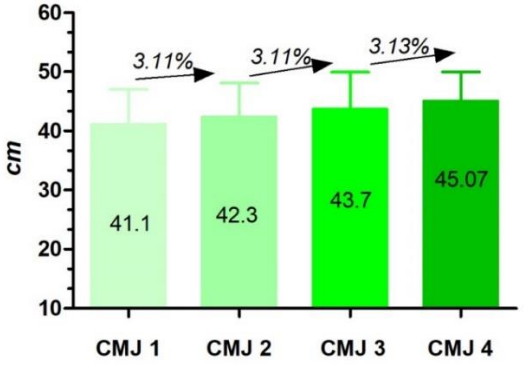


Fig.5 Evolution of the counter movement jump test
CMJ 1 Results of the counter movement jump test at the initial evaluation; CMJ 2 Results of the counter movement jump test at the second evaluation; CMJ 3 Results of the counter movement jump test at the third evaluation; CMJ 4
Results of the counter movement jump test at the final evaluation

These results may show consistency athletes in compliance with the vacation program and effectiveness of this program in achieving the target (strength and muscle power mantainance/ enhancement).
The Yo-Yo Intermittent Recovery Test Level 1 (Yo-Yo IR1) is a football specific field test that maximizes the aerobic energy system through intermittent exertion (Deprez et al., 2012).
Studies have shown that performance in the Yo-Yo intermittent recovery test correlates well with the physical match performance of male elite footballers (Mohr et al., 2003).
Literature on this topic shows that the players within the elite group who performed better in the Yo-Yo test, also ran a greater amount of high speed running within the game, which has been indicated previously to be a key physical parameter for an elite level player. Interestingly they noted that positional differences in players also affected their Yo-Yo test score. Attackers and central defenders tended to cover less distance in matches, were found to have poorer Yo-Yo scores compared those players playing within midfield and full back positions.

Our subjects enhance their effort capacity from the beginning till the end of the study (p= 0.0121), but $Vo_{2max}$ had an important decrease (p= 0.0002) during season break even though the vacation program included aerobic training without being intermittent.

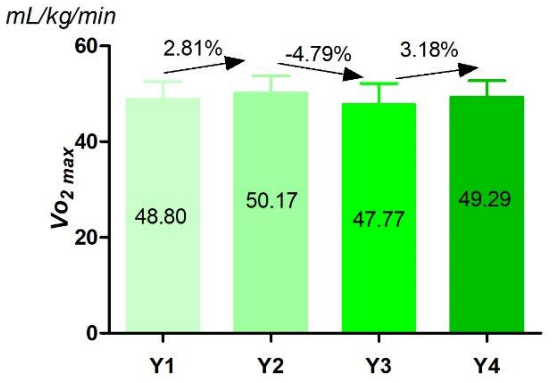


Fig.6 Evolution of the VO2max
Y1 Results of the Yo-Yo intermittent recovery test at the initial evaluation; Y2 Results of the Yo-Yo intermittent recovery test at the second evaluation; Y3 Results of the Yo-Yo intermittent recovery test at the third evaluation; Y4 Results of the Yo-Yo intermittent recovery test at the final evaluation

The results of our study on the efficiency of the vacation program, would have been more accurate if the execution and rigor of performing the program suggested for the holiday, could have been verified.

**Conclusions**

Over a season, carefully monitored and age adapted training programs, focused on the specific requirements of the sport, can bring significant improvement in in body composition and physical performance.

The competitional breaks (even for 6 weeks period) and the lack of specific training, can cause deterioration of the physical condition, especially if the training program proposed for the holiday does not cover all the essential parameters.

The results of our study clearly show the importance of a vacation program. Although some of the parameters experienced a depreciation, the lack of the program proposed by us would probably have led to an even greater deterioration of the general physical form. The results show that this program has managed to maintain and even increase muscle mass and lower limbs power. Of course, the evolution of the parameters followed by us during this period is due in part to the physical growth and development.

Additional studies are needed to accurately establish the relationship between motivation and performance in different age groups.

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# VISUAL-MOTOR MEMORY AND SEGMENTAL COORDINATION, ABILITIES NECESSARY TO PERFORM AS A PHYSICAL EDUCATION TEACHER

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**Abstract**

**PURPOSE**: The study aims to find solutions in order to improve the instructional educational activities in vocational colleges – field of Physical Education and Sport. **METHODS**: The study was conducted at the West University of Timisoara, at the Faculty of Ethics and Physics, 1st year bachelor. The sample surveyed included 88 students, including 32 (36%) girls and 56 (64%) boys aged 19-25. The 88 students were subjected to two tests: one for visual-motor memory and the second for segmental coordination. **RESULTS**: Thus at final test (Tf) at the motor memory test 7 female students out of 32 (21.87%) performed accurately compared with 4 (12.5%) at initial test (Ti) and 16 of them scored at second attempt. The segmental coordination test requires a more precise control of the movements therefor the situation was more complicated. There were students who needed 10 to 12 attempts for the correct execution of the structure at Ti as well as at Tf. None of the students performed well at first attempt. At the motor memory test 13 male students out of 56 (23.21%) executed correctly at first attempt, at Tf, compared to 5 students (8.92%) at Ti. At Tf for segmental coordination none of the students performed well on first attempt. **CONCLUSION**: In order to intervene more efficiently in the process of motor learning and memory stimulation, the activities should be varied and able to apply in a creative way.

*Keywords:* motor memory; motor capacity; tests; students; coordination

## 1. Introduction

The physical education teacher, a shaper of young people's body and mind, must be in line with and also aspire to attain the ideal of physical education, representing a prospective model, embodied in the idea of "a person who is physically and mentally healthy" (Cârstea, 2000; Bota & Dragnea, 1999; Dragnea, 2000).

Specialists in the field have reached the conclusion that in their teaching activity, physical education teachers need both general-teaching skills and attributes specific for sports-related subjects, which first requires a special motor capacity (Cosmovici, 1996; Cristea & Cristea, 1989; Faur, 2014). For this purpose, an initial and continuous interdisciplinary and transdiciplinary training is necessary (Anucuţa, 1997; Marcus, 1997; Surdu, 2000).

Literature review has allowed us to state that, first of all, a teacher's personality must be analysed in terms of his/her intellectual, perceptive-imaginative and motor-action (professional) skills (Chiriță, 1978; Turcu & Turcu, 1999; Neacsu, 2019).

Professional motor training is based on the skills acquired in school and it is achieved on a genetic background that is different from one individual to another. Throughout the three years for completing a Bachelor's degree, students will acquire motor knowledge, skills and competencies specific for the different sports-related subjects, assimilated based on well structured algorithms, so as, at the end of university education students would be able to confidently start practicing their profession. Master's programs will enable them to deepen their knowledge and specialization.

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The efficiency of the training process is greatly determined by the way in which exercises with similar biomechanical structures are used, as they determine the development of skills and competencies specific for the different sports-related subjects, in our case: gymnastics, athletic sports, handball and volleyball (Faur, 2009).

Consequently, the activity carried out by the physical education teacher is complex and must be regarded as a multidimensional process.

In order to carry out an efficient activity, the physical education teacher uses a series of teaching strategies that need to be resolved by complex motor actions, for which the teacher needs an exceptional motor capacity.

A physical education teacher's motor behaviour in the teaching process is specific for his/her activity and this behaviour largely involves the manifestation of coordination skills, determined by the capacity to organize and regulate movement.

According to Manno (1996), good coordination is a prerequisite for the most accurate performance possible of the motor programme model established, and it also depends on the precision of the information provided by the analysers, whose integrity and level of development play a key role. The solution to the coordination issues imposed by a sports motor act passes through the achievement of several partial functions:

- Performance of the movement itself by the motor parts of the body;
- Scheduling the movement which allows the acquisition and transmission of information;
- Scheduling the movement with the anticipation of results;
- Comparing the input information with the action schedule and the objective set out;
- Control and regulation process;
- Motor memory, i.e. the memory used for recording the scheme of the movement performed, essential for learning the movement.

The importance of coordination, in its various aspects, nervous, muscular, motor coordination, in the achievement of the motor act, has been particularly underlined in the papers of the authors: Sbenghe (1999), Faur (2009), who also highlighted aspects related to rhythm as a quality of coordination, an idea also expressed by Egger (2003). Specialists in the field believe that memory is particularly strained while learning, as it ensures the acquirement of knowledge, skills and competencies, as well as the possibility to update them in different situations. This is why the teacher must ensure a good systematization and order of the training content, and learning conditions, so as the acquirement may run smoothly and be durable (Sîrb, Faur, & Pantea, 2009).

The role of memory is to turn the information taken from the environment into a form that may be stored in the long-term memory. For this, it is important to know the different practice methods and the particularities of their application. There are two primary aspects that the teacher should take into consideration, i.e.: stimulating the representation that the student/athlete has about the material he/she must learn or about something similar, and presenting or suggesting a coding scheme that will influence the form in which the new material will be stored in the long-term memory (Dragu, 1999).

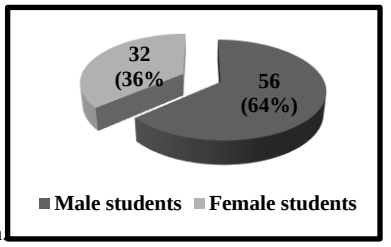
Starting from these premises, this research proposes to find solutions for improving the training-teaching process at the level of vocational higher education – in the field of Physical Education and Sports.

**Hypothesis**: It is assumed that the use of complex motor structures within the practical subjects at the level of the first year, BA, contributes to the education of visual-motor memory and of their segmental coordination.

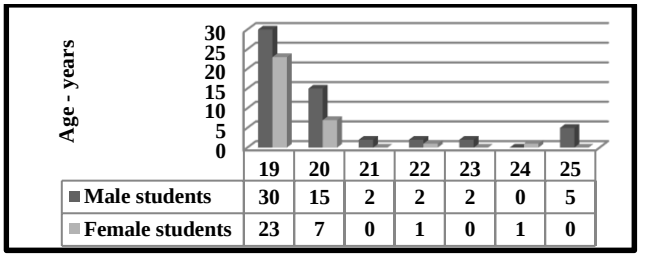
## 2. Material and method

The research was conducted within the West University of Timisoara, Faculty of Physical Education and Sports, first year – BA in the period September 2018- June 2019. The sample included 88 students, out of which 32 girls and 56 boys aged between 19 and 25 years. The mean age of the sample is of 19.88 ± 1.60 years, with a mean age of the female students equal to 19.46 ± 1.046 years and of the male students equal to 20.12±1.819 years. The entire sample presents as a homogenous group (Cv=8.084%) similarly to its two component subgroups 5.375% and 9.04%) (Fig.1 a,b)

a.




b.




| | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
|---|---|---|---|---|---|---|---|
| Male students | 30 | 15 | 2 | 2 | 2 | 0 | 5 |
| Female students | 23 | 7 | 0 | 1 | 0 | 1 | 0 |

Fig. 1. Structure of the studied sample: a. by gender; b. by age

Being only a fact-finding experiment, no strict motor content has been applied for the investigated topic. We used the subjects studied during the first year at the Faculty of Physical Education and Sports.

In order to analyze the students' motor memory we conceived an eight-movement exercise. Students came in the gym room one at a movement, the exercise was explained and demonstrated to them, and then they performed the movements they remembered. Wrong movements were recorded in the table, for the first attempt, as well as the number of repetitions. The initial tests were carried out at the beginning of the first semester and the final tests at the end of the second semester.

Exercise description: Initial position: standing; $t_1$- arms to the front; $t_2$- hands on the shoulders; $t_3$- right arm up; $t_4$- left arm up; $t_5$- right hand on the right shoulder; $t_6$- left hand on the left shoulders; $t_7$- arms raised laterally; $t_8$- I.P.

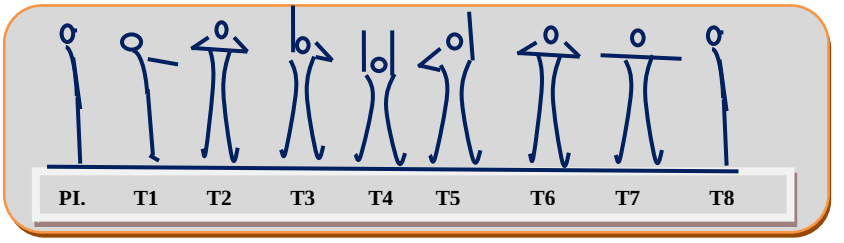



Fig. 2. Representation of the structure for the visual-motor memory test

The coordination skills, determined by the capacity to organize and regulate movement, are mainly of a psychomotor nature, and they involve the capacity to rapidly learn new movements, to efficiently adapt to continuously changing conditions (A. Albu & C. Albu, 1999, Wauters-Krings, 2014).

In order to assess the level of segmental coordination an 8-movement motor structure described below is executed and the correctness of exercise performance is evaluated. The control structure is performed by the teacher one movement, then the student performs the exercise together with the teacher; the structure is memorized for 15 sec. and then performed, while also recording the mistakes in the table. The structure is worth 20 points, and the results are included in summary tables. The test assesses the precision of the motor representation based on visual and motor memory.

Firstly, the tests we carried out aimed at determining the homogeneity of the groups and, secondly, to make it possible to compare the initial data with the final ones, in order to emphasize the efficiency of the method applied.

The terminological description of the structure for testing segmental coordination: I.P. Standing; $t_1$- step with right foot in front, Arms raised to the front $t_2$- lateral step to the left, arm to the lateral; $t_3$- step with right foot in front, arm up; $t_4$- joining the left foot, arm down; $t_5$- lateral step to the left, left arm to the front, right arm to the side "and"- arm down; $t_6$- lateral step to the right, right arm, left arm to the side "and"- arms down; $t_7$- step with left foot in the front, hands on the shoulders; $t_8$- joining the right foot, arms down.

After having performed the trial tests for "visual-motor memory", the data were recorded in the summary table 1, comparing the girls and boys.

Table 1 Registration of the number of mistakes per movement of the motor structure, comparing the female and male students

| No. | Sample | No. of wrong movements on the first attempt | | | | | | | | | | | | | | | | No. of attempts | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | t1 | | t2 | | t3 | | t4 | | t5 | | t6 | | t7 | | t8 | | | |
| | | Ti | Tf | Ti | Tf | Ti | Tf | Ti | Tf | Ti | Tf | Ti | Tf | Ti | Tf | Ti | Tf | Ti | Tf |
| 1 | **32 female students** | **0** | **0** | **16** | **4** | **12** | **8** | **10** | **6** | **6** | **2** | **8** | **2** | **8** | **0** | **0** | **0** | **4** | **7** |
| 2 | **56 male students** | **5** | **0** | **6** | **4** | **14** | **10** | **10** | **7** | **25** | **15** | **10** | **2** | **22** | **8** | **0** | **0** | **5** | **13** |

Legend: Ti – initial test; Tf –final test; t1-8 – movements 1-8; no. – number; I.P. – initial position

Table 1 lists the results of the 32 female students and 56 male students included in the research, for the two tests of the motor memory assessment. The recordings were made for each movement of the structure by noting the mistakes.

The 32 female students had the following results:

- In the initial test, most of the mistakes were recorded at movement 2 ($t_2$) (16), movement 3 ($t_3$) (12), movement 4 ($t_4$) (10) and the fewest, at movement 1($t_1$) and 8 ($t_8$) (0);
- In the final test, most of the mistakes were recorded at movement 3 ($t_3$) (8), movement 4 ($t_4$) (6) and the fewest, at movement 1($t_1$), 7 ($t_7$ ) and 8 ($t_8$) (0);

The number of attempts carried out by the female students until succeeding to perform the exercise correctly was also recorded. Thus, **at the Ti (initial test)** out of the 32 female students only 4 (12.5%) performed the exercise correctly on the first attempt, and **at the Tf (final test)** female students performed it correctly (see fig. 3).

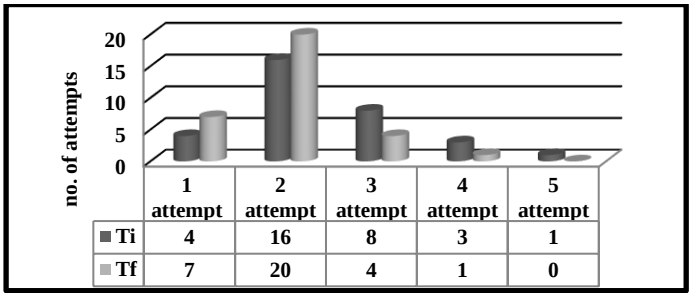



Fig. 3. Graphical representation of the attempts necessary for achieving the assessed motor structure - group of female students (32) – test for the visual-motor memory

Table 2. Summary table with the number of attempts of the 32 female students at the visual-motor memory test

| **No.** | **Number of attempts** | **Initial test (Ti)** | | **Final test (Tf)** | |
|---|---|---|---|---|---|
| | | Number | Percentage % | Number | Percentage % |
| **1** | 1 | 4 | 12.5 | 7 | 21.87 |
| **2** | 2 | 16 | 50 | 20 | 62.5 |
| **3** | 3 | 8 | 25 | 4 | 12.5 |
| **4** | 4 | 3 | 9.37 | 1 | 3.12 |
| **5** | 5 | 1 | 3.12 | 0 | 0 |

The 56 male students had the following results:

- In the initial test, most of the mistakes were recorded at movement 5 (25), movement 7 (22), movement 3 (14), and the fewest at movement 8 (0) and 1 (5), 2(6);
- In the final test, most of the mistakes were recorded at movement 5 (15), movement 3 (10), movement 7(8) and the fewest at movement 8 and 1(0) ;

The number of attempts carried out by the female students until succeeding to perform the exercise correctly was also recorded. Thus, **at the Ti (initial test)** out of the 56 male students: only 5(8.92%) performed the exercise correctly on the first attempt, and **at the Tf (final test),** out of the 56 male students: 13 (23.21%) performed it correctly on the first attempt.

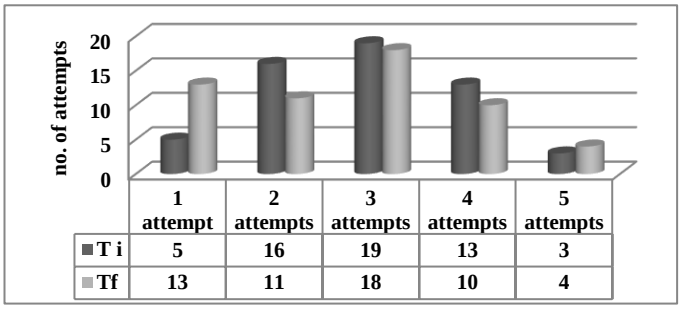



Fig. 4. Graphical representation of the attempts necessary for achieving the assessed motor structure - group of male students (56) – test for the visual-motor memory

Table 3. Summary table with the number of attempts of the 56 male students at the visual-motor memory test

| No. | Number of attempts | Initial test Ti | | Final test Tf | |
|---|---|---|---|---|---|
| | | Number of students | Percentage % | Number of students | Percentage % |
| **1** | 1 | 5 | 8.92 | 13 | 23.21 |
| **2** | 2 | 16 | 28.57 | 11 | 19.64 |
| **3** | 3 | 19 | 33.92 | 18 | 32.14 |
| **4** | 4 | 13 | 23.21 | 10 | 17.85 |
| **5** | 5 | 3 | 5.35 | 4 | 7.14 |

In conclusion, in the visual-motor memory test we may notice that progress has been recorded with regard to the mistakes made on the first attempt and the number of attempts carried out until succeeding to perform the exercise correctly. Thus, we found that in the group of female students, movements 2, 3, 4 of the assessed structure were the most difficult ones, both in the initial test and in the final test, and the average number of attempts decreased from the average of 2,406 attempts in Ti to 1,968 attempts in Tf. In the group of male students, movements 3, 5,7 of the assessed structure were the most difficult ones, both in the initial test and in the final test, and the average number of attempts decreased from the average of 2,875 attempts in Ti to 2,660 attempts in Tf (see table 4).

Table 4. Statistical indicators of the visual-motor memory test, comparing the Ti/Tf, and the female students/male students

| **Statistical indicators** | **Number of attempts female students (32)** | | | **Number of attempts male students (56)** | | |
|---|---|---|---|---|---|---|
| | Initial test | Final test | Progress/regress | Initial test | Final test | Progress/regress |
| **Arithmetic mean** | 2.406 | 1.968 | 0.437 | 2.875 | 2.660 | 0.218 |
| **Standard deviation** | ±0.945 | ±0.694 | ±0.759 | ±1.045 | ±1.225 | ±1.257 |
| **Coefficient of variation %** | 39.297 | 35.295 | 173.56 | 36.367 | 46.045 | 576.32 |

The same data interpreting method was also used for the motor/segmental coordination test. The results of the second test were recorded in table 5, also comparing the female and male students, as well as the initial and final tests. We should state that this test consisted of performing a more complex eight-movement structure, the movement of the upper limbs being correlated with the movement of the lower limbs, with moments of asymmetry of the two segments of the body.

Table 5. Registration of the number of mistakes per movement of the segmental coordination motor structure, comparing the female and male students– on the first attempt

| No. | Sample | No. of wrong movements | | | | | | | | | | | | | | | | No. of attempts | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | t1(2m) | | t2 (2m) | | t3 (2m) | | t4 (2m) | | t5 (4m) | | t6 (4m) | | t7 (2m) | | t8 (2m) | | | |
| | | Ti | Tf | Ti | Tf | Ti | Tf | Ti | Tf | Ti | Tf | Ti | Tf | Ti | Tf | Ti | Tf | Ti | Tf |
| 1 | **32 female students** | **28** | **12** | **40** | **24** | **29** | **16** | **39** | **14** | **49** | **20** | **35** | **15** | **10** | **5** | **10** | **0** | **0** | **2** |
| 2 | **56 male students** | **45** | **20** | **29** | **22** | **48** | **38** | **34** | **19** | **50** | **35** | **48** | **30** | **40** | **24** | **25** | **0** | **0** | **0** |

Legend: Ti – initial test; Tf – final test; t1-8 – movements 1-8; no. - number; I.P. – initial position; 2m – two movements; 4m – four movements.

The following situations have been recorded: For the group of female students in the initial test, most of the mistakes were recorded at movement 5 ($t_5$) (49), movement 2 ($t_2$) (40), movement 4 ($t_4$) (39), and the fewest, at movement 7($t_7$) and 8 ($t_8$) (10); in the final test, most of the mistakes were recorded at movement 2($t_2$) (24), movement 5($t_5$) (20), movement 3($t_3$) (16), and the fewest, at movement 7($t_7$) (5), and movement 8 ($t_8$) (0).

The number of attempts carried out by the female students until succeeding to perform the exercise correctly was also recorded. Nobody succeeded in performing correctly the segmental coordination structure in the initial test (Ti), and, in the final test, there were only 2 female students who performed the whole structure.

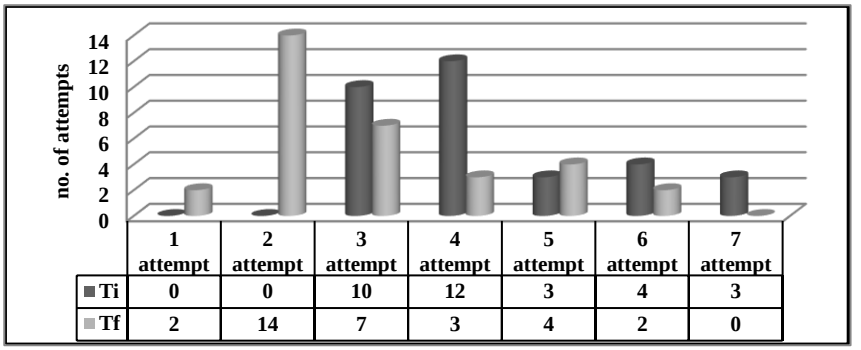



Fig. 5. Graphical representation of the attempts necessary for achieving the assessed motor structure - group of female students (32) – the segmental coordination test

Table 6. Summary table with the number of attempts of the 32 female students at the segmental coordination test, comparing the Ti and Tf

| No. | Number of attempts | Initial test Ti | | Final test Tf | |
|---|---|---|---|---|---|
| | | Number | Percentage % | Number | Percentage % |
| **1** | 1 | 0 | 0 | 2 | 6,25 |
| **2** | 2 | 0 | 0 | 14 | 43.75 |
| **3** | 3 | 10 | 31.25 | 7 | 21.87 |
| **4** | 4 | 12 | 37.5 | 3 | 9.37 |
| **5** | 5 | 3 | 9.37 | 4 | 12.5 |
| **6** | 6 | 4 | 12.5 | 2 | 6.25 |
| **7** | 7 | 3 | 9.37 | 0 | 0 |
| **8** | 8 | 0 | 0 | 0 | 0 |

For the group of male students In the initial test, most of the mistakes were recorded at movement 5 ($t_5$) (50), movement 3 ($t_{3,6}$) (48), movement 1 ($t_1$) (45), and the fewest, at movement 8 ($t_8$) (25); In the final test, most of the mistakes were recorded at movement 3($t_3$) (38), movement 5($t_5$) (35), movement 6 ($t_6$) (30), and the fewest, at movement 4($t_4$) (19) and movement 8 ($t_8$) (0).

The number of attempts carried out by the male students until succeeding to perform the exercise correctly was also recorded. Nobody succeeded in performing correctly the segmental coordination structure on the first attempt.

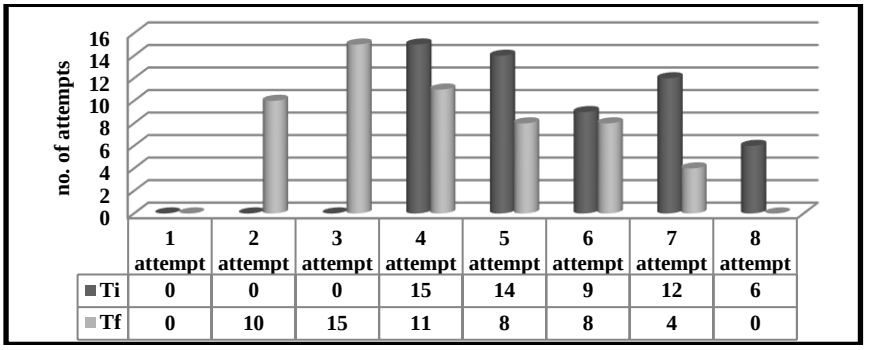



Fig. 6. Graphical representation of the attempts necessary for achieving the assessed motor structure - group of male students (56) – the segmental coordination test

Table 7. Summary table with the number of attempts of the 56 male students at the segmental coordination test, comparing the Ti and Tf

| No. | Number of attempts | Initial test Ti | | Final test Tf | |
|---|---|---|---|---|---|
| | | Number | Percentage % | Number | Percentage % |
| **1** | 1 | 0 | 0 | 0 | 0 |
| **2** | 2 | 0 | 0 | 10 | 17.857 |
| **3** | 3 | 0 | 0 | 15 | 26.785 |
| **4** | 4 | 15 | 26.78 | 11 | 19.642 |
| **5** | 5 | 14 | 25 | 8 | 14.285 |
| **6** | 6 | 9 | 16.07 | 8 | 14.285 |
| **7** | 7 | 12 | 21.42 | 4 | 7.142 |
| **8** | 8 | 6 | 10.71 | 0 | 0 |

Table 8. Statistical indicators of the segmental coordination test, comparing the Ti/Tf, and the female students/male students

| Statistical indicators | Number of attempts female students (32) | | | Number of attempts male students (56) | | |
|---|---|---|---|---|---|---|
| | Initial test | Final test | Progress/regress | Initial test | Final test | Progress/regress |
| **Arithmetic mean** | 4.312 | 2.968 | 1.081 | 5.642 | 4.01 | 1.625 |
| **Standard deviation** | ±1.306 | ±1.379 | ±1.065 | ±1.367 | ±1.543 | ±1.071 |
| **Coefficient of variation %** | 30.284 | 46.45 | 98.544 | 24.234 | 38.408 | 65.924 |

In conclusion, in the segmental coordination test, progress is well emphasized by the difference between the mean values of the number of attempts. Thus, in the group of female students, the average number of attempts decreased from the average of 4.312 attempts in Ti to 2.968 attempts in Tf, with an average progress of 1.081 attempts. In the group of male students, the average number of attempts decreased from the average of 5.642 attempts in Ti to 4.01 attempts in Tf, with an average progress of 1.625 attempts (see table 8). The most difficult movements of the complex structure were recorded both in the initial test and in the final test, i.e. movements 2, 3, 5.

## 3. Discussion and conclusions

The topic of our research has been approached by a series of researchers specializing in our field of activity who are concerned with finding efficient solutions for educating the coordinative capacity and different types of memory, necessary in the learning process. This research has revealed the following aspects: At the beginning of the research the number of attempts necessary to perform the structures was higher, and it decreased as the number of newly acquired motor actions/skills increased. Thus, in the Tf of the visual-motor memory test, out of the 32 female students – 7 students (21.87%) performed the structure correctly compared to the 4 (12.5%) students who had performed it correctly in the Ti. In the segmental coordination test, requiring a more precise control of the movements, the situation was more complicated, both in the Ti and in the Tf, as there were female students who

needed a higher number of attempts in order to succeed in performing the structure correctly. None of the female students succeeded in performing the structure correctly on the first attempt in the Ti, and in the Tf there were 2 students (6.25%) who performed the structure without any mistake. Out of the 56 male students, in the Tf of the visual-motor memory test– 13 students (23.21%) performed the exercise correctly on the first attempt, compared to 5 students (8.92%) in the Ti. Thus, in the Tf of the coordination test – none of the students succeeded in performing the structure correctly on the first attempt. We should note that all the motor actions are based on retaining the structure (performance techniques), which involves a correct memorization of the movement phases. Also, the future physical education teachers need motor memory so that they may carry out their teaching activity in good conditions. The results of this fact-finding experiment validate the proposed hypothesis and make us think about the future.

## 4. Proposals

In order to intervene more efficiently in the motor learning and memory stimulation process, the action systems used must be as diverse as possible and should allow a creative application. We believe it would be useful to include exercise structures for testing the motor memory and segmental coordination in the selection of students who apply for the Faculty of Physical Education and Sports.

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# BODY IMAGE AND PHYSICAL ACTIVITY IN UNIVERSITY STUDENTS: UTAD PLUS PROJECT

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Introduction: "PLUS UTAD - Healthy University" aims to promote the health of university students, creating conditions for an easier and more positive adaptation to Higher Education. This step is a significant and difficult change in the life cycle, implying new challenges, readjustments and responses and could be a risk factor in the adoption and maintenance of healthy lifestyles. Sedentary lifestyle and a hypercaloric eating pattern are the main causes of overweight and obesity; also, society demands from the young man a lean body model, which has led to a high body image dissatisfaction. The objective of this study is to compare the perception of body image, obesity, physical activity and health status between sports and psychology courses.

Methods: The sample consisted of 106 university students (age 21,30 ± 4,51; 62 boys, 44 girls). BMI was assessed using cut-off values to define obesity. The questionnaire on Health Indicators and Quality of Life of Academics and the Silhouettes Scale of Kakeshita and Almeida were applied.

Results: Overall, 17.7% of the sample were overweight and obese, and 61.9% were dissatisfied with their image. 67% practice physical activity (⩾2x / week) and 82.1% consider their health to be good or very good. The results of the t-test show that students of sports sciences present a higher BMI than those of psychology (23,33 vrs 21,21; p = 0,01). Through the chi-square test, 85% of students in sports science report practicing physical activity, while in psychology students this percentage is lower (p = 0.000). Significant differences were found between courses with respect to the ideal body image (p = 0.018), preferring students of sports science a leaner silhouette. Students of sports science present a better state health perception compared to those of psychology (p = 0.031).

Conclusion: The prevalence of overweight and obesity and the percentage of students dissatisfied with body image is very high. According to our expectations, students of sports science are more active, are more demanding with body image and perceive their health as better than those of psychology. We emphasize the need to promote health in this population, through intervention strategies aimed at developing a healthy life.

Keywords: Body Image Perception, Obesity, Physical Activity, Quality of Life and University Students

## 1. Introduction

Entry into higher education is a significant and difficult change in the life cycle implying new challenges, readjustments and student responses. This change can bring changes in behavioral pattern, becoming a risk factor in the adoption and maintenance of a healthy lifestyle.

Research in this area has revealed that University Students have an unhealthy eating pattern (Tanton et al., 2015, Ryall, 2015), which may translate into : weight gain (Vadeboncoeur et al., 2015), development of noncommunicable diseases (Moreno-Gomes et al., 2012; Likus et al., 2013), excessive alcohol consumption (Pimentel et al., 2013; Ryall, 2015) of psychoactive substances (Medeiros, 2013; Ryall, 2015), tobacco and/or illicit drugs (Brandão et al., 2011), unprotected sexual practices (Oliveira, 2008; Ryall, 2015), changes in sleep pattern (Fletcher et al., 2007), lack of regular exercise (Brandão et al., 2011; Ryall, 2015), non-regular health monitoring and self-medication (Fletcher et al., 2007).

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The biological changes and psychosocial instability resulting from adolescence and early youth associated with the changes that occur with the entry into higher education, make students vulnerable to pressures exerted by society regarding body aspects (Ferrari et al., 2012). A review study of Brazilian and international studies by Sousa and Alvarenga (2016) showed that dissatisfaction with body image in both sexes was between 83% and 87% in Brazilian studies and between 52% and 85.5% in international ones. In Portugal, the prevalence values are 73.6% when using Silhouette Scales (15.7% wanted to increase weight and 57.9 wanted to lose weight) and 22.5% using the Body Shape Questionnaire.

Sedentary lifestyle and overeating patterns are the main causes of overweight and obesity, which may be in conflict with the society demands from the young people to be a lean body model, which has led to a high image dissatisfaction. The objective of this study was to characterize and compare the perception of body image, obesity, physical activity and health status between students of sports sciences and psychology courses.

## 2. Methods

### 2.1 Sample

The sample consists of 106 university students (age 21.30 ± 4.51 years) from Psychology and Sport Sciences (62 boys, 44 girls)

### 2.2 Instruments and Procedures

Anthropometric Measures. Two trained technicians performed anthropometric measurements using a standardized procedure. Anthropometric measurements were performed with the students lightly dressed and without shoes. Height was measured using a stadiometer, with the head positioned according to the Frankfurt plane; weight was measured using an electronic scale with a precision of 100 g. BMI was calculated as weight/height2 (Kg/m2). The definition of normal weight, overweight and obesity were based on the cut-off points of a BMI of 25 Kg/m2 (overweight) and 30 Kg/m2 (obesity).

Quality of Life Measure. Health Indicators and Quality of Life of University Students Questionnaire (Sousa et al., 2012) was applied to evaluate behaviours and other indicators related to health, environment and learning conditions in university students. The questionnaire has 71 questions divided into sections (i) - the course and sociodemographic indicators; (ii) - lifestyles and health; (iii) - eating and body weight control habits; (iv) - physical and leisure activities; (v) - preventive behaviours and (vi) - environment and learning indicators.

Body Image Measure. The evaluation of the body image was realized by the Scale of Figures of Silhouettes developed by Kakeshita et al. (2009), through the use of 15 silhouettes for each sex. Each participant selected a figure of the image of his own body (actual BI) and a figure that approaches the silhouette wanted (desired BI). Body image dissatisfaction was calculated between the difference between the actual body image and the desired body image.

### 2.3. Statistical analysis

Mean, standard deviation and percentage were used to describe the general characteristics of the sample. The T test was used to compare BMI and Chi-Square test ($\chi 2$) to compare obesity, physical activity, actual BI, BI dissatisfaction and health status between graduations. A significant level of 0,05 was applied and all statistical analysis were carried out using IBM SPSS statistics 24.

## 3. Results

Overall, 15.7% of the sample were overweight and 2.0% obese, 19.9% consider their health to be normal, 62.3% to be good and 19.8% very good. 67% practice physical activity ($\geqslant$2x/week). 61.9% of university students feel dissatisfaction with body image, 20% wants to increased weight and 41.9% wants to decreased weight.

Table 1. Differences between graduations

| | Psychology (n=46) | Sport Sciences (n=60) | p |
|---|---|---|---|
| BMI (kg/m$^2$) | 21.21 (±3.34) | 23.33 (±2.89) | 0.001[a] * |
| Obesity | | | |
| -Normal | 82.1% | 82.6% | 0.581[b] |
| -Overweight | 17.9% | 17.4% | |
| Physical Activity | | | |
| -Yes | 43.5% | 85.0% | 0.000[b] * |
| -No | 56.5% | 15.0% | |
| Health Status | | | |
| -Normal | 30.4% | 8.3% | 0.013[b] * |
| -Good | 70.0% | 52.2% | |
| -Very good | 21.7% | 17.4% | |
| Actual BI | | | |
| -Figure 1 | 4.3% | 11.7% | 0.319[b] |
| -Figure 2 | 26.1% | 33.3% | |
| -Figure 3 | 34.8% | 25.0% | |
| -Figure 4 | 21.7% | 18.3% | |
| -Figure 5 | 8.7% | 6.7% | |
| -Figure 6 | 0.0% | 3.3% | |
| -Figure 7 | 4.3% | 0.0% | |
| -Figure 8 | 0.0% | 1.7% | |
| Ideal BI | | | |
| -Figure 1 | 4.3% | 16.9% | 0.018[b] * |
| -Figure 2 | 34.8% | 30.5% | |
| -Figure 3 | 47.8% | 25.4% | |
| -Figure 4 | 13.0% | 13.6% | |
| -Figure 5 | 0.0% | 10.2% | |
| -Figure 6 | 0.0% | 3.4% | |
| -Figure 7 | 0.0% | 0% | |
| -Figure 8 | 0.0% | 0% | |
| BI Dissatisfaction | 82.6% | 52.5% | |
| -Satisfaction | 17.4% | 47.5% | 0.023[b] * |
| -Wants to be larger | 26.1% | 30.5% | |
| -Wants to be thinner | 56.5% | 22.0% | |

*$p \leq 0.05$, note: [a] t test; [b] $\chi 2$ test

The results of the T-test show that students of sports sciences have a higher BMI than those of psychology (23.33 vrs 21.21; p = 0.01). Through the chi-square test, 85% of sports science students revealed practicing physical activity, while in psychology students this percentage is lower (43.5%; p = 0.000). Students of sports science show a better state health perception compared to those of psychology (p = 0.031).Significant differences were found between the two different courses, according with the ideal body image (p = 0.018) where the students of sports science prefer a leaner silhouette. Concerning dissatisfaction with body image, psychology students have significantly higher prevalences compared to sports science students (82.6% vrs 52.50; p = 0.023). Most psychology students prefer weight loss (56.5%), while sports science students prefer to increase body mass (30.5%).

**4. Discussion**

The objective of this study was to characterize and compare the perception of body image, obesity, physical activity and health status between the students of sports sciences and psychology. Regarding the prevalence of body

dissatisfaction, university students have high values as it is confirmed by other international studies (Sousa & Alvarenga, 2016). Comparing the results of this study with another one performed in Portugal using silhouettes, the values are slightly lower (61.9% vs 73.6%) (Santos, 2012). These high results may be justified by the fact that entry into higher education brings changes that make university students vulnerable to the influences exerted by society on their bodily aspects (Ferrari et al., 2012). When comparing the students of the sports science and psychology course, it appears that the students of the sports sciences have a better perception of their health status, BMI and physical activity levels. These results are in line with our expectations, because the sports sciences students have higher levels of physical activity and BMI. It is noteworthy that there are no differences in the prevalence of obesity, in fact when referring athletes, BMI is not an indicator of obesity because it is not distinguished the fat and fat-free mass.

Regarding the ideal body image, the most chosen by the Sports Science students was the silhouette 2 (30.5%) and those of psychology was silhouette 3 (47.8%). These results show a greater concern to the future Physical Education professionals. It should be noted that there are some sports science students who select silhouette 5 and 6, which demonstrate a desire to have a more muscular body image. There is a greater dissatisfaction with body image in students of Psychology (82.6% vs 52.5%), showing the results that 56.5% want to lose weight while in Sports Science 30.5% aims to increase muscle mass.

## 5. Conclusions

The prevalence of overweight and obesity and the percentage of students dissatisfied with body image is very high. According to our expectations, students of sports science are more active, more demanding with body image and perceive their health better than those of psychology. We emphasize the need to promote health in this population, through intervention strategies aimed to develop a healthy life style.

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# THE INFLUENCE OF THE RUFFIER TEST ON THE POSTURAL BALANCE IN PHYSICAL EDUCATION AND SPORT STUDENTS

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**Abstract**

**Background**. The objective of the study was to identifying the effects of different types of effort on postural balance, comparison of these effects with the preliminary study, identification of sports that effectively influence the balance, selecting the type of effort that allows an improved balance with increased efficiency. **Subjects and Methods**. The 1st year Physical Education and Sport Cluj-Napoca groups, which total a total of 250 subjects. They are grouped as follows: Girls: 3 groups (84) Boys: 8 groups (166). The research we developed involves the use of specific equipment for this type of research. All the equipment and materials used already exist in Center for interdisciplinary research in Physical education and sports Faculty and are as follows: AMTI Netforce power board, for measuring static balance and metronome (for the Ruffier test). **Results**. An important difference of values was observed for the measurements with standard effort and without standard effort. For each compared pair the results were very important, supporting the influence that the standard effort has on the static balance. **Conclusion.** These first results encourage us to continue our study of the manifestation of balance depending on the type of effort. Due to this data collected from the pilot research we will continue with the whole project to identify those types of effort that allow an accelerated improvement of the balance.

*Keywords:* Balance, Ruffier test, force plate, effort.

## 1. Introduction

Balance is defined as the process that maintains the center of gravity within the body's support base and requires constant adjustments that are provided by muscular activity and joint positioning. Most nervous and musculoskeletal system diseases can alter this balance control. Maintaining postural balance requires sensorial detection of the body's movements, integration of sensory-motor information into the central nervous system and an appropriate motor response. The position of the body in relation to space is determined by visual, vestibular and somatic sensitive functions. Muscular control and dynamic maintenance of balance involve the activity of coordinates of muscular kinetic chains. Adipose tissue accumulation and body mass increases can cause a reduction in the body balance and be a major contributing factor concerning falls, particularly when combined with low muscular mass, which can generate biomechanical failure of muscular responses and loss of stability mechanisms (Greve, Alonso, Bordini, & Camanho, 2007).

Postural balance is controlled by sensory information, central processing and neuromuscular responses. The sensory components include the vestibular, visual and somatosensory (cutaneous and proprioceptive) systems, which provide information to the central nervous system, which in turn sends nerve impulses to the muscles to coordinate and control the body segments (Braga, Rodrigues, Lima, Melo, Carvalho, & Bertolini, 2012).

A study in judo is saying that the classification of a specific throwing techniques based on the force couple and

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lever principle is the classification based on scientific support, which analyses the directions of the forces, static analysis, and the pathway of body during the throwing phase (flying phase), dynamic analysis, as well as the symmetries of the bio-dynamic group of the athlete couple. The static analysis shows the directional problem of the static use of forces, which occur during the performance of a technique. In order to make things easier the force which affects the performance of the technique is analyzed in two planes: horizontal and vertical.

The following problems are analyzed: a) Loss of balance b) Launching. Loss of balance during the phase the forces are efficient and can be applied horizontally in a 360° angle. This conclusion unifies the bio-mechanic problem of the forces which affect rectilinear, as well as rotational. Launching the forces are efficient and can be applied in the vertical plane for a range of 90°. In this statement the resulting force of all forces occurring during the throwing phase is taken into consideration (Pop, Gombos, & Prodea, 2014).

Ruffier test is a popular method in school physical education because of a simple procedure and apparatuses, good reliability and validity in evaluation of physical capacity. It is well-known in sports and physical rehabilitation too (Zanevskyy, 2018).

The main goal of a study was to investigate the correlations between the self-reported Physical Activity Index (PAI) and the Ruffier Index among students from Cluj-Napoca, Romania. According to the analysed data, self-reported levels of physical activity were highly predictive of cardio-respiratory fitness. A positive result of this research was the fact that participants were not overweight. An alarming outcome was the poor level of their physical fitness. The findings of study suggest that, among students aged 20.56 ± 4.58 years from "Babeș-Bolyai" University of Cluj-Napoca, self-reported physical activity was a very good predictor of cardio-respiratory fitness assessed with the Ruffier test. These results were consistent with the findings of Morales-SuarezVarela et al. (2013), in the case of adolescents, and partially consistent with the findings of Singleton et al. (1994), in the case of healthy older adults (Deak, Boroș-Balint, Ciocoi-Pop, & Grosu, 2014).

The Ruffier is a simple cardio-vascular test, both through the mode of execution and through the mode of interpretation, since it uses an index that is very easy to calculate and provides exact figures for the coefficient of the sample. From this sample I took only the standard effort part, 30 knee flexions in 45 seconds, to be able to carry out the initial evaluation of the research.

## 2. Objectives

The objective of the study was to identifying the effects of different types of effort on postural balance, comparison of these effects with the preliminary study, identification of sports that effectively influence the balance, selecting the type of effort that allows an improved balance with increased efficiency.

## 3. Subjects

The 1st year Physical Education and Sport Cluj-Napoca groups, which total a total of 250 subjects. They are grouped as follows: Girls: 3 groups (84) Boys: 8 groups (166). All the subjects participated in the preliminary research, we have 34 girls and 46 boys who did not participate in the completion of this test for objective reasons. They will not be taken into account when analyzing and interpreting data. The rest of the students (120 boys and 50 girls) will participate in the final tests of the study.

## 4. Methods and Materials

The research we developed involves the use of specific equipment for this type of research. All the equipment and materials used already exist in Center for interdisciplinary research in Physical education and sports Faculty and are as follows: AMTI Netforce power board, for measuring static balance and metronome (for the Ruffier test). The balance test was done using the AMTI NETforce platform BP400600. It is a force platform that measures the pressure force of the subject. Because of this it has the ability to register any variations or modifications regarding the center of pressure (COP), and, at its core, the movement of body's center of gravity.

The researche is composed of two tests: the initial and the preliminary one. The initial testing involved measuring the static balance of the subjects in normal situations, without being subjected to a type of effort. During this test, the subjects were reassured by sitting on the back for 5 minutes, and then sitting for 5 minutes and finally sitting for

3 minutes. They were not allowed to make any kind of movement. Before the force plate test, the heart rate was determined to be at a stable level for each subject.

The preliminary testing consisted of the same protocol as for the initial testing, to which was added the use of the standard effort exercise in the Ruffier test. The balance measurement was performed immediately after this type of effort was applied, the break between exercise and measurement being of maximum 30 seconds.

## 5. Results

As I described above, the pilot research was composed of the initial testing and the preliminary testing. The data collected after the two tests are presented in the following table.

Table 1. Data from research records - boys

| Records Boys | | | | |
|---|---|---|---|---|
| | Test Initial | | Test Preliminar(Ruffier) | |
| Subiect | Length(cm) | 95% Ellipse Area (cm²) | Length(cm) | 95% Ellipse Area (cm²) |
| 1 | 15388.78 | 2111.82 | 334909.40 | 25808.06 |
| 2 | 5771.28 | 7291.32 | 98966.04 | 13973.76 |
| 3 | 10998.09 | 1660.76 | 460671.03 | 17041.90 |
| 4 | 4301.08 | 4508.36 | 419197.59 | 19697.17 |
| 5 | 24551.74 | 6152.98 | 219009.14 | 21907.91 |
| 6 | 4144.08 | 2200.82 | 101552.04 | 15439.76 |
| 7 | 4177.08 | 1243.82 | 101678.04 | 12480.76 |
| 8 | 4580.08 | 1974.82 | 102048.04 | 13303.76 |
| 9 | 4460.08 | 1528.82 | 98962.04 | 12567.76 |
| 10 | 3933.08 | 2499.82 | 99200.04 | 15308.76 |
| 11 | 3207.08 | 2396.82 | 100595.04 | 14594.76 |
| 12 | 3816.08 | 2329.82 | 100025.04 | 12695.76 |
| 13 | 3396.08 | 2330.82 | 99639.04 | 15168.76 |
| 14 | 4080.08 | 1563.82 | 101986.04 | 12291.76 |
| 15 | 3581.08 | 1937.82 | 101698.04 | 14732.76 |
| 16 | 3795.08 | 1435.82 | 101901.04 | 14881.76 |
| 17 | 3459.08 | 2254.82 | 101459.04 | 13409.76 |
| 18 | 3861.08 | 2502.82 | 101164.04 | 14616.76 |
| 19 | 3252.08 | 2224.82 | 100104.04 | 14298.76 |
| 20 | 4464.08 | 2125.82 | 99604.04 | 12355.76 |
| 21 | 4294.08 | 1499.82 | 102174.04 | 11935.76 |
| 22 | 4471.08 | 2533.82 | 99842.04 | 14988.76 |
| 23 | 3987.08 | 2064.82 | 99325.04 | 15315.76 |
| 24 | 3226.08 | 1956.82 | 101761.04 | 15625.76 |
| 25 | 4566.08 | 2079.82 | 99508.04 | 13808.76 |
| 26 | 6256.28 | 1566.76 | 217499.14 | 15989.90 |
| 27 | 6430.28 | 1670.76 | 219952.14 | 18198.90 |
| 28 | 5856.28 | 1645.76 | 217237.14 | 16111.90 |
| 29 | 6570.28 | 2396.76 | 218220.14 | 16861.90 |
| 30 | 5641.28 | 2328.76 | 217691.14 | 19189.90 |
| 31 | 5367.28 | 2090.76 | 217734.14 | 17649.90 |
| 32 | 5552.28 | 1782.76 | 217655.14 | 15754.90 |
| 33 | 5515.28 | 1707.76 | 216902.14 | 18882.90 |
| 34 | 6054.28 | 2344.76 | 218615.14 | 16964.90 |
| 35 | 5414.28 | 2157.76 | 219415.14 | 19625.90 |
| 36 | 6637.28 | 2609.76 | 218919.14 | 18093.90 |
| 37 | 5470.28 | 1739.76 | 217350.14 | 16718.90 |
| 38 | 5869.28 | 2666.76 | 218192.14 | 17542.90 |
| 39 | 5478.28 | 1937.76 | 217461.14 | 17702.90 |
| 40 | 6047.28 | 2195.76 | 219995.14 | 16793.90 |
| 41 | 6453.28 | 2288.76 | 218514.14 | 15365.90 |
| 42 | 5553.28 | 2815.76 | 219388.14 | 16391.90 |
| 43 | 6693.28 | 2348.76 | 218447.14 | 17146.90 |
| 44 | 6580.28 | 1711.76 | 218256.14 | 15909.90 |
| 45 | 5665.28 | 1782.76 | 217145.14 | 16538.90 |
| 46 | 6043.28 | 1644.76 | 220135.14 | 18544.90 |
| 47 | 6239.28 | 2257.76 | 218004.14 | 17711.90 |
| 48 | 6070.28 | 2448.76 | 219119.14 | 17894.90 |
| 49 | 5493.28 | 2248.76 | 217238.14 | 18700.90 |
| 50 | 5945.28 | 1596.76 | 217636.14 | 15131.90 |
| 51 | 10245.09 | 3617.36 | 335367.40 | 19780.17 |
| 52 | 10365.09 | 3544.36 | 336980.40 | 20187.17 |
| 53 | 10684.09 | 4405.36 | 334849.40 | 19030.17 |
| 54 | 11062.09 | 4896.36 | 334139.40 | 21515.17 |
| 55 | 10641.09 | 4132.36 | 336277.40 | 18581.17 |
| 56 | 10536.09 | 4740.36 | 334095.40 | 19876.17 |
| 57 | 10446.09 | 4032.36 | 336029.40 | 17435.17 |
| 58 | 10691.09 | 4300.36 | 335117.40 | 20504.17 |

| Records Boys | | | | |
|---|---|---|---|---|
| | Test Initial | | Test Preliminar(Ruffier) | |
| Subiect | Length(cm) | 95% Ellipse Area (cm²) | Length(cm) | 95% Ellipse Area (cm²) |
| 59 | 10951.09 | 3661.36 | 334772.40 | 19409.17 |
| 60 | 11286.09 | 4299.36 | 333812.40 | 20044.17 |
| 61 | 10427.09 | 3824.36 | 335601.40 | 19165.17 |
| 62 | 10208.09 | 3636.36 | 334684.40 | 20910.17 |
| 63 | 10630.09 | 4410.36 | 336982.40 | 20602.17 |
| 64 | 11082.09 | 4268.36 | 336719.40 | 19967.17 |
| 65 | 10495.09 | 4554.36 | 335014.40 | 18422.17 |
| 66 | 11338.09 | 3592.36 | 334372.40 | 19293.17 |
| 67 | 11231.09 | 3753.36 | 336240.40 | 20604.17 |
| 68 | 10879.09 | 4596.36 | 334202.40 | 18614.17 |
| 69 | 10119.09 | 3828.36 | 335208.40 | 18415.17 |
| 70 | 11146.09 | 4905.36 | 334794.40 | 17746.17 |
| 71 | 10378.09 | 4053.36 | 335086.40 | 19924.17 |
| 72 | 11305.09 | 4463.36 | 336575.40 | 20291.17 |
| 73 | 11006.09 | 4549.36 | 337332.40 | 19037.17 |
| 74 | 10929.09 | 4010.36 | 334428.40 | 18331.17 |
| 75 | 11046.09 | 4648.36 | 337229.40 | 19693.17 |
| 76 | 11342.09 | 4823.36 | 336738.40 | 19477.17 |
| 77 | 10635.09 | 3992.36 | 337199.40 | 20298.17 |
| 78 | 10657.09 | 3994.36 | 336061.40 | 21295.17 |
| 79 | 11335.09 | 3606.36 | 337492.40 | 18239.17 |
| 80 | 10574.09 | 3745.36 | 335032.40 | 19877.17 |
| 81 | 11085.09 | 4689.36 | 334964.40 | 19089.17 |
| 82 | 11157.09 | 4523.36 | 336115.40 | 20986.17 |
| 83 | 10447.09 | 4110.36 | 334657.40 | 18687.17 |
| 84 | 10821.09 | 4799.36 | 336722.40 | 18664.17 |
| 85 | 10451.09 | 3933.36 | 334134.40 | 17563.17 |
| 86 | 10414.09 | 3520.36 | 334705.40 | 20366.17 |
| 87 | 10687.09 | 3906.36 | 334226.40 | 20172.17 |
| 88 | 10206.09 | 4154.36 | 337203.40 | 21644.17 |
| 89 | 10808.09 | 4178.36 | 335135.40 | 21797.17 |
| 90 | 11065.09 | 4457.36 | 334817.40 | 19179.17 |
| 91 | 11043.09 | 4530.36 | 337329.40 | 21481.17 |
| 92 | 10257.09 | 4286.36 | 335539.40 | 19612.17 |
| 93 | 10965.09 | 4395.36 | 336945.40 | 19909.17 |
| 94 | 10994.09 | 4216.36 | 334374.40 | 18945.17 |
| 95 | 10051.09 | 4180.36 | 336318.40 | 21020.17 |
| 96 | 10972.09 | 3876.36 | 335409.40 | 19510.17 |
| 97 | 10753.09 | 3884.36 | 334538.40 | 19332.17 |
| 98 | 10263.09 | 4463.36 | 333857.40 | 20719.17 |
| 99 | 15761.78 | 5796.98 | 419144.59 | 23653.91 |
| 100 | 16552.78 | 4854.98 | 420342.59 | 21939.91 |
| 101 | 16582.78 | 5942.98 | 418838.59 | 22044.91 |
| 102 | 16545.78 | 5657.98 | 419705.59 | 22480.91 |
| 103 | 15463.78 | 5419.98 | 419176.59 | 23364.91 |
| 104 | 15617.78 | 5935.98 | 418447.59 | 25248.91 |
| 105 | 15666.78 | 5645.98 | 418083.59 | 24155.91 |
| 106 | 15892.78 | 5015.98 | 417562.59 | 23094.91 |
| 107 | 16282.78 | 6105.98 | 418281.59 | 22046.91 |
| 108 | 16279.78 | 5867.98 | 421014.59 | 22827.91 |
| 109 | 16696.78 | 6010.98 | 419450.59 | 24251.91 |
| 110 | 24682.74 | 7336.32 | 461774.03 | 27737.06 |
| 111 | 23983.74 | 7007.32 | 461587.03 | 26420.06 |
| 112 | 24921.74 | 6600.32 | 461305.03 | 26245.06 |
| 113 | 24427.74 | 6533.32 | 459925.03 | 26136.06 |
| 114 | 24502.74 | 6807.32 | 458819.03 | 26639.06 |
| 115 | 24162.74 | 6775.32 | 460533.03 | 27371.06 |
| 116 | 25151.74 | 6709.32 | 462252.03 | 26543.06 |
| 117 | 24515.74 | 6929.32 | 460951.03 | 27327.06 |
| 118 | 23959.74 | 6709.32 | 462141.03 | 26644.06 |
| 119 | 24283.74 | 7052.32 | 461797.03 | 25960.06 |
| 120 | 24116.74 | 7078.32 | 461426.03 | 26841.06 |

Table 2. Data of research records - girls

| Records Girls | | | | |
|---|---|---|---|---|
| | Test Initial | | Test Preliminar(Ruffier) | |
| Subiect | Length(cm) | 95% Ellipse Area (cm²) | Length(cm) | 95% Ellipse Area (cm²) |
| 1 | 15928.78 | 1431.82 | 334274.40 | 25070.06 |
| 2 | 6322.28 | 6470.32 | 100779.04 | 14299.76 |
| 3 | 10106.09 | 2539.76 | 458915.03 | 18371.90 |
| 4 | 3844.08 | 4821.36 | 420509.59 | 17842.17 |
| 5 | 24156.74 | 5268.98 | 218197.14 | 22282.91 |
| 6 | 3448.08 | 1865.82 | 102179.04 | 11587.76 |
| 7 | 3224.08 | 2464.82 | 99715.04 | 11796.76 |
| 8 | 3360.08 | 2412.82 | 100473.04 | 13835.76 |
| 9 | 4143.08 | 2444.82 | 98476.04 | 13462.76 |
| 10 | 5776.28 | 1537.76 | 220477.14 | 17922.90 |
| 11 | 5651.28 | 1742.76 | 219103.14 | 15254.90 |
| 12 | 5788.28 | 2817.76 | 217689.14 | 15789.90 |
| 13 | 5689.28 | 2399.76 | 220343.14 | 16510.90 |
| 14 | 6443.28 | 2629.76 | 219069.14 | 18009.90 |
| 15 | 6570.28 | 1823.76 | 217330.14 | 17645.90 |
| 16 | 5849.28 | 1932.76 | 217944.14 | 17055.90 |
| 17 | 5488.28 | 2583.76 | 216975.14 | 16891.90 |
| 18 | 10598.09 | 4351.36 | 335717.40 | 19356.17 |
| 19 | 10280.09 | 4898.36 | 336470.40 | 18503.17 |
| 20 | 10140.09 | 3971.36 | 335767.40 | 18254.17 |
| 21 | 9991.09 | 3971.36 | 335626.40 | 18221.17 |
| 22 | 10450.09 | 3850.36 | 334540.40 | 18999.17 |
| 23 | 10884.09 | 4269.36 | 335788.40 | 16982.17 |
| 24 | 10911.09 | 4194.36 | 335702.40 | 18272.17 |
| 25 | 10972.09 | 4336.36 | 335213.40 | 17038.17 |
| 26 | 10664.09 | 3529.36 | 333607.40 | 17542.17 |
| 27 | 11357.09 | 3919.36 | 337461.40 | 19448.17 |
| 28 | 10952.09 | 3658.36 | 335186.40 | 19516.17 |
| 29 | 10621.09 | 4128.36 | 337193.40 | 18569.17 |
| 30 | 10032.09 | 4268.36 | 337149.40 | 20842.17 |
| 31 | 10300.09 | 3825.36 | 336045.40 | 18048.17 |
| 32 | 10622.09 | 4075.36 | 335844.40 | 17761.17 |
| 33 | 10095.09 | 4582.36 | 337229.40 | 20773.17 |
| 34 | 10174.09 | 4429.36 | 335035.40 | 19508.17 |
| 35 | 10607.09 | 4615.36 | 336518.40 | 17777.17 |
| 36 | 10262.09 | 4677.36 | 333613.40 | 17101.17 |
| 37 | 16258.78 | 6030.98 | 417938.59 | 20505.91 |
| 38 | 16509.78 | 5509.98 | 418834.59 | 24420.91 |
| 39 | 15429.78 | 4959.98 | 419583.59 | 23274.91 |
| 40 | 15369.78 | 4887.98 | 419823.59 | 21973.91 |
| 41 | 16483.78 | 5619.98 | 418050.59 | 21656.91 |
| 42 | 16155.78 | 5466.98 | 421246.59 | 24128.91 |
| 43 | 16317.78 | 5895.98 | 417822.59 | 21569.91 |
| 44 | 16100.78 | 5527.98 | 419781.59 | 20965.91 |
| 45 | 15873.78 | 5452.98 | 420832.59 | 24372.91 |
| 46 | 24559.74 | 7052.32 | 461065.03 | 25761.06 |
| 47 | 24003.74 | 7009.32 | 460013.03 | 27685.06 |
| 48 | 25055.74 | 7425.32 | 459443.03 | 25973.06 |
| 49 | 24882.74 | 6466.32 | 462431.03 | 24806.06 |
| 50 | 25130.74 | 6828.32 | 460948.03 | 26870.06 |

The paired t test was used to compare the effect of a standard effort on balance. Following the statistical analysis, the following data were obtained, displayed in the corresponding tables.

Table 3. Correlation for paired t test

| | | N | Correlation | Sig. |
|---|---|---|---|---|
| Pair 1 | LUNG_B_1 & LUNG_B_2 | 120 | 0.839 | 0.000 |
| Pair 2 | AREA_B_1 & AREA_B_2 | 120 | 0.818 | 0.000 |
| Pair 3 | LUNG_F_1 & LUNG_F_2 | 50 | 0.733 | 0.000 |
| Pair 4 | AREA_F_1 & AREA_F_2 | 50 | 0.677 | 0.000 |

Table 4. Statistical data for the paired t test

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | LUNG_B_1 | 10423.5301 | 120 | 5914.13084 | 539.88381 |
| | LUNG_B_2 | 289930.7627 | 120 | 113749.17636 | 10383.83163 |
| Pair 2 | AREA_B_1 | 3776.5352 | 120 | 1656.06654 | 151.17750 |
| | AREA_B_2 | 19199.0944 | 120 | 3738.68050 | 341.29327 |
| Pair 3 | LUNG_F_1 | 11796.7192 | 50 | 6148.28495 | 869.49880 |
| | LUNG_F_2 | 322799.4908 | 50 | 106499.09077 | 15061.24585 |
| Pair 4 | AREA_F_1 | 4217.4972 | 50 | 1582.66256 | 223.82229 |
| | AREA_F_2 | 19402.2152 | 50 | 3764.04954 | 532.31699 |

Table 5. Results for paired t test

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Lower | 95% Confidence Upper | | | |
| Pair 1 | LUNG_B_1 - LUNG_B_2 | -279507.2326 | 108834.96825 | 9935.22786 | -299179.9760 | -259834.4891 | -28.133 | 119 | 0.000 |
| Pair 2 | AREA_B_1 - AREA_B_2 | -15422.5592 | 2566.90424 | 234.32523 | -15886.5466 | -14958.5719 | -65.817 | 119 | 0.000 |
| Pair 3 | LUNG_F_1 - LUNG_F_2 | -311002.7716 | 102077.22778 | 14435.89999 | -340012.7988 | -281992.7444 | -21.544 | 49 | 0.000 |
| Pair 4 | AREA_F_1 - AREA_F_2 | -15184.7180 | 2932.84472 | 414.76688 | -16018.2232 | -14351.2128 | -36.610 | 49 | 0.000 |

An important difference of values was observed for the measurements with standard effort and without standard effort. For each compared pair the results were very important, supporting the influence that the standard effort has on the static balance.

There was an important difference in the values for the length traveled by the weight center for boys without standard effort (M = 10423.53, SD = 5914.13) and with standard effort (M = 289930.76, SD = 113749.17); t (119) = -28.13, p =0.000.

There was an important difference in the values for the length traveled by the center of gravity for girls without standard effort (M = 11796.71, SD = 6148.28) and with standard effort (M = 322799.49, SD = 106499.09); t (49) = -21.544, p = 0.000.

There was a significant difference in the values for the area described by the weight center for boys without standard effort (M = 3776.53, SD = 1656.06) and with standard effort (M = 19199.09, SD = 3738.68); t (119) = -65.817, p = 0.000.

There was a significant difference in values for the described area of weight for girls without standard effort (M = 4217.49, SD = 19402.21) and with standard effort (M = 19402.21, SD = 3764.04); t (49) = -36.610, p = 0.000.

## 6. Conclusion

Due to the fact that in all cases the values of p were lower than 0.05, and because there is a strong correlation (approximately over 0.7), we can say that the working variable (administration of a standard effort) had an influence on the two characteristics of the balance recorded: the length traveled by the projection of the center of gravity and the area described by the projection on the force plate.

These first results encourage us to continue our study of the manifestation of balance depending on the type of effort. Due to this data collected from the pilot research we will continue with the whole project to identify those types of effort that allow an accelerated improvement of the balance.

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# ADAPTED PHYSICAL EXERCISE - MEAN TO IMPROVE THE QUALITY OF ELDERLY

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**Abstract**

Physical exercise is the basic mean of physiotherapy, a common mean used in all age groups. Loss elderly performance is due to deconditioning phenomena and the non-use of physiological parameters of a function or organ and various pathological processes of the systems. **Research hypothesis**: We presume that by using adapted physical exercisea, elderly can improve their quality of life by preserving their physical and mental autonomy by slowing down the aging process. **Material and method**: In the research were selected 12 subjects aged 65-75 years who were tested with the Senior Fitness Test program applied both before and after the exercise program. The aerobic training of the elderly can be done by walking, jogging, exercises with cycloergometer, exercises with objects (weights, elastic bands), climb-down stairs. **Research Results**: The average final scores confirm the benefits of the exercise program through the following values: Chair Stand Test: 11.66, Arm Curl Test 14.83, Chair Sit and Reach Test -1.18, Back Scratch Test-8.3, Foot Up and Go Test 6.6, BMI 23. **Conclusions**: The elderly should be permanently under physical, mental and intellectual exercise, being beneficial for maintaining autonomy in daily activities and habitual gesture.

*Keywords:* physical activity; elderly; aerobic effort; prophylaxis.

## 1. Introduction

Essential component of movement and derived from it, exercise it constitutes a real source of health, recommending their practice in early childhood and elderly (Dragulin Saitoc, 1990, p. 5).

Exercise can be defined as a motor action, consciously organized and systematically repeated for achieving educational and rehabilitation psychomotor process (Albu, Albu, Vlad & Iacob, 2006, p.154).

Exercises are psychomotor structures created and used systematically involving movement of the body and the segments of the same or different planes and axes, from and in defined positions, made amplitudes, directions and paths well-defined, with dosages effort default in order: learning and improve driving skills and abilities; conditional and coordinative capacity development; regain and improve machine features neuro-myo-artrokinetic and other equipment and systems; improving quality of life; subject continuous feedback process (Marcu & Dan, 2006, p. 22).

Exercise becames adapted exercise when in need of an adaptation to peculiarities pathology and subjects treated with own principles and rules, following specific purposes (Mârza, 2012, p. 96).

These have their own character, allowing their prescription for different categories of patients, convalescents, deficient, lacking energy and physical qualities of healthy individuals (Hodorcă, 2017, p. 102).

Elder loss or poor performance is due to: deconditioning phenomena; the non-use of physiological parameters to a function or organ; various pathological processes of systems: cardiopulmonary, musculoskeletal, metabolic and nervous (Dan & Lozincă, 2007, p.59). Therefore the training programs can be extremely diverse, with various intensities and durations, being able to work on large or small muscle groups, on the upper or lower limbs or the whole body.

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It turned out that regular aerobic exercise not only beneficial preventive effect, but also contribute to the rehabilitation of elderly patients with cardiovascular and musculoskeletal pathology. Systematic aerobic exercise, activity and therapeutic exercise intensity and variable duration, sufficient to improve: O2 efficiency at work and cardiac function and respiratory system (Dan & Lozincă, 2007, p.59).

Exercise performed in order to restore the functional capacity and thus improved quality of life will be done differently from patient to patient due to treatment features on the body. In this regard will be taken into account: age, gender, motor experience, education level, type and location of the disease (Albu, Albu & Petcu, 2001, p. 26).

The physical condition can not be changed except by some type of aerobic labor. Training the elderly will be made only on the certain parameters (Sbenghe, 2002, p. 61).

## 2. Material and method

In the research were selected 12 subjects aged 65-75 years who were tested with the Senior Fitness Test program applied both before and after the exercise program. The tests applied were: Chair Stand Test, Arm Curl Test, Chair Sit and Reach – Test, Back Scratch Test, Foot Up and Go Test and Body Mass Index (Rikli & Jones, 2012).

The goal of exercise in these applications consists of: strengthening health, increase natural resistance to pathogens from the external environment, psycho-physical balancing normally between body and environment (Balint, 2010, p. 7).

Choosing exercises were based on several criteria: the muscles will be strengthened and individual physical abilities. Exercises in successive order: exercise starting with the large and complex groups, with the upper limbs, then lower levels.

The number of sets. It began with a set of each exercise, then gradually increased to three or more sets, but generally not more than 6 sets. Rest between sets and exercises was 3 minutes or more for large resistances, 2-3 minutes for medium and 1-2 minutes for lighter exercises; rest was required and reduction of under two minutes was done only if the subject has tolerated metabolic demand;

The exercises applied to subjects enrolled in the study were: walking (fast paced); jogging; treadmill exercises (walking, running); cycling; swimming; free weights, springs, elastic and partial exercises (climbed down the stairs, squats, push-ups, chin-to bar etc.). These exercises were applied 3 times/week.

In the old age cycle (65-80), with the preservation of physical and psychic capabilities, human activities shift focus towards family-related activities (Abalaşei, 2012, p. 32). Elder must be constantly subjected to a critical exercise, mentally and intellectually engaging's activities in occupational therapy and "support occupational therapy" is beneficial for maintaining autonomy in the everyday activities (Bălteanu, 2004, p. 68). Therefore, besides the adapted physical exercises, they were included in groups that perform various activities such as gardening, knitting, sewing, art therapy and daily activities (cooking, cleaning the house, went to market, etc.)

## 3. Results and discussions

In tables 1 and 2 are recorded values of 12 elderly, classified tests of the "Senior Fitness Test" which were subjected to initial and final testing (Table 1 and 2).

Table 1. Values obtained at the initial testing

| Tests | Optimal outcome | A.C. | C.A. | B.D. | Z.A. | G.G. | C.L. | V.A. | P.C.C. | A.L. | F.A.C. | O.I. | N.F. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chair Stand Test | 8-13 lifts | 8 | 9 | 10 | 11 | 13 | 11 | 6 | 10 | 11 | 9 | 7 | 9 |
| Arm Curl Test | 10-15 reps | 10 | 13 | 12 | 14 | 16 | 20 | 11 | 15 | 10 | 9 | 12 | 15 |
| Chair Sit and Reach Test | -6,35/+6,35 cm | -3.15 | +2 | +3.5 | -7 | 0 | +5.5 | -6 | -4.5 | +3 | -8 | +6 | -5.5 |
| Back Scratch Test | -17,78/ -2,54 cm | -10 | -12.5 | -5 | -7 | -8 | -5 | -12 | -7 | -8.5 | -9 | -4 | -3.5 |
| Foot Up and Go Test | 9,6/6,2 s | 7 | 6 | 8 | 7 | 6 | 7.1 | 7.5 | 8 | 9.1 | 8.3 | 7.8 | 8 |
| BMI | 18,50/24,99 | 24 | 26.50 | 19.5 | 22.5 | 22.6 | 27.80 | 34.30 | 22 | 27.41 | 29 | 31.20 | 24.50 |

Table 2. Values obtained at the final testing

| Tests | Optimal outcome | A.C. | C.A. | B.D. | Z.A. | G.G. | C.L. | V.A. | P.C.C. | A.L. | F.A.C. | O.I. | N.F. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chair Stand Test | 8-13 lifts | 9 | 10 | 12 | 13 | 13 | 12 | 10 | 14 | 15 | 14 | 8 | 10 |
| Arm Curl Test | 10-15 reps | 13 | 17 | 14 | 15 | 16 | 22 | 12 | 17 | 10 | 11 | 14 | 17 |
| Chair Sit and Reach Test | 6,35/+6,35 cm | -4.20 | +1 | +2.5 | -7.5 | +3 | +6 | -7 | -5 | +4.5 | -7 | +7 | -4.5 |
| Back Scratch Test | -17,78/ -2,54 cm | -10 | -17.5 | -7 | -8 | -9 | -7 | -14 | -9 | -10.5 | -10 | -5 | -4 |
| Foot Up and Go Test | 9,6/6,2 s | 6 | 6 | 7 | 6 | 6 | 7 | 6 | 7 | 8 | 7.3 | 6.8 | 7 |
| BMI | 18,50/24,99 | 25.6 | 27 | 19 | 23 | 22.7 | 28.12 | 35.30 | 24.15 | 28.23 | 30.23 | 32.17 | 25.50 |

"Senior Fitness Test" includes tests that check the postural balance of the patients and according to the results we can say that they have improved this capability (Chair Stand Test from 9.5 to 11.66 lifts). The improved strength and mobility of the upper and lower limbs, but also the confidence in lifting, walking and placement back on the chair, as follows: Test Curl Arm (from 13. 08 to 14.83 reps), Chair Sit and Reach Test (from 1.93 to 1.18 cm), Back Scratch Test (from -7.44 to -8.3 cm), Foot Up and Go Test (from 7.13 to 6.6 s). After application of test Body Mass Index can be seen values decline, which means that the people included in the study reduced the weight by reference to a level much better at the final testing (BMI from 25 to 23) (Figure 1).

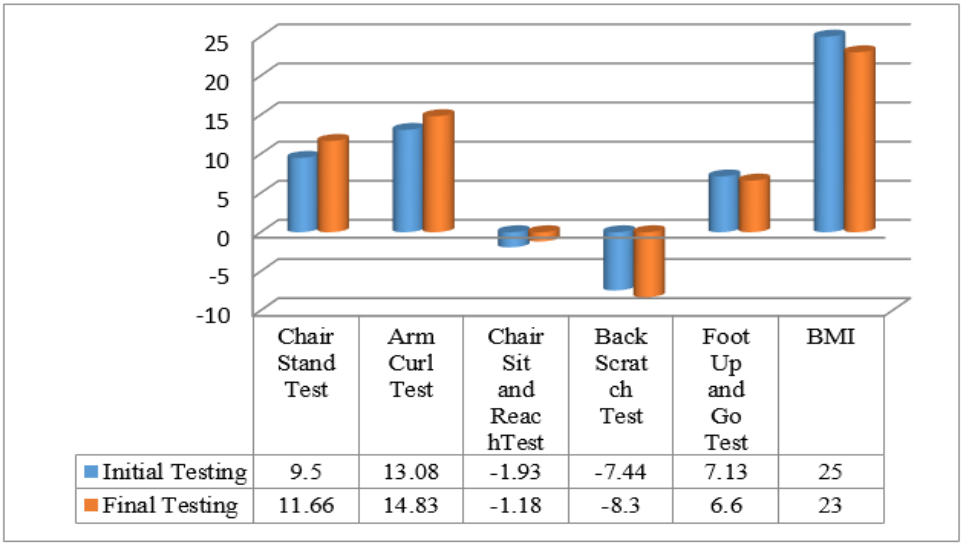


Fig. 1. Average values of initial and final testing

## 4. Conclusions

Aerobic exercise can combat the limitation of functional reserves due to age, illness or functional disability. He reduces psychological stress, improves tolerance for daily activities, improves quality of life, reduces morbidity serious diseases (Hodorcă, 2017, p. 124).

In the study, we can see the test results obtained from the Senior Fitness Test, which is an improvement of the whole body, both upper body and lower body as well as an improvement in dynamic, into balance and agility.

Of the many ways of recovery, spare time activity occupational therapy is recommended from ancient times, the best doctor is work or activity through which a patient feels useful for the society to which he belongs.

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# COMPARATIVE STUDY BETWEEN THE RESULTS OF $VO_2$MAX EVALUATION THROUGH THE FIELD EVENT VERSUS ERGOSPIROMETRY, IN FEMALE ROWERS

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**Abstract**

VO2max represents an important physiological parameter for the individualised planning of sports training and for performance prediction in resistance efforts. One of the sports branches included in this category from the perspective of effort type is rowing. The research proposes to determine whether there are differences between the values of VO2max evaluated through ergospirometry, by using the equipment Cosmed Quark CPET within a specific test using the ergometer and by using the 2000-m field event that represents a standard test used nationwide for selection, also using the ergometer. The subjects of the research are 11 girls aged 16 (±7 months), within the National Olympic Centre for Juniors of Iaşi. The data recorded highlight the fact that there are no statistically significant differences between the two evaluations (ergospirometry: 48.01 ml.kg-1.min-1; the field event: 42.73; $p<0.0001$).

*Keywords:* $VO_2$max; rowing; ergospirometry; Cosmed Quark CPET; 2000-m event.

## INTRODUCTION

$VO_2$max is a physiological parameter accounting for the amount of oxygen used by the body in order to maintain the vital functions in constant conditions and defining it as the maximum oxygen amount that the body may absorb, carry and consume per time unit, expressed in $L/min^{-1}$ absolute or $ml/kg^{-1}min^{-1}$ relative with the weight (Garcia-Garcia, Ramos-Bermudez and Aguirre). Oxygen consumption, among the adults, at rest, has values ranging between 250 – 300 ml/min and it may vary by age, sex, bodyweight, type of current activity (Honceriu & Trofin, 2015; Martin, Tomescu & Hadmaş, 2016). Though maximum oxygen consumption is a highly reliable performance indicator, in resistance efforts, and its mention may be a prediction factor for competitive productivity, and its measurement will not be able to indicate the winner. The factors influencing an athlete during competition are numerous and varied. It must be mentioned that the assessment of maximum oxygen consumption is indispensable for the individualised planning of sports training and that it mainly refers to the volume and intensity of physical effort. In order to increase maximum oxygen consumption, the intensity of effort must range between 90 and 120% of the $VO_2$max. Aerobic training determines an increase in the value of $VO_2$max by up to 30% depending on the volume, intensity and complexity of physical effort, as well as depending on the athlete's training level. Consequently, in an untrained athlete, the percentage of increase in $VO_2$max will be higher compared to an athlete who, through practice, acquired this parameter. It is worth mentioning that this parameter cannot exceed a certain biological and hereditary limit, regardless of the modifications within trainings in this respect. Most researches indicate an increase in maximum oxygen consumption, due to a training program, by 15-25% (Honceriu, 2015).

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The evaluation of $VO_2$max has a major importance for the systematic planning of trainings concerning individual necessities. Furthermore, it is also important to assess the quality of field events helping us calculate this parameter (and more).

The evaluation of $VO_2$max may be conducted using two types of methods: direct and indirect. Ergospirometry is a direct method using gas analysers measuring the gradient between inhaled air and exhaled air. Effort will be performed on the cycloergometer or the treadmill, thus being imposed and accurately monitored. The athlete makes a progressive effort, and for each effort level, we record HR, BP and lactate build-up, which will continue during the phase of post-effort recovery, all of them for the assessment of maximum oxygen consumption and for cardiorespiratory and metabolic economy. A strong point is represented by the fact that current devices enable the rapid recording of cardiorespiratory indicators allowing a qualitative appraisal of physiological parameters during effort (Honceriu, 2014).

The 2000-m test on the ergometer is another indirect method through which one may assess $VO_2$max. It is a standard test used nationwide for selection, also using the ergometer. The website www.concept2.com provides a calculator through which one may extrapolate $VO_2$max. To this end, the following are required: the bodyweight of the subject, the time of the 2 000 m, the athlete's gender, the training level. A few seconds after introducing these data, the calculator will display the result in ml/kg$^{-}$1min-1(Brzenczek-Owczarzak, Naczk, Naczk, Kowalski and Arlet).

**MATERIAL AND METHOD**

Taking into account the aforementioned information, as well as the importance of assessing $VO_2$max as accurately as possible, our research proposes to determine whether there are statistically significant differences between the values of $VO_2$max results through ergospirometry by using the Cosmed Quark CPET device within a specific test using the ergometer and the field event of 2 000 m, as well as a specific test on the ergometer using the calculation formula presented on the website www.concept2.com.

The subjects of the research are 11 female rowers aged approximately 16 years old, within the National Olympic Centre for Juniors of Iaşi. The evaluation of subjects' $VO_2$max, by using the ergospirometry method, was carried out at the nautical base of Dorobanţi, Iași and the Cosmed Quark CPET was used.

Protocol: the subjects begin the test by performing articular gymnastics for 10 minutes, followed by specific warm-up on the ergometer Concept 2 Model C for 15 min. After the warm-up, the aforementioned device is fixed and the 250 m are progressively covered by rowing. The purpose if to determine maximum oxygen consumption, peak aerobic power, expressed in W, heart rate (HR) for each effort level and maximum heart rate (HRmax).

Concerning the evaluation of $VO_2$max through the field event, namely the specific event of 2000 m, it was also carried out at the nautical base of Dorobanţi, also with the help of the ergometer Concept 2 Model C. It is a standard test used nationwide for selection; thus, it is familiar to all the female athletes who attended the two events.

Protocol: the subjects perform articular gymnastics (10 min.), specific warm-up on the ergometer (15 min.), and then they row for 2000 m (Pripstein, Rhodes, McKenzie & Coutts, 1999). The time is recorded for extrapolating $VO_2$max and peak aerobic power (W).

The ergometer was used in other research studies, which dealt with the evaluation of this parameter or performance prediction in rowing and to which we add the bibliography of our study.

**RESULTS AND DISCUSSIONS**

The Table below features the characteristics of the female rowers: height, bodyweight, body mass index (BMI).

Table 1. Characteristics of the female rowers

| **Height (m)** | **Bodyweight (kg)** | **BMI (kg/m$^2$)** |
|---|---|---|
| 1.77±0.03 | 73.27±12.5 | 23.19±3.30 |

Table 2 highlights the results obtained at the two events by the female rowers. The Table also includes the differences in the $VO_2$max value recorded by each female athlete.

Table 2. Values of $VO_2$max obtained by the subjects after the two events (ergospirometry, the field event)

| **No.** | **Subject** | **VO2max (ml.kg$^{-1}$.min$^{-1}$)** | |
|---|---|---|---|
| | | Ergospirometry | The field event |
| 1. | D.D. | 46.61 | 37.5 |
| 2. | F.P. | 40.88 | 33.58 |
| 3. | G.F. | 40.06 | 39.08 |
| 4. | G.M. | 51.05 | 36.67 |
| 5. | H.B. | 53.43 | 54.1 |
| 6. | I.A. | 53.7 | 48.53 |
| 7. | L.A. | 47.96 | 47.22 |
| 8. | N.F. | 50.08 | 42.19 |
| 9. | P.P. | 51.89 | 42.61 |
| 10. | S.D. | 45.19 | 47.15 |
| 11. | U.A. | 47.31 | 41.47 |

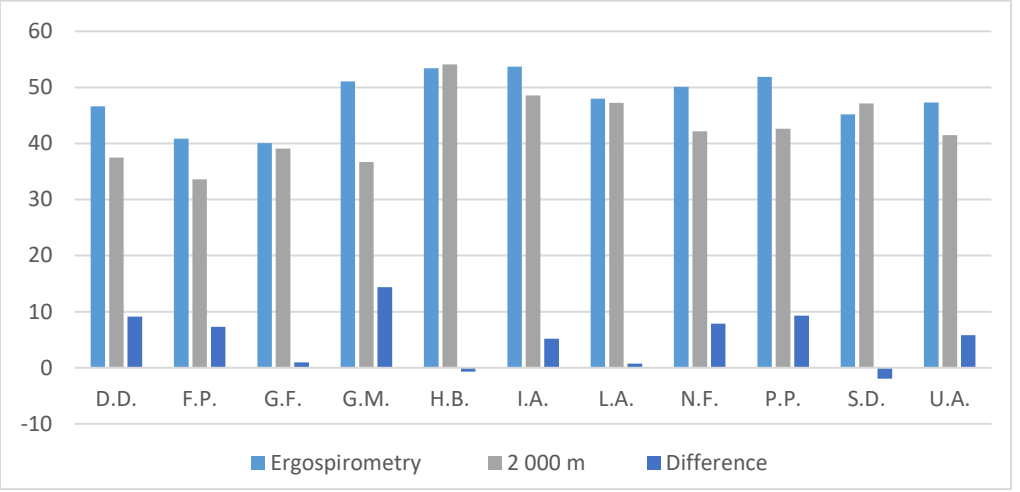


Fig. 2. Values of $VO_2$max obtained at the two tests
and the individual differences between them

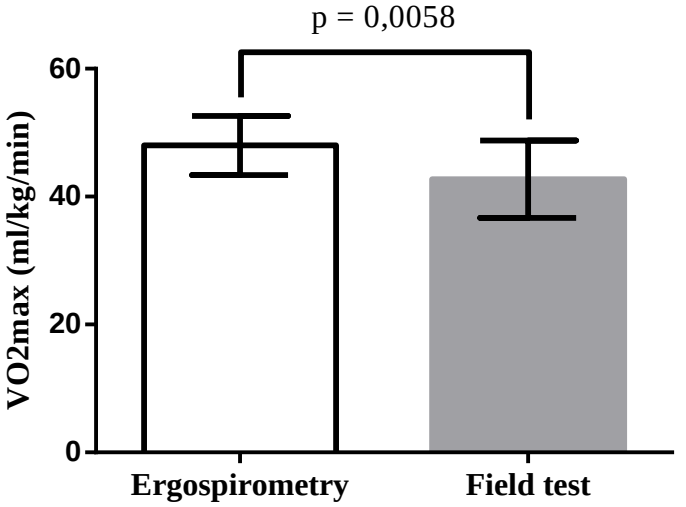


Fig. 3. Difference between the results at the two events

Figure 3 synthesises the difference between the data series obtained by our subjects. After applying the T Student test, a statistically significant difference emerged between the two evaluations (p=0.0058), the higher value being provided by ergospirometry. This difference may be caused by the specific unfolding of the two tests and by the potential gap between direct evaluation and the extrapolation used.

Table 3 illustrates the descriptive statistics of the data, comprising the following: arithmetic mean, standard deviation, maximum value, minimum value, median, module and variability coefficient of the results for the two tests applied.

Concerning the evaluation of $VO_2$max through specific effort within the progressive effort test, using the Cosmed Quark CPET device, the arithmetic mean of the aforementioned parameter is 48.01 $ml.kg^{-1}.min^{-1}$, with a standard deviation of 4.63, a minimum value of 40.06 $ml.kg^{-1}.min^{-1}$, a maximum value of 53.70 $ml.kg^{-1}.min^{-1}$ and a variability coefficient of 9.65%.

In case of VO2MAX evaluation, after performing the field test of 2 000 m, the arithmetic mean of the studied parameter is 42.73 $ml.kg^{-1}.min^{-1}$, with a standard deviation of 6.04, a minimum value of 33.58 $ml.kg^{-1}.min^{-1}$ and a maximum value of 54.10 $ml.kg^{-1}.min^{-1}$ and a variability coefficient of 14.14%.

Table 3. Descriptive statistics of the data

| Parameters calculated | Ergospirometry ($ml.kg^{-1}.min^{-1}$) | The field event ($ml.kg^{-1}.min^{-1}$) |
|---|---|---|
| **Arithmetic mean** | 48.01 | 42.73 |
| **Standard deviation** | 4.63 | 6.04 |
| **Minimum value** | 40.06 | 33.58 |
| **Maximum value** | 53.70 | 54.10 |
| **VC %** | 9.65 | 14.14 |

Table 4. Correlation level between the test results

| | | |
|---|---|---|
| **Pearson r** | | 0.58 |
| **R square** | | 0.34 |
| **P-value** | | 0.075 |
| **95% Confidence interval of the difference** | Lower | -0.095 |
| | Upper | 1.565 |
| **Significant? (alpha=0.05)** | | No |

It may be noted that the values of $VO_2$max recorded at the two events do not correlate statistically. The correlation between the results obtained at the two events is inexistent, given the value of r=0.58 and the value of p=0.075.

The values of $VO_2$max obtained in the two tests are not statistically significant, as resulted from the aforementioned aspects. Ergospirometry had been used in other studies, where they recorded values of around 45-55 $ml.kg^{-1}.min^{1}$. The same for the field event of 2 000 m (Brzenczek-Owczarzak, Naczk, Naczk, Kowalski & Arlet, 2007; Cosgrove, Wilson, Watt & Grant, 1999; Hahn, Tumilty, Shakespear, Rowe & Telford, 1988; Honceriu & Trofin, 2015; Ingham, Whyte, Jones, & Nevill, 2002; Konopka, Banach, Burkhard-Jagodzinska, Krol, Aniol, Sitkowski, Pokrywka, Klusiewicz, Ladyga, Orysiak, Dluzniewski & Braksator, 2015; Lormes, Buckwitz, Rehbein & Steinacker, 1993; Mikulic, Smoljanovic, Bojanic, Hannafin & Pedisic, 2009; Mikulic, Smoljanovic, Bojanic, Hannafin & Matkovic, 2009; Tomescu & Teodorescu, 2017).

## CONCLUSIONS

Following our research, the following conclusions may be drawn:

There are statistically significant differences between the values of $VO_2$max assessed through the method of ergospirometry on the ergometer and the field event of 2 000 m on the ergometer ($p<0.0001$).

We have found no correlation between the results of the two tests (r=0.58 and the value of p=0.075).

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# EFFECT OF CORDICEPS, GANODERMA AND TURMERIC ON SPORTS PERFORMANCE, RESEARCH AND APPLICATIONS

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**Abstract**

***Background***. Cordiceps (C) and Ganoderma (G) are two mushrooms with important antioxidative effects, enhancing cellular respiration and aerobic metabolism. Turmeric (T) is a spice known for its anti-inflammatory and antioxidative effects. Although less known for their effects in sports, C, G and T have been shown to be effective in increasing sport performance.
***Objectives***. The objective was to highlight the C, G and T effects on sports performance.
***Methods***. The study has two parts. The first is an analysis of PubMed publications, based on the analysis of key word combinations, such as: "C", "G", "T", "C and sport", "G and sport", "T and sport", "C and athlets", "G and athlets", "T and athletes", "C and performance", "G and performance", "T and performance".
***Results***. PubMed studies on C, G and T are numerous, most of them for T. Of these, studies on the relationship between C, G and T respectively, with sports, athletes or performance, represent a very small percentage. However, there are products that contain C, G or T used in sport, in order to increase performance.
***Conclusions***. 1) Studies on C, G and T are of great interest. 2) The use of C, G and T in sport, although still slightly numerically representative, is increasing especially in recent years, proving interest in this topic. 3) The greatest interest was represented by studies with T, on human subjects of both genres, review studies, review type, as well as by studies for the use of T in performance. 4) Further scientific research regarding the use of C, G and T in increasing sports performance are required, as well as the publication of practical results obtained with products containing C, G and T, which are already used in sports.

*Key words*: Cordiceps, Ganoderma, Turmeric, sports, athletes, performance

## Introduction

Cordyceps sinensis is historically known in Chinese medicine (Kuo et al., 1994). It grows at altitudes of 3500-5000 meters and in mountainous areas. It has been shown to have anti-stress and anti-fatigue effects (Mei et al., 1989; Chen & Li, 1993) and increases performance in endurance exercises (Li et al., 1993).

Ganoderma species, including G. lucidum and G. tsugae, exert antioxidative activity (Mau et al., 2002). Ganoderma lucidum is a fungus used for medicinal purposes for centuries, especially in China, Japan and Korea (Peterson, 2006), which has numerous pharmacological effects (Boh et al., 2007) and health benefits (Collado et al., 2015; Li et al., 2018). In addition, Ganoderma lucidum improves physical performance (Li et al., 2018).

Turmeric is derived from the Curcuma longa plant; it is used as a condiment, preservative and as a yellow dye for textiles (Aggarwal, 2007). In addition, it is used in Ayurvedic medicine, in India and in traditional Chinese

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medicine, to treat various conditions (Huang, 2015). Curcumin is a polyphenol derived from turmeric and has a strong antioxidant capacity (Sharma, 2005).

**Hypothesis**

Cordiceps, Ganoderma and Turmeric are recognized for their antioxidant role, but their use in sports is less-researched and known.

**Objectives**

The objective was to highlight the interes for the effect of Cordiceps (C), Ganoderma (G) and Turmeric (T) on sports research.

**Material and methods**

*Analysis of PubMed publications*

The effect of C, G and T on sports performance was analysis for the same keywords combinations:

a) "C and sport" (CS), "G and sport" (GS), "T and sport" (TS)
b) "C and athlets" (CA), "G and athlets" (GA), "T and athletes" (TA)
c) "C and performance" (CP), "G and performance" (GP), "T and performance" (TP)

Analysis for all keywords combination, was done for some filters, with their corresponding sub-filters:

a) *Species:* Other Animals (A), Humans (H)
b) *Sex:* Human Male (HM), Human Female (HF), Human Male and Human Femele (HM+HF)
c) *Article Types:* Clinical Trial (CT), Review (RW)

**Results**

This data collection was September 2019. For all groups, data distribution was normal, according to the Kolmogorov-Smirnov test. The analysis has been made on the chosen time periods.

*a) Comparative analysis of C, G and T, by Publication time period and Total number of publication (N) (Table 1).*

From the analysis of Table 1 it is found that: the studies started at the earliest for T (1876); for G, C and T, the period of starting the publications, was much earlier than in the case of keyword combinations related to the sports field. Publications for keyword combinations related to sport, debuted around 2000, and publications related to performance, between 1981-1989; in the case of studies for athletes, there were differences between the keyword combinations, the earliest studies being for TA (1975), and the most recent for GA (2014). For C, G and T, and their keyword combinations with performance, studies are present, also in 2019.

Of C, G and T, most publications were for T (5193), and the few for C (1503). Of the keyword combinations, most publications were for TP (208), and the few for GA (1).

Table 1. Comparative analysis of C, G and T,
by Publication time period and Total number of publication

| Keywords combinations | Periode | N |
|---|---|---|
| C | 1947-2019 | 1503 |
| G | 1932-2019 | 2384 |
| T | 1876-2019 | 5193 |
| CS | 2000-2018 | 24 |
| GS | 2004-2018 | 7 |
| TS | 2000-2018 | 24 |
| CA | 2010-2018 | 5 |
| GA | 2014 | 1 |
| TA | 1975-2019 | 18 |
| CP | 1989-2019 | 91 |
| GP | 1987-2019 | 115 |
| TP | 1981-2019 | 208 |

*b) Comparative analysis of C, G and T, by Number of years of publication (Fig. 1).*

The longest publication period was for G (87 years), and the shortest for GA (1 year). Most publications were: for Sport, CS and TS (18 years), Athlets, TA (44 years), Performance, TP (38 years).

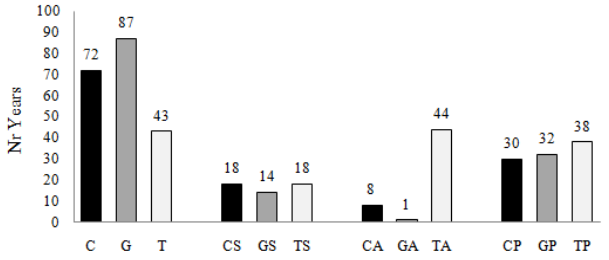


Fig. 1. Comparative analysis of C, G and T, by Number of years of publication

*c) Comparative analysis of C, G and T, by Species Filter (Fig. 2, 3).*

From C, G and T: most of publications were for T at H (2141); the fewest publications were for C at H (341). From the keywords combinations: most of publications were for TP at H (2141); the fewest publications were for GA and TA at A (0); for Sport, most of publications were for CS and TS at H (10); for Athlets, most of publications were for TA at H (15); for Performance, most of publications were for TP at A (76). Most of publications for Other Animals were for TP (76). Most of publications for Human were for TP (47).

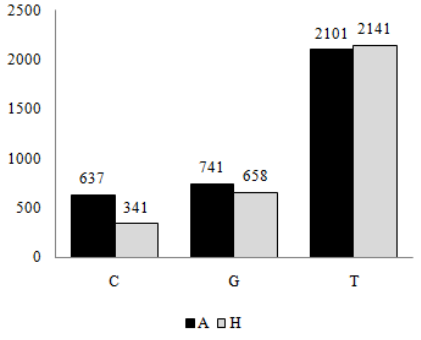


Fig. 2. Comparative analysis of C, G and T, by *Species Filter*

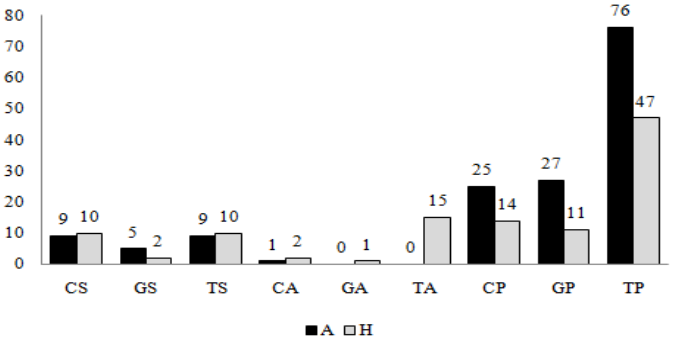


Fig. 3. Comparative analysis of keywords combinations, by *Species Filter*

*d) Comparative analysis of C, G and T, by Sex Filter (Fig. 4, 5).*

From C, G and T: most of publications were for T at HM+HF (614); the fewest publications were for C at HF (66). From the keywords combinations: most of publications were for TP at HM+HF (21); the fewest publications were for CA and GA at HF (0); for Sport, most of publications were for CS and TS at HM and HF (8); for Athlets, most of publications were for TA at HM+HF (11); for Performance, most of publications were for TP at HM+HF (21). Most of publications for HM, HF and HM+HF were for TP (17, 17, respectively 21).

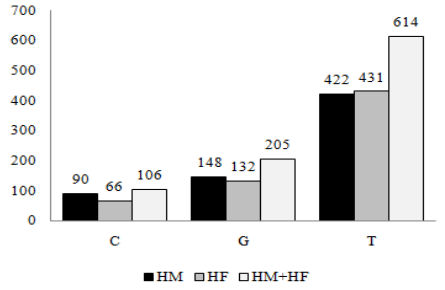


Fig. 4. Comparative analysis of C, G and T, by *Sex Filter*

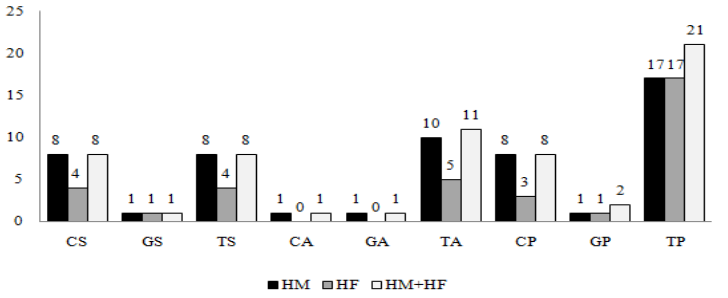


Fig. 3. Comparative analysis of keywords combinations by *Sex Filter*

*e) Comparative analysis of C, G and T, by Article Types Filter (Fig. 6, 7).*

From C, G and T: most of publications were for T at RW (678); the fewest publications were for C at CT (30). From the keywords combinations: most of publications were for TP at CT (18); the fewest publications were for GS, GA, TA and GP at RW (0); for Sport, most of publications were for CS and TS at CT (6); for Athlets, most of publications were for CA, GA and TA at CT (1); for Performance, most of publications were for TP at CT (18). Most of publications for CT were for TP (18). Most of publications for RW were for CS and TS (6).

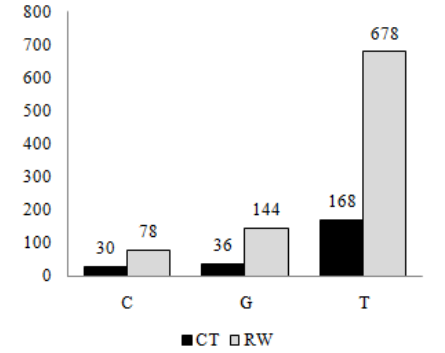


Fig. 6. Comparative analysis of C, G and T, by *Article Types Filter*

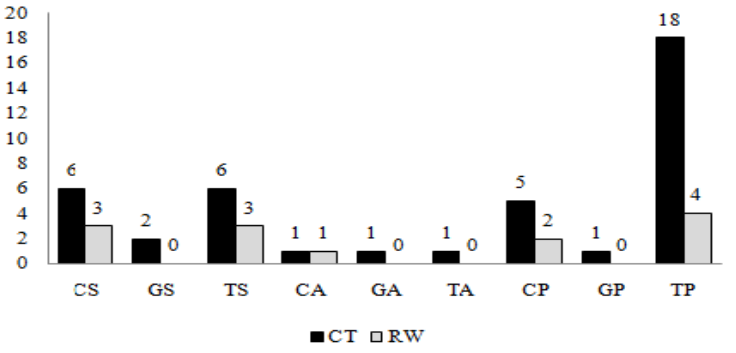


Fig. 7. Comparative analysis of keywords combinations by *Article Types Filter*

**Discussion**

*1) Specifications*

This article is a continuation of previous research of the authors, regarding the topic of: sport and plant supplements (Jurcău et al., 2017; Jurcău et al., 2018); sport and stres (Jurcău & Jurcău, 2014; Jurcău et al., 2015); stress, sport and adaptogens (Jurcău et al., 2019a; Jurcău et al., 2019b).

*2) Analysis for the results of the present study*

*Publication time period.* Considering the time period of the publications, the oldest interest is for T (1876), and of the keyword combinations for the sport field, for TA (1975). Interestingly, studies on the use of C, G and A in performance had the same period of onset, the 80s, while studies on the use of C, G and T in athletes, had different periods of onset and one variable. interest in time. Overall, interest in the use of C, G and T in sports is relatively recent, compared to the interest for the three plants in general.

*Total number of publication (N).* Reported to the total number of publications (N), the highest interest was for T (5193) and for the use of T in sports, in particular in performance (TP = 208).

*Number of years of publication.* Based on the number of years the studies were published, for the publication periods, it is found that, of C, G and T, the greatest interest, in time, was for G (87 years), and the smallest, for T (43 years). However, in the field of sport, the greatest interest, over time, was given to the use of T in sport, a proof that

most years were for appropriate publications the combinations of keywords with T, that is to say TS (18 years), TA (44 years) and TP (38 years). Of all the key word combinations, the most studied in time was TA (44 years), hence we can consider that the use of T for athletes may be of greater interest and more than the use of T in sports, in general or in performance. On the opposite side, for GA it was only one year of publications.

*Filters*

*Species Filter*. Of C, G and T, the highest interest was for studies with human subjects, at T (2141 publications), and the smallest, for animal studies, at C (341 publications). Of the keyword combinations related to the field of sport, the greatest interest was for animal studies, for T (76 publications), and the smallest, for animal studies, for GA and TA (0 publications).

*Sex Filter*. Of C, G and T, the highest interest was for studies with human subjects of both genders, at T (614 publications), and the smallest, for studies with female human subjects, at C (66 publications). Of the keyword combinations related to the field of sport, the highest interest was for studies with human subjects of both genders, at TP (21 publications), and the smallest, for studies with female human subjects, at CA and GA (0 publications).

*Article Types Filter*. Of C, G and T, the highest interest was for RW studies, at T (678 publications), and the lowest, for CT studies, at C (30 publications). Of the keyword combinations related to sports, the highest interest was for CT studies, TP (18 publications), and the smallest, for RW studies, GA, TA and GP (0 publications).

*3) Exemplification of actions of the C, G and T. A Pubmed quote evidence*

*Importance of Cordiceps in sport and physical effort.*Cordicepos increases endurance (Chiou et al., 2000; Koh et al., 2003), aerobic capacity (Li et al., 1993), resistance to muscle fatigue in sedentary subjects (Nagata et al., 2006); improves cardiovascular activity in healthy runners (Nagata & Tajima, 2000); increases the capacity of resistance to effort (Kumar et al., 2011); and has antioxidant action in situations of exhausting physical exertion (Yan et al., 2014).

*Importance of Ganoderma in sport and physical effort.* Due to its composition it has multifle medical uses (Peterson, 2006) and important antioxidative effects (Wang et al., 2013). Polysaccharides are the main active components (Zhang et al., 2008). Ganoderma lucidum improves the physical performance of patients suffering from fibromyalgia (Collado et al., 2015), increases physical performance, and improves recovery from physical fatigue (Li et al., 2018).

*Importance of Turmeric in sport and physical effort*. Turmeric as it promotes health, improves exercise performance and prevents fatigue (Huang, 2015). Curcumin reduces inflammation and improves performance in situations of excessive muscle injury (Devis et al., 2007); reduces oxidative stress caused by muscle injury, after intense physical exertion (Kawanishi et al., 2013); has analgesic effects in painful osteo-muscular disorders associated with intense physical activity (Drobnic et al., 2014; Di Pierro et al., 2017); and contributes to increased muscle performance (Nicol et al., 2015).

**Instead of conclusions**

1. Studies on C, G and T are of great interest.
2. The use of C, G and T in sport, although still slightly numerically representative, is increasing especially in recent years, proving interest in this topic.
3. The greatest interest was represented by studies with T, on human subjects of both genres, review type, as well as by studies for the use of T in performance.
4. Further scientific research regarding the use of C, G and T in increasing sports performance are required, as well as the publication of practical results obtained with products containing C, G and T, which are already used in sports.

**Conflicts of interest**

Nothing to declare.

**Acknowledgement**

Nothing to declare.

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# ACTION OF OLIVUM®, OLIVE-LEAF EXTRACT, ON MALONDIALDEHYDE IN PHYSICAL EFFORT, A BRIEF-RESEARCH

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**Abstract**

***Background***. Olive leaves, particularly oleuropein and hydroxytirosol, an important polyphenol present in OL, are already known for their benefits. Much less is studied the olive leaves use in sports.
*Objectives*. The objective was to highlight the importance of Olivum®, olive leaves extract, on oxidative stress, in physical effort.
***Methods***. 24 healthy adult volunteer men formed 4 groups: control (C=6), without treatment; placebo (P=6); who received Olife daily, for 15 days (OL1=6); who received Olife daily, for 30 days physical effort (OL2=6). All participants were subjected to the same type of stress: an intense and short term intense acute and short term physical effort on the treadmill. The product administered was Olife containing 93% of Olivum®. Evaluation moments: T1 - before OL1 and OL2 administration; T2 - 15min after physical effort; T3 - 4h after physical effort. The analyzed parameter: malondialdehyde (MDA). The results obtained were analysed using SPSS statistical package. .
***Results***. Compared to T1, the differences between MDA values were significant for: C and P (T2, $p<0.00001$and T3, $p<0.00001$); OL1(T2, $p=0.000013$ and T3, $p=0.000018$); OL2 (T2, $p=0.0001$ and T3, $p=0.00017$). At T1 and T2, compared to C, the differences between the MDA values were significant at both OL1 and OL2. The difference between the MDA values at OL1 and OL2 was significant (T2, $p=0.00075$; T3, $p=0.00062$).
***Conclusions***. 1) The intense physical effort of running on the treadmill determined, for all the groups, a similar dynamics of the MDA values, but different in intensity. 2) Under the Olife (Olivum®) influence, MDA values were reduced immediately and four hours after the intense physical exertion, compared to the control group. 3) The antioxidative efficiency of Olife (Olivum®) was significantly higher after daily administration, for 15 days, compared to the administration of only before physical effort. 4) We suggest the use of Olife (Olivum®) to ensure the antioxidative protection in the situation of intense physical effort, of running on the treadmill, to sedentary persons.

*Key words*: olive leaves exctract, Olivum®, malondialdehyde, sport

## Introduction

Olive leaves have been used historically in Mediterranean countries (Hadrich et al., 2016), in the human diet (Nunes et al., 2016), in cosmetics (Rodrigues, Pimentel & Oliveira, 2015) and for their anti-inflammatory, antihypertensive, hypoglycemic and anxiolytic actions (Kaeidi et al. 2011) and antioxidant (Elgebaly et al., 2017; Jabalbarezi Hukerdi et al., 2019), as reducing lipid peroxidation (Ustuner et al., 2018). The olive leaf has an important content of oleuropein and phenolic products (Lee at al., 2009).

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Hydroxyethrosol (HTS) is a phenolic compound present in olive leaf extract and in olive oil (Martínez et al., 2018; Orak et al., 2019). After gallic acid, HTS is recognized as the most potent antioxidant compound (Martínez et al., 2018). The ORAC (oxygen radical absorption capacity) value of HTS (68,576) is 15 times higher than that of green tea and 3 times higher than CoQ10 coenzyme (Lee Richards, 2014). HTS is the oleuropein precursor (Martínez et al., 2018). Oleuropein is an oth important compound for the pharmacological properties of olive leaves (Sarbishegi et al., 2014; Hadrich et al., 2016), whose role has been proven through numerous in vitro and in vivo studies (Pourkhodadad et al., 2016).

Excess reactive oxygen species (ROS) and reactive nitrogen species (RNS) cause oxidative stress; ROS oxidize proteins, lipids and nucleic acids, leading to structural and functional modifications of these molecules (Ito, Sono & Ito, 2019). Lipids are oxidized by enzymatic oxidation, free radical-mediated non-enzymatic oxidation, and non-radical non-enzymatic oxidation (Niki et al., 2005). Lipid oxidation generates hydroperoxides, which by fragmentation lead to the formation of reactive intermediates, such as malondialdehyde (MDA) (Ito, Sono & Ito, 2019).

Regular and physical exercises can have beneficial effects, but intense physical exercises performed by untrained people can have harmful effects (Nogueira et al., 2019). Some aerobic and anaerobic exercises, as well as physical training, can induce an acute state of oxidative stress (Fisher-Wellman & Bloomer, 2009). For example, immediately after acute aerobic exercise, there is a substantial increase in DNA damage, and this increase remains significant between 2 h and 1 day, but not at 5-28 days after exercise (Tryfidou et al., 2019).

**Hypothesis**

Olive leaves are known for their antioxidative effects, but are less studied in the context of intense physical effort.

**Objectives**

The objective was to highlight the importance of Olivum®, olive leaves extract, on oxidative stress, in physical effort.

**Material and methods**

*Research protocol*

a) *Period and place of the research*

Study have been carried out in August 2019, in the 122 Medical Family Cabinet in Cluj-Napoca.

b) *Subjects and groups*

The study involved 24 healthy adult volunteer men who met the inclusion conditions: not consume alcohol, coffee, do not smoke and not to use any medication and no antioxidant the day before and during the physical effort. There were 4 groups: control (C=6), without treatment; placebo (P=6); who received Olife daily, for 15 days (OL1=6); who received Olife daily, for 30 days physical effort (OL2=6). The data regarding the age, body mass and height of the participants are presented in Table 1.

Table 1. Age, body mass and height of the participants

| | | C | P | OL1 | OL2 |
|---|---|---|---|---|---|
| Age (years) | Mean | 23.66 | 25.5 | 23.83 | 23.66 |
| | SD | 3.249 | 2.217 | 3.387 | 2.924 |
| Body mass (kg) | Mean | 75 | 79.33 | 81 | 79 |
| | SD | 2.709 | 6.369 | 7.141 | 5.597 |
| Height (cm) | Mean | 176.9 | 179 | 181.16 | 179.16 |
| | SD | 4.45 | 3.651 | 5.699 | 3.715 |

c) *Tests applied*

*1)Study design*

*Participants.* All participants were subjected to the same type of stress: an intense and short term intense acute and short term physical effort on the treadmill. Before physical testing, the participants followed a 8-min heating muscle, on a cycle ergometer, adjusted to 30 watt. After a 12 min break, followed the proper testing, realized on the treadmill. The effort test was the same for all groups and consisted of running on the treadmill carried until the advent of fatigue feeling (perceived by each subject).

*Olife - OLIVUM®*. The product administered was Olife (1). Olife contains 93% of OLIVUM® and 7% Calendula Officinalis. Olivum is the exclusive infusion obtained from the manually harvested olive leaves, from the olives on the hills of the Friuli Rosazzo region, in Italy. Olivum® is obtained by a process that preserves all the healing properties of olive leaves.

According to the result of the chromatographic analysis performed at the Department of Life Sciences, from the University of Trieste, from July 10, 2012, Olivum® (2) contains:

- Oleuropeine - 185.7 mg / g lyophilized powder, corresponding to 2656 mg / l decoct;
- Hydroxytirosol - 14.9 mg / g lyophilized powder, corresponding to 231 mg / l decoct;
- Tyrosol - 12.2 mg / g lyophilized powder, corresponding to 174 mg / l decoction;
- Hellenic acid - 97.4 mg / g lyophilized powder, corresponding to 1393 mg / l decoction;
- Routine - 16.6 mg / g lyophilized powder, corresponding to 237 mg / l decoction;

*Administration protocol.* Each participant in OL1 and OL2 received the same amount of Olife / dose, respectively 70 ml / day, administered in the morning, before eating.

*2)The indicators determination program* was the same for C, OL1 and OL2, beeing carried out as follows:

- time 1 = T1 - before OL1 and OL2 administration
- time 2 = T2 - 15min after physical effort
- time 3 = T3 - 4h after physical effort

*3)Explorations*

The analyzed parameter was the *malondialdehyde* (MDA) from venous blood, using liquid chromatography method under high pressure (HPLC) with fluorescence detection (3).

d) *Statistical processing*

The results obtained were analysed using SPSS 19.0. statistical package.

For continuous data examination, Student's t test has been used.

The differences were considered significant at a $p< 0.05$.

**Results**

Note that the *reference values* were those of C and the *reference times* were considerate to be T1.

*a) Analysis for groups*

*Analysis for C* (Table 2). Compared to T1, the differences between MDA values for C were significant at both T2 ($p<0.00001$) and T3 ($p<0.00001$). The difference between the MDA values at T2 and T3 was insignificant (0.7614).

Table 2. Comparison of MDA values for C

| | T1 | T2 | T3 |
|---|---|---|---|
| Mean | 0.471 | 4.02 | 3.96 |
| SD | 0.139 | 0.312 | 0.296 |
| compared to T1 - p-value | | < 0.00001 | <0.00001 |
| compared to T2 - p-value | | | 0.7614 |

*Analysis for P* (Table 3). Compared to T1, the differences between MDA values for C were significant at both T2 ($p<0.00001$) and T3 ($p<0.00001$). The difference between the MDA values at T2 and T3 was insignificant (0.7614).

Table 3. Comparison of MDA values for P

| | T1 | T2 | T3 |
|---|---|---|---|
| Mean | 0.559 | 4.195 | 4.139 |
| SD | 0.202 | 0.494 | 0.492 |
| compared to T1 - p-value | | <0.00001 | <0.00001 |
| compared to T2 - p-value | | | 0.4299 |

*Analysis for OL1* (Table 4). Compared to T1, the differences between the MDA values for OL1 were significant at both T2 ($p=0.0001$) and T3 ($p=0.00017$), but for T3, the difference was smaller. The difference between the MDA values at T2 and T3 was insignificant (0.2037).

Table 4. Comparison of MDA values for OL1

| | T1 | T2 | T3 |
|---|---|---|---|
| Mean | 0.64 | 1.63 | 1.56 |
| SD | 0.161 | 0.226 | 0213 |
| compared to T1 - p-value | | 0.000013 | 0.000018 |
| compared to T2 - p-value | | | 0.6332 |

*Analysis of OL2* (Table 5). Compared to T1, the differences between the MDA values for OL2 were significant at both T2 (p=0.000013) and T3 (p=0.000018), but for T3, the difference was smaller. The difference between the MDA values at T2 and T3 was insignificant (0.6332).

Table 5. Comparison of MDA values for OL2

| | T1 | T2 | T3 |
|---|---|---|---|
| Mean | 0.609 | 1.13 | 1.09 |
| SD | 0.177 | 0.064 | 0.042 |
| compared to T1 - p-value | | 0.0001 | 0.00017 |
| compared to T2 - p-value | | | 0.2037 |

*b) Analysis for moments* (Table 6)

*Analysis for T2*. At T2, compared to C, the differences between the MDA values were significant at both OL1 (p<0.00001) and OL2 (p<0.00001). The difference between the MDA values at OL1 and OL2 was significant (p=0.00075).

Table 6. Comparison of MDA values for T2 and T3

| | | C | P | OL1 | OL2 |
|---|---|---|---|---|---|
| T2 | Mean | 4.02 | 4.195 | 1.63 | 1.13 |
| | SD | 0.312 | 0.494 | 0.226 | 0.064 |
| | compared to C - p-value | | 0.2613 | < 0.00001 | < 0.00001 |
| | compared to OL1 - p-value | | | 0.00075 | |
| T3 | Mean | 3.96 | 4.139 | 1.56 | 1.09 |
| | SD | 0.296 | 0.492 | 0.213 | 0.042 |
| | compared to C - p-value | | 0.2536 | < 0.00001 | < 0.00001 |
| | compared to OL1 - p-value | | | 0.00062 | |

*Analysis for T3*. At T3, compared to C, the differences between the MDA values were significant at both OL1 (p<.00001) and OL2 (p<.00001). The difference between the MDA values at OL1 and OL2 was significant (p=0.00062).

c) *Analysis for T2/T1 and T3/T1* (Fig. 1 and 2). In the case of T2 / T1, the largest differences between the MDA values were at C (8.5) and the smallest at OL1 (1.86). In the case of T3 / T1, the largest differences between the MDA values were at C (8.4) and the smallest at OL1 (1.77). For both T2 / T2 and T3 / T1, the values of the ratios were close to each other, but higher to OL2 (T2 / T1 = 2.55; T3 / T1 = 2.44).

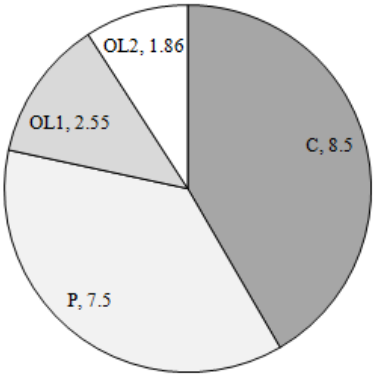


Fig. 1. Analysis for T2/T1

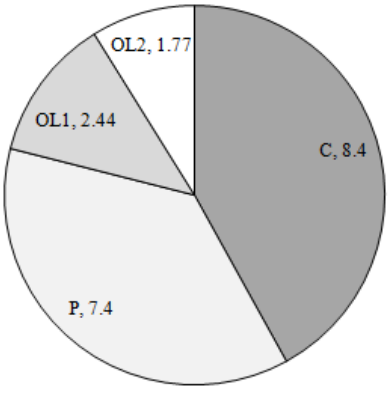


Fig. 2. Analysis for T3/T1

**Discussion**

*1) Specifications*

This article is a continuation of previous research of the authors, regarding the topic of: sport and plant supplements (Jurcău & Jurcău, 2014; Jurcău et al., 2017); sport and stres (Jurcău et al., 2013; Jurcău et al., 2016b); sport and oxidative stress (Jurcău et al., 2016a); sport and malondialdehyde (Jurcău & Jurcău, 2017).

*2) Analysis for the results of the present study*

*Impact of intense and short-term physical exertion on MDA.* Under the influence of intense and short-term physical exertion, MDA values increased, at T2, in all groups and remained increased at 6 hours after exertion. The highest increases were for C and P, and the smallest for OLE2. The differences between the MDA values for C and P were insignificant, both at T2 and at T3, which proves that the placebo used did not provide antioxidative protection.

*The influence of Olife on the MDA.* Under the influence of the Olife product, which has a content of 93% Olivum®, both for the administration for 15 days and for the administration of 30 days, the MDA values were significantly lower, compared to C, both at Q2 and Q3 . This fact proves the protective anti-oxidative effect of this product, under the conditions of physical effort. Significant differences between OL1 and OL2, both at T2 and at T2, prove that the most intense effect of Olife was after 30 days administration.

*Analysis of T2 / T1 and T3 / T1 ratios.* It is found that the largest differences between the MDA values were for C and P, where the ratios had close values. This fact further emphasizes the impact of the pro-oxidative effect of physical effort and lasting exercise assessed. On the other hand, the lowest values of the ratios were for OL1 and OL2, which proves the intense protective effect of the Olife product, against the impact of the oxidative stress induced by this type of physical effort. The antioxidant effect of Allife has been shown to be longer than 30 days, compared to 15 days.

*3) Exemplification with Pubmed quote evidence*

*Hydroxyethrosol and oleuropien*. Polyphenol derivatives from olive leaves have proven antioxidant, and by reducing MDA detection (Rizzo, 2017). HTS is found in the leaves and the olive pulp (Lee Richards, 2014). HTS is one of the most potent phenolic antioxidant compounds in olive extract, in addition, in the order of antioxidative importance, it is followed by oleuropein (Martínez et al., 2018). Oleuropeine is useful to prevent or minimize the incidence of rhabdomyolysis due to its strong anti-stress, anti-inflammatory and anti-apoptotic effects (Yin, 2019). Oleuropeine is an essential component of Olivum® extract, from olive leaves, used in this study through the Olife product; in addition, Olivum® also contains a significant amount of hydroxytyrosol (3).

*MDA and oxidative stress.* Severe stress can cause oxidative damage to proteins, lipids and cellular DNA (Halliwell & Cross, 1994). Oxidative stress is a condition that appears as a result of an imbalance between increased free radical production and the antioxidant defense system that cannot cope with them (Fisher-Wellman & Bloomer, 2009). MDA is an important biomarker of lipid peroxidation (Ito, Sono & Ito, 2019), thus, a biomarker of the oxidative stress (Nardi et al., 2018), very useful in its assessing (Tsikas, 2017).

*Physical exercise and oxidative stress.* Exercise can be accompanied by increased production of free radicals, leading to various oxidative changes (Vollaard, Shearman & Cooper, 2005). Exercise type, intensity, and duration may impact oxidative stress intensity (Fisher-Wellman & Bloomer, 2009). Thus, severe physical activity leads to a marked increase in the production of free radicals, a source of oxidative stress (Vafaee et al., 2019).

The results obtained in our study, on MDA, by using Olife pruduct, containing 93% Olivum®, are consistent with recent research that affirms the antioxidant role of olive leaf extracts. Thus, the Olife product used in this study, which has a high concentration of olive leaf extract, confirmed the antioxidative action conferred by Olivum® composition. The difference from the cited studies is given by the use in our study of an infusion with a high concentration of oleuropein, which provided an important antioxidative protection, in the chosen physical exercise model, of running on the treadmill.

**Conclusions**

1. The intense physical effort of running on the treadmill determined, for all the groups, a similar dynamics of the MDA values, but different in intensity.
2. Under the Olife (Olivum®), influence, MDA values were reduced immediately and four hours after the intense physical exertion, compared to the control and placebo groups.

3. The antioxidative efficiency of Olife (Olivum®) was significantly higher after daily administration, for 15 days, compared to the administration of only before physical effort.
4. We suggest the use of Olife (Olivum®) to ensure the antioxidative protection in the situation of intense physical effort, of running on the treadmill, to sedentary persons.

## Conflicts of interest

Nothing to declare.

## Acknowledgement

Nothing to declare.

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ICU 2019

# CONTRIBUTION OF PHYSICAL THERAPY TO THE REHABILITATION OF PATIENTS WITH ACUTE STROKE

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**Abstract**

This paper proposes to highlight the role of kinesiotherapy in the functional treatment of patients with acute stroke. The sample comprises 13 subjects (7 men and 6 women) aged between 63 and 71, with ischaemic stroke localised in the middle cerebral artery, in the acute phase, admitted in the Neurology ward of the "Prof. dr. Nicolae Oblu" Clinical Emergency Hospital, Iași.
The initial and final evaluation was carried out using the method of articular testing, of The Barthel Index for Activities of Daily Living and of the FIM scale (Functional Independence Measure).
Our research findings highlight the beneficial effects of movement therapy on patients with ischaemic stroke.

*Keywords:* recovery, passive mobilisation, joint mobility.

## 1. Introduction

The second mortality cause in Romania is represented by stroke, which is currently a major public health concern worldwide, as it is the third cause of death globally, after cardiovascular diseases and oncological disorders. According to the Neuroradiology and Interventional Radiology Society, the annual costs for the treatment of stroke are huge, thus contributing to an increase in the socioeconomic burden. In Romania, four people die every hour because of this disease. From the perspective of public health, it is necessary for the burden caused by stroke worldwide to be monitored and compared over time, in various countries and regions, to determine future projections regarding other serious diseases (Feigin et al., 2017).

The patients with stroke can represent a burden for their families due to the difficulties and limitations entailed by their recovery, by avoiding risk factors, which is a very important component for the rehabilitation and the increase in the quality of life (Gheorghias et al., 2019). The difficulty degree of caregivers is all the greater as some patients develop depression, which leads to low functional outcomes, given that the individual has no drive to get involved in the therapeutic activities necessary for their recovery. Studies have confirmed that depression emerged following a stroke leads to a negative influence on motor outcomes, despite pharmacological treatment (Paolucci et al., 2019). On the other hand, there are studies attesting the importance and efficiency of non-pharmacological treatment for depressive symptoms using techniques such as psychotherapy, acupuncture, transcranial magnetic stimulation, melotherapy, physical exercise and robotic therapy (Hadidi et al., 2017).

In order to maximise the possibilities of recovery for patients with post stroke disabilities, the rehabilitation process requires consistent and constant effort from the part of the team, including the patient, the family, the friends and the other caregivers, the family physician, the kinesiotherapist and the occupational therapist, the speech therapist, the nutritionist and other persons, such as social workers. Communication and collaboration between them may lead to a highly effective rehabilitation; the lack of teamwork decreases the maximum potential of rehabilitation (Winstein et al., 2016).

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This disease is devastating from physically and mentally and it impairs the possibilities of performing daily living activities, thus lowering the quality of life of an individual and of his family (Lucaci & Neculăeș, 2018). The means of kinesiotherapy represent the basis of the recovery treatment of the patient with stroke, in order to obtain movement autonomy, self-care and, not last, socio-professional reinsertion (Hodorcă et al., 2018).

Some clinical trials highlight that the initiation of kinesiotherapy in the first 2 weeks from the onset of stroke may improve the functional outcomes of patients, the movement induced by constraint, with benefits on the motor capacity of the upper limb (Coleman et al., 2017).

Early mobilisation is described in some clinical trials, which argue that kinesiotherapeutic intervention begin right after stroke, entailing specific activities for practicing sitting and walking, during the acute hospitalisation phase. In other cases, early mobilisation refers to the simple the passive movement of the limbs, in bed or by positioning them outside the bed (Bernhardt et al., 2015).

In a study carried out in Australia, on a sample of 443 healthcare professionals, regarding early mobilisation of patients with stroke, we concluded that compared to 2008, in 2014 a significantly higher number of specialists believe that quick kinesiotherapeutic intervention is also beneficial and it has no downsides for the patients (Lynch et al., 2017).

The prognosis of recovering motor deficit and functional outcomes represents a difficult stage and it is a crucial element of rehabilitation and of the discharge plan for the patients. The status of an individual with severe deficit of the upper limb may be useful in differentiating between efficient motor recovery and a minimum potential of function reprisal (Stinear, 2017).

The role of kinesiotherapy in the acute phase of stroke is, first f all, to prevent decubitus complications, to avoid joint stiffness and musculotendinous retractures that lead to blocking the joints in vicious positions. Furthermore, therapy through movement preserves muscle elasticity and tries to rewrite the body scheme of patients, which will tend to neglect the impaired half of the body.

Stroke involves the onset of physiological and pshysiopathological modifications at cerebral level, which may be grouped intro three main recovery periods. The first stage is represented by the first hours after the stroke and it provides the possibility of saving the tissue by reperfusion or neuroprotective treatment. In the second stage, which begins on the second day post stroke and goes on for a few weeks, cerebral repair processes take place, and the spontaneous curing mechanisms are little represented. The last stage refers to the chronic phase of cerebral repair, as the brain is relatively stable and with the possibility of modifying the structure (Cassidy & Cramer, 2016), which confirms that recovery therapy has a very important role for maximising the functional potential.

From a clinical perspective, the greatest success in the optimisation of functional recovery is training through kinesiotherapy, which proposes to re-educate and to maintain optimal physical, intellectual, mental and social function. The effects induced by this therapy lead to the generally accepted principle that supports the idea according to which neuromotor recovery depends on the use of active potential (Hara, 2015).

## 2. Material and method

The study was carried out on a sample of 13 subjects (7 men and 6 women) aged between 63 and 71 years old, with ischaemic stroke localised in the middle cerebral artery, in the acute phase, admitted in the Neurology ward of the "Prof. dr. Nicolae Oblu" Clinical Emergency Hospital, Iași.

The functional testing of the subjects was based on the passive evaluation of joint mobility, The Barthel Index for Activities of Daily Living (assessing bowel transit, bladder, personal care, toilet use, diet, transfer, mobility, capacity to get dressed and to bathe) and the FIM scale (Functional Independence Measure), assessing the type of food (solid, liquid), bladder and anal control, memory, the need of assistance for: personal care, washing the face and the hands. The tests were carried out at the beginning of the kinesiotherapy sessions and after 3 weeks.

The subjects benefited from kinesiotherapy sessions daily with duration of 60 minutes for 3 weeks, which included passive mobilisation, posturing, bed turns, bronchial drainage and transfer to sitting from lying down. Passive mobilisation targeted the preservation of joint mobility and of muscle elasticity, thus preventing muscular atrophy and tendinous retractions. Bed turns were meant to relax the pressure areas and to use remaining muscle

strength on the healthy half of the body, to change the position of the body on the bed. By applying tapping on the dorsal area, we have favoured the drainage of bronchial secretions and the limitation of stases.

## 3. Results

In order to quantify the results obtained from the initial testing to the final testing, we calculated the means of the values obtained by the 13 subjects for each test.

In Figure 1, we represented the average values of the initial and final evaluation for the passive mobility of the joints of the impaired upper limb.

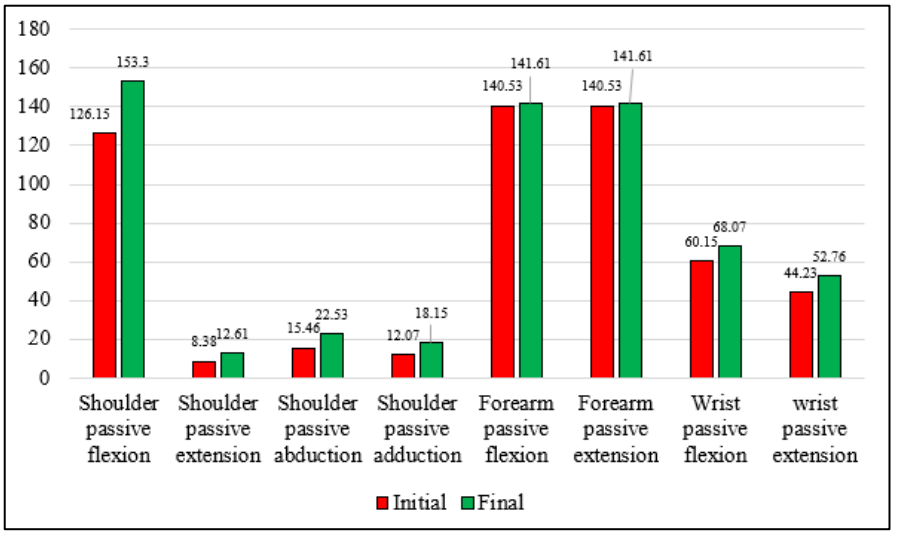


Fig. 1. Passive joint mobility of the impaired upper limb

According to Figure 1, the passive mobility of the impaired upper limb improved from the initial to the final evaluation due to the passive mobilisations aiming at preserving muscle elasticity and at preventing the onset of joint stiffness. The values that were lower at the initial testing were due to pain, which was present duringș mobilisation, to the lack of effective cooperation from the subjects, who were still under the effects of the symptoms during the acute stage of stroke. The mobility of the upper limb is an important objective of kinesiotherapy during the onset of ischaemic event, taking into account that 40% of the patients regain some of their dexterity and only 11% achieve complete function regain of the impaired upper limb (Coroian, 2018). Most individuals who suffered a stroke remain with significant sequelae at the level of the impaired upper limb, which decreases their capacity of performing daily living activities independently (Gobbo, 2017).

Some studies have demonstrated the efficiency of robot-assisted passive mobilisations, performed for 6 weeks in a row with o frequency of 5 sessions a week, thus highlighting that this type of training had a positive impact on the function of the impaired upper limb, for the patients with stroke (Taveggia, 2016).

Manual therapy represents a beneficial intervention in the management of functional recovery of the upper limb, as passive mobilisation promotes the inhibition of hyper-excitability of the cortical paths, leading to the alteration of sensations and to impaired sensitiveness (Griffin et al., 2019).

Figure 2 shows the average values of the initial and final evaluation for the passive mobility of the joints of the impaired lower limb.

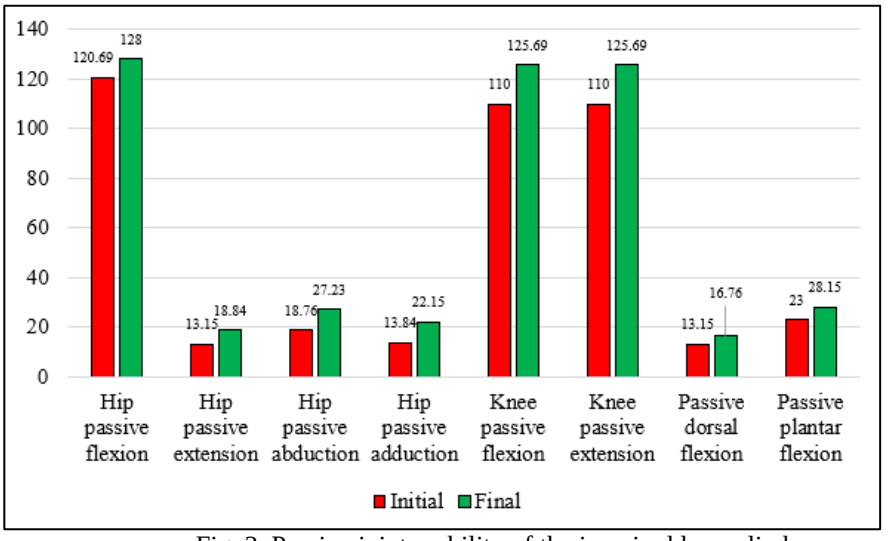


Fig. 2. Passive joint mobility of the impaired lower limb

As illustrated in Figure 2, the passive mobility of the impaired lower limb improved within the two tests. From the initial value of 120.69° (hip flexion), 13.15° (hip extension), 18.67° (hip abduction), 13.85° (hip adduction), 110° (knee flexion and extension), 13.15° (dorsal flexion), 23° (plantar flexion), they reached at the final evaluation the improved values of 128° (hip flexion), 18.84° (hip extension), 27.23° (hip abduction), 125.69° (knee flexion and extension), 16.76° (dorsal flexion), 28.15° (plantar flexion). Passive mobilisation proved its efficiency in the case of the range of lower limb joints, too. The research studies conducted have proved the efficacy of the robotic therapy for the lower limb, too, thus concluding that this therapy proves its efficiency by improving functional outcomes (Zhang et al., 2017, Calabrò, 2015), but such robotic methods are mainly specific to the sub-acute and chronic phase of stroke.

Figure 3 shows the average values of the score obtained by the subjects from the initial to the final evaluation for the Barthel Index.

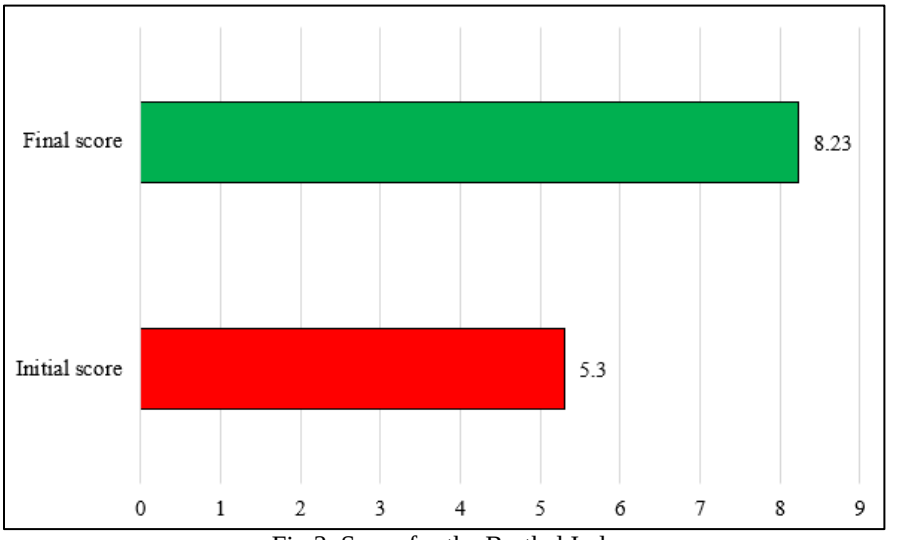


Fig 3. Score for the Barthel Index

As illustrated in Figure 3, within the Barthel Index, the average value of the score obtained by the subjects at the initial evaluation was 5.3 points, while tat the final evaluation, 8.23 points. The increase in the score means better bowel functions, higher feeding possibilities, transfer capacity and mobility. The accuracy and reliability of the Barthel Index was proven over time by studies; it is one of the most commonly used questionnaires for assessing functionality (González et al., 2018).

Figure 4 shows the initial and final average values of the score obtained by the subjects within the FIM scale (Functional Independence Measure).

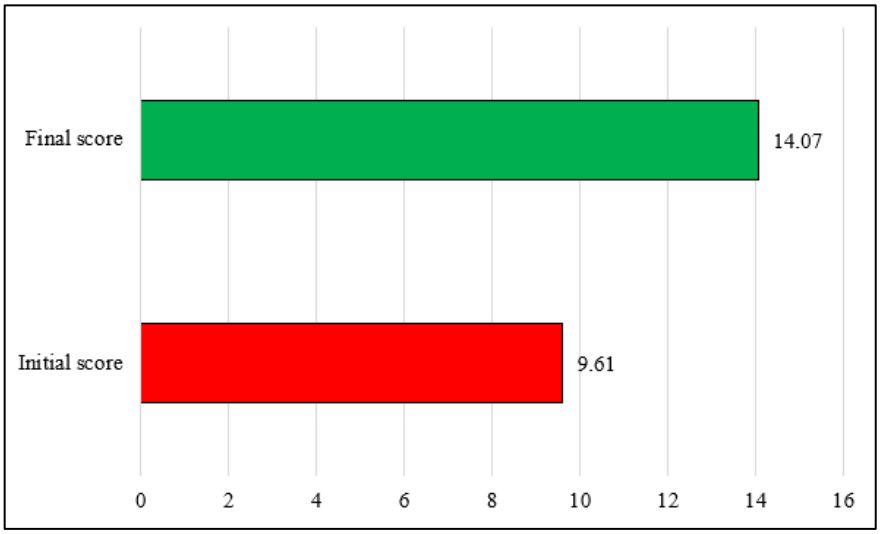


Fig 4. Score of the FIM scale (Functional Independence Measure)

Figure 4 highlight the average evolution recorded by the subjects from the initial average value of 9.61 points to the final average value of 14.07 points, which entails a better capacity of eating solid foods, of washing the face and hands, of controlling the bladder and anal sphincter. This evaluation is necessary in case of patients with ischaemic stroke, in order to quantify their possibilities of regaining the capacity of performing daily living activities (Darzins, 2017).

## 4. Conclusions

Hence, it may be stated that therapy through movement plays a very important role in the treatment of patients with acute stroke. The decubitus complications and the onset of joint stiffness and musculotendinous retractions may be avoided by applying means specific to kinesiotherapy. A thorough and consistent program may lead to a better quality of life for the patients.

The acute phase of recovery after an ischaemic event is difficult, due to the various symptoms that a patient must face, but the presence of a kinesiotherapist is stringent for mitigating the gravity of the sequelae.

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# STRESS MANAGEMENT IN CLUJ-NAPOCA SPORTS HIGH SCHOOL

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**Abstract**

This paper examines the records according to a questionnaire by Cohen et al. *(*1983) of stress level experiencedby the 12th grade students. It focused on their feelings and thoughts reported the last month when this questionnaire was applied. Within the organization, organizational stress has grown as a result of overburdening, existing conflicts between organizational and family demands, more and more health and psychological problems faced by most people in organizations.The research was conducted on April 4th 2018 at the Sports School High School in Cluj-Napoca and involved 30 students, 15 football players and 15 handball players, all male and aged between 18 and 19. After the data were recoreded and processed, we proceeded to the interpretation of the scores for each grade. The scores were then compared as students' activity was led and guided by different teachers even if they attend the same educational establishment.That respective teacher has also been the coach of the gradefor each sport specialty, which may also have been a factor in influencing the stress level in that respective grade.

*Keywords:* stress level, organizational stress, football, handball.

## 1. Introcution

Organizational stress is nowadays one of the most frequently mentioned categories of mental stress, being generated by those stress factors that appear at the workplace, in the organization where the individual works. Among the stress factors we would like to mention: conflicting relationships between colleagues or between subordinates and supervisors, working conditions, environment, communication problems both vertically & horizontally.

Stress has been dubbed the "Health Epidemic of the Century". Regardless of whether we can figure it out or not, it can affect each of us, the organization in which we work, our colleagues, therefore it cannot be ignored. At the individual level, "stress is defined as a factor of interference that destroys a person's mental and physical health and occurs when the body is required more than it can normally provide and is harmful to both individuals, their families, society and organizations that may suffer from the so-called organizational stress" (Hindle, 2001, p. 6).

Stress has increased over the recent years due to the new living and working conditions. To be able to cope with the alert rhythm and every day changes to which we must adapt, it is necessary to increase nervous consumption and make additional efforts. Unfortunately, stress affects people's life from an early age, causing the appearance of disease with serious physical, mental and social consequences. To prevent them, and to adopt a healthy lifestyle, it is very important to be aware of stress issues and its risk factors.

Iamandescu's research on the phenomenon of organizational stress (1997) focused on four main areas, namely:

- stress definition and measurement issues;
- the relationships between stress and family / work inter-relationships;
- the relationships between stress and professional career;
- the important role played by both the social and family environment in stress prevention.

### *1.1. Organisational Stress*

A special category of stress is the organizational (professional) stress - generated by the existence of stressors within the organizational environment, such as conflictual relationships with colleagues, supervisors, working conditions, lack of communication, environment, etc.

Organizational stress is the result of an interaction between:

- the individual characteristics of the person who works, for example the balance between the professional life and family life, social support;
- the characteristics of the situation and working conditions, for example working hours, responsibilities, workload.

Organizational stress occurs in any organization, regardless of its specific features, the number of employees and other characteristics, characterized by the discrepancy that arises between job demands and the abilities of each person to adapt.

Specialized literature gives many definitions of organizational stress. Deaconu, Podgoreanu and Rasca (2005) define organizational stress as representing those: "physical and emotional, harmful responses, which appear when job demands exceed the capabilities, resources, the needs of the individual, which can lead to deterioration or even injury to his / her health state."

a. Effects of organizational stress

When we refer to the effects of organizational stress, we must say that moderate level of stress will be beneficial for the organization to maintain and increase productivity. This moderate level shall be established by the organization and its members. Organizational stress will affect more or less the members of the organization and the organization itself, for a greater or lesser period of time. These should be understood from the point of view of the consequences of stress impacting each member of the organization but also from the perspective of the effects of these consequences on the whole organization.

Zorlențan et al. (1998) classifies the main categories of stress effects as follows:

- *physiological*: increased blood sugar, increased heart rate and blood pressure, dry mouth, abundant sweating, dilated pupils;
- *subjective, psycho-individual*: anxiety, aggression, apathy, boredom, depression, fatigue, frustration, irritability, low self-esteem, nervousness, feelings of inferiority;
- *cognitive*: the inability to make relevant decisions, decreased ability to focus attention, hypersensitivity to criticism, mental blocks;
- *behavioural*: predisposition to accidents, addiction, emotional outbursts, bulimia, alcohol or tobacco abuse, nervous laughter, loud crying;
- *psycho-organizational*: absenteeism, decreased productivity, poor relationships with other members of the organization, reduced involvement, work dissatisfaction, decreased trust and loyalty in / to the organization.

Regarding the ways in which the organization can reduce stress, Armstrong (2006) mentions: performance standards (setting reasonable, achievable goals which can motivate the employees, but without forcing them to perform tasks impossible to accomplish according to their abilities; performance management - allows for a dialogue between managers and individuals regarding their future tasks, problems and ambitions; performance training management - counselling techniques by means of which managers can relieve stress and reduce others' people stress; "work-life balance" policies that focus on the pressures experienced by the employees who have responsibilities as parents and need a flexible work schedule.

Stress can be prevented and reduced by also offering social support to those who are going through a stressful period. This is why communication and further discussions are crucial in reducing stress. This can be achieved by creating a climate of collegiality and mutual support between employees. The discussions between the leaders and those employees who have problems are also important. These employees should be treated with patience and will be provided with understanding and support. Support can be materialized by means of counselling sessions, temporary reduction of workload, participation in a physical exercise program, etc. The support given to people under stress must follow certain steps: discussing the problem they face and its cause – whether job-related or personal problems, identifying the type of support they want - discussions, training, medical assistance, monitoring the effectiveness of the program chosen by mutual agreement and its change, if necessary.

*1.2. Conducting the survey*

The survey was conducted on May 4, 2018 by means of a questionnaire designed to allow 30 respondents, male, aged 18-19 years to select the answer. The sample consisted of 15 students from the football gradeand 15 students from the handball grade, respectively.

The survey to assess the stress level experienced by the students in the football and handball grades respectively was conducted in Cluj-Napoca Sports High School.

The main goal and purpose of this organization regarding the students (sportsmen), after graduation from the high school and consequently, leaving the organization, are as follows:

- graduating from high school after having performed and passed the High school leaving examination when students can opt for two subjects from theoretical or practical sport training;
- obtaining a certificate entitling the graduates to be employed as a sports instructor, sports facility manager, competition organizer or physical education substitute teacher;
- the right to attend the courses of any faculty in any field of study.

The essential material for social survey was a questionnaire on stress levels during the last month - PSS14 (Cohen, Kamarch, & Mermelstein, 1983). The questions in this scale ask about their feelings and thoughts during the last month. In each case, they were asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and they should treat each one as a separate question. The best approach is to answer fairly quickly. That is, they were told not to try to count up the number of times they felt a particular way; rather indicate the alternative that seems like a reasonable estimate. An important clarification regarding the questionnaire is that it was anonymous. The respondents had only to mention the gender and the grade to which they belonged

*1.3. Interpretation of Results*

According to *Cohen et al*. (1983) interpretation of the PSS14 questionnaire is made according to the following algorithm: the scores for each respondent (see table 2) are obtained by reverse coding items for questions 4, 5, 6, 7, 9, 10 and 13, and then summing the reverse coding items with the remaining items.

Table 1. Data interpretation template

| Item | 1 | 2 | 3 | **4** | **5** | **6** | **7** | 8 | **9** | **10** | 11 | 12 | **13** | 14 | Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Raw data | 0 | 4 | 1 | **2** | **0** | **3** | **4** | 1 | **3** | **1** | 2 | 2 | **0** | 4 | |
| Coded data | 0 | 4 | 1 | **2** | **4** | **1** | **0** | 1 | **1** | **3** | 2 | 2 | **4** | 4 | 29 |

The interpretation of the score will be made according to the result obtained and will fall into one of the following three categories:

- Scores ranging from 0-18 would be considered low stress
- Scores ranging from 19-36 would be considered moderate stress
- Scores ranging from 37-56 would be considered high perceived stress

In the first part of the research, we tried to interpret the scores for the answers in the questionnaire submitted to each grade, respectively the football gradeand the handball gradefrom Cluj-Napoca Sports High School.

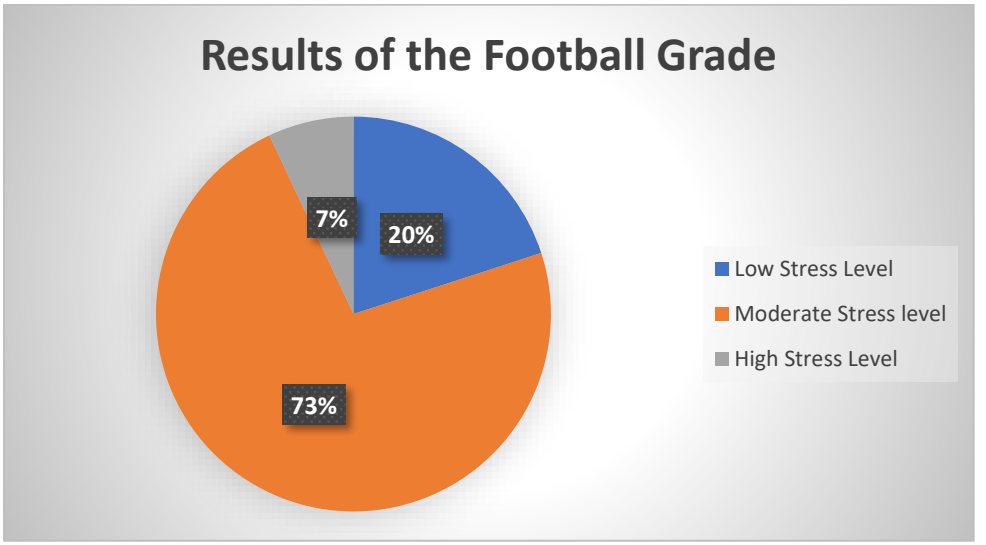


*Fig. 1. Stress level for the football grade*

According to figure 1, the football grade shows all three stress levels considering the scores and are as follows: 11 respondents, representing 73% had a score after interpreting the questionnaire between 19 - 36 meaning a moderate stress level, 3 respondents representing 20% had a score between 0 - 18 meaning a low stress level and 1 subject representing 7% had a score between 37 - 56 considered to be a high stress level.

It is worth mentioning that the questionnaire was submitted in the month at the end of the national junior championship for students under 19 years where these students participated during the school year. This was not an impediment to validate their answers as the questions refer to the feelings and thoughts they had during the last month, when they were still involved in the competition.

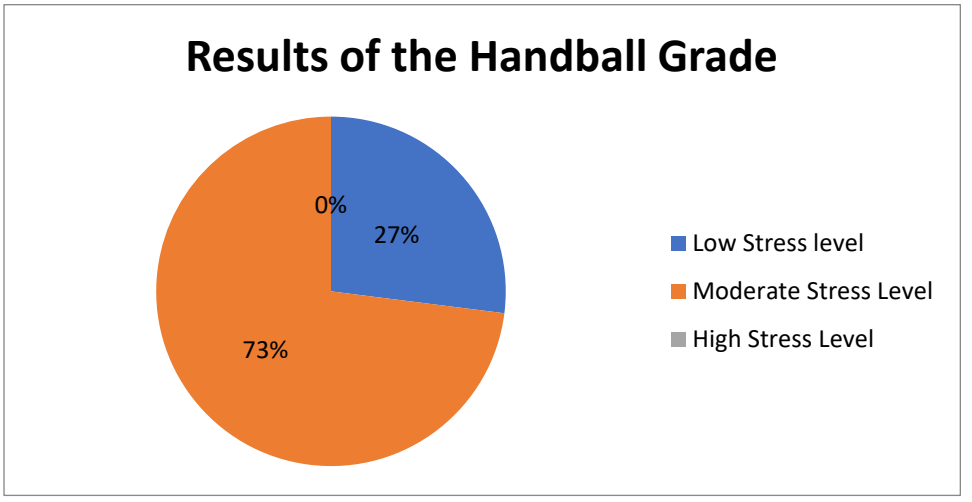


*Fig. 2. Stress level for the handball grade*

According to figure 2, the students in the handball grade experienced only two types of stress levels according to the results interpreted according to the questionnaire. The results are as follows: 11 respondents, representing 73% had a score after interpreting the questionnaire between 19 - 36 which means a moderate stress level, 4 respondents representing 27% had a score between 0 - 18 meaning a low stress level.

The students in the handball grade were submitted the questionnaire, comparably to the students in the

football grade, at the end of the national junior championship for students under 19 years where these students participated during the school year. This was not an impediment to validate their answers as the questionnaire refers to the feelings and thoughts they experienced during the last month, when they were still engaged in the competition.

### 1.4.Comparison of results between the two grades

A comparison regarding the scores obtained by the students of the football grade and the handball grades necessary. Even if they attended the same educational establishment, namely the Cluj-Napoca Sports High School, they were supervised and guided by a different teacher. That teacher is also the coach of the grade. It can also be a factor influencing the stress level experienced by the grade.

According to the interpretations of the score for each grade, as far as low stress level is concerned (see figure 3), we made a comparison in this respect.

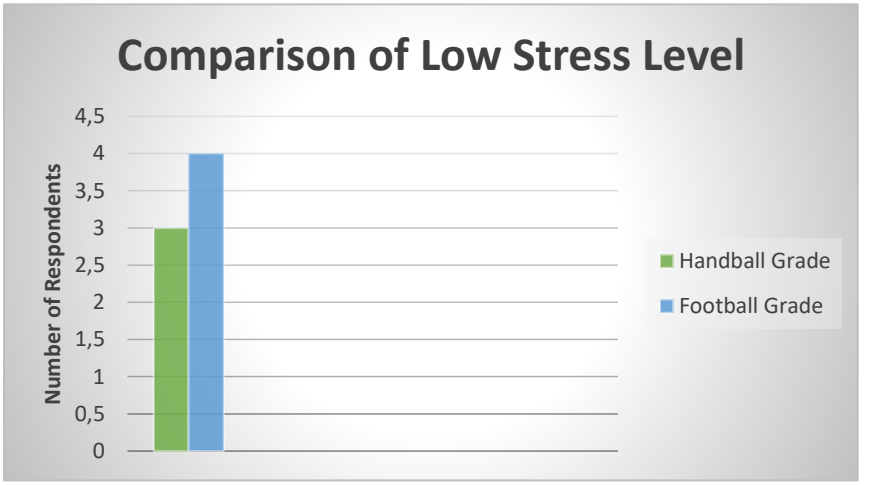


*Fig. 3. Comparison of Low Stress Level*

Chart 3, regarding a comparison of low stress level between the two grades consisting of a number of 3 respondents in the football grade, show a score for low stress level after questionnaire interpretation. As for the handball grade, there were 4 respondents with this score.

The comparison regarding the score of moderate stress level (see figure 4) between the two grades indicates that this is the area where the most respondents ranged.

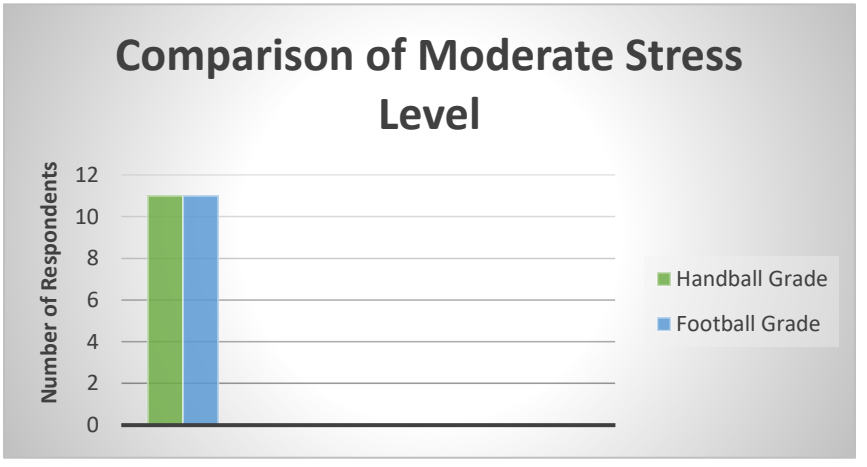


*Fig. 4. Comparison of moderate stress level*

A comparison of the scores of the two grades as a result of questionnaire interpretation shows as follows: scores ranging between 19 - 36 is considered moderate stress, was expressed, to my surprise, as shown in chart 4, by an equal number of respondents, namely 11 in each grade are considered to have experienced a moderate stress level, which means 73% of those surveyed.

The last comparison between the two grades is for high perceived stress (see figure 5), being the most alarming area for any individual within an organization.

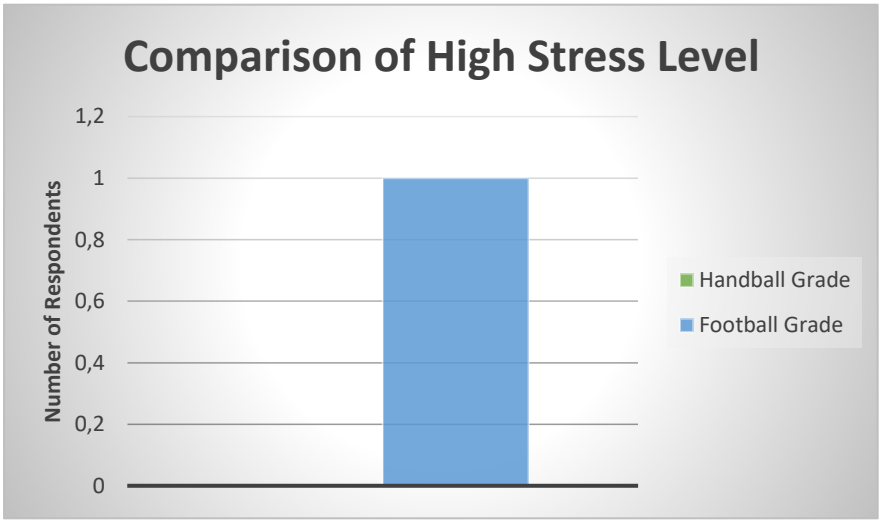


*Fig. 5. Comparison of high perceived stress*

It is worth noting that, according to figure 5, none of the respondents of the handball grade experienced high stress. None theless, there's a respondent in the football grade that appear to have experienced high stress.

**Conclusions**

After the Perceived Stress Scale 14 items questionnaire (PSS14) was used to indicate the stress level caused by the feelings and thoughts lived by the respondents during the past month from the moment the questionnaire was submitted, the scores show that most of the respondents experienced a moderate stress level within the organization where they carry out their daily activities, therefore it does not represent a danger for them as individuals or for the organization to which they belong.

The result of the moderate stress level within the organizations attended by students aged 18-19 is also confirmed by the results obtained in most previous studies (Arribas-Galarraga, Saies, Cecchini, Arruza, & Luis-De-Cos, 2017; Bulbule & Kannur, 2014; Pozos, Preciado, Acosta, Aguilera, & Delgado, 2014; Ujwala & Jigmat, 2011).

The highest percentages in this case study regarding the stress level for the football and handball grades were 73% for moderate stress level in both classes, meaning a number of 11 students from each grade, indicating that the respondents are facing stress resistance, they have the ability to cope with the physiological states and keep them within the normal parameters for moderate stress level.

Regarding the score obtained for low stress level, both grades have respondents with this score, namely, 3 respondents in the football grade, 4 respondents in the handball grade, respectively. According to the intensity with which the organizational stress is perceived, the type of personality is also important. For instance, those with low stress level (after questionnaire interpretation) belong to type B personality, which means: even-tempered, laid-back, easy-going, with a relaxed attitude and a carefree approach.

A good thing after interpreting the results it is the fact that, only one respondent out of 30 respondents, experienced a high stress level and belongs to the football grade.

In conclusion, an effective method for both grades having to cope with any stress level, low, moderate or high, is the importance of the organization manager / grade supervisor in providing support and feedback to each member. This is especially important for young people who are at the beginning of their journey in their professional

life and who are beginning to experience the thoughts and feelings that can be really stressful. Stress may ultimately have a negative influence on their physical and mental health.

## A. Appendixes

*1. Romanian version of Perceived Stress Scale - 14 items (PSS14) questionnaire.*

The questions in this scale ask about your feelings and thoughts during the last month. In each case, you will be asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer fairly quickly. That is, don't try to count up the number of times you felt a particular way; rather indicate the alternative that seems like a reasonable estimate. The questionnaire is anonymous and confidential, please mention only the gender and class to which you belong.

Table 2. Romanian version of Perceived Stress Scale – 14

| Questions | Never | Almost never | Sometimes | Fairly often | Very often |
|---|---|---|---|---|---|
| 1. In the last month, how often have you felt anxious for something that happened unexpectedly? | 0 | 1 | 2 | 3 | 4 |
| 2. In the last month, how often have you felt unable to control the important things in your life? | 0 | 1 | 2 | 3 | 4 |
| 3. In the last month, how often have you felt nervous and ”stressed”? | 0 | 1 | 2 | 3 | 4 |
| 4. In the last month, how often have you dealt successfully with day to day problems and annoyances? | 0 | 1 | 2 | 3 | 4 |
| 5. In the last month, how often have you felt that you were effectively coping with important changes that were occurring in you live? | 0 | 1 | 2 | 3 | 4 |
| 6. In the last month, how often have you felt confident about your ability to handle your personal problems? | 0 | 1 | 2 | 3 | 4 |
| 7. In the last month, how often have you felt that things were going your way? | 0 | 1 | 2 | 3 | 4 |
| 8. In the last month, how often have you found that you could not cope with all the things that you had to do? | 0 | 1 | 2 | 3 | 4 |
| 9. In the last month, how often have you been able to control irritations in your life? | 0 | 1 | 2 | 3 | 4 |
| 10. In the last month, how often have you felt that you were on top things? | 0 | 1 | 2 | 3 | 4 |
| 11. In the last month, how often have you been angered because of things that happened were outside of your control? | 0 | 1 | 2 | 3 | 4 |
| 12. In the last month, how often have you found yourself thinking about things that you have to accomplish? | 0 | 1 | 2 | 3 | 4 |
| 13. In the last month, how often have you been able to control the way you spend your time? | 0 | 1 | 2 | 3 | 4 |
| 14. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them? | 0 | 1 | 2 | 3 | 4 |

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# THE RELATION BETWEEN PHYSICAL ACTIVITY LEVELS AND MINDFUL ATTENTION AWARENESS IN SCHOOL AGED STUDENTS

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**Abstract**

Physical activity (PA) is a priority area in adolescent health promotion. The promotion of lifelong physical activity (PA) and healthy lifestyle is among the main aims of physical education in many countries. Mindfulness-based approaches have been used in health and lifestyle interventions for physical activity promotion, we set out to see if physical activity influences the mindful awareness level.
The aim of these study was to investigate how different type of sports and the physical activity level influence the mindful attention awareness level in school aged children
Physical activity level was measured with the Physical Activity Index. For the evaluation of the dispositional mindfulness we used the Mindful Attention Awareness Scale. We applied a questionnaire about the type of sports they practice.
75 students from a local school aged between 11 and 17 were evaluated.

*Keywords:* phisical activity, mindful attention awareness, school age children

## 1. Introduction

Physical activity (PA) is a priority area in adolescent health promotion. Benefits in participation of PA can create improvements in the physical (Jasen & LeBlanc, 2010), mental (Biddle & Asare, 2012) and social (Johnson, 2009) health domains.

Physical activity was associated with numerous health benefits. The dose-response relations observed in observational studies indicate that the more physical activity, the greater the health benefit (Jasen & LeBlanc, 2010).

The promotion of lifelong physical activity (PA) and healthy lifestyle is among the main aims of physical education in many countries (Puhse & Gerber, 2005).

Investment in physical education is based on the belief that PA in youth is beneficial for young people's health, and also becomes habitual and tracks over time, and thus influences individual and public health in the adult population (Malina, 2001).

Mindfulness is the act of increasing present-moment awareness of physiological, mental, and environmental events without imposing judgment on the quality or meaning of them (Kabat-Zinn, 1994).

Basically it involves paying close attention to one's thoughts, feelings, and bodily sensations as they appear from moment to moment. The main activity of it is a cognitive and intention-based process characterized by mindful attention to the present moment with an open and accepting orientation toward one's experiences (Bishop et al., 2004).

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Psychological research distinguishes between dispositional mindfulness and mindfulness cultivated through. Dispositional mindfulness is often defined as a 'basic human quality' (Kabat-Zinn, 2004) that everyone possesses to a varying extent; it is widely assessed by self-report questionnaires.

Meditation practice, on the other hand, involves intention to attend to the present moment (Wheeler, Arnkoff & Glass, 2016) and is aimed at cultivating mindful awareness (Kabat-Zinn, 2004; Rau & Williams, 2016).

## 2. Material and methods

### *2.1. Study group*

The study included 75 students aged between 11 and 17, 44 girls and 31 boys enrolled to a local school.

Student belonged to 3 classes: IV grade (28 student, 11 -12 years old), VII grade (28 students 14-15 years old), XI grade (19 students, 16-17 years old).

### *2.2. Measurements*

*Physical Activity Index*

Physical activity index is calculated by multiplying physical activity frequency, intensity and duration. To generate positive effects in terms of health, a physical activity must be performed frequently, must last enough time (not less than 20-30 minutes, but not much more than the exercising level or phase) and must engage as many muscle groups as possible, at an appropriate level of intensity.

Score rating characterization: physical condition category: 80-100 – very active superior lifestyle; 60-80 – active and healthy person, very good; 40-60 acceptable reasonable; 20-40 – insufficiently active, relatively sedentary; 20-0 – very sedentary

We completed the questionnaire with the type of sport they were practicing.

*Mindfull Attention Awareness Scale*

The MAAS is a 15-item scale designed to assess a core characteristic of dispositional mindfulness, namely, open or receptive awareness of and attention to what is taking place in the present.

*Statistical analysis*

Statistical analysis was performed using MedCalc Statistical Software version 19.0.7 (MedCalc Software bvba, Ostend, Belgium; https://www.medcalc.org; 2019). Quantitative variables data were tested for normality of distribution using the Shapiro-Wilk test and characterized by mean and standard deviation. Nominal data were expressed as absolute and relative frequency. Differences between groups were verified with the Student t test or the chi-square test, as appropriate. A p value of $<0.05$ was considered statistically significant.

## 3. Results

### *3.1. Physical Activity Index (PAI) for classes*

10.7% from the IV grade students, 14.3 % from the VII grade students and 13.3% from the XI grade students have insufficiently active, very sedentary lifestyle (PAI <40)

89.3% from the IV grade students, 85.7 % from the VII grade students and 86.7% from the XI grade students have active/ very active lifestyle(PAI >40)

Table 1. Physical Activity Index for classes

| Physical Activity Index | IV grade | VII grade | XI grade |
|---|---|---|---|
| <40 insufficiently active/ very sedentary | 10.7% | 14.3% | 13.3% |
| >40 active/ very active | 89.3% | 85.7% | 86.7% |

*3.2. Mindfull Attention Awareness Scale (MAAS) in relation with the Physical Activity Index levels*

Students who are active/ very active showed higher scores for the MAAS than students who are insufficiently active/very sedentary p≤0, 05.

Table 2. Mindfull Attention Awareness Scale

| Physical Activity Index | mean | Std. deviation | p |
|---|---|---|---|
| <40 insufficiently active/ very sedentary | 3.637000 | 0.5210257 | |
| >40 active/ very active | 4.056462 | 0.5373530 | ≤0.05 |

*3.3. Mindfull Attention Awareness Scale (MAAS) in relation with the gender*

Female student have significantly higher values for the MAAS ≤0.05.

Table 3. MAAS in relation with the gender

| gender | mean | Std deviation | p |
|---|---|---|---|
| female | 4.150455 | 0.5855070 | |
| male | 3.852258 | 0.4075186 | ≤0.05 |

*3.4. Mindfull Attention Awareness Scale (MAAS) in relation with the classes*

Younger students have higher scores for the MAAS.

Table 4. MAAS in relation with the classes

| grade | mean | Std deviation |
|---|---|---|
| IV | 4.143571 | 0.5359672 |
| VII | 3.962143 | 0.5828052 |
| XI | 4.027200 | 0.5370152 |

*3.5. Type of sports practiced*

23 types of sports are practiced in the studied group as follows: Basketball (15 students), CrossFit (2 students), Volley 1 students), Football (10 students), Water polo (1 students), Unspecified sport (5 students), Physical therapy (1 students), Athletic (4 students), Yoga (1 students), Swimming (10 students), Zumba ( 1 students), Dance (20 students), Calisthenics (1 students), Cycling (13 students), Kickboxing ( 2 students), Handball (2 students), Skiing ( students), Fishing (1 students), Field tennis (5 students), Kung Fu (3 students), Judo (10 students), Chess (2 students), Gymnastics (5 students).

*Student practicing dance showed higher mindful awareness values when compared with the other students, ≤0.05*

Table 5. MAAS for dance

| MAAS | N | mean | Std deviation | P |
|---|---|---|---|---|
| Other sports | 55 | 3.948182 | 0.5317201 | |
| Dance group | 20 | 4.244500 | 0.5018847 | ≤0.05 |

*Students practicing swimming also showed higher mindful awareness values when compared with the other students, ≤0.05*

Table 6. MAAS for swimming

| MAAS | N | mean | Std deviation | P |
|---|---|---|---|---|
| Other sports | 65 | 3.985692 | 0.5375697 | |
| Swimming group | 10 | 4.297000 | 0.4720887 | ≤0.05 |

**4. Discutions**

To achieve substantive health benefits, the physical activity should be of at least a moderate intensity. Vigorous intensity activities may provide even greater benefit. Aerobic-based activities had the greatest health benefit, other than for bone health, in which case high-impact weight bearing activities were required (Jasen & LeBlanc, 2010).
Physically active lifestyle starts to develop very early in childhood and that the stability of PA is moderate or high along the life course from youth to adulthood (Telama et al., 2014).
In our study most of the school aged student participate in regular vigorous intensity activities: 89.3% from the IV grade students, 85.7 % from the VII grade students and 86.7% from the XI grade students have active/ very active lifestyle(PAI >40)
Physical inactivity, defined as engaging in insufficient levels of physical activity and not meeting the current physical activity recommendations, (Tremblay, 2017) has been identified as the fourth leading risk factor of premature mortality in adulthood (WHO, 2009).

Our findings shows that a small percent of the students participate in insufficient levels of PA: 10.7% from the IV grade students, 14.3 % from the VII grade students and 13.3% from the XI grade students have insufficiently active, very sedentary lifestyle (PAI <40)

In contrast, accumulating sufficient moderate- to vigorous-intensity physical activity (MVPA) is recognized as a key determinant of physical, mental, social, and environmental health (WHOO 2010; Bull et al., 2018).

Among children and youth (aged 5–17 y), several systematic reviews have reported physical activity benefits on physical, physiological, developmental, mental, cognitive, and social health, as well as academic achievement (Janssen & LeBlanc, 2010; Biddle & Asare, 2011; Strauss, 2001; Poitras, 2016; Donnelly, 2016; Esteban-Cornejo, 2015).

Despite these benefits, it has been estimated that 80% of youth (11–17 y old) worldwide do not reach the minimum recommendation of 60 minutes of MVPA per day (Sallis, 2016). This is alarming given that physical inactivity among school-aged children and youth has been found to be associated with adverse physical, mental, social, and cognitive health outcomes (Janssen LeBlanc, 2010; Poitras, 2016; Kremer, 2014; Mc Mahon, 2017) lower physical fitness (Blair, Cheng & Holder, 2001) and lower physical activity levels in later life (Telama, 2005).

Given the potentially significant amount of time that children and youth spend at school, this environment is a strategically important setting for the promotion of physical activity. Physical activity opportunities can be provided to children and youth in the school environment through physical education, lunch and recess breaks, in-class physical activities, and in intramural competitive and non-competitive activities before or after school (Hills, Dengel & Lubans, 2015).

The available evidence supported a positive association between trait mindfulness and physical activity and confirmed a large gap in research on state mindfulness and physical activity (Chih-Hsiang & David, 2019).

In our study students who are active/ very active showed higher scores for the MAAS than students who are insufficiently active/very sedentary.

Student practicing dance and swimming showed higher mindful awareness values when compared with the students who practiced other sports.

## 5. Conclusions

Practice vigorous PA have positive effect on mindful awareness values.

Students who have higher physical activity levels show higher mindful attention awareness scores.

Female students are more mindful than male students.

Younger students show higher mindful awareness scores.

From a great variety of sports practiced by students involved in our study those who practiced swimming and dance showed higher scores for dispositional mindfulness.

Majority of the students involved in our study practice vigorous PA.

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# DOES DIFFERENT TYPE OF PHYSICAL ACTIVITIES INFLUENCE LUNG FUNCTION IN BLIND AND VISUALLY IMPAIRED CHILDREN?

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**Abstract**

Motor development is influenced by visual impairment due to the lack of sensory imput resulting in low cardiorespiratory rezistance and physical performance compared with the general population.
Aerobic fitness is positively associated with lung volumes. Aerobic fitness was associated with higher values of $FEV_1$ and FVC among children, adolescents and young adults.
Blind children show lower pulmonary values due to the lack of physical activities.
The aim of this study was to investigate the effects of different physical activities such as swimming, climbing and trampoline jumping on lung function in blind and visually impaired children.
36 visually impaired children aged between 7 and 12 participated in the study.
We mesured Forced vital capacity (FVC), Forced expiratory volume in 1 second (FEV1), peak expiratory flow (PEF), maximal voluntary ventilation (MVV), Tiffeneau Index.
12 children practiced swimming twice a week 50 minutes for a session, 12 children practiced climbing twice a week 50 minutes a session and 12 children jumped on the trampoline 3 times a week 30 minutes a session, for 12 weeks.
FVC, FEV1, PEF, MVV and the Tiffeneau Index showed improvement for the whole group, $p \leq 0.05$.
FVC and FEV1 values are higher for children attending swimming sessions, $p \leq 0.05$.

*Keywords:* physical activities, blind and visually impaired children, lung function

## 1. Introduction

Visually impaired subjects are less active physically when compared to their sighted peers. They encounter difficulty in adaptation to an unknown environment. Safety problems, and economic issues are suggested to be responsible of the limited participation in physical activity of visually impaired children, which negatively affect motivation (Aslan et al., 2012; Chen & Lin, 2011; Tabrett & Latham, 2011).

Deficits in physical fitness may be a problem for visually impaired who experience extra demands in dealing with their environments (Ponchillia, Strause, & Ponchillia, 2002).

Literature indicates a lack of activity in visually impaired children. Some studies report that physical acti vity levels of many sighted children and adolescents are also insufficient to promote health benefits (Sallis, 2002; Rachele et al., 2012; Currie et al., 2012).

Many studies have shown that the aerobic work capacity of visually impaired persons is lower than that of age-matched sighted counterparts (Hopkins, 1986; Jankowsky & Evans, 1981; Seelye, 1883; Sundberg, 1982).

Better function in the human body systems is achieved by regular exercise. Muscular strength including respiratory muscles is developed by systematic training, so it has a positive effect on the lung function. Athletes

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have larger capacity of the respiratory system when compared to their age-matched sedentary controls (Mazik et al., 2015).

It was also observed that some sport disciplines improve lung function better than others (Lazovic, 2015).

## 2. Material and methods

### *2.1. Study group*

The study included 36 visually impaired or blind children from the Special School for Visually Impaired Children from Cluj Napoca, 14 boys and 12 girls aged between 7 and 12 years old.
12 children practiced swimming twice a week 50 minutes for a session, 12 children practiced climbing twice a week 50 minutes a session and 12 children jumped on the trampoline 3 times a week 30 minutes a session.

### *2.2. Measurements*

*Spirometry*

MIR Spirobank II Spirometer, S/N 000912 was used to assess Forced vital capacity (FVC), Forced expiratory volume in 1 second (FEV1), peak expiratory flow (PEF), and maximal voluntary ventilation (MVV), Tiffeneau Index.
The tests were administrated by the same technician, the children were given time to accommodate with the device.

*Statistical analysis*

Statistical analysis was performed using MedCalc Statistical Software version 19.1 (MedCalc Software bv, Ostend, Belgium; https://www.medcalc.org; 2019). Continuous data were tested for normality of distribution using the Shapiro-Wilk test and characterized by mean and standard deviation, or the median and the 25th and the 75th percentiles. Qualitative data were expressed as absolute and relative frequency. Differences between measurement were verified with the ANOVA for repeated measurements test or two-way ANOVA for repeated measurements, whenever appropriate. A p value of $<0.05$ was considered statistically significant.

## 3. Results

### *3.1. Mean functional values for the respiratory system for the swimming group. Comparation between the initial and final values*

The mean and standard deviations of the functional values for the swimming group are presented in table 1.

Statistically high differences are observed $p \leq 0.000$ for all the measured parameters.

Table 1. Mean values for the swimming group. Comparation between initial and final values

| Functional values of the respiratory system | mean | Std. deviation | p |
|---|---|---|---|
| FVC initial | 2.5408 | 0.50595 | |
| FVC final | 3.1083 | 0.60895 | $p \leq 0.000$ |
| FEV initial | 2.4975 | 0.44170 | |
| FEV final | 2.9767 | 0.52460 | $p \leq 0.000$ |
| PEF initial | 4.5042 | 0.68987 | |

| Functional values of the respiratory system | mean | Std. deviation | p |
|---|---|---|---|
| PEF final | 4.9808 | 0.87476 | p≤0.002 |
| MVV initial | 86.0750 | 23.503 | |
| MVV final | 90.4750 | 25.255 | p≤0.001 |
| Tiffeneau index initial | 95.300 | 3.3095 | |
| Tiffeneau index final | 98.525 | 4.2425 | p≤0.003 |

*3.2. Mean functional values for the respiratory system for the climbing group. Comparation between the initial and final values*

The mean and standard deviations of the functional values for the climbing group are presented in table 2.

Statistically high differences are observed p≤0.000 for all the measured parameters.

Table 2. Mean values for the climbing group. Comparation between initial and final values

| Functional values of the respiratory system | mean | Std. deviation | p |
|---|---|---|---|
| FVC initial | 1.9458 | 0.38087 | |
| FVC final | 2.2192 | 0.42152 | p≤0.001 |
| FEV initial | 1.9158 | 0.44743 | |
| FEV final | 2.1542 | 0.41979 | p≤0.000 |
| PEF initial | 3.0983 | 0.41623 | |
| PEF final | 3.5633 | 0.57877 | p≤0.014 |
| MVV initial | 52.7833 | 15.3829 | |
| MVV final | 58.1092 | 12.0500 | p≤0.014 |
| Tiffeneau index initial | 95.442 | 4.9458 | |
| Tiffeneau index final | 96.800 | 6.9836 | p≤0.222 |

*3.3. Mean functional values for the respiratory system for the trampoline jumping group. Comparation between the initial and final values*

The mean and standard deviations of the functional values for the trampoline jumping group are presented in table 3.

Statistically high differences are observed p≤0.000 for all the measured parameters.

Table 3. Mean values for the trampoline jumping group. Comparation between initial and final values

| Functional values of the respiratory system | mean | Std. deviation | p |
|---|---|---|---|
| FVC initial | 1.9358 | 0.37087 | |
| FVC final | 2.2182 | 0.43152 | p≤0.001 |
| FEV initial | 1.9358 | 0.43743 | |
| FEV final | 2.1442 | 0.42979 | p≤0.000 |

| Functional values of the respiratory system | mean | Std. deviation | p |
|---|---|---|---|
| PEF initial | 3.0883 | 0.42623 | |
| PEF final | 3.4633 | 0.56877 | p≤0.011 |
| MVV initial | 52.6833 | 15.2829 | |
| MVV final | 58.1192 | 12.0400 | p≤0.011 |
| Tiffeneau index initial | 95.432 | 4.9448 | |
| Tiffeneau index final | 96.700 | 6.9826 | p≤0.212 |

*3.4. Mean values for FVC for all of the groups. Comparation of FVC values between the groups*

Statistic showed that swimming showed the most significant improvement compared to climbing and trampoline jumping for FVC values, p≤0.450

Table 4. Mean values for the climbing group. Comparation between initial and final values

| Functional values of the respiratory system | | mean | Std. deviation |
|---|---|---|---|
| FVC initial | trampoline | 1.9758 | 0.37471 |
| FVC final | trampoline | 2.2125 | 0.35463 |
| FVC initial | climbing | 1.9457 | 0.38087 |
| FVC final | climbing | 2.2192 | 0.42152 |
| FVC initial | swimming | 2.5442 | 0.50595 |
| FVC final | swimming | 3.1083 | 0.60895 |

*3.5. Mean values for FEV for all of the groups. Comparation of FEV values between the groups*

Statistic showed that swimming showed the most significant improvement compared to climbing and trampoline jumping for FEV values, p≤0.050

Table 4. Mean values for the climbing group. Comparation between initial and final values

| Functional values of the respiratory system | | mean | Std. deviation |
|---|---|---|---|
| FEV initial | trampoline | 1.9758 | 0.37471 |
| FEV final | trampoline | 2.2125 | 0.35463 |
| FEV initial | climbing | 1.9457 | 0.38087 |
| FEV final | climbing | 2.2192 | 0.42152 |
| FEV initial | swimming | 2.5442 | 0.50595 |
| FEV final | swimming | 3.1083 | 0.60895 |

PEF, MVV and Tiffeneau Index does not show any significant improvement compared between the groups.

**4. Discution**

Regular physical activity is positively associated with lung function healthy subjects (Luzak et al., 2017). Sustained physical activity leads to adaptive changes in respiratory function values (Tijana et al., 2017). Aerobic fitness is associated with greater lung volumes in children and young adults. Improvements in fitness during childhood and adolescence are associated with greater growth in lung volumes at follow-up (Hancox, Finn Rasmussen, 2018).

Visually impaired children and adolescents who are not practicing sport at all have much lower respiratory function values (Maniu, 2018).

Visual impairment affects motor development due to the lack of sensory data input through the visual pathway, resulting in low cardiorespiratory resistance and physical performance, compared to the performance of standard individuals (Zebrowskai, Gawlik, & Zwierzchowska, 2007).

There are reports showing that blind children engaged in regular exercise demonstrate greater mobility of the chest and increased strength of the respiratory muscles resulting in an improvement of vital lung capacity and maximum lung ventilation (Shepard, 1990).

In our study we followed the changes of the functional respiratory values for 36 visually impaired or blind children who practiced swimming (12 children) climbing (12 children) and trampoline jumping (12 children).

Forced vital capacity (FVC), Forced expiratory volume in 1 second (FEV1), peak expiratory flow (PEF), maximal voluntary ventilation (MVV), Tiffeneau Index were measured before and after intervention.

All the parameters shoved statistically significant improvement after a 12 weeks program for the swimming group.

After a 12 week climbing program the group shoved improved respiratory volumes for all the parameters we measured.

The group who jumped the trampoline for 12 weeks also showed improvements for the measured parameters.

We also wanted to find out which sport has the greatest influence on the respiratory values.

The biggest changes occurred in the group practicing swimming when compared with climbing or trampoline jumping for FEV and FVC.

Climbing and trampoline jumping groups showed similar changes for FEV and FVC values.

PEF, MVV and Tiffeneau Index does not show any significant improvement compared between the groups.

Visual impairment does not limit the effect of training in development of aerobic and anaerobic capacity in blind athlets (Kamelska, Mazurek, & Zmijevski, 2015).

**5. Conclusions**

Physical activities have a positive effect upon functional respiratory values for visually impaired and blind children.

Swimming, climbing and trampoline jumping significantly influence the functional respiratory values for visually impaired and blind children.

Swimming has the greatest influence upon respiratory values when compared with climbing and trampoline jumping.

Climbing and trampoline jumping also produce a statistically significant change in the respiratory volumes for visually impaired and blind children.

Swimming can lead to the most significant changes for FEV and FVC when compared to climbing or trampoline jumping for visually impaired and blind children.

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# STATISTICAL ANALYSIS OF SPECIFIC TEAM SPORTS TRAUMATOLOGY- RUGBY WOMEN'S 7

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**Abstract**

Rugby is a collective sport, of high physical intensity, that creates a spectacle, in which the physical contact is present. Rugby is a contact sport by its specificity, which by default will cause a diverse and quite frequent appearance of traumas
With the accelerated dynamics of the game itself, with the improvement of the techniques and tactics of the game, with the improvement of the specific trainings, methods and means and with the increase of the sporting skill, the accidents appear, common from any sports branch.
The present work is based on traumatology specific to the rugby women's 7 game at senior level, so using the research methods used and the questionnaires applied to the athletes, the statistical analysis was materialized.
The rugby women's 7 game has a high level of difficulty due to the intensity of the effort in a relatively short time. Accidents generally occur during the attack phases, the contact being harsh, often aggressive. The players are characterized by strength, speed, agility, always offering spectacular play phases, while respecting the principles that define the game of rugby: discipline, respect, integrity, passion, solidarity.

*Keywords:* traumatology, rugby, statistical analysis.

## 1. Introduction

„Sport, this multipurpose phenomenon of the modern world, is considered individual experience and institution, leisure and specialization of the competitive level, spontaneous and elaborate technical expression, educational practice and performance, play and labour, physical exercise and mental guidance" (Dragnea, 2006).

Rugby is a collective sport of high physical intensity and high spectacle in which physical contact is present. The popularity of this sport and the increased interest of future generations towards it, was the reason why I stopped my attention on rugby, and more specifically, women's rugby.

Rugby is a contact sport by its specificity, which by default will cause a diverse and quite frequent trauma. One of the interesting things about this team sport is the so varied positions that determine a different somatic biotype depending on the position, but also other specific characteristics.

Integrity, passion, solidarity, discipline and respect are the defining characteristics of the Rugby. These are now known generically as the Fundamental Values of World Rugby and are included in the World Rugby Game Charter, a document whose purpose is to ensure that the game of Rugby will retain its unique character both on and off the field.

An essential feature of the current rugby game is given by the total physical commitment, the games bearing an imprint of the contact fight, carried out on the basis of the individual and collective confrontation sustained in attack and defense, physical training being essential.

„The originality and specificity of the Rugby involve the most important opportunities for expressing the attributes of human physical, mental, intellectual and moral qualities in terms of stimulating and profound

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legislation, but at the same time, the support of the rugby game insists on observing the supreme needs and techniques such as the non-dangerousness, the spectacularity and the efficiency of the phases" (Chihaia, 2008).

The traumatology deals with the traumas of the locomotor system, determines their causes, the clinical manifestations, their prophylaxis and their treatment at different stages of treatment: from the first medical aid stage to the specialized assistance in the recovery of the traumatized one.

The trauma that occurred in sports practice is defined as the result of the external forces represented by mechanical agents (strokes, pressures, tractions), which produce contusions, wounds or fractures.

In sports, trauma is common, especially in contact sports, where the presence of the opponent is the factor on which they often depend and requires special attention and appropriate treatment.

„Depending on the type of structures affected, the macro-trauma can be classified into:

- traumas of the soft parts (bruises, wounds, stretches and muscular ruptures, stretches and tendon ruptures, contusions / elongations of the nerves, closed trauma to the blood vessels)
- joint trauma (sprains, dislocations, disjunctions, meniscus injuries, post-traumatic knee instability)
- bone trauma (fractures, cracks, periostitis, apophysitis)

Depending on the mechanisms involved in the etiology of the trauma, they can be divided into traumatic (accidental) and stress (overstrain)" (Smîdu, 2011).

The competitive sporting activity carried out under the conditions of total involvement in the fight to achieve the best performances, often situated at the limit of the individual possibilities or obtained through a collective effort of maximum demand, can generate a wide range of accidents.

Rugby is a popular sport and is played worldwide by over 3.5 million people. Rugby players are prone to injury due to the minimal protective equipment they use and of course due to the physical nature of the game represented by the hard contact with the opponent throughout the match.

This highly complex sports game requires special attention and quality medical-sports assistance, especially regarding prophylaxis and, sometimes, the recovery of traumas, which are imminent, but also the competitive biological training and the appropriate recovery after the effort.

„The sports branches with the most sprains are, in order: football, gymnastics, handball, athletics, wrestling, rugby, volleyball, and the most frequently distorted joints are those of the ankle, knee, followed by the joints of the elbow, fist and hallucis" (Smîdu, 2011).

Limited studies are available on risk factors associated with amateur rugby players in the Sevens version. The development of gender-specific injury prevention measures that emphasize speed and agility training, and improve hip flexor extensibility may be important to reduce the risk of severe injuries (Mirsafaei, Simon, Yeunga& Stewartb, 2017).

Detailed information on the traumas, their classification according to the degree of severity has made it possible to study the consequences of accidents. Every third major or moderate trauma was preceded by a minor trauma. A minor trauma preceding a major or of the same kind and localization, reflects inadequate recovery and the tendency to force the return to play too early. I think that more careful treatment of minor injuries and their medically controlled recovery could prevent recurrence. Some minor injuries were different in type and location from the major injuries that followed. This fact suggests the idea that a minor trauma recovered insufficiently adversely influences the coordination of the player, making him more vulnerable to relapses.

„Contact sports such as rugby, american football, wrestling, boxing have a higher risk of developing muscle injury, but should not be neglected the non-contact sports where strong forces (for example, grip / grab) can be developed on a single body segment (tennis, canoeing, throwing the weight, gymnastics, golf) that can lead to muscle injuries" (FRR, 2011).

„For those who work in sports trauma, rugby remains the sport with the highest risk of injury per player per hour. Paradoxically, at the international level, where the game is faster and spectacular, studies show that good physical condition and players experience reduce the injury rate" (Bara, 2012).

Two injury risk profiles emerged, associated with subsequent injury occurrence. Using these risk profiles, individualized prevention strategies may be designed regarding deficits in groin muscle strength and identifying foot alignment (Yeomansab, Comynsab, Cahalanbc, Hayesd, Costelloa, Warringtonab, Harrisona& Lyonsa, 2019).

„The need to prevent traumas of performance athletes is extremely high, especially in the first performance standard, as exceptional results are expected at this level. To achieve this goal, the team must send clinically healthy players on the field. Reducing the number of traumas therefore becomes extremely important" (Bahr, 2003).

## 1. Material and method

In order to accomplish this work based on the statistical analysis of the trauma specific to the rugby women`s 7 game, I have chosen as research subjects the group of senior players of the CS Politehnica Iași and CS Agronomia Bucharest teams, in order to collect the data related to the injuries suffered by them.

Therefore 15 players from each team were questioned, the collected data being entered in the database for the statistical analysis.

The purpose of this paper is to carry out a statistical analysis on the traumatology specific to the collective sports - Rugby women`s 7, at senior level, between the teams of CS Politehnica Iași and CS Agronomia Bucharest.

## 2. Interpreting the results

After studying the specialized literature and the various researches carried out on this topic, I found that the most frequent traumas appear at the level of the knee, shoulders and ankle. At the level of the knee and ankle the highest percentage is occupied by the sprain, at the level of the shoulders, the most common are the dislocations, and at the level of the arms the most frequent are the contusions, followed by sprains and fractures.

A study conducted in France in 2017 classified the traumas by location and at the same time by their type, establishing the following: in the lower limbs, joint trauma represent 85%, in the upper limbs, articular trauma occupies 52%, at the head, joint traumas represent 69% and in the trunk the most present are the muscular traumas. At the same time, we observe that bone trauma occupies a low percentage in all 4 categories.

Having as a model the French study, I delimited the number of traumas by classifying them according to their type.

Table 1. Number of traumas by type

| | Joint traumas | Bone traumas | Muscle traumas | Ligament and tendon traumas |
|---|---|---|---|---|
| CS Politehnica Iaşi | 8 | 4 | 0 | 1 |
| CS Agronomia Bucureşti | 3 | 0 | 1 | 4 |

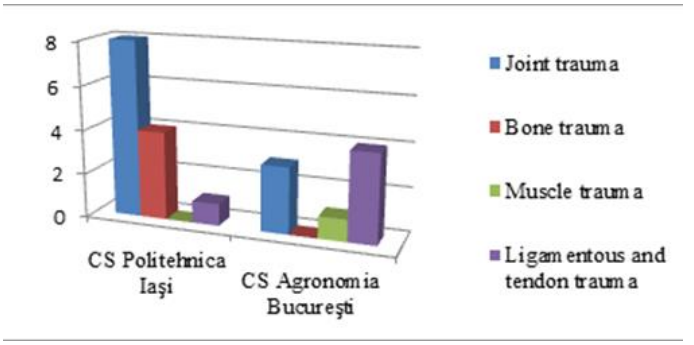


Fig. 1. Number of traumas

The following graphic shows the data regarding the experience of the players in the rugby game. This aspect can contribute to the occurrence or prevention of traumas, the experience at the same time outlining the technique of execution of the different procedures, an important factor in the prevention of accidents.

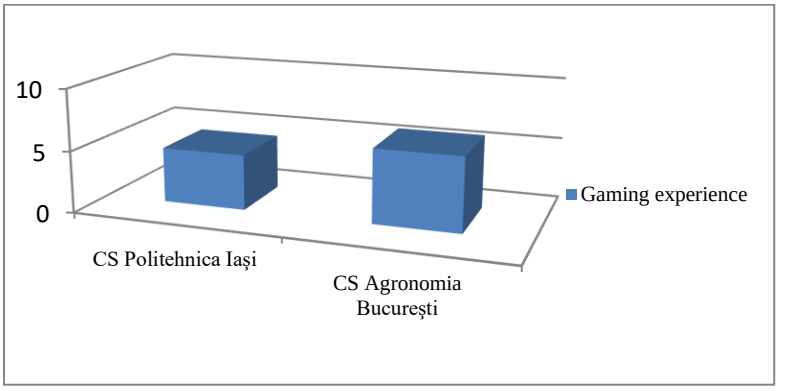


Fig. 2. The experience of playing of both teams

In relation to the experience, the age of the players is a determining factor in the appearance of the traumas, this presenting somato-functional, psychomotor, motric, cognitive and affective-volitional particularities. These particularities are basic benchmarks in performance sport.

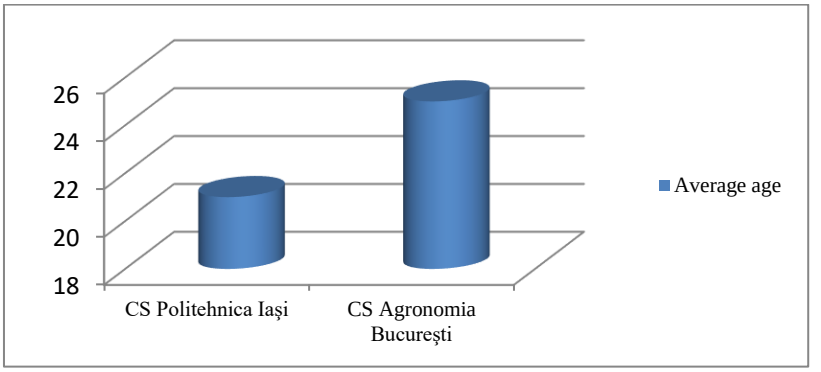


Fig. 3. Graphical representation of the average age of athletes

In the following I will refer to the most serious injuries suffered so far by the senior players of the two teams. It can be seen in the graphs below that the incidence of trauma is higher within the CS Politehnica Iasi team - 20% fractures, 7% dislocations, 33% sprains, 7% ligament stretches and 33% representing the players without injuries. Within the teams of CS Agronomia Bucharest, 47% of the players did not have serious injuries, and the rest - 13% dislocations, 7% LIA rupture, 27% muscle stretches and 7% sprain.

Comparing the two graphs, it can be seen the presence of sprains on both teams, with a higher percentage within the CS Politehnica Iasi team. As gravity, there are fractures in the same team, which are not present in the opposing team. The muscle stretches, of lower gravity, are observed in the CS Agronomia Bucharest team, these missing from the opposing team.

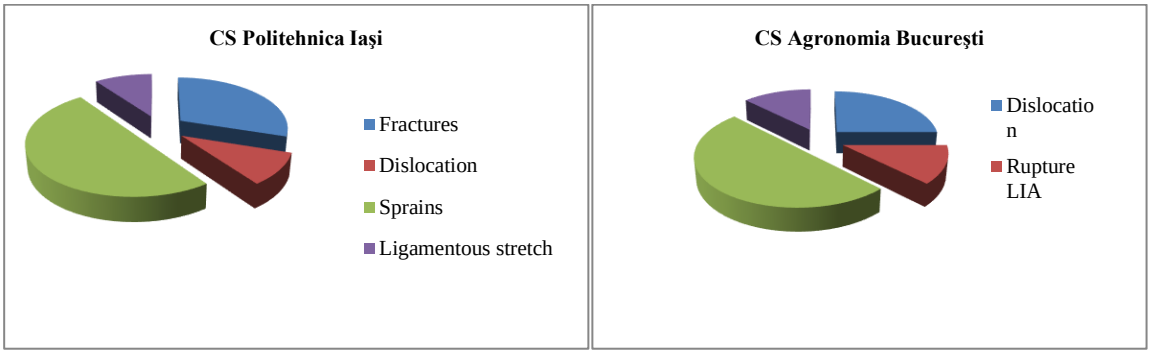


Fig. 4. Analysis of the most serious traumas suffered so far by CS Politehnica Iaşi and CS Agronomia Bucharest

In the following graph it will be presented the location of the most serious traumas, comparing the two teams. Analyzing the graph, the most frequent injuries occur at the ankle level, with a higher value in the CS Politehnica Iaşi team, at the knee level with a higher value in the CS Agronomia Bucharest team, the following being those at the elbow.

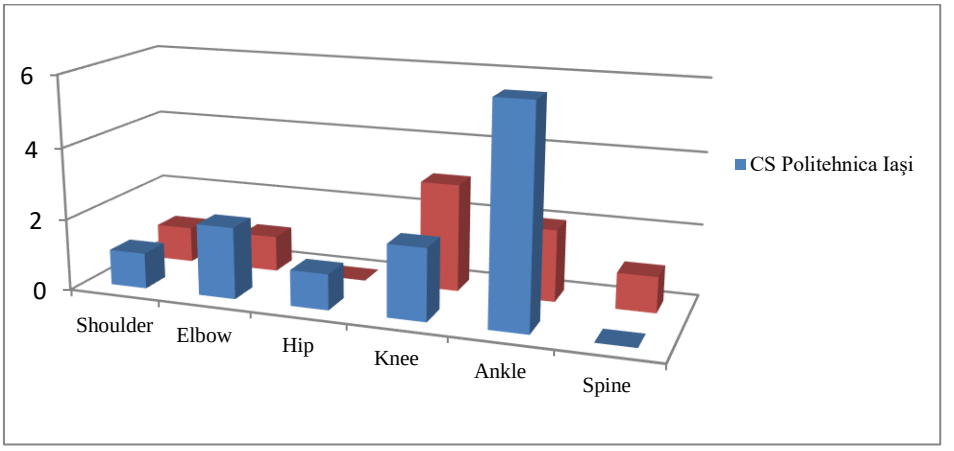


Fig. 5. Analysis of the location of the most serious traumas so far

Analyzing the incidence of trauma to the two teams, from the following graph it can be highlighted the moment of trauma, in the match or in training. Most injuries occur during matches for both teams.

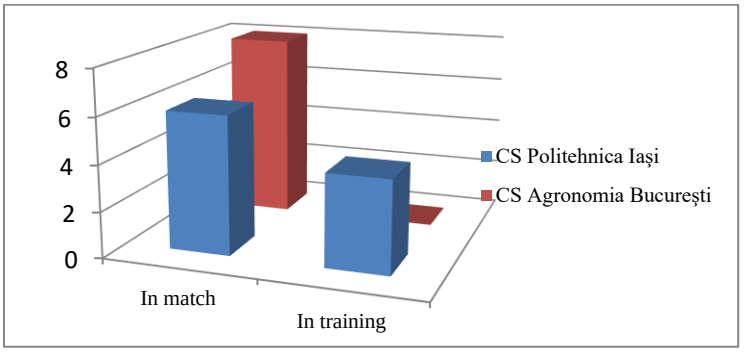


Fig. 6. Occurrence of injuries in the match or in training

For a more in-depth research, I decided to approach the traumas that occurred this season. The analysis of the questionnaires shows that this season only the CS Politehnica Iaşi team suffered injuries. As a percentage, the

traumas can be expressed as follows: 50% sprains, 17% nasal pyramidal fracture, 17% muscle stretch, 17% LIA stretch.

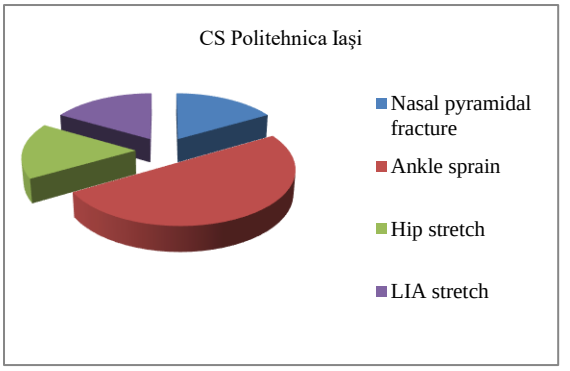


Fig. 7. Analysis of the most serious traumas suffered during this season by CS Politehnica Iaşi

## 3. Conclusions

The present paper aims to analyze the traumas of the rugby game played in 7, this aspect being a major one for the performance sport in the sense of preventing the occurrence of accidents during both, the matches and the trainings. This research can be a pilot in future studies on the traumas suffered and their prevention in the rugby women`s 7 game.

After completing the entire paper, I`ve reached the following conclusions:

- The experience of playing of the athletes is higher among the players from CS Agronomia Bucharest.
- At the senior level, the most common are trauma to the ankle, knee and elbow.
- I`ve noticed that the sprains have the highest percentage in the case of the senior teams from CS Politehnica Iaşi.
- Most of the injuries occur during the matches.
- Most traumas of the two teams are in the lower limbs, followed by the upper limbs.
- The joint injuries have the highest percentage in the two teams.

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# THE ROLE OF PHYSICAL ACTIVITY AND NUTRITION AS DETERMINANTS OF THE LIFESTYLE OF TIMISOARA WEST UNIVERSITY FEMALE COLLEGE STUDENTS

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**Abstract**

The interest in developing strategies aimed to increase the quality of life gained a national political aura in most European countries. Thus, the increasing of the fitness level by implementing a better nutrition and also by improving of the physical activity as main lifestyle determinant factors, become a continuous concern among young generation. **Purpose: A**nalyzing the nutritional and physical activity habits of the West University female students, participants at the general course of sports and physical activity and the comparison with national guidelines provided by the Romanian Ministry of Health. **Methods:** 100 female volunteers (20 ± 0.67 years) filled the nutritional habit questionnaire and the international physical activity questionnaire (IPAQ), as accurate as possible. The obtained data have been compared with the Romanian guidelines. **Results:** The nutritional habit questionnaire analyzed the subject's food consumption for the main food groups and the comfort group respectively. The data have been expressed as monthly consumption in order to obtain results that are more accurate. The physical activity questionnaire has concerned on vigorous, moderate and light weekly activity and on sedentary activities as well. The data have been analyzed using statistical analysis soft-wares (GraphPad Prism 5.0 and Microsoft-Excel 2007). The value of $p < 0,05$, has been considered statistically significant. For all analyzed food groups, we found extremely significant differences in comparison to the Romanian Health Ministry guidelines. Thus, revealed an extremely low monthly consumption for dairy; 24.21 ± 2.1, fruit: 22.56 ± 2.2; vegetables: 23.11 ± 2.01 vs. 60-150 portions/month ($p<0.001$); meat and alternatives: 13.73 ± 1.5 vs. 60- 90 recommended portions/month of each group ($p<0.001$). For comfort food, the data also suggested a significantly higher weekly consumption and comfort food: 21.32 ± 2.2 ($p< 0.001$). In the case of physical activity, we found that our subjects have a lower level of effort, about one third comparing with the guidelines ($p< 0.001$)**. Conclusion:** The results indicated that our young subjects need a better education and practice regarding both nutritional and physical activity habits in order to have a qualitative lifestyle and to prevent the negative effects of a poor habits on ageing process.

*Keywords:* nutrition habits, physical activity, lifestyle determinant factors

## 1. Introduction

Epidemic dimension of obesity that affects all social classes and, most concerning, all age categories, have become a major public health worldwide since the end of the 20th century (World Health Organ Tech Rep Ser. 2010, Spanos & Hankey, 2010) The World Health Organization data revealed that at the beginning of 21st century have been reported already over 600 million cases of obesity among adult population worldwide (WHO, 2015). The Eurostat data from 2018 showed that in EU countries, 16% of adults have been diagnosed with obesity in 2014.

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According to the statistics, Romania has a good position with only 9% of obese people in comparison with other European countries where the rates are up to over one quarter of population (OECD/EU, 2016, 2017, 2018; European Commission, 2016). This concerning picture regarding the health status of young and mature population determined an increased interest in developing strategies aimed to augment the quality of life which in most European countries gained a national political aura. Not only obesity was the concern of public health authorities but also the level of physical activity. Thus, the statistics showed, also, that in 2014 the population from the Northern countries is the most active among the European citizens, with a level of physical activity almost two times higher than European average. At this chapter Romania has reported an activity level that is about a quarter from the European average, considering the physical activity recommended guideline as 2.5 hours of exercising (moderate-intensity) /week (Eurostat, 2014). The reported data in 2018 (WHO, 2018) revealed that only 30% of the Romanians over 15 years of age have an enough physical activity level. This ranking placed our population at the opposite side of the scale, in comparison with the European countries and indicates that our population must start to increase the physical activity level (WHO, 2011).

It is known that the meal pattern, the food choices and the portion size influence the nutrient intake are related to the level of life quality both in adult and young and adolescents (Sjöberg et al., 2003). Dietary habits together with physical activity represent two of the greatest lifestyle determinants that have a great contribution to the general population health status and healthy aging (WHO, 2010). Thus, the intake level of total saturated fatty acids, carbohydrates, salt, fibre, fruits and vegetables and comfort foods influence the health status by modulating the risk of major diseases (Johanson et al, 1999; Department of Health and Human Services, 1988; World Health Organization, 1990; Ministry of Health and Social Affairs, 1992; World Cancer Research Fund/American Institute for Cancer Research, 1997). As Seneca study concluded, over 15 years ago, a healthy lifestyle at older ages is associated with a reduced risk of premature mortality and deterioration of health status (Haveman-Nies et al, 2003). A continuous preoccupation regarding modulation of the lifestyle habits should be the goal at any age. A multi-factorial lifestyle changing by applying nutritional and exercise interventions (both single or as combinative strategies) represent the real "fountain of youth" available to improve the quality of life at any age (Martone et al., 2017). Therefore, in the last years the increasing of the fitness level by implementing a better nutrition and increased physical activity as main lifestyle determinant factors, become a continuous concern among young generation. The purpose of the present study was to analyze the nutritional and physical activity habits of the West University female students, participants at the general course of sports and physical activity and the comparison with national guidelines provided by the Romanian Ministry of Health.

## 2. Material and methods

The study was conducted at the Faculty of Sport and Physical Education during October 2018- April 2019. Before the beginning of the study a pre-requisite permission was taken from the ethical committee of the faculty. Although, the subjects have been informed about the purpose of the study, and an informed written consent was obtained, for both participating within the study and for the personal data computing according to the present law. Procedure was explained to all the participants.

The study was conducted within a group of subjects consisted of 100 female volunteers, students from West University, participants at the general course of sports and physical activity. The age range for the study group subjects was $20 \pm 0.67$ years.

The study group was asked to fill tow questionnaires: the nutritional habit and food frequency questionnaire designed by the research team according to the Romanian Ministry of Health guidelines and international physical activity questionnaire (IPAQ), as accurate as possible.

### *2..1 The nutrition behavior evaluation*

The nutritional questionnaire consisted in 46 items grouped on 3 different categories:

- personal data (name, age, weight, height, profession);
- data related to food consumption for each food groups and comfort foods and alcohol. The portion size have been indicated as number of cups, slices, pieces, glasses (according to Romanian Ministry of Health guidelines (Graur, 2006).

A comparison with the national guidelines provided by the Romanian Ministry of Health has been done.

2.2.2 **Physical activity evaluation**

Physical activity was evaluated using the International physical activity questionnaire (IPAQ), (Booth, 2000, www.ipaq.ki.se.). The questionnaire comprises a set of 27 items from 5 activity domains: job-related, transportation, housework, recreation/ sport/ leisure time and sedentary activities and evaluates the activity level within the last 7 days.

To estimate the duration of physical activity for each domain the average time spent on various activities was expressed as minutes (hours)/days. The general score of the questionnaire was evaluated using responses to all items. Sub scores could be evaluated for each domain as well for different intensity levels of activity from walking to vigorous activity.

The scoring protocol was applied as it was presented within the protocol on the official site of the questionnaire (www.ipaq.ki.se) and considering the results within the recommended categories: low activity, moderate activity and high activity according to the number of minutes of moderate or vigorous activities/day and the number of days when the designated activity has been accomplished, or by the number of metabolic equivalents developed during the performed activities.

## 3. **Results**

The nutritional habit questionnaire analyzed the subject's food consumption for the main food groups and the comfort group respectively. The data have been expressed as monthly consumption in order to obtain results that are more accurate.

The physical activity questionnaire has concerned on vigorous, moderate and light weekly activity and on sedentary activities as well.

The data have been analyzed using statistical analysis soft-wares (GraphPad Prism 5.0 and Microsoft-Excel 2007). The results have been expressed as mean values ± S.E.M (standard error of mean). The statistical significance was appreciated by appling the Student *t* –test or ANOVA followed by post-hoc Bonferroni, accordingly. The value of $p < 0,05$, has been considered statistically significant.

### *3.1 Results for nutrition behaviour evaluation*

For all analyzed food groups we found extremely significant differences in comparison to the Romanian Health Ministry guidelines.

The analysis of the collected data revealed an extremely low monthly consumption for some of the fundamental food groups such as dairy, vegetables and fruits in comparison with the guidelines. In the following tables and figures there are depicted the results for these food groups and the statistic significance. In table 1 are presented the results for the vegetable fruits and dairy products consumption in comparison with the guidelines, as follow:

Table 1. Food group Monthly Consumption/food group in comparison with the guidelines

| Food group | Mean | SEM | Guidelines |
|---|---|---|---|
| **Vegetables** | 23.11 | 2.01 | 60-150 |
| **Fruits** | 22.56 | 2.2 | 60-90 |
| **Dairy** | 24.21 | 2.1 | 60-150 |
| **Meat and alternatives** | 13.73 | 1.05 | 60-90 |
| **Cereals** | 27.42 | 2.31 | 180-300 |
| **Comfort food** | 21.3 | 1.2 | 0-75 |

Table 2. Comfort food groups choices comparison

| Food group | Fast food | French fries | Sweets | Pastry | Muesli | Chocolate | Ice-cream | Alcohol |
|---|---|---|---|---|---|---|---|---|
| **Mean** | 2.72 | 2.45 | 3.28 | 2.85 | 1.76 | 4.2 | 1.88 | 2.22 |
| **SEM** | 0.27 | 0.28 | 0.47 | 0.31 | 0.19 | 0.98 | 0.23 | 0.26 |

In the following figures there are presented the results of statistical analysis for the monthly consumption/food group in comparison with the Guidelines.

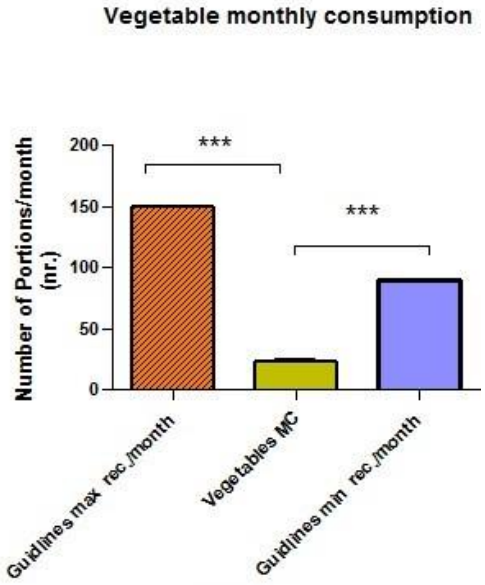


Fig. 1. Statistical analysis for the monthly vegetable consumption in comparison with the Guidelines.

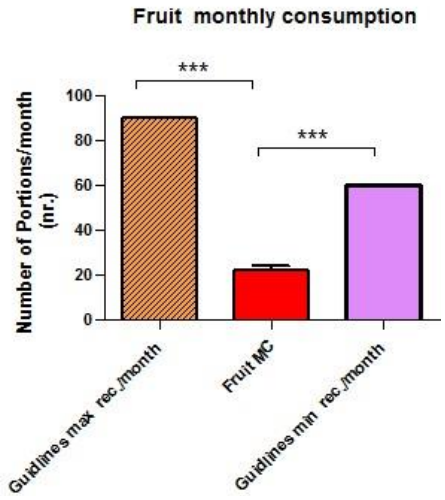


Fig. 2. Statistical analysis for the monthly fruit consumption in comparison with the Guidelines

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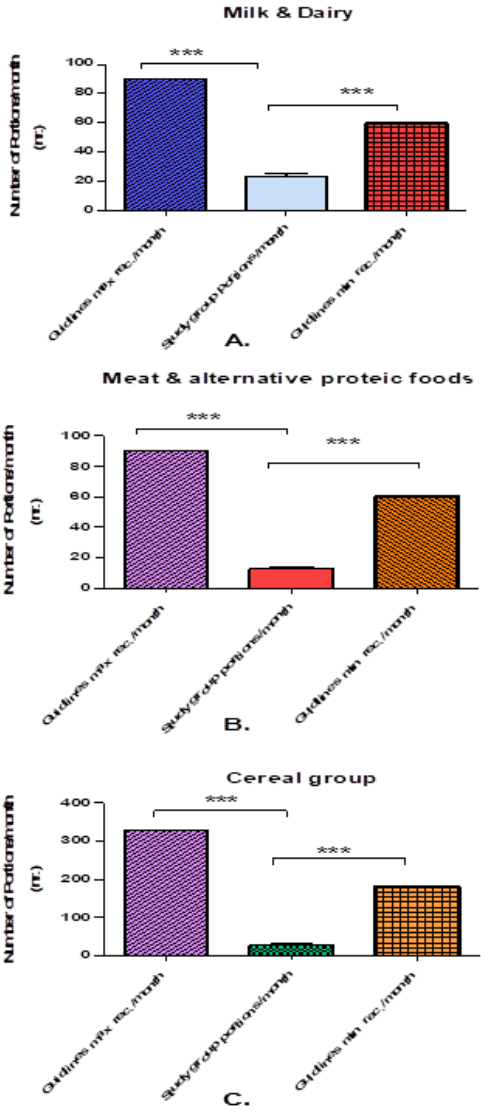


Fig 3. Statistical analysis for the monthly consumption in comparison with the Guidelines: A.: Milk & Dairy; B. Meat and alternative proteic foods; C.: Cereal group.

*3.2 Results for physical activity evaluation*

Regarding the physical activity evaluation, our results revealed a homogenous distribution of our studied subjects according to the effort intensity. We found that within our study group the subjects who performed a lower level of effort comparing with the guidelines (minimum 150 min of moderate effort/week) represent about one third from the total evaluated number ($p< 0.001$)**.**

Further analysis revealed no significant differences between the groups that performed light, moderate or high intensity effort. Each group represents about one third from the total number of subjects with a little less representation for the high intensity effort group comparing to the others ($p > 0.05$) (fig 4).

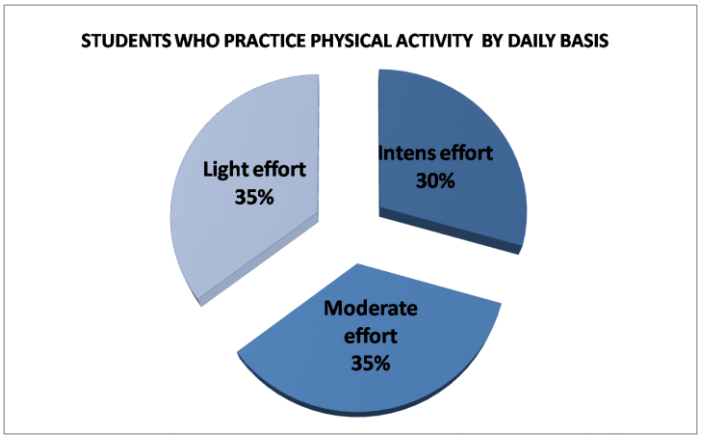


Fig. 4. Distribution of the subjects according to the performed level of effort intensity

The interesting result revealed by the analysis of the physical activity evaluation data is an extremely significant difference between the number of sedentary hours spent by the high intensity effort group in comparison with the other two groups. In this group, the time spent in a sedentary manner is less than a 50% comparing to the moderate and light effort groups ($p< 0.001$). The mean number of sedentary minutes/weeks are represented in table 3.

Table 3. Physical activity evaluation results in comparison with the guidelines

| Sedentary minutes/week | Effort intensity group | | |
|---|---|---|---|
| | **Low intensity effort group** | **Moderate intensity effort group** | **High intensity effort group ($p< 0.001$)** |
| **Mean** | 900 | 780 | 375 |
| **SEM** | 0.20 | 0.28 | 0.31 |

In table 4 are depicted the results obtained by the evaluated subjects concerning the moderate and vigorous physical activity related to the job activity, walking, public or personal car transportation and biking. The results show that the great majority are spending the job-related hours by performing low effort ($p< 0.001$). Analyzing further, we found that all the other categories of activities together achieve about 70% of low intensity effort time which represent a significant difference ($p< 0.05$).

Table 4. Moderate and vigorous physical activity related to the job activity

| | Job related physical activity – Total weekly time (h) | | | | | |
|---|---|---|---|---|---|---|
| | **Intense Physical activity** | **Moderate Physical activity** | **Light Physical activity** | **Walking hours** | **Public/car Transportation** | **Biking** |
| **Mean** | 25. | 40.042 | 110.7 | 4.75 | 2.000 | 1.42 |
| **SEM** | 0.11 | 0.21 | 0.40 | 0.39 | 0.15 | 0.29 |

## 4. Discussions

The present study offers a radiography of the actual lifestyle of the young generation in the early 20's. The obtained results revealed an alarming situation concerning both nutritional habits and physical activity in most of the cases. Considering the nutrition as a determinant factor of lifestyle we must admit that there are some negative aspects regarding the nutrition related behavior. This is concerning, mostly because the study was performed on female young student. Their nutritional habits revealed a lack of intake of most fundamental food groups. The intake

of high-quality proteins is about 25% from the minimum recommended not only by the Romanian authorities but also in the comparison with other European and worldwide guidelines (Graur, 2006; CSIRO 2016, USDA guidelines for Americans, 2015). Further comparison with the Romanian guidelines also revealed a decreased intake of vegetables and fruits. Comparing to the minimum recommended dosage, that intake is with about 30% from the minimum comparing to meat and alternatives group. Another concerning result is related to the cereal group. All the guidelines recommend at least 6-8 portions of cereals/day for a good nutrition. Our subjects consume only 15%. A good result was revealed, unexpectedly, from the comfort food. For this category our study group showed an important low intake, which in this case has a great impact on health status. At this category our young female students could be considered in the top of the pyramid. The Commonwealth guidelines revealed that in the British territory the intake of such portions of comfort food could be sometimes insufficient for one week (CSIRO, 2016). Also, analysing the composition of the food group we found that chocolate and sweets are the most preferred items. Considering that chocolate has also beneficial effects on the health status through its antioxidant and tonic effects we can consider this (Latif, 2013; Higginbotham, & Taub, 2015) little "guilty pleasure" less harmful for our subjects than the other results. Another good result revealed by the study is represented by the declared alcohol intake. Even in some cases the number of portions consumed by the subjects was higher than the recommended guideline for women this behavior was met only occasionally and in most cases related to some social recreational activities.

On the other hand, the results regarding physical activities confirm some reduced interest for a healthy lifestyle but not in such amount as in the case of nutrition. Analyzing the data we found that 65% of our subjects practice a moderate or high intensity effort, which is a great result considering the average value for the adult population of Romania (according to Eurostat, 2014). At this age category, our young female students presented an activity comparable with the average value of most European countries (Eurostat, 2014). Still, considering that in case of our subjects, the great majority are not engaged in the labor market and their "job-related activity" refers to the time period spent studying, the result revealing the number of weekly hours spent in low intensity effort related to the job activity can be considered an alarming result. It is well known that moderate activity increases both physical and mental performance, so, a reduction in the low intensity effort hours and increasing the moderate activity hours by participating at sportive or recreational activities individually or in organized groups can not add other than overall beneficial on our subjects quality of life. Considering all these facts, regarding nutritional and physical activity habits, we consider that is important to intervene as soon as possible maybe by developing a campaign within our females and male students together in order to provide a great healthy biological material for further generations.

## 5. **Conclusion**

The results indicated that our young subjects need a better education and practice regarding both nutritional and physical activity habits in order to have a qualitative lifestyle and to prevent the negative effects of a poor habits on ageing process. Further research is needed to understand the relationship between the actual stage of nutrition and physical activity status of our students and the long-term disease risk prognosis, in order to create the framework for establishing the optimum intervention plan.

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**Authors: Silvia-Nicoleta Mirica, Cerasela Domokos, Martin Domokos have contributed equally to the article.

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# OPTIMIZING THE COORDINATION SKILLS OF 11-YEAR-OLD TENNIS PLAYERS BY USING UNCONVENTIONAL (ADAPTED) TRAINING METHODS

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**Abstract**

The modern tennis is characterized by the restructuring of training content in the context of great performance of nowadays sports (Ulbricht, Fernandez-Fernandez, Mendez-Villanueva, & Ferrauti, 2016). Latterly, tennis implies a specific background of players' skills, which includes, first of all, a multifaceted training, the manifestation of a great level of creation, tactical inventiveness that can only be expressed by individuals who have reached a high level of technical, physical and psychological abilities (Ulbricht, Fernandez-Fernandez, Mendez-Villanueva, & Ferrauti, 2016). The significance of physical training is unanimously acknowledged, as it is the support of the players' activity, which can use their technical-tactical and psychological possibilities during training sessions and competitions (Reid, Elliott, & Alderson, 2008; Reid, Whiteside, & Elliott, 2011; Reid, Elliott, & Crespo, 2013).

The significance of physical training is widely recognized, because it constitutes support, the central axle of the activity of players who validate the technical-tactical and psychological possibilities (Bompa, 2000).

Any player, starting with the child for the selection stage and ending with the performer, has the necessary force to practice the tennis game (Girard & Millet, 2009). We believe, however, that what is lacking in our new beginner players is the development of an appropriate level of the profile of some regions often required by this particular effort in this direction.

We particularly refer to: the development of the scapulo-humeral belt force (required in particular for serve and smash), pectal, abdominal and lower limb muscles as a whole unit. In this enumeration we include also the force required in the respective articulation elements.

Under these circumstances, the need to apply "unconventional" training methods and create appropriate drills to positively influence the performance capability is, from our point of view, an essential preoccupation of the motricity specialist. Current performance training cannot be anchored in definitive template shapes.

*Keywords:* tennis, performance, force, speed, performance capacity, means and methods;

## 1. Introduction

The motor drills practiced and developed in the aquatic environment have specific characteristics due to the nonspecific environment (timing, balancing, modified force parameters) and all the improved motor abilities can be efficiently transferred on the tennis court (positive transfer) (Bahamonde & Knudson, 2003).

The topicality of the work is that it is in line with the concerns of optimizing sports training in all its aspects (including the development of motor skills) (Baechle & Earle, 2008). The practical value of the paper is that it

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demonstrates the effectiveness of adapted unconventional drive systems and highlights the role of coordinating skills development in the sports training process (Dawes & Roozen, 2009).

The effort in training is the process of convincing the athlete to overcome the demands during physical training, to achieve a superior technical and tactical level, and to enhance the psychic factors, the results of which increase performance (Perry, Wang, Feldman, Ruth, & Signorile, 2004).

The game concept has evolved over time according to the new requirements of the game. Throughout the evolution of game factors, of the game itself, in the context of permanent changes of orientation and accent, physical training was an element of progress for the other factors of training. A very important element of physical training is strength, speed, balance and mobility (Perry, Wang, Feldman, Ruth, & Signorile, 2004).

## 2. Hypothesis

Starting from the premise that the optimization of sports training in the actual game of tennis is conditioned by the level of coordination capacities (essential elements of the motoring profile of the player) we will organize an experimental study that will confirm / invalidate the hypothesis that the use of tennis-specific motor-driven structures developed in the aquatic environment will have positive effects in optimizing the 11-year tennis player motor profile by increasing the specific parameters of the coordinating capacities.

## 3. Objectives

Selection of relevant bibliographic materials in current field of tennis training and theoretical foundation of the above mentioned topic, elaboration of an unconventional methodical line (developed in the aquatic environment) dedicated to the optimization of the coordination capacities, the means are taken and adapted from the tennis-specific motor structures, the increase of the training efficiency in the field of tennis.

- finding the main methods and means of training with maximum efficiency in the junior tennis game
- developing coordination and balance between all limbs;
- implementing the most effective methological strategies which can optimize in time the process of training and competition;
- developing motor skills as force and speed;
- optimizing the ability to perform at the highest level in training and competitions.

## 4. Subjects

The subjects of the experiment were in number of 12 which were organized in two groups (experimental and control). The tennis players are aged between ten and eleven years.

They have been training at different tennis clubs in Bistrița-Năsăud county having a five to six years of experience, currently playing tennis at advanced level. Also the junior tennis players involved in the experimental research have been participated at various national tournaments annually.

## 5. Experiment

The junior tennis players are engaged in performance activity with numerous participations competitions. Both groups of players are made up of boys aged 10-11 years, with competitive experience, at the level of children, in the tennis game.

While the control group carried out a standard training program according to the conventional training plan, the experimental group took part in adapted training sessions (where drive systems are modeled and adapted to the aquatic environment), internships included in the conventional annual plan.

The experiment was conducted over a six-month period. The experimental and control groups have been monitored throughout this interval (taking data to allow the interpretation of adaptation to the specific effort, respectively, to allow validation of the effectiveness of the proposed means of preparation.

While the control group carried out a standard training program according to the conventional training plan, the experimental group took part in adapted training stages (where the drive systems are adapted to the aquatic

environment), stages inserted in the conventional annual plan. The means applied within the adapted, unconventional program refer synthetically to: water running, water games (volleyball, polo, badminton, right-handed and back-handed imitative stroke exercises). All these means are carried out in swimming pools, where the athletes have evolved in water with the progressively increased depth (knee level, coxofemoral joint, elbow, scapulo-humeral joint level).

1. Lateral jumps: for this drill a jump rope is placed straight on the floor. Players should jump over to the other side of the rope and back and try to clear the rope by a few inches each time. They should start off slowly but build up to three sets of 15 seconds at a time.
2. Forward and Backward Jumps: this is the same drill except the player jumps forwards over the rope and then backwards over it. Start off slowly and build up to three sets of 15 seconds at a time.
3. Criss-cross rope: in rapid movements straddle the rope, landing on one foot first and then the next, before jumping to the other side and doing the same procedure. Try to do three sets of 10 seconds.
4. Assisted let go: the player leans forward until their shoulders are cupped in the other person's hands at shoulder height. They then imitate the running stance with the support of the second person to stop them falling forwards, and then the player is let go and does a sprint. Repeat this drill 3 times with 6 reps, taking a break of a minute between sets.
5. Zig zag drill: Have six cones laid out about 8 feet apart in the form of a 'W'. Players must run through the cones without stepping on them, as rapidly as possible. Repeat three or four times and then take a break.
6. Lateral throw drill: stand with legs shoulder width apart and arms at sides, with a ball in one hand. In an explosive movement raise the arm and throw the ball to the other player. This drill should be done as vigorously as possible. Try to do three sets of 8 reps and make sure to change sides.

The player needs to learn to master and control his/her body. Especially important in the game of tennis is the ability to lower the centre of gravity and control the upper body.

Recovery of the ball: For this exercise there are 8 to 10 balls on the ground or on the water, in different places and they will be recovered running from one to the other and will be collected outside the playing surface. Continue the exercise until all the balls are recovered. It is preferable that this exercise be repeated until the best time is obtained.

Races with the progressive increase and decrease of the complexity and speed considering the modification of the parameters of the effort:

- walking - runing -walking
- runing with increasing and decreasing speed
- lateral running
- backwards running
- transporting the medicine ball, throwing from the side and above the head, running and recovering the balls placed on the playing surface

## 6. Results and Interpretation

Table 1. Experimental group/ Initial evaluation, Speed agility (meters/sec.) and coordination drills

| Nr. Crt. | Name | 6x20m | 5m | 10m | Hexagon | Diamond | Shuffle Steps |
|---|---|---|---|---|---|---|---|
| 1 | A. B. | 4.66 | 1.91 | 2.80 | 10.90 | 21.40 | 8.79 |
| 2 | F. N. | 4.78 | 1.94 | 2.89 | 10.99 | 22.00 | 8.80 |
| 3 | A. M. | 4.39 | 1.79 | 2.77 | 10.48 | 21.10 | 8.39 |
| 4 | V. D. | 4.29 | 1.70 | 2.75 | 9.92 | 21.19 | 8.32 |
| 5 | I. S. | 4.80 | 1.97 | 2.90 | 10.92 | 24.10 | 9.00 |
| 6 | C. N. | 4.47 | 1.70 | 2.75 | 10.69 | 23.00 | 7.99 |

Table 2. Control group/ Initial evaluation, Speed agility (meters/sec.) and coordination drills

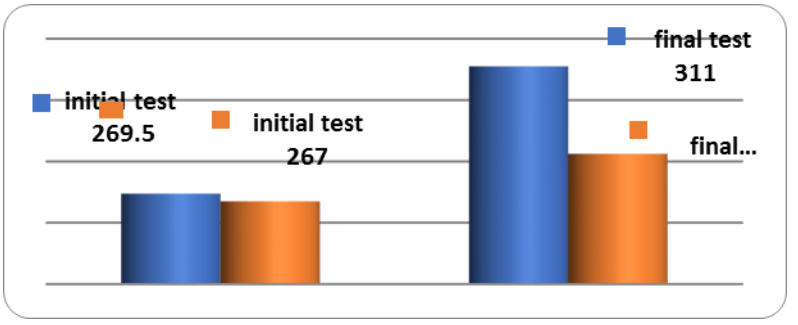
| Nr. Crt. | Name | 6x20m | 5m | 10m | Hexagon | Diamond | Shuffle Steps |
|---|---|---|---|---|---|---|---|
| 1 | M. P. | 4.96 | 1.99 | 3.00 | 11.10 | 24.90 | 9.10 |
| 2 | D. G. | 4.39 | 1.80 | 2.78 | 11.00 | 23.00 | 9.00 |
| 3 | M. S. | 4.90 | 1.90 | 2.85 | 11.20 | 23.10 | 8.90 |
| 4 | P. P. | 4.70 | 1.88 | 3.00 | 10.90 | 22.90 | 8.75 |
| 5 | D. V. | 4.35 | 1.77 | 2.70 | 10.50 | 21.45 | 8.60 |
| 6 | G. U. | 4.25 | 1.69 | 2.70 | 9.90 | 21.39 | 8.35 |

Table 3. Experimental group/ Final evaluation, Speed agility (meters/sec.) and coordination drills

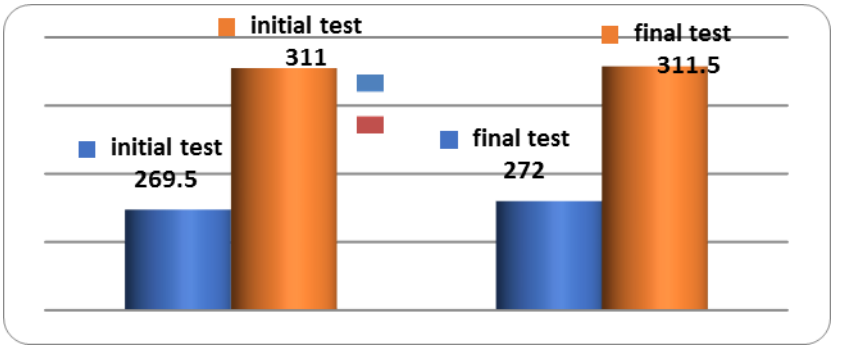
| Nr. Crt. | Name | 6x20m | 5m | 10m | Hexagon | Diamond | Shuffle Steps |
|---|---|---|---|---|---|---|---|
| 1 | A. B. | 4.66 | 1.91 | 2.80 | 10.90 | 21.40 | 8.79 |
| 2 | F. N. | 4.78 | 1.94 | 2.89 | 10.99 | 22.00 | 8.80 |
| 3 | A. M. | 4.39 | 1.79 | 2.77 | 10.48 | 21.10 | 8.39 |
| 4 | V. D. | 4.29 | 1.70 | 2.75 | 9.92 | 21.19 | 8.32 |
| 5 | I. S. | 4.80 | 1.97 | 2.90 | 10.92 | 24.10 | 9.00 |
| 6 | C. N. | 4.47 | 1.70 | 2.75 | 10.69 | 23.00 | 7.99 |

Table 4. Control group/ Final evaluation, Speed agility (meters/sec.) and coordination drills

| Nr. Crt. | Name | 6x20m | 5m | 10m | Hexagon | Diamond | Shuffle test |
|---|---|---|---|---|---|---|---|
| 1 | A. B. | 4.50 | 1.90 | 2.70 | 10.10 | 20.90 | 8.80 |
| 2 | F. N. | 4.54 | 1.92 | 2.81 | 10.15 | 21.00 | 8.61 |
| 3 | A. M. | 4.28 | 1.75 | 2.74 | 10.40 | 20.45 | 8.00 |
| 4 | V. D. | 4.20 | 1.61 | 2.73 | 9.85 | 20.49 | 7.93 |
| 5 | I. S. | 4.72 | 1.85 | 2.88 | 10.19 | 22.85 | 7.99 |
| 6 | C. N. | 4.40 | 1.70 | 2.69 | 10.00 | 21.90 | 7.50 |




**Graph 1.** Running test (6x20m) - average values




**Graph 2.** Diamond test – average values

We will further demonstrate that the rate of progress and its dynamics is significantly different in the experimental group compared to the control group, evidenced by the calculated statistical indicators, but also by the diagrams built for each test.

For centralized data in the tables below, we make the following points:

- C represents the control group (control) and E the experimental group;
- IT is the initial test, and TF final testing;
- Initial-final student is the result of the T test applied to one of the groups for the two tests;
- Student Final is the T test for final testing, applied for the two groups;
- t represents the experimentally determined value at the T test;
- F represents the value recorded by the ANOVA method at the final test for the two groups;
- the critical value of F in the Fisher table used at the significance threshold of 0.05 with 1 and 18 degrees of freedom and calculated with the FINV () function of the Microsoft Excel application is 4.4138 (F (0.05, 1.18) = 4.4138);
- the critical values of t in the Fisher table used at the significance threshold of 0.05 and calculated using the TINV () function in the Microsoft Excel application are as follows:
- for initial T-test T = 2.262 for 9 degrees of freedom;
- for final test T: t = 2,1009 for 18 degrees of freedom;
- P represents the significance threshold (probability), the one used by us is 0.05;

Table 5. Diamond test/statistics

| Diamond test | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Group** | | **X** | **S** | **m** | **Cv** | **Student initial-final** | | **Student final** | | **ANOVA** | | |
| | | | | | | t | P | T | P | F | P | |
| E | TI | 269.5 | 32.782 | 10.366 | 12.164 | 5.326 | <0.05 | | | | | |
| | TF | 311 | 29.79 | 9.42 | 9.58 | | | 2.334 | <0.05 | 5.352 | <0.05 | |
| C | TI | 267 | 25.733 | 8.137 | 9.638 | 2.435 | <0.05 | | | | | |
| | TF | 282.5 | 24.54 | 7.76 | 8.68 | | | | | | | |

- mean values indicate an increase between tests by 41.5 degrees in the experimental group and by 15.5 grades in the control group, significant for both groups:

Experiment group: t(9)=5.326>2.262

Control group: t(9)=2.435>2.262

The coefficient of variation indicates a high homogeneity in both groups is improving compared to initial testing, especially in the first group;

- the values of t and F in the final test confirm the significant differences between the two groups:

t(18)=2.334>2.1009

F(1,18)=5.352>4.413

Table 6. Running test/statistics

| Running test | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group | | X | S | m | Cv | Student initial- final | | Student final | | ANOVA | | |
| | | | | | | t | P | t | P | F | P | |
| E | TI | 272 | 23.944 | 7.571 | 8.803 | 6.353 | <0.05 | | | | | |
| | TF | 311.5 | 24.72 | 7.81 | 7.93 | | | 3.144 | <0.05 | 7.379 | <0.05 | |
| C | TI | 264 | 29.135 | 9.213 | 11.036 | 2.143 | >0.05 | | | | | |
| | TF | 274 | 28.48 | 9.01 | 10.39 | | | | | | | |

## 7. Conclusions

The coordinative and physical capacities involved in the aquatic environment (repetitions characterized by higher concentration parameters - central nervous system demand and skeletal musculature) produce positive accumulations on the coordination and effort capacity of tennis players;

The reaction capacity seen in the context of the specific manifestation of the lower limbs (forms of movement in different directions) has undergone positive changes;

Regarding the amount of training in the aquatic environment is 60% and that in the specific environment of the tennis game is 40%.

The practical value of the experiment is that it demonstrates the efficiency of adapted unconventional drive systems and emphasizes the role of developing coordination and effort capabilities in the sports training process.

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# TENNIS SERVES LOCATION IDENTIFICATION BY YOUNG TENNIS PLAYERS WITH RESPECT TO DIFFERENT COURT COLORS

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**Abstract**

Visual reaction is a voluntary response to an external stimulus. There is a certain time period between application of external stimulus and appropriate motor response to the stimulus called the reaction time. ***Objectives.*** The aim of this paper was to determine if young tennis players can accurately identify the location of a tennis serve with different court color contrasts. ***Materials and Methods.*** The participants in this study were young tennis players (N = 12), males, with the ages between 13 and 14 years old. ***Results.*** There was a significant difference in the scores for green court and gray court colors for both the left-to-right and right-to-left serve directions. ***Conclusion.*** Our study managed to show that a different kind of background color can affect the accuracy in identifying the serve location on a tennis court.
**Keywords:** tennis, reaction accuracy, colors, visual, serve

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## 1. Background

The visual reaction time refers to the amount of time which passes from the moment of application of the stimulus until the response occurs. The reaction time is usually measured in milliseconds, just like in the case of the motor reaction (Batra et al., 2014; Grrishma et al. 2013). The reaction time can be measured in a variety of experimental tasks – detection, discrimination, localization, recognition, remembering. There are three basic kinds of reaction time: simple reaction time (there is only one stimulus and one response), recognition reaction time (there is only one correct response, the participant must ignore the other stimuli – also called the discrimination reaction time) and choice reaction time (the user must give a response that corresponds to the stimulus – every stimulus has its one specific response). The simple reaction time measures the speed of the nervous influx, while the discrimination reaction time measures the basic time (the speed of the nervous influx) combined with the identification time (Madan et al., 1984; Malathi et al., 1990; Baayen & Milin, 2010).

Investigating the laterality was a predilection for psychophysiology researchers. Audio-visual reaction is a very important concept and is studied in areas such as: attention and memory, emotions and neurosciences. There are evidences that laterality, based on brain asymmetry, influence a great number of cognitive processes, for example self-face identification. When the right hemisphere is preferentially active, participants have a tendency to refer images to self, as well as it shows further support for a preferential role of the right hemisphere in processing selfrelated material (Shah et al., 2010).

As a mental function, attention accompanies mental activity being the one that leads to the modelling of the nervous tonus which is compulsory in developing all the other mental processes (Lit et al., 1971). Through attention we realize an important selection of the stimuli. As a property of conscience, attention implies the existence of a certain degree of focalization on a region which becomes central in relation to the rest of the ensemble, which comes to occupy a marginal position. Attention appears during the state of active standby and concurs with the optimum level of performance in a given task. Through attention: an event is perceived with a higher speed; the clarity of an

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object or activity grows (by increasing the conscious process); a selection of certain impressions is made (while others are more fading) (Misra et al., 1985).

## 2. Objectives

The aim of this paper was to determine if young tennis players can accurately identify the location of a tennis serve with different court color contrasts.

## 3. Methods

*Subjects*

The participants in this study were young tennis players (N=12), all males, with the ages between 13 and 14 years old.

*Methods and the Steps of the Research*

For the purpose of this study three tennis court background colors were used: orange (slag court), gray (normal concrete court) and green (concrete court with green paint over it). Only one shade of tennis balls was used as minimize the number of variables used. The official shade of the balls approved by the ITF (International Tennis Federation) was used.

All the serves during this study were made by the same person, a tennis coach with 22 years of experience. The type of serve made was a straight hard hit with no spin or countereffect.

Each subject had to watch from the baseline 10 serves from left-to-right direction, and also 10 serves from right-to-left direction. They were required that, after each serve, to mark the position they thought the ball hit the ground on a stylised tennis court on an observation sheet. This stylised court was obtained by using a photograph of each of the courts, from a vantage point.

Each serve hitting location was filmed from a vantage point and was compared later with each subject answers. The correct answers were counted and a score was calculated for each subject. The error permited was of 6 cm (the diameter of a tennis ball). For an easier cuantification of the answers, the sheet of paper with the subject's marks was overlayed to the court film.

## Results

After the tests were finished we've collected the following data for each subject and for each background tested.

Tabel 1. Successful marks of each subject for each court color for the left-to-right direction

| | Boys Left-to-Right | | |
|---|---|---|---|
| Subject | Orange_Court | Green_Court | Gray_Court |
| 1 | 8 | 9 | 5 |
| 2 | 7 | 8 | 6 |
| 3 | 9 | 8 | 5 |
| 4 | 5 | 7 | 6 |
| 5 | 5 | 8 | 7 |
| 6 | 4 | 7 | 7 |
| 7 | 7 | 8 | 5 |
| 8 | 7 | 9 | 5 |
| 9 | 6 | 8 | 7 |
| 10 | 5 | 7 | 4 |
| 11 | 9 | 7 | 5 |
| 12 | 9 | 7 | 4 |

Tabel 2. Successful marks of each subject for each court color for the right-to-left direction

| | Boys Right-to-Left | | |
|---|---|---|---|
| Subject | Orange_Court | Green_Court | Gray_Court |
| 1 | 7 | 8 | 4 |
| 2 | 6 | 7 | 5 |
| 3 | 8 | 7 | 4 |
| 4 | 4 | 6 | 5 |
| 5 | 4 | 8 | 7 |
| 6 | 4 | 7 | 7 |
| 7 | 8 | 8 | 6 |
| 8 | 8 | 9 | 6 |
| 9 | 7 | 8 | 7 |
| 10 | 5 | 8 | 5 |
| 11 | 9 | 7 | 7 |
| 12 | 9 | 8 | 5 |

Table 3. Mean, Standard deviation and standard error mean calculated for each pair of court colors for the left-to-right direction

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Orange_LtR | 6.75 | 12 | 1.765 | 0.509 |
| | Green_LtR | 7.75 | 12 | 0.754 | 0.218 |
| Pair 2 | Orange_LtR | 6.75 | 12 | 1.765 | 0.509 |
| | Gray_LtR | 5.50 | 12 | 1.087 | 0.314 |
| Pair 3 | Green_LtR | 7.75 | 12 | 0.754 | 0.218 |
| | Gray_LtR | 5.50 | 12 | 1.087 | 0.314 |

Table 4. Mean, Standard deviation and standard error mean calculated for each pair of court colors for the right-to-left direction

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Orange_RtL | 6.58 | 12 | 1.929 | 0.557 |
| | Green_RtL | 7.58 | 12 | 0.793 | 0.229 |
| Pair 2 | Orange_RtL | 6.58 | 12 | 1.929 | 0.557 |
| | Gray_RtL | 5.67 | 12 | 1.155 | 0.333 |
| Pair 3 | Green_RtL | 7.58 | 12 | 0.793 | 0.229 |
| | Gray_RtL | 5.67 | 12 | 1.155 | 0.333 |

Table 5. Mean, Standard deviation and standard error mean calculated for each pair of the same court color for the left-to-right and right-to-left direction

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Orange_LtR | 6.75 | 12 | 1.765 | 0.509 |
| | Orange_RtL | 6.58 | 12 | 1.929 | 0.557 |
| Pair 2 | Green_LtR | 7.75 | 12 | 0.754 | 0.218 |
| | Green_RtL | 7.58 | 12 | 0.793 | 0.229 |
| Pair 3 | Gray_LtR | 5.50 | 12 | 1.087 | 0.314 |
| | Gray_RtL | 5.67 | 12 | 1.155 | 0.333 |

Table 6. Paired sample t-test for each pair of court colors for the left-to-right direction

| | | Paired Differences | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 95% Confidence Interval of the Difference | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | Lower | Upper | t | df | Sig. (2-tailed) |
| Pair 1 | Orange_LtR -Green_LtR | -1.000 | 1.758 | 0.508 | -2.117 | 0.117 | -1.970 | 11 | 0.074 |
| Pair 2 | Orange_LtR - Gray_LtR | 1.250 | 2.563 | 0.740 | -0.378 | 2.878 | 1.690 | 11 | 0.119 |
| Pair 3 | Green_LtR - Gray_LtR | 2.250 | 1.288 | 0.372 | 1.432 | 3.068 | 6.051 | 11 | 0.000 |

Table 7. Paired sample t-test for each pair of court colors for the right-to-left direction

| | | Paired Differences | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 95% Confidence Interval of the Difference | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | Lower | Upper | t | df | Sig. (2-tailed) |
| Pair 1 | Orange_RtL -Green_RtL | -1.000 | 1.809 | 0.522 | -2.149 | 0.149 | -1.915 | 11 | 0.082 |
| Pair 2 | Orange_RtL - Gray_RtL | 0.917 | 2.392 | 0.690 | -0.603 | 2.436 | 1.328 | 11 | 0.211 |
| Pair 3 | Green_RtL - Gray_RtL | 1.917 | 1.311 | 0.379 | 1.083 | 2.750 | 5.063 | 11 | 0.000 |

Table 8. Paired sample t-test for the two serve directions on the same court color

| | | Paired Differences | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 95% Confidence Interval of the Difference | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | Lower | Upper | t | df | Sig. (2-tailed) |
| Pair 1 | Orange_LtR - Orange_RtL | 0.167 | 0.835 | 0.241 | -0.364 | 0.697 | 0.692 | 11 | 0.504 |
| Pair 2 | Green_LtR - Green_RtL | 0.167 | 0.718 | 0.207 | -0.289 | 0.623 | 0.804 | 11 | 0.438 |
| Pair 3 | Gray_LtR - Gray_RtL | -0.167 | 1.030 | 0.297 | -0.821 | 0.488 | -0.561 | 11 | 0.586 |

A paired-samples t-test was conducted (Tabel 6.) to compare successful marks between green and gray court colors during the serves from left to right. There was a significant statistical difference in the scores for green background (M=7.75, SD=0.754) and gray background (M=5.5, SD=1.087) conditions during the left-to-right direction; t(11)=6.051, p = 0.000. This means that the change of court background color has an influence over the accuracy of the subjects to see where the tennis ball has fallen after a serve.

A paired-samples t-test was conducted (Tabel 7.) to compare successful marks between green and gray court colors during the serves from right to left. There was a significant statistical difference in the scores for green background (M=7.58, SD=0.793) and gray background (M=5.67, SD=1.115) conditions during the left-to-right direction; t(11)=5.063, p = 0.000. This means that the change of court background color has an influence over the accuracy of the subjects to see where the tennis ball has fallen after a serve.

The other paired sample t-tests performed for either another court color or direction of serve didn't show any important statistical difference.

## 4. Conclusion

Our study managed to show that there is an important difference between the accuracy of identifying the serve location between green and gray court color. This may indicate that there is a need for more reaction training on either green or gray backgrounds to be able to see the ball location. This result may also indicate that training on either green or gray background may affect the accuracy of identifying the location of the serve when changing to the other color.

These results may point towards the idea that tennis players must train their reaction accuracy according to the type colored field they will play on. The fact that there was no significant difference between orange background and the rest may indicate that training done on orange doesn't affect the accurancy of seeing the serve on the other court colors.

There was no significant difference between the accuracy of the two directions tested. Left to right serve and right to left serve directions means were almost the same in all three court colors.

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# DOES THE GROSS MOTOR DEVELOPMENT OF ROMANIAN AND HUNGARIAN 6 – 7-YEAR-OLD CHILDREN DEPEND ON THE DEGREE OF OBESITY? (FIRST PHASE OF A LONGITUDINAL STUDY)

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**Abstract**

**Introduction and aim:** In Hungary (HU) there are everyday PE lessons (5 per week), while there are fewer PE lessons (2 per week) in Romania (RO). We compare RO and HU children who started to attend primary school in the last semester and we hypothesize that more regular PE lessons have more positive effect on motor development due to the improvement in the degree of obesity. **Methods**: 361 children from both countries and genders (RO: 132 boys and 116 girls; HU: 57 boys and 56 girls) participated in the study. They were classified by BMI percentiles to lean (L; percentile was less than 25%), normal (N; percentile was between 25.1 and 74.9%) and overweight/obese (OOB; percentile was more than 75%) categories. Their motor development was measured by Test of Gross Motor Development-2 (TGMD-2) which contains locomotor (run, gallop, hop, leap, horizontal jump, slide) and object control (striking a stationary ball, stationary dribble, catch, kick, overhand throw, underhand roll) tasks. **Results:** The rate of L or OOB pupils was similar in both countries. There were no differences between the BMI categories in either countries in the results of different locomotor and object control tasks. N and OOB RO pupils achieved higher scores in hop than HU children in the same BMI categories. In the overall results of locomotor tasks L HU pupils were significantly better than OOB HU children and L RO pupils achieved higher points than N or OOB RO children. N or OOB RO pupils' overall locomotor scores were higher than HU children in the same BMI categories. The N RO children's results of catch were lower than N HU pupils' results. In the overall results of object control tasks, there were no differences among the BMI categories or the countries. In the cumulate outcome of TGMD-2, the OOB HU pupils' scores were lower than the L or N HU children's scores. The OOB RO pupils achieved higher cumulate TGMD-2 scores than the OOB HU children. **Conclusions and further perspectives**: Our results seem to prove that the OOB children's motor skills are weaker. We detected a few differences between RO and HU pupils' motor development, but we would like to perform the same examinations once in the following semesters among the same children. Now we reported the results of the first measurement period. We suppose that the differences would be more remarkable when the pupils spend more time in the system of everyday PE or 2 PE lessons per week.

*Keywords:* motor development; degree of obesity; 6 – 7-year-old pupils

## 1. Introduction

Since the autumn of 2012, everyday physical education (PE) lessons have been introduced in Hungary (HU) within the framework of statutory regulations (Magyar Közlöny, 2012). This means five PE lessons per week for

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every student in primary and secondary schools. The purpose of this provision is to educate a healthier lifestyle, prevent various diseases and thus ensure a better quality of life (Meszlényi et al.,,2017; Rétsági & Csányi, 2014). In contrast, schools in Romania have only two PE lessons for children per week (Ministerul Educației Naționale, 2016).

Our main hypothesis is that more regular PE lessons have more positive effect on motor development due to the improvement in the degree of obesity. Our aim was to compare the motor development of different BMI groups from RO and HU.

Now we report the results of the first measurement period with participants who newly enrolled in 1st class of school education after nursery, but we would like to perform the same examinations once in every semester during the first two school years, and follow up the same indicators among the same children.

Numerous studies have proven the positive effects of regular physical activity on motor development (Fisher et al., 2005; Graf et al., 2004; Houwen et al., 2009) or physical (Bailey, 2006), cognitive (Sibley & Etnier, 2003; van der Niet et al., 2015) and social (Taras, 2005) abilities. The progress in these areas also contributes to a better quality of life of the children concerned (Bailey, 2006). As a counterpoint, the relevant literature emphasizes that the number of overweight children increases in industrial countries (Allison et al., 1999; Barth et al., 1997; Bundred et al., 2001; Kromeyer-Hauschild et al., 1999) due to lack of physical activity (Dietz & Gortmaker, 1985; Gortmaker et al., 1990). As a result, the number of children with mobility problems increases as well (Cairney et al., 2005).

It is well-known that there is a strong correlation between the body fat content and the motor development. Already in infancy it was noticeable that overweight children's motor development was delayed compared to non - obese children (Slining et al., 2010). It is shown among older children (5 to 10 years old) as well, that motor development of obese children is fallen behind than normal weight children (D'Hondt et al., 2009). Limaa et al. (2018) followed up children from 6 to 13 years of age, and similarly to the previous studies, they found that overweight children perform worse in movement coordination.

Moreover, childhood overweight can be the starting point for a number of additional adult complications (abnormal obesity, motor problems, type 2 diabetes mellitus, hypertension, metabolic syndrome, etc.) that greatly contribute to the deterioration of the quality of life (Parsons et al., 1999; Wabitsch, 2000). One of the options to prevent these problems is the regular physical activity in school education (Bailey, 2006), the increase in the number of PE lessons, and the regular physical activity as a daily routine (Holm et al., 2001).

## 2. Methods

### *2.1. Participants*

361 children from both countries and genders (RO: 132 boys and 116 girls; HU: 57 boys and 56 girls) participated in the study. They were newly joined in the system of everyday PE in HU and the system of 2 PE lessons per week in RO and we performed the measurements in the beginning of their first semester. The children attend to primary schools in the downtown area of Cluj-Napoca and Arad (RO) and Szeged (HU). For each participant, their parents gave written consent and ethics approval was gained from the relevant school institutional body.

### *2.2 Procedures*

Body mass index (BMI) was measured by Omron BF 511 body composition monitor (Healthcare Co., Kyoto, Japan). The participant's degree of obesity was specified based on their BMI percentiles that were defined according to the BMIs of the measured children from the same country. Then they were classified by BMI percentiles to the following three groups: lean (L; percentile was less than 25%), normal (N; percentile was between 25.1 and 74.9%) and overweight/obese (OOB; percentile was more than 75%) categories. The 25% and 75% BMI percentile values of the pupils from both countries are presented in Table 1.

Table 1. The 25% and 75% BMI percentile values of the participants

| | Romania | Hungary |
|---|---|---|
| BMI (kg/m$^2$) percentile=25% | 14.60 | 15.20 |
| BMI (kg/m$^2$) percentile=75% | 17.45 | 17.55 |

The rate of the participants in the three BMI groups is demonstrated in Table 2. The proportions of L or OOB pupils (L RO: 22.18%; L HU: 23.01%; OOB RO: 25.00%; OOB HU: 24.78%) were similar in both countries.

Table 2. The rate of the participants in the different BMI groups

| | Romania | Hungary |
|---|---|---|
| lean (BMI percentile less than 25%) | 22.18% | 23.01% |
| normal (BMI percentile between 25.1 and 74.9%) | 52.82% | 52.21% |
| overweight/obese (BMI percentile more than 75%) | 25.00% | 24.78% |

To examine the children's motor development we used the Test of Gross Motor Development-2 (TGMD-2) (Ulrich, 2000) which does not measure performance, but classifies motor coordination based on given observation criteria. The TGMD-2 contains 12 motor skills divided into two subtests: locomotor (run, gallop, hop, leap, horizontal jump, slide) and object control (striking a stationary ball, stationary dribble, catch, kick, overhand throw, underhand roll) tasks. The test administration took approximately 20 min for each child. The assessment protocol involved providing children with a demonstration of the correct technique before assessment. Children were then asked to perform the skill twice. Each attempt was scored with each component receiving a '1'if correctly executed or a '0' if not. The sum of the observed criteria for each subscale comprises the overall score (maximum point available (mpa): 48).

The sum of the overall scores from locomotor and object control subtest was the cumulate outcome (mpa: 96). During the performances general encouragement was given but no specific verbal feedback about skill performance.

The TGMD is already widespread in the US and in many countries of the world (Bakhtiar, 2014; Kit et al., 2017; Pang & Fong, 2009; Valentini, 2012), but it is not well-known yet in Central and Eastern Europe, although there was a study in the Czech Republic that used this test system (Cepicka, 2010).

*2.3. Statistical analysis*

Data were expressed as means ± S.E.M. The data were tested for signicance via Bonferroni-test, and differences were regarded as significant at *$p<0.05$ between the BMI groups in the same country and $^{\#}p<0.05$ between RO and HU in the same BMI groups.

**3. Results**

There were no significant differences between the BMI categories in either country in the results of different locomotor tasks (Table 3).

N ($8.66 \pm 0.16^{\#}$) and OOB ($8.6 \pm 0.24^{\#}$) RO pupils achieved higher scores in hop than HU children in the same BMI categories (N: $7.54 \pm 0.28$; OOB: $6.54 \pm 0.48$). In the overall results of locomotor tasks L HU pupils ($38.50 \pm 1.20$*) were significantly better than OOB HU children ($33.39 \pm 1.49$) and the L RO pupils ($41.65 \pm 0.68$*) were significantly better than N ($39.74 \pm 0.6$) or OOB ($39.37 \pm 0.86$) RO children. N or OOB RO pupils' overall locomotor scores were higher than HU children in the same BMI categories (N: $36.44 \pm 0.75$).

Table 3. Results of locomotor tasks

| | Romania | | | Hungary | | |
|---|---|---|---|---|---|---|
| | L | N | OOB | L | N | OOB |
| Run (mpa: 8) | 6.80 ± 0.21 | 6.67 ± 0.16 | 6.68 ± 0.22 | 6.31 ± 0.32 | 6.08 ± 0.20 | 5.68 ± 0.33 |
| Gallop (mpa: 8) | 7.09 ± 0.20 | 6.58 ± 0.15 | 6.66 ± 0.24 | 6.35 ± 0.42 | 5.95 ± 0.26 | 5.64 ± 0.32 |
| Hop (mpa: 10) | 8.69 ± 0.24 | 8.66 ± 0.16$^{\#}$ | 8.60 ± 0.24$^{\#}$ | 7.73 ± 0.40 | 7.54 ± 0.28 | 6.54 ± 0.48 |
| Leap (mpa: 6) | 5.05 ± 0.19 | 4.61 ± 0.14 | 4.40 ± 0.23 | 4.73 ± 0.33 | 3.88 ± 0.22 | 3.61 ± 0.32 |
| Horizontal jump (mpa: 8) | 6.62 ± 0.22 | 6.21 ± 0.19 | 6.29 ± 0.24 | 6.12 ± 0.47 | 5.81 ± 0.29 | 5.29 ± 0.41 |
| Slide (mpa: 8) | 7.40 ± 0.12 | 7.02 ± 0.16 | 6.74 ± 0.26 | 7.27 ± 0.35 | 7.17 ± 0.21 | 6.64 ± 0.35 |
| Overall score (mpa: 48) | 41.65 ± 0.68* | 39.74 ± 0.60$^{\#}$ | 39.37 ± 0.86$^{\#}$ | 38.50 ± 1.20* | 36.44 ± 0.75 | 33.39 ± 1.49 |

The results of object control tasks are presented in Table 4. We did not detect any significant differences between the BMI categories in either country in the results of different object control tasks.

The N RO children's results of catch were significantly lower (4.40 ± 0.12$^{\#}$), than N HU pupils' (5.27 ± 0.13) results. In the overall results of object control tasks, there were no significant differences among the BMI categories or the two countries.

Table 4. Results of object control tasks

| | Romania | | | Hungary | | |
|---|---|---|---|---|---|---|
| | L | N | OOB | L | N | OOB |
| Striking a ball (mpa: 10) | 6.27 ± 0.33 | 6.27 ± 0.23 | 6.08 ± 0.25 | 5.46 ±0.45 | 5.93 ± 0.26 | 4.86 ± 0.44 |
| Dribble (mpa: 8) | 5.20 ± 0.34 | 5.24 ± 0.23 | 4.84 ± 0.31 | 4.88 ± 0.46 | 4.53 ± 0.32 | 3.79 ± 0.42 |
| Catch (mpa: 6) | 4.45 ± 0.20 | 4.40 ± 0.12$^{\#}$ | 4.37 ± 0.18 | 5.08 ± 0.29 | 5.27 ± 0.13 | 5.00 ± 0.20 |
| Kick (mpa: 8) | 6.31 ± 0.28 | 6.53 ± 0.16 | 6.05 ± 0.30 | 6.58 ± 0.35 | 6.64 ± 0.20 | 5.86 ± 0.30 |
| Overhand throw (mpa: 8) | 5.45 ± 0.26 | 5.53 ± 0.16 | 5.16 ± 0.26 | 5.46 ± 0.31 | 5.76 ± 0.25 | 5.54 ± 0.26 |
| Underhand roll (mpa: 8) | 5.85 ± 0.30 | 6.03 ± 0.18 | 6.16 ± 0.23 | 5.69 ± 0.41 | 6.15 ± 0.22 | 5.86 ± 0.30 |
| Overall score (mpa: 48) | 33.55 ± 1.02 | 34.00 ± 0.68 | 32.66 ± 0.89 | 33.15 ± 0.97 | 34.29 ± 0.79 | 30.89 ± 0.79 |

The obesity-degree dependent cumulate outcomes of TGMD-2 are demonstrated in Table 5. In the cumulate outcome of TGMD-2, the OOB HU pupils' scores (64.29 ± 2.02*) were remarkably lower than the L (71.65 ± 1.51) or N (70.73 ± 1.23) HU children's scores. The OOB RO pupils achieved higher cumulate TGMD-2 scores (72.03 ± 1.52$^{\#}$) than the OOB HU children.

Table 5. Cumulate outcomes of TGMD-2

| | Romania | | | Hungary | | |
|---|---|---|---|---|---|---|
| | L | N | OOB | L | N | OOB |
| Cumulate outcomes of TGMD-2 (mpa: 96) | 75.20 ± 1.48 | 73.74 ± 1.10 | 72.03 ± 1.52$^{\#}$ | 71.65 ± 1.51 | 70.73 ± 1.23 | 64.29 ± 2.02* |

## 4. Discussion

To answer the question in the title, our results seem to prove that the gross motor development of Romanian and Hungarian 6 – 7-year-old children depends on the degree of obesity. Similarly to previous findings (D'Hondt et al., 2009; Limaa et al., 2018; Slining et al., 2010), we observed that OOB children's motor skills are weaker. We may

conclude that according to our results, in both countries L children achieved higher overall scores in locomotor task than OOB children. Furthermore, OOB HU pupils performed worse in cumulate outcomes of TGMD-2 than non - obese HU children.

Okely at al. (2004) demonstrated in their publication that students in grades 4, 6, 8 and 10 performed better on locomotor tests than those who were overweight. However, in object control tasks, only Grade 6 and Grade 10 not overweight boys performed better than their overweight schoolmates. Similarly, in our research among younger participants, the overall scores of locomotor tasks depended on the degree of obesity, but the object control task's overall results did not. Moreover, it is worth mentioning that in our study, the participants seemed to achieve higher overall scores in the locomotor subscale than in the object control tasks.

Surprisingly we observed several differences between the results of RO and HU children. The HU children caught the ball with higher scores, but performed the hop with lower scores than the RO pupils. There were significant differences between RO and HU pupils in the overall results of locomotor tasks and the cumulate outcomes of TGMD-2 as well. We did not expect these differences, because the participants of our study newly joined in the system of everyday PE in HU and the system of 2 PE lessons per week in RO. We expected these differences between the two countries when the pupils spend more time in their own national system of PE, not when they newly enrolled in 1st class of school education after nursery. It needs further investigations to explain these non-expected differences, because we suppose that it cannot be the effect of the everyday PE.

Now we reported the results of the first measurement period of a longitudinal study. We would like to perform the same examinations once in every semester during the first two school years, and follow up the same indicators among the same children. We suppose that the differences would be much more remarkable.

## 5. Further perspectives

Our research is a part of a longitudinal international (RO-Slovakia-HU) study. Its purpose is to prove the beneficial effects of regular health promotion physical activity including the school PE lessons on body composition, motor skills and quality of life as well among 6-7-year-old pupils. We would like to study the correlations between these indicators. In addition to the data presented here, we measure the height, weight, relative body fat and muscle content, basal metabolic rate as well. To examine the quality of life we use the child and parental version of KidScreen-27 questionnaire (Ravens-Sieberer et al., 2007; Robitail et al., 2007; The KIDSCREEN Group Europe, 2006). We perform the same measurements in Slovakia (Nitra and Komarno) as well.

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# STATISTICAL ANALYSIS OF INJURY PATTERNS ACCORDING TO PLAYING POSITION IN HANDBALL

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**Abstract**

Handball is a rough sport and by its means, dynamics and evolution implies the appearance of traumatic injuries of different severity. This article has the purpose of showing which are the main injuries for each playing position that this game presents and to observe which one of these field position has the higher injury rate.

*Keywords:* injuries, traumatology, handball, playing position

## 1. Introduction

It is safe to say that many authors had analyzed the incidence of the specific injuries of amateur handball players but information regarding top level athletes is quite limited. So, this article is meant to study the injury pattern according to playing position in the handball game. Depending on the field area, players tend to have higher physical contact on some of them or be more physical demanding, regarding to speed, difficult throwing and landing positions, these along with the involvement of the opponent making the circumstances for the appearance of traumatic injuries.

The appearance of these injuries requires also a higher interest in the prevention process in order to decrease their number, and also trying to find the main cause that produces them, or the specific areas that are more inclined to suffer them. Alterations in posture and motion patterns are thought to play a role in developing shoulder injuries in overhead athletes. Taping is widely used in the sporting population, but there are limited empirical data regarding its effectiveness (Damla, Sibel , Ozer et al, 2017).

Acute traumas that need medical attention and specific treatment have a great importance because they could lead, in the worst case, to permanent medical conditions (Tirabassi, Brou, Khodaee et al., 2016).

By playing this sports, the appearance of these injuries of any type or gravity is, at one point, imminent. These can be represented by acute lesions or microtraumas that usually affects bones, joints and skeletic muscles. From the acute traumas category we can enumerate bone lesions (fractures), joint lesions (strains and sprains), as well as muscle ruptures of different degrees. These kind of injuries lead to a great distress, absence from the training sessions and official games and high costs for the society environment. It is therefore suggested that the more injuries severe injuries the highest should be the prophylactic priority, no matter their incidence (Van Mechelen, 1997).

This sport evolves continuously, this meaning that the dynamics, physical implication, overuse are increasing amongst the players. There are a great number of internal or external factors that contribute to the production of these traumas. Like we have said before, playing positions has it's role in the type of injuries that occurs, this article having the purpose which one of them is more inclined to suffer more frequent and severe traumas.

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We have assumed that the backs and pivots tend to suffer more of them because of the tricky and demanding throwing and landing positions, in the intermediar players case, and also because of the permanent harsh contact when we reffer to the pivot that constantly is „flanked" by its opponents.

## 2. Material and methods

We have questioned a number of 25 players using a specific set of questions in order to receive valid data of their traumatic history. The players activate in the first Romanian handball league and are the components of the teams HC Vaslui and CSM Focsani. Both teams received the same type of questions, the data was interpreted therefore we were able to extract the main points that could lead to the confirmation of the hypothesis, and also to compare the field positions from the traumatic injuries perspective.

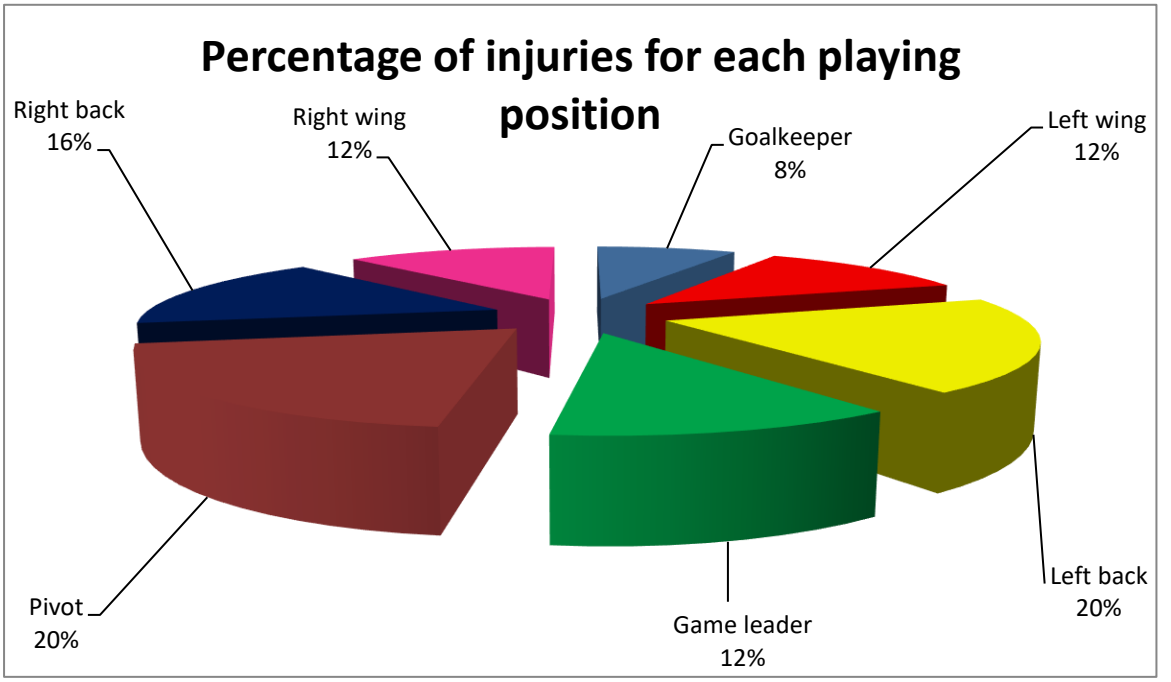


Fig.1 Percentage of injuries for each playing position

In the graphic above we calculated the percentage of the number of injuries for each playing position. Therefore for goalkeepers we have 8%, which is the lowest value, for the game leader, left and right wing they all have 12% of them, pivots and left backs have each 20% and the right backs have 16%. As we can see the pivot, right and left backs have the highest percentage of injuries this being connected to the permanent contact with the opponents that these ones require. As we know, these playing position require a lot of strength, stability, power and also speed and agility in order to complete the tasks of the game and to be able to outstand the hard contacts that the opponents apply.

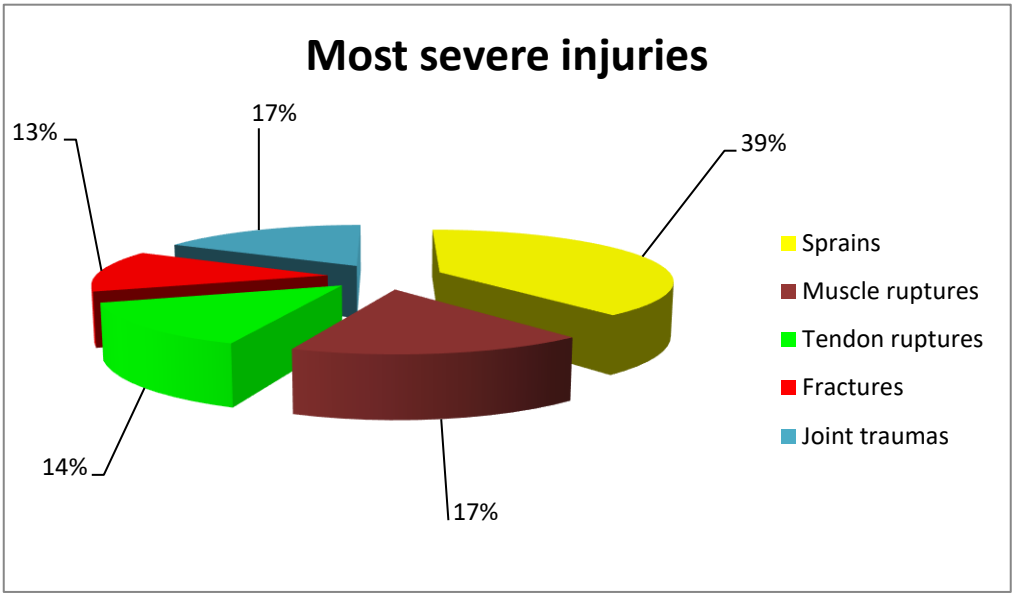


Fig.2. Most severe injuries

In what concerns the most severe injuries of the Romanian handball players, we can see a high percentage of sprains (39%) due to the sudden direction changes made throughout the games and training sessions and also because of the overuse of the articular structures.

Another high percentage trauma is represented by muscle ruptures especially in the lower limb area (thigh). Following the interpretation of the data, 17% of the total injuries were represented by this one, mainly because of overuse, not preparing the body for the specific effort, and also because of the hard hits received from opponents.

We can also see a 14% tendon ruptures especially in the shoulder and Achilles tendon. In what concerns the shoulder area, the main production cause is connected to hard contact with the opponent.

Other injuries are fractures of the metatarsal, forearms and malleolus bones due to wrong landing after throwing the ball. We can see joint traumas (17%) especially in the knee, more specific being represented by meniscus ruptures, strains, total and partial ruptures of the ligaments (especially anterior cruciate ligament).

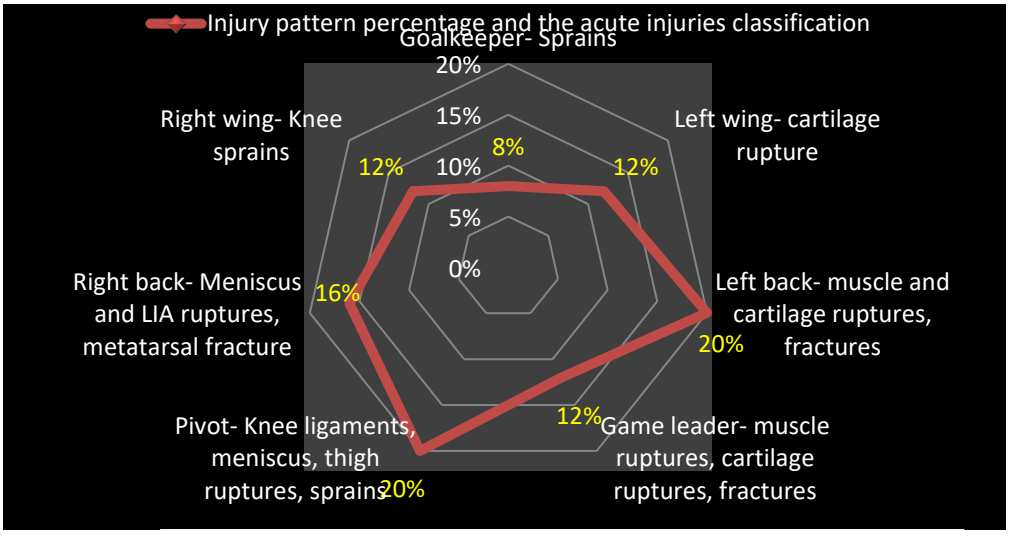


Fig. 3. Injury pattern percentage and the acute injury classification

In the following graphic we have tried to present along the percentage that was shown before, the main acute injuries of the questioned handball players in order to have a better image of their traumatic injuries and also to be able to conclude on which position from all of them suffers the most severe injuries. In what concerns the goalkeepers, the main injuries were represented by sprains mainly because of wrong landing positions when defending during the game, they also being the ones with the lowest percentage rate of injuries. On the left side we concluded for the left wing that the most severe trauma was represented by cartilage ruptures in the knee area, and for the left back muscle and cartilage tears along with tendon inflammation and shin and fibula fracture. The main traumas for the playmaker are represented by sprains and muscle tears on the lower limbs due to overuse.

In what concerns the pivot, this positions presents a variety of traumatic injuries such as collateral ligaments, anterior cruciate, meniscus and biceps femur tears because of rough contact, hard landings and powerful hits from the opponents in the 6 meters area. On the right side we will start with the right back and the main injuries of the players from that position, represented by meniscus and ligaments ruptures and fractures of the metatarsal bones. The last position is the right wing, this one being represented by ankle and knee sprains.

As we can see, there is a variety of injuries that the handball players suffered, with different grades of severity due to a number of factors as rough contact, overuse, contact with the opponent, inappropriate landings and so on.

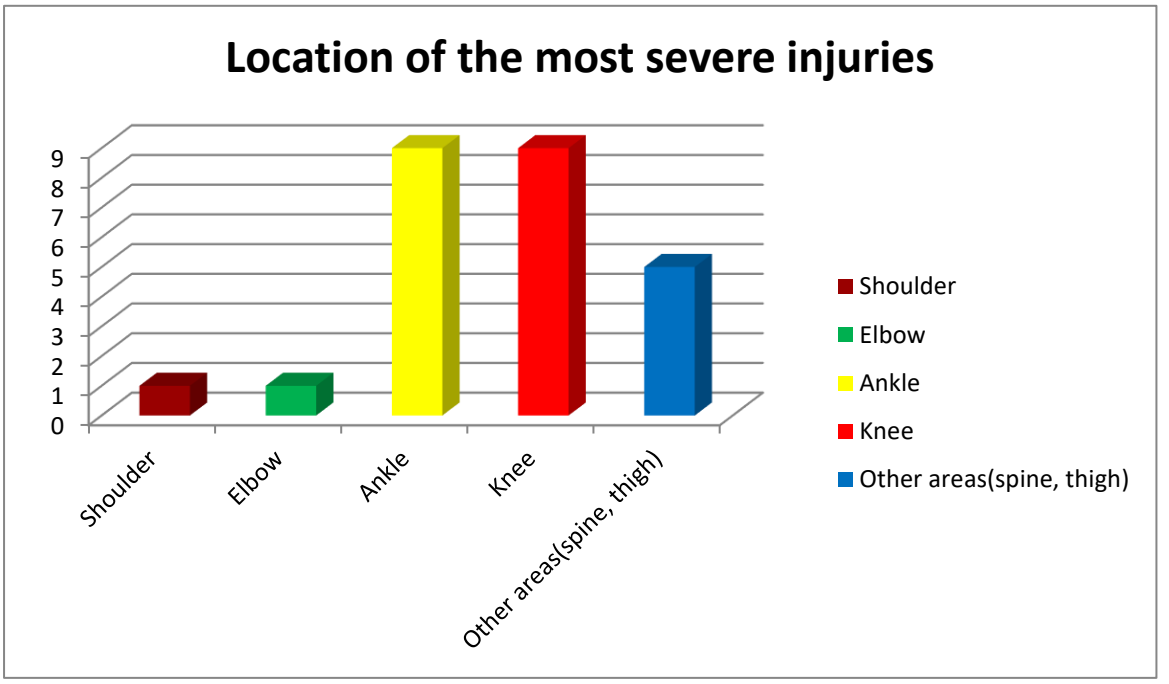


Fig. 4. Location of the most severe injuries

In what concerns the location of these severe injuries we highlighted the main areas being affected, more specific the ankle and the knee, one of the most eloquent being the overuse due to the high intensity games and the repetitive actions that these players make. The spine is usually affected because of the continuous landings with the kinetic forces breaking in the lumbar region. Lower limbs are usually affected in playing this team sport this meaning that a poor training could lead to these injuries and implicitly to long periods of absence from trainings and official matches.

Another interesting fact is the moment when these injuries occur. More than 80% of them happened during the training sessions, this meaning maybe insufficient training or preparing the body for the effort, too much physical

implication with the team mates, and also the overuse state in which they are constantly forcing the bone, joint, muscular and ligamentous systems with few time to fully recover.

## 3. Conclusions

The main objective of the study was to show the patterns of each playing position from the perspective of traumatic injuries that the handball players tend to suffer. The data collected was introduced into graphics to show the percentage of injuries for each position, most severe of them and the display of the most important ones alongside their location. To conclude, we can say that the pivots and left backs had the highest percentages of injuries (20% each), followed by the right back position (16%), this being caused by, like we have said before, continuous physical contact with the opponent (even in training), tough landing and throwing position all these combined with other factor and leading to the results presented and explained above.

If we are to talk about the limitations of the study, the main one could be the number of the players, in the future another study with many more other athletes being able to offer more specific data for interpretation.

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# SOCIAL ACTIVATION THROUGH CONSCIOUS PARTICIPATION TO INDIVIDUAL TRAINING

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**Abstract**

**Aim.** The purpose of the research is to capitalize on the didactic principle of conscious participation for the achievement of sports goals. **Methodology.** Formation of the cortical image of the movement using the intuitive method by activating several analysers and self-report. Strengthening information through proprioceptive afferents discovered in practical activity. The conscious participation of the athletes in their own training played a central role. The information regarding the health, diet and recovery have contributed to the responsibility of the athletes. A record of the quality of the activities constituted the reference framework. The role play takes place in groups of three athletes, in which two pass between them and the other records the quality of the executions. In this situation, all become observant and observers and are much more responsible for the grades they receive. Assertive behaviour is cultivated. The didactic principles used in the coherent training of the athletes were the guide of the training design. **Results.** The bibliographic study, the experience and the answers given to the interview highlighted the following aspects: some of the coaches are improving through the use of electronic websites, follow the press, discuss with opponents and colleagues, participate in courses organized by the specialized sports federation; another part takes advantage of the goodwill of people with great experience in sports, who highlight the psychosocial contexts of events, interests, adversities, psychological strategies, tactical innovations; vision coaches understand the stages of learning the motor skills and the significance of sports values, follow the performance expressed by training valuable players. **Conclusion**. The establishment and management of the learning objectives was achieved through psycho-behavioural setting and compliance with the deadlines. The athlete's involvement in their own preparation has led to the awareness of the role of coaches that the coaches have. Responsible and rational behaviour, conscious participation in one's own training soon led to unexpected initial progress.

*Keywords:* conscious involvement, reference framework, sports, evaluation..

## 1. Introduction

Coaches with great performances in gymnastics, swimming, boxing, weightlifting and team sports tackle in their discussions or lectures the topic of trainers. With the beginning of the sports activity, the habits adapt to specific requirements. The state of health and the prevention of accidents, the hardening of the body become suddenly important (Bulduș, 2013).

In this context, the intrinsic motivation from the athletes is noted in psychology courses, as a decisive factor in achieving great performances (Crăciun, 2014).

In the sports team the presence of teammates or opponents is an element that determines social facilitation as a factor of progress (Mureșan, 2005). Sometimes from a misunderstanding of solidarity this does not work. The

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athletes remain the object of the training and not the subject of the activity. They turn into robots for which the coach thinks.

The sports training focuses on the rationalization, standardization or individualization of the training (Nicu, 2000).

The didactic principles and the methods of training have succeeded

The use of certain teaching principles is not found in the researched sports literature.

Notions of technique (Mureșan, 2002) organization, regulation (Dragan, 2000) are at hand and provide perennial information for training in school volleyball or performance.

School competition and the use of doping substances is also a very important educational topic (Vamvu, 2009).

Renowned teachers (Dragomir, & Scarlat, 2004) treated the evaluation in physical education and sports very carefully.

Notions of sports training theory, physical education and sport as social phenomena, training principles in physical education and sports, planning and evaluation are eloquently rendered as a necessary guide in this activity (Cârstea, 2000).

Theoretical sports training is just as important as the other notions in the rational and conscious training of the sports students (Dragnea, Păunescu, Tudor, & Morenciu, 2007).

The problem of impression management (Chelcea & Iluț, 2003) imposes tangible evidence for conflict resolution.

In the sports team the presence of teammates or opponents is an element that determines social facilitation as a factor of progress (Mureșan, 2005). Sometimes from a misunderstanding of solidarity this does not work. The athletes remain the object of the training and not the subject of the activity. They turn into robots for which the coach thinks.

The use of certain teaching principles is not found in the researched sports literature and this has aroused our curiosity.

### *1.1. Hypothesis*

Transforming the athlete from the object into the subject of their own training by conscious participation in training will lead to an increase in the efficiency of the training.

### *1.2. Aim and objectives*

The purpose of the research consists in capitalizing on the didactic principle of conscious participation in achieving its objectives.

The research objectives are:

- to study the plenary involvement of athletes in their own preparation process;
- the application of the role play for the empowerment of the athletes;
- to evaluate the efficiency of the methods used by testing the evolution of the athletes.

## 2. Materials and methods

### *2.1. Overall framework for research*

The research was conducted at a private volleyball club. The coach, a former high level volleyball player, was interested in this topic, which he considered a necessity in his training.

The subjects were 20 sports school students between 12-13 years old and they belong to advanced groups of junior volleyball team. The students were divided in two groups, the control and the experimental group.

The research was carried out over a period of three months between 04.02.2019 - 04.04.2019.

*2.2. Methods*

The didactic principle of conscious participation of athletes in their own training was reinvented in the sense that application mechanisms were created inspired by experience and practice.

Formation of the cortical image of the movement self-report was achieved by the following methods:

- analysis of visual images - demonstrations, signs, visual signals, images recorded on their own phones and images from different volleyball sites;
- auditory sensations - explanations, onomatopoeia, auditory signals;
- perception of proprioceptive sensations - actions have been interrupted so that the athletes can evaluate the position of the legs, the torso, the hands, to feel the orientation of the body segments in space and the body diagram.
- role play - the athletes were in a position to evaluate and evaluator according to the evaluation sheet.

The information received from proprioceptors is provoked by exercises that we mention:

- pressing the ball with different intensities, by the coach in the specific triangle formed by the player's fingers and pushing the ball by the player;
- pressing the ball into the specific cup formed by the player's hands and pushing it by stretching the knees;
- from sitting on his knees and heels on the gym mattress pushing the ball to the wall or partner with the knee lifting;
- from the back, control passes with various tasks of hands and arms between the passes; - passes with different balls, big, small, heavy;
- pressing the ball on the specific plate formed by the forearms, to hit with two lower hands and to simulate the execution;
- from pressing the ball on the specific plateau formed by forearms, the analysis of the angles of the segments of the legs, body, arms;
- pressing the ball by the trainer on the forearms and positioning the body, legs, trunk, arms in the direction of the bird indicated by the trainer;
- moving in one direction and sending the ball at a fixed point in the opposite direction by striking the ball with the elbows outstretched;
- pressing the ball on the forearm when striking from the side;
- throwing the ball to the side for the bottom kick and adjusting the precision;

The role play takes place in groups of three athletes, in which two pass between them and the other notes in the rating sheet the quality of the executions. In this situation, all become observers and observers and are much more responsible in executions for the grades they receive. The evaluator is obliged to make decisions and justify them. Assertive behavior is cultivated.

The didactic principles used in the coherent training of the athletes were the guide of the training design.

*2.2.1. The method of bibliographic study and specialized documents*

The bibliographic study contributed to the knowledge of the technique of play actions, of the teaching principles, of the working methods in the trainings, the influence of the rules of play on the specific of the training, the theory of physical education and sport, anatomy and physiology, notions of psychology.

The study of the specialized documents revealed the regulations and the requirements of the Romanian Volleyball Federation, notions about the selection of the players, the preparation of the motor qualities, of the basic motor skills and utilitarian application, verbal and non-verbal communication, ethics and responsibility, leadership and management.

*2.2.2. The method of conversation*

Through discussions with children, unknown things can be clarified, possibly hidden about interests, behaviour, health and adaptation to effort, etc.

Social investigation through the semi-directed interview

The semi-directed interview for the trainers aimed to obtain information about the neuromuscular and proprioceptive training, the dosage of the effort or the working time.

*2.2.3. The test method*

The tests were applied in three moments at a distance of one month. The technical requirements regarding the evaluated game action are contained in the scoring table. The children were familiar with the procedure. By comparing the results obtained by the two groups, the degree of efficiency of social facilitation in training was monitored.

The evolution of the players was recorded in the following file:

Evaluation sheet of the game actions

First name, Date of birth, Height

**Lifting**

• Moving to the ball - 2 points.
• Back position (vertical) - 2 points.
• Hitting the ball in the cup above the forehead - 2 points.
• The action (extension) of the feet - 2 points.
• Elbow length and ball tracking - 2 points.

Total maximum 10 points.

**Hit the ball with both hands down**

- Meeting the ball near the body - 2 points
- Elbows extended and blocked during the ball hit - 2 points
- Hitting the ball with the forearm, 2 points
- The action of arms and trunk to print the ball direction - 2 points
- Hitting the ball in a low position, close to the ground - 2 points.

Total maximum 10 points

We choose five key aspects of the game action, valued by two points. The athlete can get the grade 10. We considered that the decimal evaluation system is the most suitable, because it is similar to the school one.

The athletes have agreed both the aspects pursued, which can contribute to their own improvement of the technique and the evaluation system.

The assessment sheet could be used in research after five preparatory lessons.

The sports technical tests evaluated were aiming:

- the technique of executing the pass with two hands, high;
- the technique of two-handed pass execution, below.

The upper and lower passes were made with the ball provided by the teacher at the same height and distance from the performers. The exercise or test started with a beep when the coach hit the ball with his hand.

Distance between teacher and sportsman 5-6 m.

The direction of the throw was at the teacher's choice.

The recordings were made by the other teacher at each assessment.

The evaluation sheets with the marks obtained were made available to the players, who were frequently asked about the tasks they had in training to correct the mistakes.

Each athlete in the two groups was evaluated at three different times and the average scores were scored. Based on these averages, the group average was achieved.

The group average results were compared to reveal the efficiency of the activity.

For analysis we will present in the results section the centralizing tables with the averages obtained by the two groups at three different evaluations.

Analyzing the situation vertically, the score obtained for the execution of a game action at the three moments of the evaluations is obtained. The grade obtained refers to note 10.

The total vertical section compares the value obtained with a maximum of 30 points.

## 3. Results

### *3.1. The bibliographic study and specialized documents results*

The bibliographic study emphasizes that the selection is permanent, does not end at the initiation-learning stage. Specialized literature abounds in training theory information, but does not provide information about team culture and team values formation. Knowledge of leadership, management is considered ex officio, but the minimum information does not apply individually.

### *3.2. The conversation results*

The semi-directional interview followed the interests of the coaches and the modalities of theoretical information. The interview allowed people to express their personal points of view.

Responses were recorded directly in writing, coded, by phone or skype.

After grouping information on ideas I noticed the following opinions.

Some of the coaches are improving through the use of electronic websites, follow the press, discuss with their opponents and colleagues and participate in courses organized by FRV.

Another part benefits from the goodwill of people with great experience in sports, namely volleyball, who highlight the psychosocial contexts of events, interests, adversities, psychological strategies, etc.

Balanced coaches, who understand the stages of learning the motor skills and the meaning or significance of sports values, follow the performance expressed by training valuable players at senior level and national teams. Great coaches aim to form remarkable characters, educated people, who can activate at a very high level.

Other coaches hunt for results to impress decision-makers who don't know the mysteries of the sport.

The ignorance of establishing tangible goals creates cognitive dissonance, confusion and resignation.

The lack of sound knowledge of psychology leads to the establishment of the state of insecurity, mistrust and then disinterest.

Credible, open and correct communication, setting tasks, individual and team goals ensure coherence, trust and an optimal team climate.

The equidistant behavior and the understanding that the coach with the athletes have the same goals that they achieve through each other regulates the behavior of both parties. It distinguishes the relationship "me with my team versus him with his team". Understanding this situation regulates some possible confused states regarding the attitude of the partners between coach and athletes.

Competition can become an educational, life-preparing factor.

Some of the interviewees consider that the education for the children is sometimes more important than the competition.

### *3.3. The test results*

Tests or assessments and role play were of great effect.

Analyzing the evolution of the notes on rows, we observe a relatively constant growth of them, determined by the effect of the preparation according to the traditional model.

The lower notes demonstrate the difficulty of the recorded aspects compared to others in the complex of a game action.

Not having a recognized statistic academically or at the level of FRV we only see the progress, the regress or the stagnation of the evolution of the players.

Table 1. The control group evaluation sheet results.

| Passing the ball from above | | | |
|---|---|---|---|
| Action | T0 average | T1 average | T2 average |
| Moving toward the ball | 0.50 | 0.50 | 1 |
| Position of the back (vertical) | 0.50 | 1 | 1.50 |
| Hitting the ball with the cup above the forehead | 0.50 | 1.50 | 1.50 |
| The active extension of the feet | 1 | 1.50 | 1.50 |
| Elbow extension and ball tracking with gaze | 0.5 | 1 | 1.50 |
| Total | 3 | 5.50 | 6.50 |
| Passing the ball from below | | | |
| Action | T0 average | T1 average | T2 average |
| Meeting the ball near the body | 0.50 | 1 | 1.50 |
| Elbows stretched and locked to hit | 1 | 1 | 1.50 |
| Hit the ball with the forearm | 1 | 1.50 | 2 |
| The action of arms and trunk to imprint the direction of the ball | 1 | 1 | 1.50 |
| Hitting the ball in a low position, close to the ground | 0.50 | 0.5 | 1.50 |
| Total | 4 | 5 | 8 |

Table 1. The experimental group evaluation sheet results.

| Passing the ball from above | | | |
|---|---|---|---|
| Action | T0 average | T1 average | T2 average |
| Moving toward the ball | 0.50 | 1 | 2 |
| Position of the back (vertical) | 0.50 | 1.50 | 1.50 |
| Hitting the ball with the cup above the forehead | 0.50 | 1.50 | 1.50 |
| The active extension of the feet | 1 | 1.50 | 2 |
| Elbow extension and ball tracking with gaze | 1 | 2 | 2 |
| Total | 3.50 | 7.50 | 9 |
| Passing the ball from below | | | |
| Action | T0 average | T1 average | T2 average |
| Meeting the ball near the body | 0.50 | 1.5 | 1.50 |
| Elbows stretched and locked to hit | 1 | 1.5 | 2 |
| Hit the ball with the forearm | 1 | 2 | 2 |
| The action of arms and trunk to imprint the direction of the ball | 1 | 1.5 | 2 |
| Hitting the ball in a low position, close to the ground | 0.50 | 1.5 | 2 |
| Total | 4 | 8 | 9.50 |

Analyzing the tables horizontally, the evolution during the three months shows a greater increase between "Time 0" (T0) of the records and T1. We assume that the increased attention for one's own preparation has led to these results, since the means used in the preparation of the two groups were the same.

The lower progress between the results obtained in T1 and T2 is due to the fact that the athletes reached a very good technique in T1. It remains to change the difficulty of the tests by increasing the distances, quantifying the precision of the steps, the conditions of effort, psychological pressure, etc.

We can notice that activating the conscious participation of the athletes with objective records of the technical benefits is advantageous and with an economy of effort.

The children were warned that it would be a lesson similar to the one at school. They were surprised by the role of evaluator with evaluation sheet and pen in the hand. They considered this form of appreciation as a school extemporaneous.

We noticed that their interest suddenly increased and they became serious and responsible. They were overwhelmed by the roles they went through relatively quickly: from the evaluated they became evaluators with importance and decision-making power. They reported that they were excited because they could evaluate their colleagues.

The assessments were organized in such a way that they did not waste much time.

The first effect was that the evaluators no longer followed the flight of the ball but the aspects required by the evaluation sheet. The time for observations and decisions was short, but they got used to it and understood the meaning of things.

The consequences were very important. They started to be interested in technique. They began to observe both the executions of their colleagues and their personal ones.

The coach has become a counselor, a help, a "coach". I thought this was the big leap.

The figures in the tables demonstrate these things through the personal evolution of the children in the experimental group.

Another gain we consider major is the changed attitude of the parents involved too strongly. They became more respectful of the coaches and less sympathetic to the children's inabilities.

Focusing on the educational triangle child-parent-teacher I discovered that the tests became a buffer between the child and the coach, but also between the parents and the coach.

Communication is directed to efficiency, obvious things and not aspirations and hopes.

We took into account the multitude of aspects presented by the interviewees because they constituted the social, psycho-pedagogical, cultural, economic, etc. context, which influences the volleyball learning methodology.

## 4. Conclusions

Establishing and managing the learning objectives was achieved by setting psycho-behavioral and timelines.

The involvement of the children in their own training has increased the efficiency of the training and awareness of the role of coaches.

The co-interest in the body's temper has led to an understanding of the need for physical training.

The hypothesis being confirmed we will continue to promote this type of involvement of the children in their own preparation.

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# THE MECHANISMS THAT INFLUENCE THE INTERPERSONAL RELATIONSHIPS BETWEEN COACHES AND SPORTSMEN

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**Abstract**

**Aim.** The aim of this paper is to study the mechanisms that determine the interrelations between athletes and decision-makers. The main objective is to identify the factors that alter the interpersonal relations between sportsmen and coaches at the end of the sports contractual period. **Methodology.** The research is based on the following methods: bibliographic and specific documents study; conversation; social inquiry through semi-directed interview; social inquiry through questionnaire. **Results.** The bibliographic study of the documents on the social relations topic revealed information regarding the organizational culture, the job description as a means of regulating the role play, the duties and obligations of the partners in a project, the stages of team integration, the role of the star, the team captain, communication problems. The conversation allowed finding information kept secret from fear, shame, insecurity, politeness or ethics. At the level of children, the coaches' dissatisfaction comes from the parents too involved, due to the lack of preparation and competition conditions, inappropriate timetable, improper accommodation, very small selection area, many temptations in the lives of children, lack of models. At the level of adults through an interview we revealed three directions: the motivation of the donors; employers' complaints; the dissatisfaction of the athletes. Conflicting situations are related to injuries of athletes. The questionnaire highlighted three categories of answers: the athletes' distrust of the compliance of the contractual provisions by the financiers; non-professional attitudes from athletes; low level of coaches' professional training. **Conclusions**. The financial statements and the precarious material conditions of the clubs determine the unproductive climate. The situations of unprofessionalism and opportunism of both club managers and athletes determine divergent meanings of interests and attitudes.

*Keywords:* organizational culture; interpersonal relationhips; attitudes; social climate.

## 1. Introduction

The experience in the career of coach, teacher, doctor and promoter of Olympism has shown us that performance sport also has shadowed facets of attitudes and behaviors that are in contradiction with Olympic ethics and principles. We noticed that in today's society of consumerism, people no longer organize festive retirement activities of athletes from the performance activity as a proof of respect and appreciation. Most of the athletes express dissatisfaction, indignation or even disappointment with the clubs they represented at the career end.

This topic is important in the context of the interest for the working climate and the organizational culture and yet it is not frequently found in the specialized literature on leadership, management, or ethics. The theme often appears in tabloids and discussions, closed-door analyzes of clubs or newsrooms.

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*1.1. The importance of professional relationships*

Sport is a social phenomenon worldwide. Understanding the rules that govern it requires knowledge of management, leadership, psycho-sociology, human resources.

The quality of the relationships between the financiers and the performance athletes or the professional athletes is part of what we call the organization and stratification of life and implicit the quality of life of those involved (Rațș, 2011).

The relationships between athletes and coaches are often influenced by financial and material gains (Crăciun, 2014).

In the group culture, the role play are important notions in achieving the necessary harmony between the members of the sports communities (Mureșan, 2005).

*1.2. Leadership*

Highly successful clubs are having leaders with vision and enthusiasm who ensure long-term performance by harmonizing interests and revealing the common direction of the members of the organizations. The transactional leader also manages the interpersonal relationships between the members of the community (Mureșan, 2005). At the level of training athletes and leading teams in competitions, we note the role and importance of coaching (Ormenișan, 2013).

*1.3. Management*

The management of the sports organizations in the performance sport implies the knowledge at the performance level of the dynamics of the activity and assuming the responsibility for the successful management of the resources (Grădinaru, 2018). The efficient management of sports clubs is achieved through adequate communication, compliance with financial legislation and local and international specificity (Macra-Oșorhean, 2016).

*1.4. Job description*

The job description can be a useful tool for sports team managers. With the help of the job description, the competences and responsibilities of the parties are regulated. This regulates the social status, the type of communication and the claims of the employees. If this instrument is used, ambiguous behaviors and expectations are annihilated (Mureșan, 2017).

*1.5. Human resources*

Performance sport involves physical wear to the point of altering the health status and recovering it for social integration (Bulduș, 2017)

**2. Materials and methods**

The research with its preliminary stages took place between November 2018 and May 2019.

*2.1. Hypothesis*

The quality of interpersonal relationships in performance sports is determined by compliance of the contractual obligations and the internal regulations, together with the informal work climate. These are social mechanisms that ensure efficiency and enthusiasm.

*2.2. Objectives*

Identification of the mechanisms that determine the interrelations between sportsmen, coaches and other decision-makers.

Revealing the factors that alter the interpersonal relations at the end of the sports contract

*2.3. Subjects*

The subjects who participated in the research are persons from the country and abroad who have withdrawn from the sports activity.

The research was also attended by coaches, managers, sports directors, university teachers, members of sports federations, referees, representatives of the Romanian Olympic Academy, doctors, physiotherapists and other opinion centers.

*2.4. Methods*

*2.4.1. Method of bibliographic study and specialized documents*

The bibliographic study consisted of collecting information from the field of sociology, leadership, and management, through which we managed to unitary understand the sports phenomenon, the culture of the group and the psychosocial climate of the team.

The specialized documents include the regulations and requirements of the Federations on the sports branch and information of a judicial nature regarding the contractual relations and sports ethics.

*2.4.2. Method of conversation*

The conversation method brings information about what the project partners feel and believe.

The conversation is detached from the other research methods by allowing it to find information kept secret because of fear, shame, insecurity, politeness or ethics.

Through this method we found out the causes of unexpressed attitudes openly or in writing, the motivation of some actions or secrets of those involved.

*2.4.3. Social investigation through semi-directed interview*

The semi-directed interview was applied directly or indirectly. The data were recorded in writing or were recorded with the phone or the recorder. The interviewees were informed of the scientific purpose and character of the research and were assured of their safety.

The semi-directional interview addressed to sports opinion centers aims to reveal things that cannot be measured directly, because they are people's opinions about events. Interests, skills, hidden or concealed attitudes, physical, mental, and spiritual impossibilities are often revealed by direct observers, who understand their significance in team culture.

*2.4.4. Social inquiry through questionnaire*

The content of this questionnaire aims to obtain scientific information. The answers are confidential and will not be used in any way against the interests of the respondents as individuals or groups.

To what extent do you consider that the relations between the athlete and the coach are altered due to:

1. The impossibility of the clubs to fulfill the financial promises: not at all…. less ... more.... very much...
2. The impossibility of clubs to respect the material promises: not at all…. less ... more.... very much …
3. Lack of material conditions for preparation? not at all…. less ... more.... very much …
4. Results are not as expected: not at all…. less ... more.... very much …

5. The frustration of the athletes that they are not used according to their expectations: not at all…. less ... more.... very much …
6. Not accepting the role in the team: not at all ... little ... much ... very much …
7. The overlap between the decisions of the coach and those of the manager: not at all…. less ... more.... very much …
8. The lack of professionalism or the non-professionalism of the coaches: not at all…. less ... more.... very much …
9. Poor communication - not at all ... a little ... a lot ... a lot ...
10. Aggressive behavior of coaches: Physical- not at all ... little ... much.... very much … / Verbal - not at all…. less ... more.... very much … / Psychological - not at all…. less ... more.... very much … / Sexual - not at all…. less ... more.... very much …
11. Political implications - not at all…. less ... more .... very much …
12. Attitudes, rats / nationalists on the part of the athletes: - not at all…. less ... more .... very much
13. Attitudes, chauvinistic / nationalist coaches: - not at all. less ... more .... very much
14. Political partisanship of coaches ... athletes ...
15. Alcohol consumption ... drugs .... of the athletes - not at all ... a little ... a lot ... a lot ...
16. Alcohol consumption ... drugs ... of coaches - not at all. less ... more .... very much…
17. Sexual practices homosexual- lesbianism .... gay - not at all ... little ... a lot ... a lot ...
18. Age mismatches - not at all ... little ... a lot ... a lot ...
19. Incompatibilities with the culture of the group - not at all ... a little ... a lot ... a lot ...
20. Bad influences of the entourage - not at all ... little ... much ... very much …
21. Discretion of the coach by the family ... press ... others ... - not at all ... little ... much .... very much …
22. Failure to meet sportsmen's expectations caused by not participating in games - not at all ... little ... much ... very much …
23. Non-accommodating athletes - not at all ... little ... much ... very much …

## 3. Results

### *3.1. The results of the bibliographic study*

The bibliographic study in the field of sports sociology, sports management and leadership on the topic of social relations has revealed the following issues regarding the organizational culture:

- roles within the organization
- job description as a means of regulating the role play, the duties and obligations of the partners in a project
- stages of team integration, the role of the star, the team captain, communication problems.

### *3.2. Results of the study of specialized documents*

The study of the documents regarding the objectives of the Federations on the sports branch, the competition regulations, legislation and internal regulations revealed:

- training and performance objectives are staggered by age levels
- promotion of foreign athletes and coaches in internal competitions
- the legal, ethical and civic training of athletes is not highlighted in the specialized documents

Understanding these mechanisms gives the possibility of objective analysis of the causes that determine the social interrelationships and the taking of rational measures.

### *3.3. The results of the conversations*

The following ideas emerged from the conversations:

The training and performance objectives are staggered by age levels, but the clubs aim to obtain the results for the moment. These results do not constitute the prerequisites for high level performance.

The promotion of the players and coaches from abroad is to the detriment of the Romanian players who are part of the national team. From a financial point of view, the amounts invested in the foreign players do not increase the value of the national lots. Often, Romanian players are discriminated against.

There is inconsistency in pursuing long-term training objectives.

Alteration of the working climate leads to the deterioration of the health status and the occurrence of accidents. For example, one of the respondents states that he had three serious accidents in very tense situations with the coach. Five other athletes report accidents associated with an altered team climate and coach disputes. These accidents deprived the athlete of the possibility of practicing sports at various intervals. In these conditions, the dissatisfaction of the athletes also gained financial character. The coach and the financiers felt the lack of valuable players

Altered relations between athletes and funders are due to unprofessionalism and opportunism on both sides. There are un-experienced leaders who occupy a visible position for the image and unserious athletes take advantage of certain situations.

The financial rights paid with delay, partially or not at all, alter the most serious relationship between athletes and team management.

### *3.4. The results of the social survey through semi-guided interview*

The data collected through the conducted interview reflects the opinions of the coaches, financiers, junior and senior athletes on the situations that generate the alteration of relationships within the group.

The semi-directed interview brings to the surface information about athletes' motivation, desire for financial gains, affirmation, image and social prestige. There are also people who have practiced sport and want to give back to society something of the success they have acquired from sport. For some funders, all of these motivations are combined with political, family or conjunctural situations.

The financiers evoke the following problematic situations, which generate dissatisfaction:

- non-involvement of athletes;
- the interest only for financial gain;
- poor financial legislation;
- the supposed bet of the matches at the bookmakers;
- lack of valuable Romanian players;
- the exaggerated financial claims of the players;
- unprofessionalism expressed through unsportsmanlike life in both girls and boys;
- unsportsmanlike life and lack of interest in achieving goals manifested by foreign players;
- poor nutrition, poor recovery;
- homosexual relationships;
- lack of real respect for the financiers and the spectators;
- lack of quality in the training of the juniors.

The junior athletes and the parents interviewed first invoke the school program. Students from high schools with a physical education and sports program do not have this problem. Here, however, the deficient selection manifests itself, which is no longer oriented to athletes but to the completion of high school classes.

The complains of the coaches refer to the parents too involved, the lack of preparation and competition conditions, inappropriate schedule, improper sport facilities, the very small area of selection, many temptations in the lives of children, the lack of models.

At the level of adults through interview we highlighted two directions:

- employers' complaints and proposals for recovery;
- sportsmen's complaints and suggestions for correction.

Adult athletes are dissatisfied with the communication and the relationship with the coach. He is suspected of insincerity and discrimination.

Some athletes are unhappy because they are not used, they are used at least, or the coach expect too much from them.

Most athletes are unhappy with the non-observance of the contractual agreements: the delay with a few months of salary collection and allowances.

These aspects are important when it comes to the exclusion of a sportsman from the group, or the inclusion of the athlete in a team.

The athletes describe in order the lack of communication with the coaches, situations of discrimination, injustice, boredom, the lack of pleasure to play, eliminating the chances of being integrated into the teams with foreign players.

The specialists in the organization of competitions and with leadership positions in the club insisted on the importance of current legislation regarding the player's status and the application of the internal regulations.

All those involved mentioned the need to secure the budgets for the competition year before it starts.

*3.5. The results of the social survey by questionnaire*

The questionnaire was applied through the Internet to a number of 88 people. The athletes were retired from sport activity. The valid answers of 25 people were recorded.

The questionnaire was launched online by two operators, to people who gave up playing different sports. There have been 25 valid responses.

The study sample included subjects with the following characteristics:

The social gender of the respondents

The majority respondents are men with 64% and 36% are women.

Age of respondents

The respondents ranged in age from 17 to 34 years.

The mean age of respondents were in the 22-29 age range.

The sport practiced

Respondent athletes played volleyball in 80%, 8% football, 8% basketball and 4% handball.

- The question "What is the last team you evolved from?"

It is noted that most of the respondents are part of 3 teams, the majority being from Unirea Dej, volleyball division A. They are followed by players from Trento Italy and the University of Craiova.

We can say that the sample, although very small, is very geographically dispersed.

- The question "To what extent do you think the relationships between coaches and athletes are altered?"

On a scale of 1 to 5, 84% of the answers to the questionnaire state much altered relations between athletes and coaches, 4% say that the relations are very little altered, and 8% say that the relations are very much altered.

The unaltered relations between the coach and the athlete are not recorded at any level of evaluation.

- The question "Do you represent on the scale of 1 to 5 the impossibility of the clubs, the coaches to fulfill the financial promises."

92% reported the clubs' inability to fulfill the financial promises towards the athletes.

There is no answer that states the fulfillment of the financial promises.

Only 8% of athletes are slightly affected by the financial problem.

The nuanced understanding of the respective problem requires further research in this regard.

- The question "Do you represent on the scale of 1 to 4 the impossibility of the clubs, the coaches to respect the material promises?

The respondents affirm that the material promises are not respected to a great extent and to a large extent in a representative percentage of 80%.

Another part of the respondents representing 20% states that, to a small extent, the material promises are not respected.

- The question "Lack of material preparation conditions"

The lack of the material conditions for training expressed by the qualifications much and very much represents 76% and 24% represent the qualifications little and not at all. According to the theory of sports antenna, this situation is a problem with negative effects on the health of the athletes and poor efficiency of training.

- The question "Are the sports results according to the expectations of the decision-makers?"

The decision makers are not satisfied with the performance of the athletes much and very much in the percentage of 76%. Little are satisfied is 20% and 4% not satisfied.

- The question "To what extent are athletes frustrated that they are not used as a team according to their expectations?"

According to the answers expressed by the dissatisfied with the way they are used, a percentage of 88% is shown, which represents frustrated athletes. Satisfied athletes represent 12%.

This condition implies either the ignorance of some notions of leadership or other reasons, the understanding of which would require further research.

- The question "Not accepting the role in the team"

The players do not accept the role they play in the team. In this sense, three of the 4 assessment levels represent 94% of cases.

- The question "Coincidence between the intentions of the coach and the decisions of the manager"

The opinions of the sportsmen expressed in percentages show that 60% trust the unit between manager and coach, and those who do not trust represent 32%. A group that represents 8% does not trust the cooperation between the coach and the manager.

- The question "Dismissal, non-professionalism of coaches"

The athletes consider 76%, that the coaches are not professionals and do not give them confidence for their expertise in the field. An additional 8% gives little recognition of professional expertise.

There is a 16% percentage, which does not give the coaches any confidence.

The analysis of this state of facts implies that not all team members have the same direction of action and the forces become divergent.

- The question "Poor communication"

Communication is found to be deficient to a large and very large extent and represents 72%. Poor communication to a small extent represents 24% of cases. Communication is rated as good in 4% of cases.

Poor communication is not a prerequisite for performance.

- The question "Aggressive behavior of coaches (physical, verbal, psychological, sexual)"

The aggressive behavior of the coaches is expressed in different proportions at each of the 5 expression levels. The absence of violence is 28%. At low and medium level, 36% of the ratings are expressed. The highest levels represent 40%.

Assuming this situation is a characteristic of the culture of the groups.

- The question "Political implications"

The political implications manifested within the team represent between 64% and 80%.

To a degree, which represents 20%, the political implications are not noticed.

The politicization of sport can have very serious consequences. To draw definitive conclusions, a nuanced analysis is required.

- The question "Nationalistic attitudes from athletes"

The chauvinistic attitudes among sportsmen in percentages are expressed as follows: not at all 20%; less than 40%; more than 36%; very much 4%.

- The question "Nationalistic attitudes from coaches"

The chauvinistic or nationalist attitudes expressed by the "little and no" qualifiers express 48%.

Very much and much represents 52%.

In this situation, the meritocratic attitude of the coaches is problematic.

- The question "Discriminatory political bias of coaches or athletes"

The responses recorded record such attitudes at minimum levels.

- The question "Alcohol or drug use by athletes"

The answers state that one third, 28% of athletes do not use alcohol or drugs at all. Another third, 32% consume to a small extent. Consumers account for 16% and 28% for consumption. The last two categories, that consume large and very large represent 40%.

- The question "Trainers' alcohol or drug use"

Athletes' perception of alcohol or drug use by coaches is represented as follows: To a large extent 16%; largely 20%; to a small extent 36%; not at all 28%.

- The question "Gay-lesbian / gay sexual practices among athletes"

In the perception of athletes these relationships these relationships in percentages are as follows: 60% not at all; 20% less; 8% more; 12% very much. The size of their effects in specific contexts matters.

- The question "Age mismatches"

A proportion of 44% consider that relationships are affected to a small extent. Another 28% believe that relationships are not affected at all. a fifth, that is, 20% believe that relationships are severely affected. The minority of 8% consider that relationships are influenced by age differences.

- The question "Incompatibilities with the culture of the group"

Cultural incompatibilities are perceived in 20% of cases, and 80% do not consider that there are problems.

We appreciate that the sports rules are assumed in the general way.

- The question "Adverse influences of the entourage"

A consistent group representing 60% considers that the entourage has great and very great influences in the conduct of the athletes. Just under half of the respondents, 40% do not recognize the harmful numbers of the entourage.

Athletes come from different backgrounds.

Good practice shows that psychologists, counselors, club managers are interested in managing athletes' time and professional orientation.

- The question "Discretion of the coach by the family, the press or other factors"

About one third, 32% of athletes think that coaches are not discredited.

The others representing 68% consider that the coaches are discredited a lot.

- The question "Failure of the expectations of the athletes determined by the non-participation in the games"

A number of athletes representing 52% of the respondents did not meet expectations, and 48% did not meet them at all.

- The question "Non-accommodating athletes"

68% of the respondents did not accommodate. The effects of non-accommodation are perceived little and not at all on 32% of the athletes questioned.

Analysis of the results obtained through the questionnaire

The mutual distrust between the athletes and the management of the clubs regarding the contractual relations determines the alteration of the cooperation and a situation of circular conditioning. Under these conditions the leadership has to suffer. Failure to comply with promises and agreements demotivates athletes.

Another category of responses reveals unprofessional attitudes on the part of athletes by not assuming responsibilities. The optimum physical condition seems to suffer from the style of life, nutrition and recovery.

Athletes believe that coaches are poorly trained. This is also evidenced by the views on player development, communication, role-play and adaptation.

Other interactions that are related to politics, chauvinism, homosexual relationships alter more or less the work climate. We believe that species need to be analyzed separately in specific contexts.

## 4. Conclusion

The research revealed information known at the level of the common understanding, but also of some nuanced and defining aspects in the interpersonal relations in the sport practice.

The financial statements and the precarious material conditions of the clubs determine the unproductive climate.

The questionable professional training of the coaches regarding the role play, the communication, the encouragement of the players produces confusion and dissatisfaction.

The low level of the Romanian players, the lack of involvement and the resigned attitudes determine the dissatisfaction of the club managers.

The situations of unprofessionalism and opportunism of both the club leaders and athletes determine divergent meanings of the interests and attitudes of the partners within the joint sports project.

The new financial regulations ensure a status worthy of the performance athletes.

Their attitude and behavior will be officially regulated only through the job description contained in the internal regulations.

Through conversations with junior athletes, interesting situations were revealed, sometimes hidden about interests, behaviors, health and adaptation to the effort, etc.

Talks with adult athletes have raised concerns about interpersonal relationships, family and social responsibilities.

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# STUDY REGARDING FUNCTIONAL REHABILITATION AFTER ACHILLES TENDON TENORRHAPHY

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**Abstract**

The purpose of the study was to reveal the role that Kinetotherapy has in achieving a functional rehabilitation in patients with Achilles tendon tenorrhaphy, by attaining muscular force and range of motion, but also by walking reeducation.
The study was done on a lot of 11 subjects, consisting of 6 men and 5 women between the ages of 28-43 years, whom have suffered traumas upon which they have been diagnosed with the rupture of Achilles tendon. Following the surgical intervention they had to follow a rehabilitation program. The results are showing the effects of the therapy in attaining functional movement in the patients.

*Keywords:* rehabilitation, functional deficit, gait re-education.

## 1. Introduction

The Achilles tendon is the most voluminous tendon of the human body, having approximately 5-6 cm in length, 1.2-1.5 cm in width and a thickness of 0.5 cm. This tendon is built of fibers arranged in spirals. The connection between these and the muscular fibers of the Triceps Surae are made through tissue formed by connective inter-muscular fibers, which are vulnerable and have low resistance to loading. This is why most traumatic injuries are located at this level. The morphology and distribution of the collagen and endotendon can be characterized quickly and precisely, by using the frozen section technolog (Zhaang et al., 2019).

The Achilles tendon has a great importance in the standing position and unipedal stance, running, walking, jumping, cycling, the most important of these being plantar flexion. The leg can act as a class I lever (effort-fulcrum-load), as a class II lever (effort-load-fulcrum) or a class III lever (load-effort-fulcrum).

In the first phase of the walking cycle, the leg is behaving as a class II lever, while in the second phase it becomes a class I lever. There is also the possibility that the calf acting as a class III lever in connection with the leg, such as when one is kicking a football. In sport system, the tendon-bone interface has an effect of loading and resistance such, that the healing process has a crucial role in restoring the joint function (Lu et al., 2019).

The tearing mechanism of the tendon can be indirect, when we think about a strong muscular contraction which encounters an abnormal resistance (falling on your knees, sudden moves, the start in athleticism tests), or direct by sustaining micro-traumatisms. There are some predisposing factors one of the most important being the morphological state of the tendon.The functional properties of the Achilles's tendons differ from usual models of the leg in leisure runners (Wearing et al., 2019). Cinical manifestations include sudden and violent pain, accompanied by crackling. In the same time, we have a local edema with a hematoma forming in the para-tendon.

The discontinuity of the tendon is felt on palpation, and approximately 12 hours later another edema presents, accompanied by the retraction of the Triceps Surae and the abnormal angles of dorsiflexion.

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The functional rehabilitation has a significant role in socio-professional reintegration of the patients, since it implies a long immobilization period which will present with onset hypotonia, muscular atrophy and impaired range of motion. Worldwide there is a special interest in this type of pathologies, research being made for the best therapeutic approach.

The therapeutic protocol after Achilles tendon tenorraphy is diverse. it takes into account the surgical techniques, the orthopedist's indications, but also the particularities of the patients. Due to a lack in guides of treatment, there is no consensus regarding diagnostic methods, primary treatment (surgical or non-surgical) and rehabilitation. However there are studies focused on the factors contributing to the recovery and profitability of the aforementioned factors in the recovery process of Achilles tendon (Dams et al., 2019).

The acute rupture of Achilles tendon can be treated surgical and non-surgical depending on degree of damage. In the case of choosing a non invasive procedure it will be necessary to immobilize the ankle through a cast or a walking boot.The utilization of the walking boot in the mentioned institutions resulted in a significant decrease in the equin degree, nevertheless the clinical relevance isn't certain. The study mentioning that the type of walking boot utilized is decisive in achieving therapeutic goal (MacDonald et al., 2018).

In cases which require the utilization of an invasive surgical intervention, the technique will be selected taking into account the experience and professional conduct of the surgeon, the technique being either the Krackow technique, the Lindholm technique, the Lynn technique, Teuffer technique, Abraham technique or Bosworth technique.

There are numerous studies which propose researching the efficiency of a simple Krackow suture, through a small limited incision for the treatment of acute rupture of the Achilles tendon. The simple Krackow suture, through a small limited incision, has the advantage of a minimal lesion, a reduced occurrence of another rupture and injury of the Sural nerve, all while providing a shorter recovery period (Zhongguo et al., 2017).

In the same time we need to point out the type of surgical approach, as there exists the possibility of a percussive surgical treatment, or an open surgical treatment.

The tear of the Achilles tendon can produce a significant influence upon the functional level of the patient, this influence being expressed by testing and the identification of the functional deficit. The percussive technique has satisfying results, similar to that of the open surgery technique in the treatment of the acute rupture of the Achilles tendon, with less complications and a higher rate of recovery of the activity levels in the patient (Zayni et al., 2017).

The recovery of the Achilles tendon's tenorraphy is a complex process, rendering it necessary for a multi-disciplinary collaboration to happen, in the hopes of achieving the best results possible.

## 2. Material and Method

The study was conducted on a batch of 11 subjects, all aged between 24 and 43 years, 5 of which women and 6 men, all of whom have undergone intervention for the tenorraphy of the Achilles tendon, and whom have followed a specific functional recovery program. The kinetic means employed were used taking into account the moment in the recovery period, and the particularities of each individual subject. In order to recover the mobility of the joint, a multitude of techniques were employed, amongst which techniques for the improvement of the range of motion, and active mobilization assisted by the kinetotherapist. At a later stage exercises were gradually introduced focusing on increasing the muscular strength, the joint's stability, culminating in means and methods specific to re-educating the ability of walking in the patients. A key element in reaching this objective was the usage of the treadmill, through which optimization of the gait's parameters (cadence, and pace) could be achieved. The recovery process lasted for a period of 6 months, with an initial frequency of 5 session per week, in the first month, ultimately switching to a frequency of 3 session a week, with the duration of a session being 60 minutes.

The subjects of this research were evaluated initially, intermediately, and finally at the end of the rehabilitation period, through the means of manual muscular testing and goniometric measurements at the affected ankle (the movements used in the measurements are the dorsal flexion and the plantar flexion), as well as testing the gait's parameters by evaluating the cadence (using an Omron Walking Style II pedometer) and the length of the simple pace (measured from the tip of the support foot to the heel of the foot which makes contact with the ground), all the while performing an evaluation through the Tinetti scale.

## 3. Results

In order to highlight the data in an efficient way, we realized the arithmetic mean of the values obtained in the evaluations.

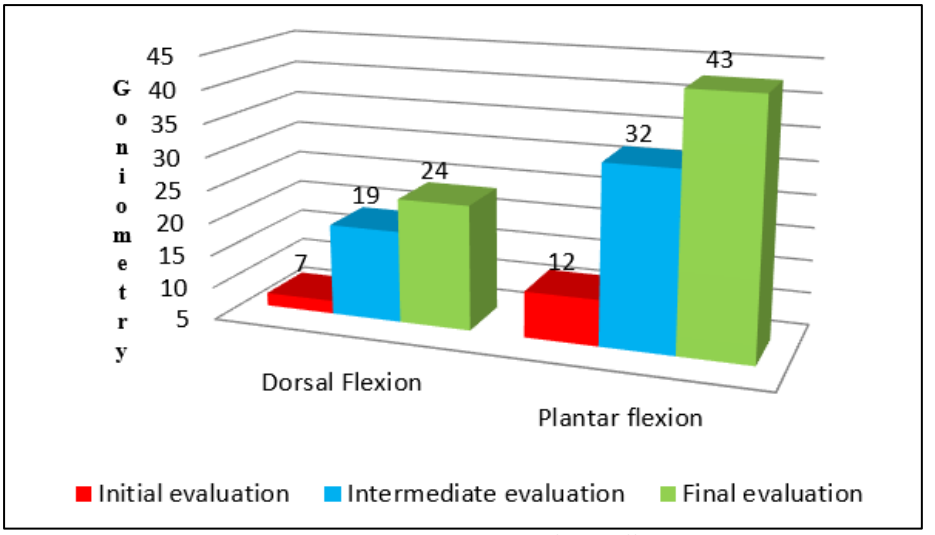


Fig.1. Goniometry results for the affected ankle

În fig. 1 we highlighted the results of joint goniometry on dorsal flexion and plantar flexion, based on the arithmetic mean. According to the data contained in fugure 2 in the initial evaluation of joint mobility on the dorsal flexion movement, the value of 7° was recorded, in the intermediate evaluation 19° was recorded, in the final evaluation reaching a value of 24°. The plantar flexion movement, in the initial evaluation recorded in the joint testing was 12°, 32° in the intermediate evaluation, and 43° in the final evaluation. It can be stated that the evolution of the joint mobility has improved from one stage to another, reaching the physiological values in the final evaluation.

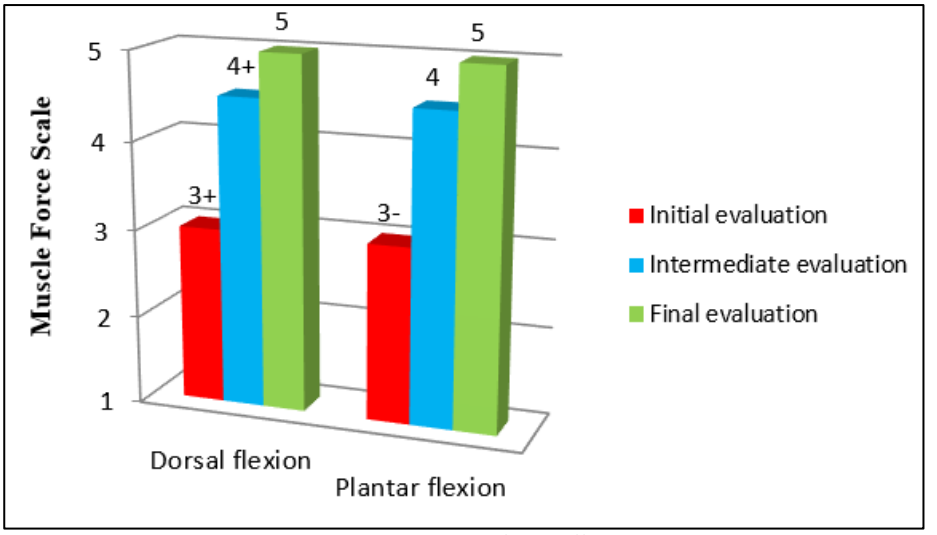


Fig. 2. Muscle testing for the affected ankle

Figure 2 highlight the average of the muscle testing results for the ankle plantar and dorsal flexion. According to the data obtained in the initial evaluation of the muscle strength of the dorsal flexion movement, the 3+ value was recorded, in the intermediate evaluation we obtained a 4+ value, reaching a normal force in the final evaluation.

Also we recorded a good evolution for the plantar flexion which recorded a value of 3- in the initial evaluation reaching the normal force in the final evaluation. It can be stated that the evolution of muscle strength was progressively ascending from one stage to another.

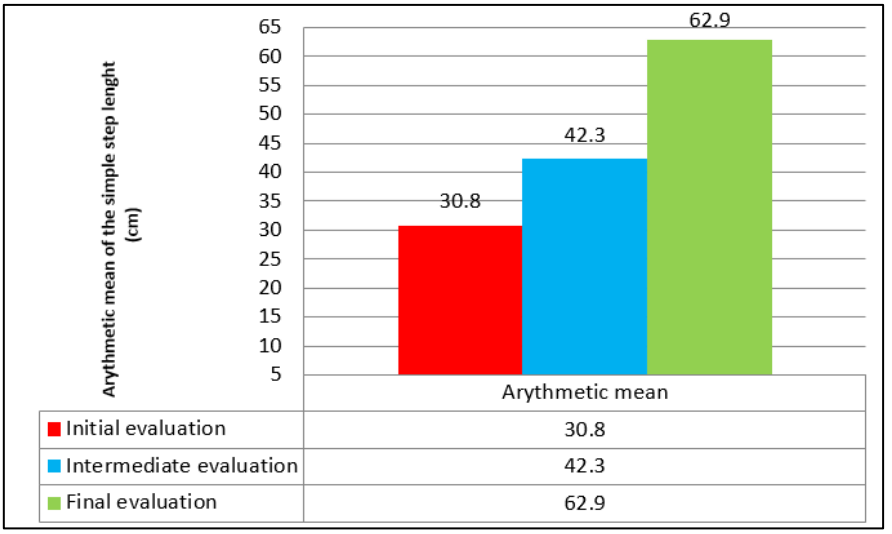


Fig. 3. The evaluation of the average length of the simple step

In Figure 3 we highlighted the progression of average of simple step length. This walking parameter has undergone significant improvements from one stage to another, in the initial evaluation the average of simple step length being 30.8 cm, reaching the value of 62.9 cm in the final evaluation. The results are closely related to the improvement of muscular strength and the mobility of affected ankle.

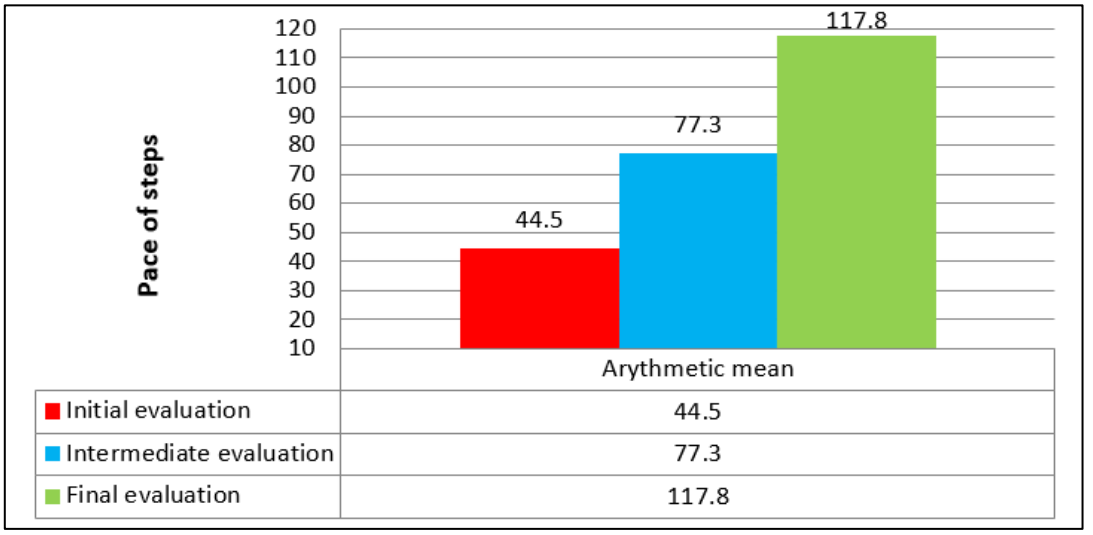


Fig.4. Evaluation of the pace of the steps

Figure 4 shows the progression of walking being highlighted the average of the pace of steps. It can be stated that the cadence has undergone significant improvements from one stage to another, in the initial evaluation the average of steps per minute being 44.5, reaching in the final evaluation the value of 117.8 steps per minute. The progression is closely related to the re-education walking means.

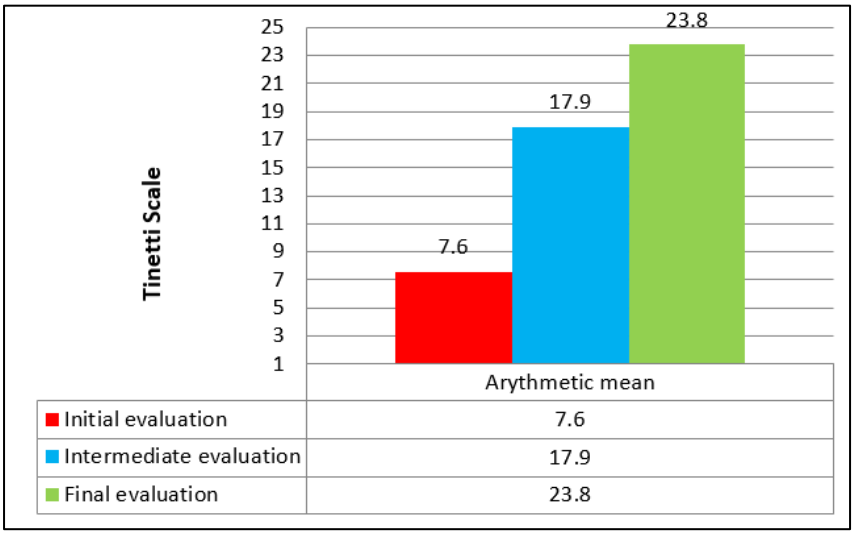


Fig.5. Tinetti scale for gait and balance assessment

Figure 5 shows the results obtained in the Tinetti evaluation scale, which provides information of the level of walking achievement and balance. The average of initial score was 7,6 points reaching to an improved score of 23,8 points in the final evaluation.

## 4. Discussions

According to the realized study the joint's mobility increased by an average of 17° for the dorsal flexion and by 31° for the plantar flexion, thus the exercises employed in order to regain the range of motion proving their effectiveness.

Following this research, we concluded that the muscular strength of the subjects has improved from a starting value of +3 for dorsal flexion, and -3 for plantar flexion ultimately reaching a normal value of 5. This is due to the exercises targeting the increase in muscular strength, through the active training of the muscles of the calf and foot.

The parameter of the gait regarding the average length of the simple step have ameliorated following this study with a value of 32.1 cm, this aspect being attributed to the exercises targeting the re-education of walking.

Another result of the research refers to the cadence of steps, this value having registered an improvement of 73.3 steps per minute.

A last parameter tested within this research was the evaluation of the gait and balance through the Tinetti scale, which after starting from an initial score of 7.6 points, reached a final score of 23.8.

## 5. Conclusions

In conclusion we can state that the role of rehabilitation of the tenorrhaphy of the Achilles tendon is very important based on the improvement of parameters measured, after the specific therapy targeting muscular strength, articular mobility, and parameters of gait and balance.

Our research shows aspects which check the results of the subjects, the later being evaluated initially, intermediately and finally. The comparison of the results of the articular and muscular tests, the evaluation of the gait (the cadence and length of the simple step), as well as the evaluation of the gait and the balance through the Tinetti scale proving an amelioration of the functional status of the subjects from one stage of the recovery to the next one.

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# MODE OF COMMUTING TO AND FROM UNIVERSITY AMONG YOUNG ROMANIAN STUDENTS

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**Abstract**

**Aim:** The aim of the study was to find out how the students, usually, commute (in an active or a passive way) to/from their faculty, and if there is a gender difference regarding the mode of commuting. **Methods:** A total of 331 students (average age 20.35), girls (n=169) and boys (n=162), from Babes-Bolyai University/Cluj-Napoca, were involved in this study. We have used the questionnaire developed by a group of researchers from University of Granada (Proyecto PACO "Pedalea y Anda al COle"). **Results:** Those students who have commute between 0 and 2km declared that they cover the distance by walking; instead when they commute 2 till 5km they prefer using public transportation. Furthermore when the distance increases above 5 km, they commute using cars and public transportation. **Conclusions:** Female students (31.12%) use more often the bus for commuting to faculty, in comparison with male students (13.29%). Using the comparison between genders, the male students (21.45%) prefer walking and only 14.50% female students do the same. Using the bus as a mode of commuting from the faculty we found the same pattern between female and male students (32.33%, 15.41%). Male students commute, from their faculty, by walking more often than female students (19.64%, 12.99%).

*Keywords:* active/passive commuting, gender, body mass index

## Introduction

Active commuting (walking, cycling), to and from school/faculty/job, nowadays is considered a way to fulfil the necessary daily physical activity which have to be accomplished by every individual. The concept of active commuting means "a physical activity behaviour occurring daily in specific frame times before and after school" (Chillón et al., 2017, p. 613).

In the previous studies the mode of commuting were categorized in active (walking, cycling) and passive (here being included motorized vehicles - car, bus, motorcycle, tramway, train) (Chillón et al., 2017; Herrador-Colmenero et al., 2019; Knott et al., 2018; Barranco-Ruiz et al., 2019; Rodríguez-Rodríguez et al., 2019).

The researches in this field emphasise that active commuting (walking, cycling) have a positive influence on the health state of the individuals, reducing the incidence of cardiovascular, metabolic diseases and cancer (Knott et al., 2018; Garcia-Hermoso et al., 2018; Barranco-Ruiz et al., 2019).

From the psychological point of view, active commuting could reduce the depressive symptoms, influences psychological wellbeing and sustain the cognitive performance in adolescent (Knott et al., 2018; Molina-Garcia et al., 2019; Herrador-Colmenero et al., 2019).

The aim of the study was to find out how the students, usually, commute (in an active or a passive way) to/from their faculty, and if there is a gender difference regarding the mode of commuting.

## Material and methods

A total of 331 students (average age 20.35), girls (n=169) and boys (n=162), from Babes-Bolyai University/Cluj-Napoca, were involved in this study. The data was collected during the months of May and June/2019.

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In this study we have used the following research methods: bibliography study, statistical analysis (SPSS v.19) and survey. The students, from different faculties, have answered to a questionnaire developed by a group of researchers from University of Granada (Proyecto PACO "Pedalea y Anda al COle"). We were interested to find out the body mass index (BMI) of the sample, using online calculator (National Heart Lung and Blood Institute https://www.nhlbi.nih.gov/health/educational/lose_wt/BMI/bmicalc.htm). In order to calculate the students' BMI we started from the weight and height self-reported measurements.

The questionnaire items were about the way the students commute daily to and from University (walking, cycling, by bus, by car, by motorcycle or by tramway). Additional question was about the distance between "home" and the University (0-500m; 501m -1km; 1.1-2km; 2.1-3km; 3.1-5km; 5.1-7km; >7.1km).

## Results

Concerning the BMI, the outcomes reveal that 67.98% of the students have a normal weight meanwhile 18.43% are overweight, as we can see in the Fig.1.

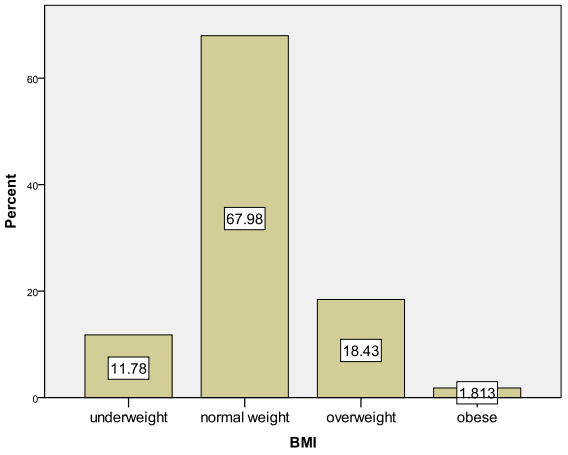


Fig. 1 Students BMI

Analysing the gender differences of BMI, we found out that there is a significant statistical difference between female and male ($X^2$ = 28.988, df. = 3, p <0.001). In the Fig. 2 we can observe that 14.20% of males and only 4.23% of females are overweight.

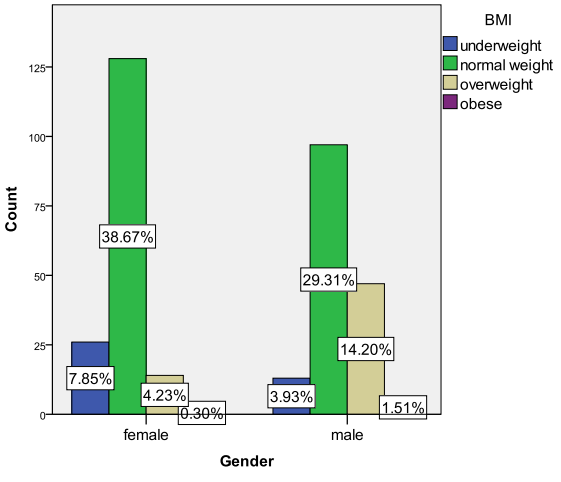


Fig. 2 Gender and BMI

In the current study we were interested to find out the distance that the students have to cover from home/accommodation till their University and the way of commuting.

Those students who have commute between 0 and 2km declared that they cover the distance by walking; instead when they commute 2 till 5km they prefer using public transportation. Furthermore when the distance increases above 5 km, they commute using cars and public transportation (Fig. 3). The results emphasized a significant statistical difference regarding the distance covered and the way of commuting ($X^2$ = 170.773, df. = 48, p <0.001).

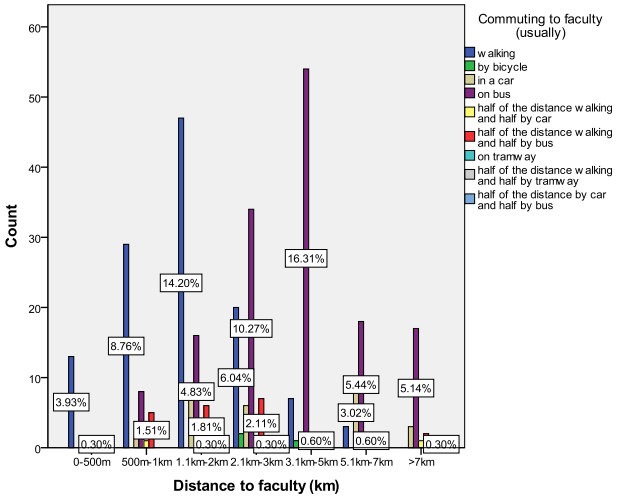


Fig. 3 Distance covered to faculty and the way of commuting

We were also interested about the relationship between the distance and the mode of commuting from faculty till their homes/accommodations. The data analysis reveals that is a statistical significant difference regarding the distance that they have to commute and the mode of commuting ($X^2$ = 183.601, df. = 48, p <0.001). As in previous case there aren't significant changes in the mode of commuting, the students still prefer the passive way (bus and car), especially those who lives at a longer distance. (Fig. 4)

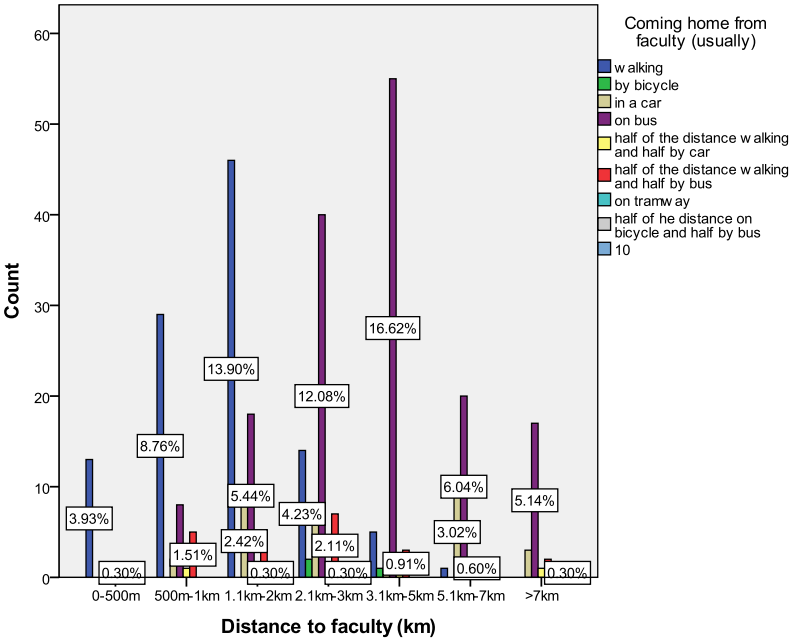


Fig. 4 Distance covered from faculty and the mode of commuting

Gender differences and the usual mode of commuting to faculty represented an interest in our study. The female students (31.12%) use the bus, as the main mode of commuting meanwhile the male students (13.29%) do in the same way. Only 14.50% female students commute by walking and 21.45% male students use the same mode. (Fig.5) There is a statistical significant difference at the level of gender and their mode of commuting to faculty ($X^2$ = 49.466, df. = 8, p <0.001).

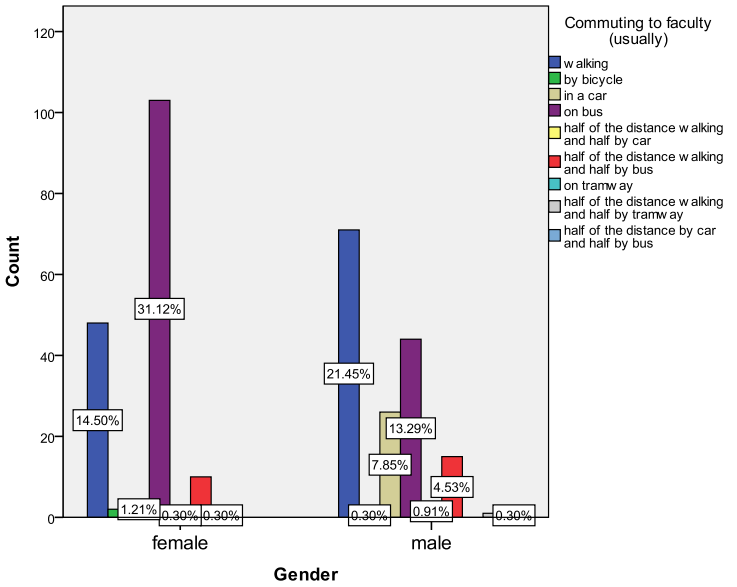


Fig. 5 Gender and the mode of commuting to faculty

In the case of commuting from university we meet, more or less, the same tendency like in the case of commuting to faculty. Female students (32.33%) prefer using the bus and only 15.41% male students use the same mode of commuting. Furthermore the male students (19.64%) are walking back home and the female students (12.99%) do in a similar way. (Fig. 6) The difference in this case at the level of gender and their commuting habits was statistical significant ($X^2$ = 45.028, df. = 8, p <0.001).

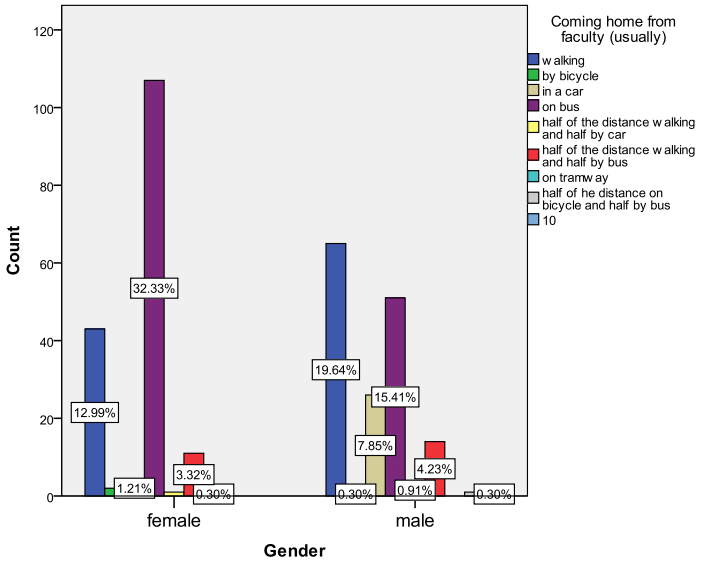


Fig. 6 Gender and the option commuting from faculty

**Discussions**

The previous studies incorporate walking and cycling on the student necessary daily physical activity. However the students keep on commuting to and from faculty (44.49%, 47.74%) with the bus. They use also the mode of walking to and from faculty (26.89%, 26.59%), but the outcomes reveals that the distance in this case is under 2km. Just a small percentage (7.85%) reported that they use the car meanwhile bicycle is used in a smaller percentage.

Our cities become more and more crowded which leads to traffic congestion. So, it would be more efficient using walking/cycling and public transportation (Molina-Garcia et al., 2019). In order to make it possible we need a better infrastructure for cycling and public transportation (Negru & Andras, 2018).

In a similar study the outcomes reveals that the main mode of students commuting were by car, despite most of them where situated less than 2km form their faculty (Barranco-Ruiz et al., 2019).

**Conclusions**

Most of the students involved in this research reported using the bus as a main mode of commuting, especially when the distance to/from the faculty is about more than 2km. In the case when the distance is shorter than 2km, they prefer walking as a mode of commuting.

Female students (31.12%) use more often the bus for commuting to faculty, in comparison with male students (13.29%). Using the comparison between genders, the male students (21.45%) prefer walking and only 14.50% female students do the same.

Using the bus as a mode of commuting from the faculty we found the same pattern between female and male students (32.33%, 15.41%). Male students commute, from their faculty, by walking more often than female students (19.64%, 12.99%).

The data reveals that only the male students use the car like to/from faculty like the way of commuting (7.85%).

Despite our study was realized during summer, we found out that the bicycle, as a mean of commuting, was seldom used by participants.

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# CHILDREN SELECTION IN THE FOOTBALL GAME AT 12-14 YEARS AT U-LUCEAFĂRUL FOOTBALL ACADEMY

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**Abstract**

The aim of the paper is to complete the system of tests and control rules for the initial selection in football, as well as the possibility of applying them during the preparation process to the great performance. Our attempt starts from the finding that current test evidence used does not investigate all the components of the behavior of football players, which makes it too late to detect deficiencies in training that are in fact due to physical and psychics of the subjects.
For the highest accuracy of the selection, I used tests to determine speed, coordination, concentration and attention, somato-functional evaluation, technical and game tests. For a more accurate monitoring we filmed the entire selection process and for speed determination I used the photocell. All research data has been statistically interpreted with SPSS.
The results highlight the necessity of completing the test battery with samples and control rules for testing some mental traits (dullness, vigilance, courage) as well as the use of devices with minimal risk of error.
Talent detection as a result of a precise diagnosis also means a prognosis of future performance. Making a prognosis as close as possible - "sport performance" means that we can define at the same time the parameters of the training process, which will have to bring sport to the level of international performance.

*Keywords: selection, performance, training, teaching, motor skills, football, tests,*

## Introduction

In the specialized literature, there are numerous definitions of the sports selection, of which I mention the one of Alexe (1993), who consider it as "an organized and repeated process of early detection of the child's abilities, using a complex system of criteria (medical, biological, psychosociological and motor) for his subsequent practice and specialization in a sport discipline or test " .
The selection can be included in the first place in the hierarchy of the training components, because the achievement of the performances cannot be conceived without the stages of the selection, from the beginning of the training, throughout its duration and even during the upper stage of the mastery. The quality of the initial selection and of the one made on all the stages of the preparation will depend on the performance of the work performed in the coach-player-team relationship, respectively, in meeting the training and performance objectives(Alexe, 1992).

The selection in football, as a permanent process, can be divided according to the stages of preparation as follows:

- primary selection (stage I) - starting at age 6-7;
- secondary selection (stage II) - which is carried out in 2 stages: 10-12 years and 12-14 years;

final selection (stage III) - 14-18 years (Demian, 1998).

Teaching and learning the game and its elements is getting new aspects. It is the period of transition from the methodology of the young age to the one that begins to divide the training directions. At this age, biological and social conditions are created for a constant activity in football, oriented towards performance (Mănescu, 2010).

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Effort parameters, volume, intensity and complexity are required specifically dosed. The volume of effort increases compared to the previous period. It includes 4 to 5 weekly training lessons and one game. During a training lesson the amount of means increases, the duration being of 90 - 120 minutes, with a weekly volume of about 500 minutes (Scarlat & Scarlat, 2002). The level of psycho-physical development allows the widening of the gestural accumulations, the rapid acquisition of new motor skills, the formation of a "culture" of the movement. There is now an increase in the ability of motor guidance, temporal differentiation, rhythm and reaction. By mixing new skills with those already fixed, on an integrative basis, the premises for consolidating a multilateral motor luggage are assured (Ifrim, 1986).

Antonelli and Salvini (1978), quoted by Manno (1996), highlight the role of the coach in increasing the efficiency of a sports team.

This efficiency depends on the following factors:

- factors that ensure the achievement of the performance objectives: competitiveness, sports discipline, rigidity of roles, utilitarian relationships, formal communication, vertical decisions, hierarchy and authority;
- factors that maintain cohesion: collaboration, participation and spontaneous communication, affective relationships, group decisions, collective and democracy (Manno, 1996).

During this training period, the aerobic effort is increased, as well as the development of those motor skills, mainly in the development of speed and coordination capabilities (Mănescu, 2010).

The selection at the level of the juniors must be carried out on a wider spectrum of motor and mental aptitudes in order to have a greater certainty regarding the discovery of the subjects with real possibilities of progress (Alexe, 1993). Selection on a scientific basis in football provides security against selection based on the observation of the technical baggage that the subjects have. We believe that subjects who achieved superior performance in the selection tests will have a faster progress in the training process compared to the empirically selected subjects.

Table 1. The characteristics of the subjects

| Nr. | Initials of the name | Age (years) | Height (cm) | Weight (kg) |
|---|---|---|---|---|
| 1 | A.D. | 14 | 168 | 62 |
| 2 | A.M. | 14 | 170 | 60 |
| 3 | B.D. | 14 | 173 | 66 |
| 4 | C.I. | 14 | 169 | 59 |
| 5 | D.D. | 14 | 165 | 60 |
| 6 | G.T. | 14 | 175 | 68 |
| 7 | I.D. | 14 | 174 | 66 |
| 8 | M.O. | 14 | 171 | 63 |
| 9 | M.E. | 14 | 179 | 72 |
| 10 | M.N. | 14 | 169 | 61 |

**Materials and Methods**

For greater accuracy of the selection we used speed determination tests, coordination, concentration and attention ability, somato-functional evaluation sheet, technical and game tests. For the most accurate monitoring we filmed the entire selection process and to determine the speed we used the photocell. All research data were statistically interpreted using SPSS.

- Sprint (10 m, 30 m). The test aims to evaluate the speed of movement over short distances, respectively 5 m and 10 m. The running time is recorded using photoelectric cells. The sample is run twice and the best time is recorded. In order to have the highest data accuracy, we used the recording system with the help of the MICROGATE 2 photocell.
- Long jump on the spot. From standing with the tips of the feet back to the line drawn on the ground, long jump with detachment from both legs; landing on both legs. The length of the jump is recorded, in meters and

centimeters, from the line drawn on the ground to the heels of the feet. The candidate is allowed to use any degree of flexion in the joints of the legs and for the advancement of the arms, without crossing the starting line.

- Vertical relaxation on the spot. Objective: to investigate the explosive force (detention) of the lower limbs. The test will consist of two vertical jumps without impetus, on two legs. First of all, the subject passes his hand through talcum powder and from the left side towards a vertical wall he reaches the highest possible point without detaching the heels from the ground so he performs a flexion of the legs and a vertical jump as well as reaching the wall at the highest point. The difference between the initially marked and the bounced mark in centimeters is measured. It is performed twice with the best performance recorded.
- Resistance on 2000m. The subjects start from the start line and record the time in which they run 2000m.
- The "Prague test" aims to study the distribution, the oscillation of attention and to determine the level of development of the spirit of observation. It is applicable from the age of 13 to adults with a duration of 6 minutes. It can be applied individually, in a large or small group of individuals. In your left hand you have a sheet that represents a large square divided into small squares. Each one has two numbers, one bigger and one smaller. In your right hand you have a sheet that represents 4 columns with numbers. The first number in column I is 75, look for it the small number listed there (69). Write it on the free side of the right column. You found him. Now you will have to work further without skipping the numbers.

1. Passing test

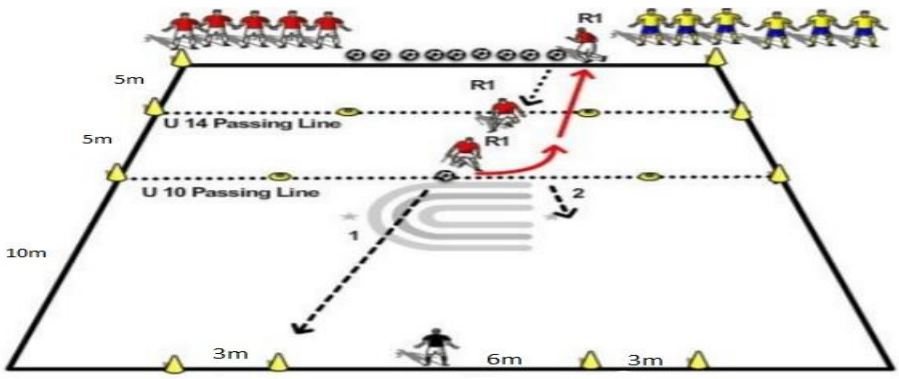


Fig. 1. Passing test representation

Purpose: To test Passing Accuracy
Set up:

- A 20x20 grid with two small goals 12m apart on one end line.
- Balls are lined up on the opposite end line.
- Cones mark a U 14 shooting line 5 m from the start line.
- A U12 passing line 10m from the start line.

Action:
The Player dribbles the ball to his passing line and passes on the run with the ball moving with the inside of his right foot to the right side goal. Then the sprints back to gather another ball, dribble to his passing line again and passes to the left goal with his left foot.
He repeats this sequence gathering a ball with alternate foot and finishing to alternating sides as many times as he can in the allotted time.
U10 = 40 seconds
U14 = 60 seconds
Scoring:
Balls must go in the goal without touching the posts to score.
1 goal = 2 pts.

Hit goal post and score = 1 pt.
Hit post and miss or miss all = 0 pt.
Coach's tip:
Increase distance to make harder.
Increase size of goals to make easier.
U10s can stop the ball before passing to make it easier.
Player tip:
Eyes up to see target before you pass.

2. Shooting test

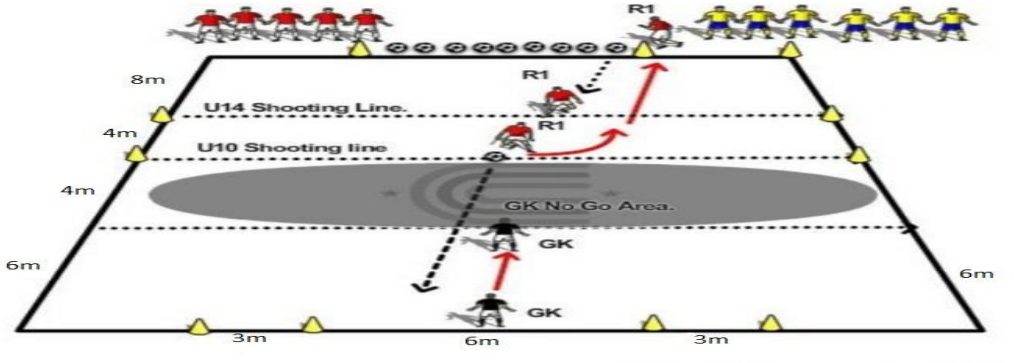


Fig. 2. Shooting test representation

Purpose: To measure shooting accuracy
Set up:

- Balls on a line 22 m from a full size goal with a goalkeeper.
- A 6 m line where the goalkeeper can come out of goal to challenge.
- A 10 m shooting line for U10 players and a 14m shooting line for U16.

Action:
Player dribbles a ball from the 22 m line and shoots before his line then turns and sprints to get a 2nd ball and repeats the sequence as often as he can in the allotted time.
U10 = 45 sec.
U14 =90 sec.
Coach keeps scores.
Coach's tip:

- Increase or decrease the shooting distance to make it easier or harder for the shooters.
- Adjust the distance the goalkeeper can advance according to your player's success.

Player tip:

- Get your eyes up before shooting.
- Shoot low for the corners especially when the goalkeeper is moving forward.

Apart from the motor and technical tests, each athlete participated in the game tests consisting of the relation 1v1, 5v5, 7v7 respectively 11v11. Each athlete was rated according to performance with * (unsatisfactory) ** (sufficient) *** (good) **** (very good).

The evaluation commission consisted of 5 members: 3 coaches with A license, one Coach with license B, one coach with Pro license.

**Study sample**

The experimental study was conducted within the ACS UNIVERSITATEA CLUJ Club, between November 24 and 25, 2018, with 10 athletes who have given their consent for their data to be processed and statistically interpreted.

On November 24, the testing of the motor qualities and the technical-tactical skills of birding and shooting was carried out. Later, on November 25, the game trials took place.

**Results and Discussion**

According to the experiment protocol, the dynamics of the results will be interpreted in relation to the somatic, functional and motor aspects, because the subjects come from different statistical population at the initial moment (the first moment of the selection).

Our results confirm this hypothesis, and as shown in the tables and graphs presented, the differences are significant across all investigated indicators.

Table 2. The results obtained when examining the aspects of general motility

| Nr. | The initials of the name | 10 m Speed (s) | 30 m Speed (s) | Length from the spot (cm) | Detention on the spot (cm) | Resistance on 2000m (min) | Praga Test (Points) | Pass Test (Points) | Shoot Test (goals) | Game Test (Average) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. | A.D. | 3.21 | 4.82 | 236 | 43 | 6.00 | 29 | 16 | 23 | ** |
| 2. | A.M. | 3.03 | 4.26 | 253 | 47 | 6.06 | 37 | 24 | 16 | *** |
| 3. | B.D. | 3.11 | 4.41 | 224 | 42 | 6.58 | 41 | 25 | 15 | * |
| 4. | C.I. | 2.89 | 4.40 | 229 | 39 | 6.44 | 19 | 18 | 25 | ** |
| 5. | D.D. | 3.02 | 4.22 | 265 | 51 | 5.59 | 38 | 25 | 21 | * |
| 6. | G.T. | 3.22 | 4.95 | 241 | 47 | 5.52 | 40 | 21 | 20 | ** |
| 7. | I.D. | 3.38 | 4.88 | 238 | 43 | 6.05 | 37 | 23 | 17 | *** |
| 8. | M.O. | 3.15 | 4.24 | 263 | 46 | 7.01 | 48 | 18 | 16 | ** |
| 9. | M.E. | 2.77 | 4.08 | 260 | 52 | 6.35 | 36 | 26 | 24 | **** |
| 10. | M.N. | 3.12 | 4.66 | 239 | 48 | 6.48 | 29 | 25 | 19 | ** |
| | **Standard** | **3.10** | **4.30** | **250** | **45** | **6.30** | **30** | **20** | **20** | |
| | **Average** | **3.12** | **4.53** | **239.8** | **44.8** | **6.22** | **34.4** | **20** | **19.6** | |

* the underlined results are above the required scale.

Table 3. Statistical processing of the results of the group when examining the aspects of general motility during the testing

| Groups | Values | Sum | Average |
|---|---|---|---|
| 10 m Speed (s) | 10 | 59.34 | **3.12** |
| 30 m Speed (s) | 10 | 1919 | **4.53** |
| Length from the spot (cm) | 10 | 269 | **239.8** |
| Detention on the spot (cm) | 10 | 202 | **44.8** |
| Resistance on 2000m (min) | 10 | 41.06 | **6.22** |
| Praga Test (Points) | 10 | 344 | **34.4** |
| Pass Test (Points) | 10 | 200 | **20** |
| Shoot Test (goals) | 10 | 196 | **19.6** |

We mention that the game samples are 60% important at the expense of the motor samples that have 40%. As a result of the results recorded in the game tests correlated with the motor tests, only the players M.E. and A.M. both from Vaslui remained in the Junior C lot of the Luceafarul Academy.

Unfortunately the D.D player who had the best results in the motor tests did not impress at all in the game tests, failing to pass this selection.

As a feedback of this selection in the summer of this year, with the reorganization of the groups and preparation for the 2019-2020 competitive season to our great joy and astonishment, the two players managed to take the U 19 elite Republican team, mentioning that they are 15 years old and they play 4 years above. I would like to mention that both players are part of the U16 group of the National of Romania.

**Conclusion**

The importance of scientific selection is to discover talents, to prepare children and juniors, and to train football players with a high level of sportsmanship, with a high moral standing, able to successfully cope with this true social phenomenon which, today reached unheard of odds some time ago. Given the importance of the selection in the evolution of the training process, it is necessary to limit the event and the provisorate in the work of finding and training the future footballers.

Talent screening as a result of accurate diagnosis also means a forecast of future performance. Making a forecast as close to reality as possible - "sports performance", means that we can define at the same time the parameters of the training process, which will have to bring the sport to the level of international performance.

The selection, however scientific it may be, is validated only by practice in the sense of the great football competitions to which the selectable, if he has the necessary conditions, can reach. We want to say that if the football talents selected by the appropriate scientific means, if they do not have adequate training conditions, they do not have an adequate motivation for the proposed purposes and, ultimately, they are not lucky, they can be lost, and the measure of the selection by its efficiency, to lose their national content.

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# STUDY ON THE DEVELOPMENT OF EXPLOSIVE FORCE IN FOOTBALL AT JUNIORS A LEVEL

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**Abstract**

The aim of this paper is to find and implement a program for the development of the muscles of young footballers in order to enforce the transition to seniors and to reduce the physical differences. The research included 20 subjects and faded over a 5 months period. The subjects were selected following the value-based observation, being considered as the most perspective players. The research results confirmed that all 5 follow-up indexes: push-ups, flat bench press, chin-ups, squats, high knee jumps, after the training period showed a good progress. In conclusion, we can once again confirm that the circuit-weight training method is an effective method for developing the force. At the same time, the results of the research show that the age of Juniors "A" (17-18 years) is suitable for the development of force.

*Keywords:* force, football, weight training, circuit, juniors.

## Introduction

Physical strength depends on the activity of the central nervous system, the physiological section of the muscle, the biochemical processes taking place in the muscles, as well on the efforts of the will, concentration and attention that the athlete is capable of. From the biochemical point of view, the force of muscle contraction depends on the nature of the nerve impulses, the way of transmitting these impulses, and the action of ATP on muscle myosin.

The muscular hypertrophy that emerges from strength training is because of from the high protein consumption that takes place in such endeavors (Florescu, 1975).

For the education of force, it is necessary to take into account the following aspects:

- Simultaneous mobilization of the maximum number of functional units,
- Maximizing the effort of will and attention focus on the work being done,
- Increasing the physiological section of the muscles.

In terms of muscle strength, the conditioning reaction is known to be very variable.

As a result of the training, the isolated subject can record evolutions, stagnation or even involution of the muscular force. But, if group training is more frequent (as number of weekly sessions), it is possible that the strength of more subjects will evolve.

The results from the study made by Wisloff et al. (2004) indicated that there was no relation between the 10 m shuttle run and the 30 m sprint test. However, after Cormie et al. (2011) and Silva et al. (2015) both sprint capacities are of importance in soccer, and the obtained data show that both capacities should be included and evaluated in a sprint test battery of soccer players.

The results obtained by Maio Alvez et al. (2010) suggested that the complex and contrast training (CCT) induced the performance increase in 5 and 15 m sprint and in squat jump. Vertical jump and sprint performances after CCT program were not influenced by the number of CCT sessions per week (1 or 2 sessions/wk). From the obtained results, it was suggested that the CCT is an adequate training strategy to develop soccer players' muscle power and speed.

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Sedano et al. (2011) studied the effects of plyometric training on explosive strength, acceleration capacity and kicking speed in young elite soccer players, after Paavolainen et al. (1999) and Lopez-Segovia et al. (2010). Marques et al. (2013), Saez de Villareal et al. (2013) and Chtara et al. (2017) confirmed that the replacement of some soccer-specific training with plyometric, agility, or repeated shuttle sprint exercises would enhance explosive actions, agility and anaerobic performance to a greater extent in young soccer players than soccer training alone.

After Jovanovic et al. (2011), their proposed speed, agility, quickness training program appears to be an effective way of improving some segments of power performance in young soccer players during the in-season period. After Keiner et al. (2014) football coaches could use this information in the process of planning in-season training. Without proper planning of the SAQ training, soccer players will most likely be confronted with decrease in power performance during in-season period.

Cicioni-Kolsky et al. (2011) examined the effect of two different interval training programs–high-intensity interval training (HIT) and supramaximal interval training (SMIT)–on measures of sprint and endurance performance. The study showed that for concurrent improvements in endurance, sprint and repeated sprint performance, SMIT provides the greatest benefits for physically active individuals.

Wahl et al. (2014) revealed that 4 weeks without high intensity training (HIT) had moderate to large decreasing effects on physical performance. On the contrary, 2-week HIT shock microcycle is a promising tool in preseason training of semi-professional soccer players to largely improve Repeated-Sprint-Ability (RSA)Index by 46% (Cohen's d = -1.99), RSAMean by 2.3% (Cohen's d = -1.15) and Yo-Yo Intermittent Recovery Test Level 2 (YYIR2) performance by 24% (Cohen's d = +1.92) of semi-professional soccer players. These results were further confirmed by Keiner et al. (2014).

Balsalobre-Fernández et al. (2015) observed after Tonnessen et al. (2013) that a month of active rest during the off-season break is enough to prevent decreases in force production of such athletes.

The effectiveness of the different techniques implies reaching the limit force by the subjects, which allows an accurate determination of the role played by the candidates' prior training and attenuates any reaction depending on their initial strength. A shorter number of weeks to reach the limit force indicate the superiority of a technique. This is true only when all subjects have a relative equal initial force, and all practice the same training method.

Behm et al. (2017) proved that power training was more effective than strength training for improving youth jump height. For sprint measures, strength training was more effective than power training with youth. Furthermore, strength training exhibited consistently large magnitude changes to lower body strength measures, which contrasted with the generally trivial, small and moderate magnitude training improvements of power training upon lower body strength, sprint and jump measures, respectively.

Abade et al. (2017) in their research explored the effects of the re-warm-up performed in the time gap between the end of the warm-up and the beginning of the match. It was proved that re-warm-up exercises such as plyometrics and repeated changes of direction are simple, quick and efficient activities to attenuate losses in power output during vertical jump and sprint activities after warm-up.

Helgerud et al. (2011) observed that their concurrent strength and endurance training program together with regular football training resulted in considerable improvement of the players' physical capacity and so may be successfully introduced to elite football players. Moreover, after Di Giminiani and Visca (2017) the tests used in the study are practical and reliable predictors to monitor explosive strength, and endurance performance changes in young elite soccer players. Secondly, the training structure and the improvements evidenced provide helpful guidelines of expected longitudinal gains in endurance and strength performance of elite soccer players from 13 to 15 years.

The qualitative aspect of the accumulations can be analyzed from two points of view: the "angular" specificity and the "working" specificity.

The "angular" specificity is the most important increase in muscle strength. For example, following an isotonic training with maximum resistance, knee extensions register a more significant increase in force at an angle of 115°. In isometric training, strength development appears to be less specific. It is noted the existence of a certain specificity for one or two muscle groups trained at different angles.

Specificity of "work": In subjects trained with concentric isotonic contractions, the evolution of isometric force is not proportional to the isotonic force. The percentage increase in isotonic force exceeds the percentage increase of isometric values. It is concluded that an eccentric isotonic contraction implies a more spectacular evolution than the concentric isotonic contraction.

## 1. The assumptions of the research

In the course of the experiment, the established hypothesis was that the circuit method can make the physical training of athletes more efficient, especially the force in speed mode.

## 2. Theoretical data of the experiment

*2.1. The design of the research*

This research is quasi-experimental; the 20 subjects born in 2002 were selected based upon the observation method. In co-operation with the coach of A.C.S Sporting Cluj U18 team, Alin Bărăian, the selected subjects were considered to have perspective in the football performance but at this stage have some deficiencies in terms of force quality in speed.

Strength training sessions were flown three times a week in the morning at 6:45 am and lasted for 45 minutes.

*2.2. Subjects*

The subjects included in this study are members of the A.C.S. Sporting Cluj football team and they play at Junior A1 level. The anthropometric measurements were as follows: height 1.66 – 1.89 m; weight 60 – 80 kg.

Table 1. The characteristics of control subjects

| Nr. | Initials of the name | Age (years) | Height (cm) | Weight (kg) |
|---|---|---|---|---|
| 1 | F.D. | 17 | 168 | 60 |
| 2 | M.A. | 17 | 169 | 65 |
| 3 | T.S. | 17 | 175 | 71 |
| 4 | R.C. | 17 | 179 | 75 |
| 5 | I.H. | 17 | 180 | 69 |
| 6 | A.C. | 17 | 185 | 71 |
| 7 | P.P. | 17 | 176 | 76 |
| 8 | Z.M. | 17 | 169 | 60 |
| 9 | L.F. | 17 | 189 | 80 |
| 10 | B.V. | 17 | 166 | 63 |

Table 2. The characteristics of experimental subjects

| Nr. | Initials of the name | Age (years) | Height (cm) | Weight (kg) |
|---|---|---|---|---|
| 1 | S.A. | 17 | 167 | 74 |
| 2 | J.I. | 17 | 169 | 69 |
| 3 | I.O. | 17 | 174 | 63 |
| 4 | P.L. | 17 | 176 | 67 |
| 5 | E.T. | 17 | 166 | 75 |
| 6 | A.B. | 17 | 187 | 78 |
| 7 | N.M. | 17 | 183 | 80 |
| 8 | L.G. | 17 | 168 | 71 |
| 9 | D.G. | 17 | 173 | 60 |
| 10 | U.L. | 17 | 175 | 80 |

*2.3. Time and place of the research*

The research was conducted at the Big Fitness Hall during the period 01.02.2018 - 31.07.2018.

The research period was divided into 3 stages as follows:

- 1st of February 2018 – Initial test,

- 2nd of February - 30th of July 2018 – experimental training period,
- 31th of July 2018 – Final test.

For the development of force, the 9-point circuit training method was used, each station having a different load depending on the body mass of the subject. Each training was structured in three to five parts:

- Preparing the body for effort and the selective influence of the locomotive apparatus (12 minutes)
- Circuit 1 (9 minutes)
- Rest (4 minutes)
- Circuit 2 (9 minutes)
- Rest and stretching (10 minutes).

Table 3. The circuit components

| **Exercise** | **Series** | **Dosage** | **Charge** |
|---|---|---|---|
| Leg press | 2 | 25-20, 20-15 rep. | 100% From the body mass of the subject. |
| Machine bench press | 2 | 25-20, 20-15 rep. | 50% From the body mass of the subject. |
| Seated cable row or pulldown to front | 2 | 25-20, 20-15 rep. | 25% From the body mass of the subject. |
| Machine shoulder press | 2 | 25-20, 20-15 rep. | 20% From the body mass of the subject. |
| Calves extension | 2 | 25-20, 20-15 rep. | 25% From the body mass of the subject. |
| Leg flexures | 2 | 25-20, 20-15 rep. | 75% From the body mass of the subject. |
| Biceps flexures – machine | 2 | 25-20, 20-15 rep. | 25% From the body mass of the subject. |
| Triceps press – machine | 2 | 25-20, 20-15 rep. | 25% From the body mass of the subject. |
| Crunch - machine | 2 | 25-20, 20-15 rep. | 50% From the body mass of the subject. |

At each station the actual working time was 40 seconds followed by a pause of 20 seconds, during which the subjects changed the workstation. The break between the two circuits was 4 minutes.

*2.4. The results of the research*

Initial Test experimental group

Table 4. Initial test sample values

| **No.** | **Push-ups** | **Flat bench press / min** | **Chin – ups / min** | **Squats / min** | **High knee jumps / min** |
|---|---|---|---|---|---|
| 1 | 27 | 13 | 7 | 27 | 42 |
| 2 | 22 | 15 | 9 | 20 | 47 |
| 3 | 33 | 18 | 6 | 32 | 53 |
| 4 | 35 | 16 | 10 | 34 | 55 |
| 5 | 28 | 14 | 8 | 25 | 57 |
| 6 | 31 | 18 | 10 | 36 | 41 |
| 7 | 32 | 20 | 5 | 22 | 40 |
| 8 | 35 | 13 | 11 | 31 | 59 |
| 9 | 24 | 15 | 12 | 20 | 48 |
| 10 | 26 | 14 | 7 | 33 | 60 |
| Average | 27 | 15.6 | 8.5 | 26 | 49.1 |

Final Test experimental group

Table 5. Final test sample values

| No. | Push-ups | Flat bench press / min | Chin – ups / min | Squats / min | High knee jumps / min |
|---|---|---|---|---|---|
| 1 | 39 | 27 | 15 | 42 | 68 |
| 2 | 33 | 20 | 13 | 36 | 59 |
| 3 | 35 | 25 | 12 | 39 | 65 |
| 4 | 37 | 23 | 14 | 40 | 55 |
| 5 | 32 | 22 | 12 | 31 | 63 |
| 6 | 31 | 25 | 15 | 43 | 46 |
| 7 | 36 | 27 | 8 | 29 | 47 |
| 8 | 36 | 19 | 17 | 37 | 66 |
| 9 | 30 | 24 | 19 | 25 | 55 |
| 10 | 28 | 23 | 16 | 38 | 70 |
| Average: | 33.7 | 23.5 | 14.1 | 36 | 59.4 |

Figure 1. Evolution of average values from the initial to the final test of the experimental group
Initial Test control group

Table 6. Initial test sample values

| No. | Push-ups | Flat bench press / min | Chin – ups / min | Squats / min | High knee jumps / min |
|---|---|---|---|---|---|
| 1 | 25 | 12 | 5 | 26 | 41 |
| 2 | 20 | 11 | 8 | 21 | 45 |
| 3 | 30 | 15 | 6 | 31 | 50 |
| 4 | 31 | 14 | 6 | 28 | 53 |
| 5 | 24 | 14 | 4 | 25 | 47 |
| 6 | 25 | 12 | 11 | 32 | 39 |
| 7 | 21 | 13 | 6 | 20 | 42 |
| 8 | 32 | 16 | 12 | 27 | 54 |
| 9 | 24 | 11 | 7 | 20 | 43 |
| 10 | 25 | 15 | 9 | 30 | 55 |
| Average | 25.7 | 13.3 | 7.4 | 28 | 51 |

Final Test control group

Table 7. Final test sample values

| No. | Push-ups | Flat bench press / min | Chin – ups / min | Squats / min | High knee jumps / min |
|---|---|---|---|---|---|
| 1 | 27 | 14 | 8 | 28 | 44 |
| 2 | 22 | 13 | 9 | 24 | 46 |
| 3 | 30 | 15 | 9 | 30 | 51 |
| 4 | 32 | 15 | 7 | 29 | 50 |
| 5 | 28 | 13 | 6 | 24 | 47 |
| 6 | 27 | 14 | 14 | 33 | 45 |
| 7 | 26 | 16 | 9 | 24 | 46 |
| 8 | 25 | 15 | 10 | 25 | 43 |
| 9 | 26 | 12 | 10 | 24 | 46 |
| 10 | 25 | 14 | 10 | 31 | 56 |
| Average: | 31 | 17 | 13 | 30 | 54 |

All research data has led to the confirmation of the hypothesis according to which the method of the circuit can physiologically improve the physical training of the athletes, especially the force in speed mode.
The means and methods used in the research found an improvement in the development of force.
The obtained results lead to the conclusion that force at this age can be influenced.

The development of force by our means does not harm the physical training as a whole, but on the contrary, these means form skills that can help in the future, acquiring more complex motor actions.

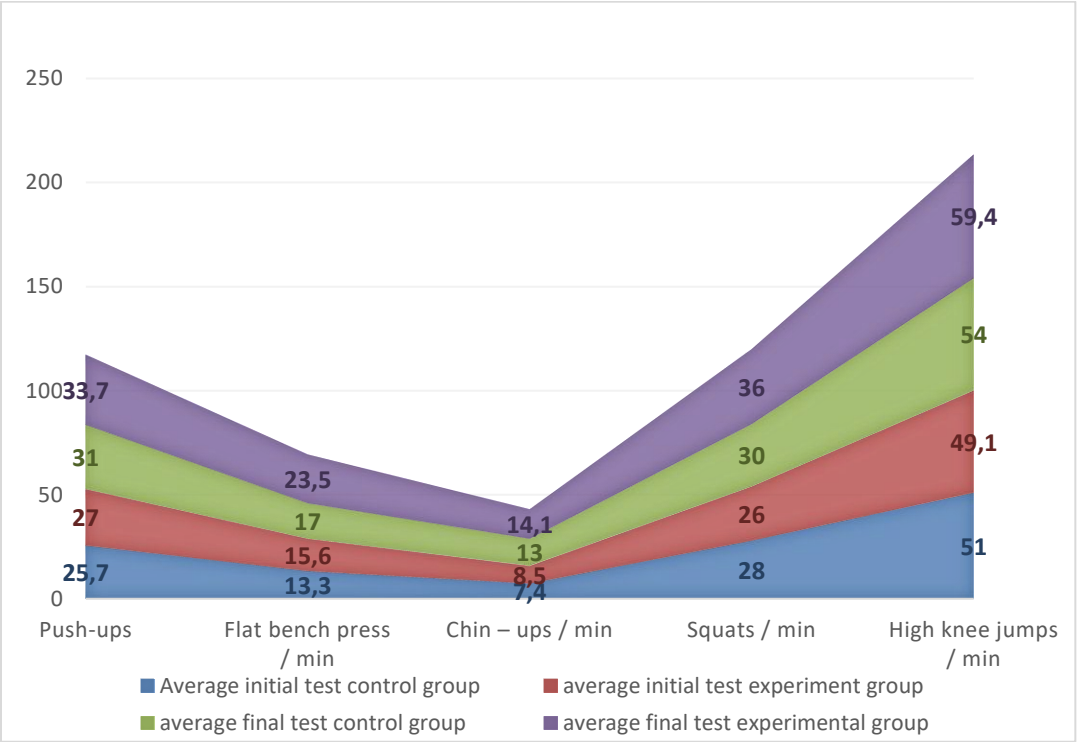


*Fig. 1. Representation of initial and final average of experimental and control group*

## Conclusions

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ICU 2019

# THE IMPORTANCE OF EMOTIONAL IN THE SPORTS PERFORMANCE OF GYMNASTS

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**Abstract**

The topic of this research consists in the study of the importance of emotional intelligence for sport performance of gymnasts. The research starts from the fact that certain individuals have outstanding results in practice and succeed better in life than others who have a greater (cognitive) IQ (Goleman, 2001). The objective consists in the study of the relation between emotional intelligence and sport performance of gymnasts. **Material and methods:** This research precedes some elaborated studies related to emotional intelligence and sport performance and represents a starting point in this direction. We have chosen a random sample of 36 persons, professional gymnasts with ages between 7-12 years. **Procedure**: The study was conducted for a period of two months by administering to each gymnast the questionnaire for assessment of EI. The study continued with assessment of the sport performance of gymnasts. It was conducted during a contest which covered all the conditions of an important contest. The performances obtained by gymnasts were assessed by a jury of arbiters, who assigned the grades in accordance with the IFG Code of Points. **Results**: The proportion of those with a low sport performance level and low emotional intelligence level is 46.5% comparing with 34.9% low sport performance level and high emotional intelligence level. This proportion is reversed in case of high sport performance group. The highest frequency in the studied sample appears at the subjects with a low emotional intelligence level and low sport performance level, almost half. **Conclusions**: The emotional intelligence and sport performance of the gymnasts in the studied sample are in interdependent relationship. Emotional intelligence is closely linked to the sport performance as results from the above data. The gymnasts with a high level of emotional intelligence have a significantly greater performance than the ones with a low level of emotional intelligence.

*Keywords:* emotional intelligence; sport performance; gymnastics

## Introduction

One of the major missing parts in the success equation is emotional intelligence, a concept made popular by the groundbreaking book by Daniel Goleman (2001), which is based on years of research by numerous scientists such as Peter Salovey, John Meyer, Howard Gardner, Robert Sternberg and Jack Block, just to name a few. For various reasons and thanks to a wide range of abilities, people with high emotional intelligence tend to be more successful in life than those with lower EIQ even if their classical IQ is average.

Trainers and parents have always been interested in sport achievement and children's emotional adaptation both inside and outside of the official framework provided by a sport club. However, in the last period, the researchers found out that the child's emotional life has a significant impact on the aforesaid two aspects. Thus, the Emotional Intelligence has become an important area of research in the field of human resources, management, sport and psychology. Salovey and Mayer (1990), the first intelligence theorists emotional, I mean by this concept a set of supposed abilities of contribute to the accurate evaluation and expression of emotions related to oneself and to others, to the effective regulation of emotions related to oneself and to others when using feelings to motivate, plan and succeed in life. Goleman points out that this theory of Salovey and Mayer has its roots in Gardner's theory of interpersonal intelligence - the ability to understand others, which is extended in five areas: knowledge of personal emotions, management of emotions, motivation self and self-manipulation (Goleman, 2001).

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Following the subject from the perspective of the sports field we notice in the literature that the connection between emotional intelligence and sport was made by Botterill and Brown with the discovery that athletes do not critically reflect and constructive to the emotions I feel, but take them as such. Meyer recalls that there are various components of emotional intelligence such as the perception of emotion or its influence management the process of maximizing performance, but that there are not many studies to analyze the impact of emotional intelligence as a whole on performance in sports. The author points out that intelligence skill-based emotional is a skill that can be learned and improved and that this is useful in the field of sports psychology which aims to support athletes to improve their skills mental and physical, performance and satisfaction in relation to performance (Meyer, 2007).

Laborde, Dosseville and Allen show, based on studies reviewed, that athletes who have a high level of emotional intelligence are more successful. At the same time, it is emphasized that the athletes are you have to cope consistently with the stress of some workouts intense pressure and competitive pressure, which requires understanding and regulation own emotions and those of others around them (Laborde, Dosseville, & Allen, 2016).

**Research Subjects and Methods.** The objective consists in the study of the relation between emotional intelligence and sport performance of gymnasts.

**General hypothesis.** Level of the emotional intelligence has influence on the sport performances of gymnasts.

*Operational hypotheses*

1. The high sport performance is significantly associated to a high level of emotional intelligence;

2. Gymnasts with a high level of emotional intelligence achieve a significantly increased sport performance than the ones with low level of emotional intelligence.

**Variables and experimental design.** This study is a non-experimental design (observational) study with 2 variables.

Variables used for evaluation by statistical analysis are independent and unmodified by the researcher, and the dependent variables are considered to be modified by the influence of the independent ones.

*The independent variable* is the emotional intelligence.

*The dependent variable* is the sport performance.

For a better evaluation, the study also uses the age variable as an independent variable with the purpose of clarifying the differences taking into consideration this factor.

**Methods.** In what concerns the framework of this study, our intention was not to make a comprehensive and complex research, but rather a study of the two variables. Therefore, we focused on analysing the questionnaire and observation charts. No other studies in which these tests were implemented are taken into view and since we don't know the limits of the tests implementation, the research results are fallible.

This research precedes some elaborated studies related to emotional intelligence and sport performance and represents a starting point in this direction.

In order to achieve the proposed objective, we have used the inquiry method based on questionnaire for checking the level of emotional intelligence and the observation method to find out the sport performance of gymnasts.

**Subjects.** We have chosen a random sample of 36 persons, professional gymnasts with ages between 7-12 years.

**Instruments – measurements.** 1. For measuring the level of emotional intelligence we used the Bar-On (1997) and Goleman EI Test, (adapted by Roco 2001, version for children).

2. In order to measure the sport performance level we have used the observation charts in which we wrote the gymnasts evolution during contest. Data related to the sport performance are represented by the general averages of grades obtained during the contest at the four events.

**Procedure.** The study was conducted for a period of two months by administering to each gymnast the

questionnaire for assessment of EI. To avoid the distortion of test statistical results, the possibility of some errors sources as bellow mentioned, has been excluded:

- loss of subjects – the tested group was formed by randomly chosen subjects;
- selection errors – tests have been administered once to all subjects, in order to avoid the loss of subjects due to their absence;
- the diffusion effect – testing was not previously announced, so that the answers were not prepared or debated before testing by the participants and the testing intention was not interpreted.

The study continued with assessment of the sport performance of gymnasts. It was conducted during a contest which covered all the conditions of an important contest (audience, arbiters, specific competitive environment). The performances obtained by gymnasts were assessed by a jury of arbiters, who assigned the grades in accordance with the IFG Code of Points.

**Results.** Data have been analysed from the statistical perspective using the SPSS 15 Program, and the graphs have been drawn in Microsoft Excel 2010.

For data statistical analysis and for graphical representations (histograms) we have utilized the SPSS v 15 Package (SPSS Inc., Chicago, USA). Microsoft Excel (Microsoft Office Prof. 2010). The statistical significance threshold was established at $p < 0.05$ (accepted error margin $\alpha=0.05$). Data distribution was checked by using Shapiro-Wilk and Kolmogorov-Smirnov tests. All three variables have normal distribution as we can see in the bellow graphs made in the form of histogram.

Correlations inside the lot were established using the correlation coefficient r (Bravais-Pearson), in addition an appropriate signification test was administered. At the interpretation of correlation coefficients we utilized the empirical rules of Colton.

Univariate regression was used to express the sport performance (PS) in relation with emotional intelligence (IE) (PS – dependent variable, IE – independent variable).

Multivariate regression was used to determine the sport performance depending on the emotional intelligence and age (PS-dependent variable, IE, age – independent variable).

The descriptive statistics for the three variables is presented in the table bellow:

Table 1. Description of data resulted from study

| Variable | Minim | Maxim | Total | Mediate | Standard error | Standard deviation | Variation |
|---|---|---|---|---|---|---|---|
| Age | 7 | 12 | 318 | 8.83 | 0.24 | 1.42 | 2.02 |
| Score EI | 35 | 170 | 3480 | 96.67 | 6.87 | 41.25 | 1701.43 |
| Score SP | 16.5 | 41.7 | 1074.2 | 29.84 | 1.22 | 7.311 | 53.51 |

EI = emotional intelligence; SP = sport performance

The distribution of variables is shown in the histograms bellow:

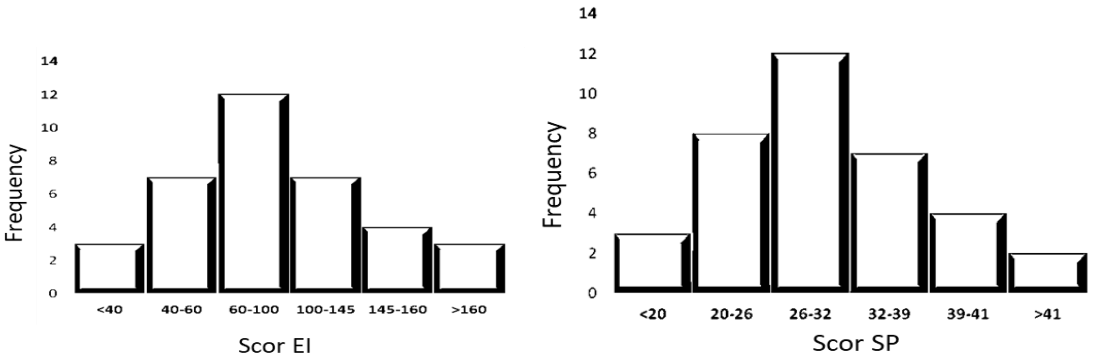
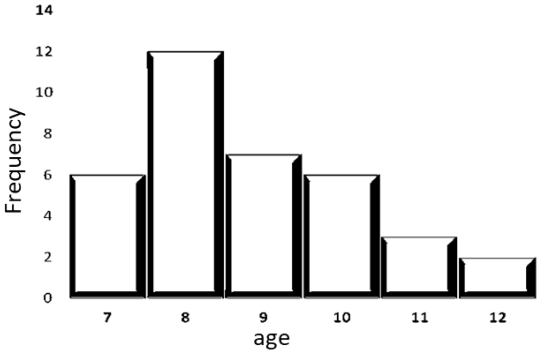



Fig. 1. a. Histogram of emotional intelligence score b. Histogram of sport performance score

From the above histogram results that the highest frequency of the emotional intelligence scores ranged from 60 to 100 (12 gymnasts).

The maximum frequency of sport performance scores ranged from 26 to 32 (12 gymnasts).




c. Histogram of Age

The analysis of frequency *sport performance* in relation with *the emotional intelligence* is described in the following tables.

Table 2. The frequencies of sport performance depending on the emotional intelligence

| Level emotional intelligence | | Level sports performance: Low average and low | Level sports performance: High average and high | Total |
|---|---|---|---|---|
| **Low** | Frequent | 16 | 1 | 17 |
| | Expect frequent | 13.1 | 3.9 | 17.0 |
| | % after emotional intelligence level | 95.2% | 4.8% | 100% |
| | % after sport performance level | 57.1% | 12.5% | 48.8% |
| | % total | **46.5%** | 2.3% | 48.8% |
| **High** | Frequent | 14 | 5 | 19 |
| | Expect frequent | 14.9 | 4.1 | 19.0 |
| | % after emotional intelligence level | 68.2% | 31.8% | 100% |
| | % after sport performance level | 42.9% | 87.5% | 51.2% |
| | % total | **34.9%** | 16.3% | 51.2% |
| **Total** | Frequent | 30 | 6 | 36 |
| | Expect frequent | 30.0 | 6.0 | 36.0 |
| | % after emotional intelligence level | 81.4% | 18.6% | 100% |
| | % after sport performance level | 100% | 100% | 100% |
| | % total | 81.4% | 18.6% | 100% |

The proportion of those with a low sport performance level and low emotional intelligence level is 46.5% comparing with 34.9% low sport performance level and high emotional intelligence level. This proportion is reversed in case of high sport performance group. The highest frequency in the studied sample appears at the subjects with a low emotional intelligence level and low sport performance level, almost half.

Table 3. School performance – emotional intelligence interdependent relationship

| **Emotional intelligence – Sport performance** | Values | gl | Segnificance |
|---|---|---|---|
| **χ2 (Pearson)** | 5.183 | 1 | **0.024** |
| No. cases | 36 | | |

Test χ2 test reveals sport performance as being closely related to the emotional intelligence as results from the bellow data and graph.

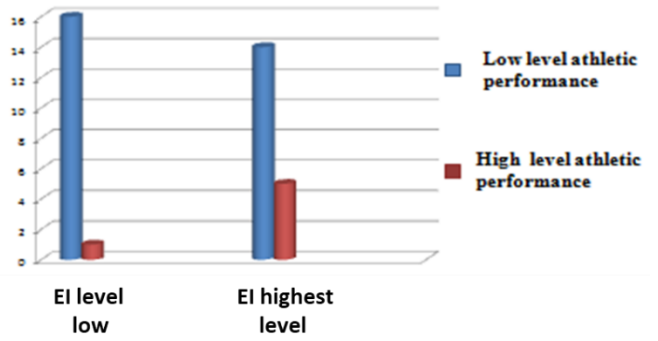



Fig. 2. Sport performance – emotional intelligence

This graph presents from the quantitative perspective (number of cases) the proportion of the level of sport performance in two situations (low and high).

More cases with low sport performance level are met in case of low emotional intelligence, comparing with the cases of high emotional intelligence level where less cases of low performance are met and the other way around for a high sport performance level.

Correlations between the values of variables *emotional intelligence and sport performance* are presented in the table bellow.

Table 4. Bravais-Pearson Correlations related to sport performance

| Correlation PS | r | p |
|---|---|---|
| Score IE | 0.96 | <0.001 |
| Age | 0.37 | 0.02 |

After calculating the correlations, we found out that a very good correlation between sport performance and emotional intelligence exists ($r=0.96$ $p<0.001$ $r^2=0.91$) (the high level of emotional intelligence is linked to a high level of sport performance) 91% of the variation of sport performance is due to the linear relation with emotional intelligence (fig. 3). There is an acceptable correlation between sport performance and age ($r=0.37$ $p=0.02$) (fig. 3).

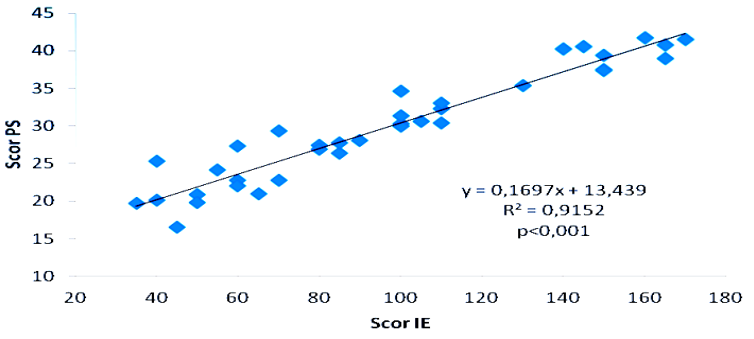
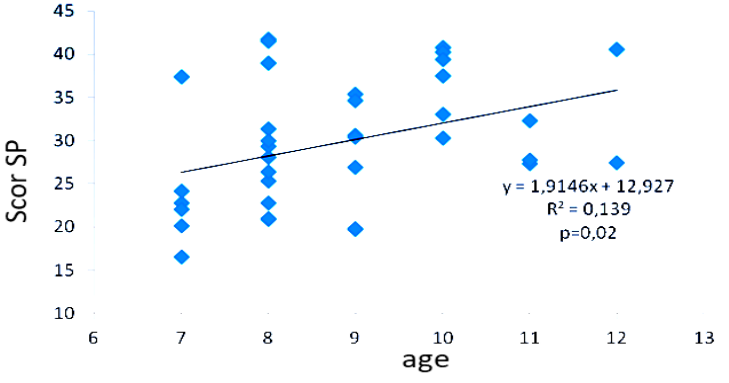



Fig. 3. a. Graphical representation of the correlation between sport performance and emotional intelligence




b. Graphical representation of the correlation between sport performance and age

Next, we present the steps followed in SPSS for obtaining the multidimensional regression (sport performance, emotional intelligence and age).

Table 5. Variables Entered/Removed(b)

| Model | Variables Entered | Variables Removed | Method |
|---|---|---|---|
| 1 | Score IE, Age(a) | . | Enter |

a All requested variables entered.

b Dependent variable: Score athletic performance

Table 6. Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | 0.962(a) | 0.925 | 0.921 | 2,0594 |

a Predictors: (Constant), Score emotional intelligence, Age

Table 7. ANOVA(b)

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 1732.904 | 2 | 866.452 | 204.292 | 0.000(a) |
| | Residual | 139.961 | 33 | 4.241 | | |
| | Total | 1872.866 | 35 | | | |

a Predictors: (Constant), Score emotional intelligence, Age
b Dependent variable: Score athletic performance

Table 8. Coefficients(a)

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 9.207 | 2.195 | | 4.194 | 0.000 |
| | Age | 0.538 | 0.255 | 0.105 | 2.106 | 0.043 |
| | Score IE | 0.164 | 0.009 | 0.926 | 18.634 | 0.000 |

a Dependent variable: Score athletic performance

Equation of multivariate regression (obtained from the above table) is:

**PS=0.164×Score IE+0.538×Age+9,207**

Univariate regression for sport performance and emotional intelligence:

Table 9. Variables Entered/Removed(b)

| Model | Variables Entered | Variables Removed | Method |
|---|---|---|---|
| 1 | Scor IE(a) | . | Enter |

a All requested variables entered.
b Dependent variable: Score athletic performance

Table 10. Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | 0.957(a) | 0.915 | 0.913 | 2.1610 |

a Predictors: (Constant), Score emotional intelligence

Table 11. ANOVA(b)

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 1714.089 | 1 | 1714.089 | 367.050 | 0.000(a) |
| | Residual | 158.777 | 34 | 4.670 | | |
| | Total | 1872.866 | 35 | | | |

a Predictors: (Constant), Score emotional intelligence; b Dependent variable: Score athletic performance

Table 12. Coefficients(a)

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | B | Std. Error |
| 1 | (Constant) | 13.439 | 0.929 | | 14.470 | 0.000 |
| | Score IE | 0.170 | 0.009 | 0.957 | 19.159 | 0.000 |

a. Dependent variable: Score athletic performance

Equation of univariate regression (obtained from the above table) is: **PS=0.17×Score IE+13.439**

**Conclusions**

During this study we followed the link between the emotional intelligence and sport performance of gymnasts. This study attempts to check the hypothesis according to which the level of emotional intelligence has influence on the sport performance of gymnasts.

After data analysis and interpretation made with the purpose of studying the relation between *emotional intelligence and sport performance* by using:

- the *emotional intelligence – sport performance* interdependent relationship
- the influence of *emotional intelligence* on *sport performance*, in what concern the hypotheses of this study, the following conclusions can be established.

The emotional intelligence and sport performance of the gymnasts in the studied sample are in interdependent relationship. Emotional intelligence is closely linked to the sport performance as results from the above data.

The gymnasts with a high level of emotional intelligence have a significantly greater performance than the ones with a low level of emotional intelligence.

This analysis confirms the hypothesis according to which the level of emotional intelligence has influence upon the sport performance of gymnasts.

The development of emotional intelligence in gymnasts' preparation facilitates the improvement of intellectual aptitudes and creativity which in time lead to professional achievements. By means of personal capacity of identification and management of individual emotions in relation with the (target) purposes, the gymnasts (who acquired knowledge) can reach favourable results and increase their sport performance.

Application of certain methods and changes of the conditions and relations in the school, family and group environment may lead along with other necessary factors to an increased school performance of students.

It is necessary to confer more attention to the emotional development. Our purpose as trainers is not only to provide practical knowledge for athletes but to help them to develop their survival abilities in order to successfully face life in the contemporary world.

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ICU 2019

# OPTIMIZING THE PHYSICAL TRAINING FOR JUNIORS 14-16 YEARS IN THE FOOTBALL GAME, BY IMPLEMENTING A PROGRAM ADAPTED BY FUNCTIONAL TRAINING USING THE TRX

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**Abstract**

**Introduction.** Functional training is a reinterpretation of traditional training methods, it means giving up on fixed equipment and very heavy weights. **Methods and means.** In order to carry out this study, TRX equipment was used in sports training, so we could train each subject separately. **Subjects.** The participants of this study were 20 children, all boys, aged between 14 and 16 years. **Results.** Following the final tests, a significant difference is observed on the performance indices of the two groups. **Conclusions.** The results of the research reveal the effectiveness of the modern functional training program (TRX) implemented in order to improve the performance capacity of the football players in the experiment group.

**Key words:** functional training, trx, football, childrens.

## Introduction

Functional training is a reinterpretation of traditional training methods, it means giving up fixed equipment and very heavy weights (Cannone, 2007).

According to Teodorescu (2009), "sports training is a complex process, carried out systematically and continuously graded, adapting the athlete's body to intense physical and mental efforts, involved in participating in competitions organized in different sports branches."

Training by specific means of the football game are very comprehensive and take care that the body develops in an organized way, using specialized equipment in an organized space such as dumbbells, TRX, treadmill and many more, or by using the body weight and performing exercises that require it in both an open and closed environment.

Research in the field of football shows that physical training plays a fundamental role in achieving performance. Training planning and coordination is vital to achieving performance; all this planning must include the competitive calendar, the composition and the level of the team, the goals of the club, the game system and the level of the opponents (Lopez et al., 2011).

The TRX system, also known as Total Strength Exercises, refers to a specialized form of suspension training that utilizes equipment developed by former US Navy SEAL Randy Hetrick. TRX is a form of suspension training that uses body weight exercises to simultaneously develop strength, balance, flexibility and stability.

## Objective of this study

The objective of this research consists in the elaboration and implementation of a functional training program in which the TRX equipment is introduced, oriented to optimize the physical training of football players between the ages of 14-16 years in order to increase the performance capacity.

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**Methods and means**

The research was carried out between January 2019 - February 2019. After presenting the ideas and everything that was to come in carrying out this experiment, the students were randomly divided into two groups: Experimental group (5 students from the secondary school and 5 students from the school and the Control Group (5 pupils from the secondary school and 5 pupils from the high school). The children were called for initial assessments, one by one, for the 3 types of assessments: evaluation of abdominal muscles by flexion and extension of the trunk from the dorsal elbow, testing of the upper limb muscles by flexion and extension of the arms of the facial support, evaluation of the muscles the lower limbs through knee flexions with a weight of 10 kg at the chest.

In order to carry out this study, TRX equipment was used in sports training, so we could train each subject separately.


**Fig. 1** TRX Hamstring Runner X3


**Fig. 2** TRX Hip Press X3

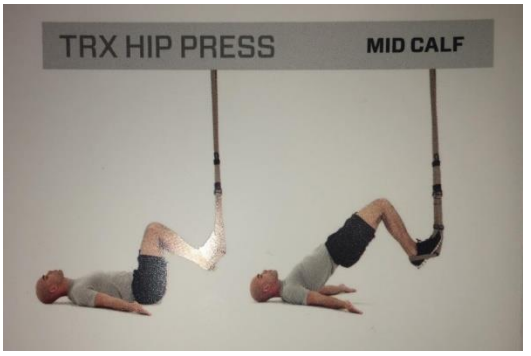



**Fig. 3** TRX Body Saw X3

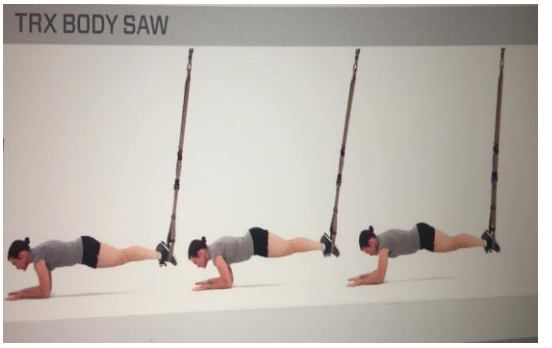



**Fig. 4** TRX Body Saw


**Fig. 5** TRX Squat Jump


**Fig. 6** TRX Hamstring Curl

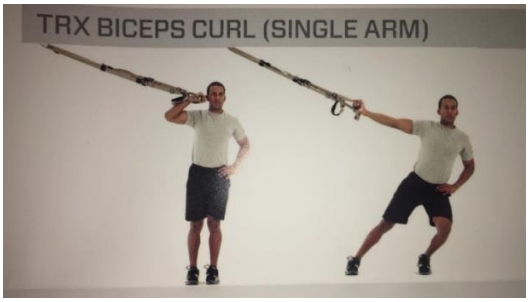



**Fig. 7** TRX Y Deltoid Fly to T Fly

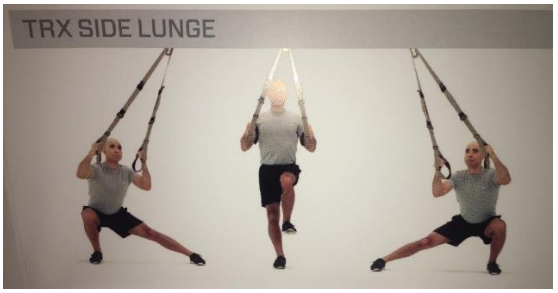



**Fig. 8** TRX Side lunge

**Subjects**

The participants of this study were 20 children, all boys, between the ages of 14 and 16 years, divided into two groups: the experimental group and the control group. 10 children are students at the ”Ioan Alexandru” Sînpaul High School and the other 10 are students at the high schools in Cluj-Napoca. These children appear in the category of people who practice physical activities regularly, but do not follow a well-planned and well-established training, not being performance athletes.

**Results**

The results obtained from the evaluation of the upper limbs, the abdominal muscles and the lower limb muscles before and after the training period are presented in tables 1 and 2. Table 1 contains the values obtained by subjects in the experimental group for each of the 3 forms of evaluation in part, the numerical value being represented in seconds and repetitions. Table 2 contains the values obtained by the subjects in the control group for each of the 3 forms of the evaluation, after which measurements were repeated.

The tables are made up of subjects (S), exercises used: Upper limb strength (FMS), abdominal muscle strength (FMA) and lower limb strength (IMF), for initial and final assessments.

**Table nr. 1** Experimental group

| Experimental group | | | | | | |
|---|---|---|---|---|---|---|
| | **Inițial** | | | **Final** | | |
| | FMS | FMA | FMI | FMS | FMA | FMI |
| S1 | 8 | 33 | 23 | 13 | 42 | 29 |
| S2 | 8 | 31 | 20 | 15 | 40 | 26 |
| S3 | 11 | 32 | 17 | 17 | 45 | 25 |
| S4 | 9 | 35 | 25 | 13 | 51 | 32 |
| S5 | 16 | 28 | 29 | 21 | 41 | 35 |
| S6 | 14 | 47 | 31 | 16 | 59 | 34 |
| S7 | 11 | 49 | 26 | 15 | 58 | 31 |
| S8 | 9 | 41 | 34 | 12 | 50 | 42 |
| S9 | 13 | 36 | 38 | 17 | 39 | 52 |
| S10 | 12 | 28 | 27 | 18 | 37 | 47 |

**Table nr. 2** Control group

| Control Group | | | | | | |
|---|---|---|---|---|---|---|
| | **Inițial** | | | **Final** | | |
| | FMS | FMA | FMI | FMS | FMA | FMI |
| S1 | 11 | 29 | 22 | 12 | 27 | 20 |
| S2 | 14 | 35 | 25 | 11 | 33 | 21 |
| S3 | 9 | 38 | 20 | 10 | 31 | 20 |
| S4 | 7 | 26 | 19 | 9 | 29 | 16 |
| S5 | 10 | 41 | 27 | 7 | 37 | 25 |
| S6 | 15 | 48 | 26 | 13 | 45 | 28 |
| S7 | 14 | 37 | 24 | 11 | 35 | 21 |
| S8 | 11 | 32 | 26 | 11 | 33 | 20 |
| S9 | 12 | 40 | 29 | 10 | 36 | 22 |
| S10 | 9 | 30 | 33 | 12 | 32 | 27 |

The average obtained for each of the four evaluations, both for the control group and for the experimental group was introduced in table no.3, this represented by values of seconds and repetitions.

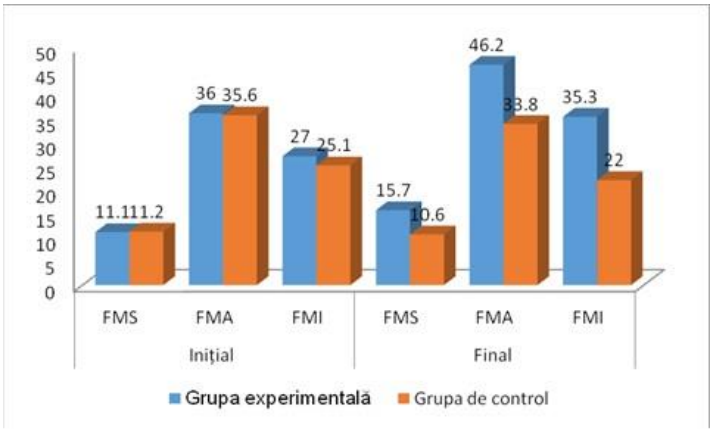
**Table nr. 3** Group averages

| | Initial | | | Final | | |
|---|---|---|---|---|---|---|
| | FMS | FMA | FMI | FMS | FMA | FMI |
| Experimental group | 11.1 | 36 | 27 | 15.7 | 46.2 | 35.3 |
| Control group | 11.2 | 35.6 | 25.1 | 10.6 | 33.8 | 22 |

Following the execution of the program adapted by functional training with the implementation of the TRX equipment within the experimental group, it was found that the performance indices of the athletes in this group were improved.

The difference between the initial tests of the two groups is not significant, having values close to the average of the 3 samples.

Following the final tests, a significant difference is observed on the performance indices of the two groups. For the control group we have results close to the initial test value, and for the experimental group there is a difference for each sample so we have for FMS - 4.6 sec; FMA - 10.2; IMF - 8.3 sec.




**Graph. 1** Medium valors for both groups

**Conclusions**

The results of the research reveal the effectiveness of the modern functional training program (TRX) implemented in order to improve the performance capacity of the football players in the experiment group.

The diversity of the exercises used through the TRX that constituted the program implemented in this research contributed to the suppression of the physical condition of football players between the ages of 14-16 years.

The benefits of implementing a new methodology in the physical training of football players, juniors, that improve certain performance parameters, meet the new requirements of modernization, diversification and increasing the attractiveness of training lessons at this level of training.

Functional training has received a new orientation in terms of its practice among performance athletes, due to the specific programs it includes, as well as to the specific sports materials and equipment that are part of its gear.

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ICU 2019

# INCREASING THE PERCENTAGE OF THROWS TO THE BASKET ON THE BASIS OF TIREDNESS BY APPLYING THE CIRCUIT TRAINING AT HIGH SCHOOL LEVEL

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**Abstract**.

Due to the importance of the percentage of throws to the basket on the basis of tiredness in basketball game, this paper presents a series of exercises included in technical circuits for improving this technical elements in those specific conditions. The research had been comprised of four phases: a pretest, a period during which independent variables were applied, followed by a final evaluation and then the analysis of the research results. The result of the research have shown that the exercises used contributed to the increase of the percentage of throws to the basket on the basis of fatigue and we recommend that they should be used during physical education classes, mentioning that these are to be adapted and even supplemented according to the age of the children, the existing infrastructure and their training level. This paper present some of the exercises conceived and applied to the trial group.

**Keywords**: test, technical circuit, technical element, throw, specific exercises.

## 1. Introduction

Circuit training (in this case only for basketball players) is a form of body conditioning or endurance training or resistance training using the basketball exercises based on a high-intensity effort (Barbuica, 2012). Each circuit is divided into several workshops in which certain technical exercises are executed. Circuit training has also a very important role in the practical organization of certain activities, when the number of students in the class is very high (Antoniale, 2002). I would like to mention that in this circuit training I did not focus on the development of any motor quality, but on improving the percentage of throwing to the basket on the basis of fatigue.

## 2. Hypothesis

We consider that the implementation of a program based on the training in the circuit leads to a percentage increase in terms of basket throwing under fatigue conditions.

## 3. Methods

### *3.1 Location and materials*

The research took place at the "Onisifor Ghibu" Theoretical High School in Cluj-Napoca, being involved a class of 9th, A students in the gymnasium that has the necessary conditions for research development.

The research was conducted during a school semester, from 18.02.2019 to 10.05.2019.

We used: basketball balls, gym bench, landmark, whistle, stopwatch.

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### *3.2 Subjects of the trial*

The subjects of the research are 24 students of 9th grade (Table 1). At the beginning of the research, the initial tests were carried out, which reflected the percentage of students at basket throwing on fatigue. The research ended with the final testing which was to show progress / regression / stagnation compared to the initial testing.

Table 1. Experiment group subjects

| Crt. no. | Initial name | Class | Gender |
|---|---|---|---|
| 1. | D.M. | 9th B | M |
| 2. | O.R. | 9th B | F |
| 3. | A.A. | 9th B | F |
| 4. | S.A. | 9th B | F |
| 5. | M.V. | 9th B | M |
| 6. | M.E. | 9th B | M |
| 7. | I.S. | 9th B | F |
| 8. | F.K. | 9th B | M |
| 9. | L.Y. | 9th B | M |
| 10. | Z.B. | 9th B | F |
| 11. | K.K. | 9th B | F |
| 12. | T.U. | 9th B | F |
| 13. | G.R | 9th B | F |
| 14. | H.I | 9th B | M |
| 15. | S.V | 9th B | M |
| 16. | E.P | 9th B | F |
| 17. | P.A | 9th B | F |
| 18. | M.F | 9th B | M |
| 19. | D.A | 9th B | M |
| 20. | M.C | 9th B | F |
| 21. | R.E | 9th B | F |
| 22. | G.G | 9th B | M |
| 23. | S.A | 9th B | M |
| 24. | P.I | 9th B | M |

### *3.3 Organization, phases and development of the trial*

The experiment was conducted during the 2018/2019 school year, in four phases:

- Phase 1: initial testing 18 February 2019 - 20 February 2019.
- Phase 2: 25 February 2019 - 8 May 2019 - introduction of training in circuit.
- Phase 3: 12 May 2019 - 14 May 2019 – final testing by applying the same tests to observe the results obtained.
- Phase 4: 16 May - 20May - analysis of the results.
-

### *3.4 Investigation methods*

**Test no.1** How many baskets are scored from 14 throws

In this first test, the student starts from the free line next to the red milestone, runs to the right in front of the yellow landmark, receives the ball and throws it to the basket and after this throw he runs to the opposite side of the initial throw where is the second yellow landmark. where the ball is thrown again to the basket (Figure.1).

This test is executed in a continuous run, monitoring the throws until it throws 14 times. The purpose of this test is to score as many baskets possible from the total of 14 throws.

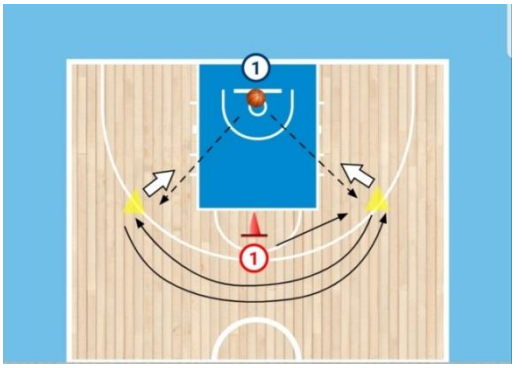


Figure 1. First test :14 throws to the basket

**Test no. 2** The student starts from the middle of the field in the run towards the free line. After receiving the ball from the coach who stands under the basket, he throws to the basket and then runs back to the middle of the field. This procedure is executed until the student scores 6 times. The time traveled is timed.

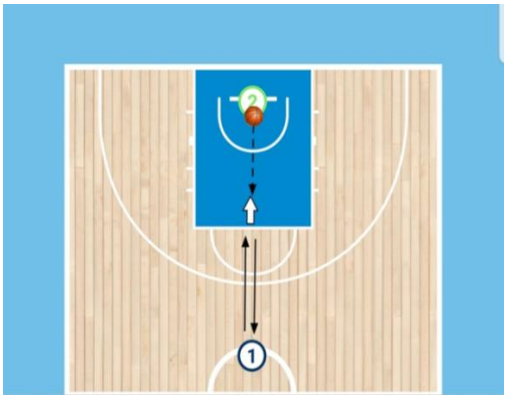


Figure 2. How fast scores 6 time

### *3.5 Exercises conceived and applied throw circuits training*

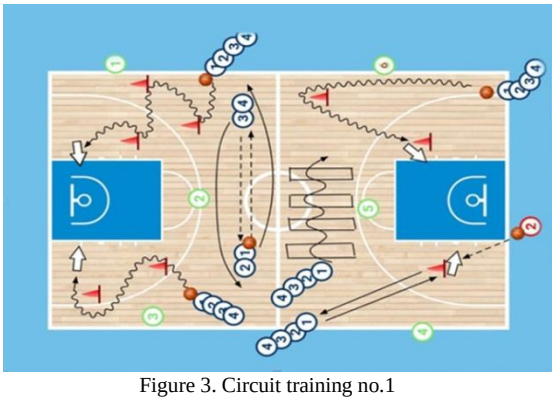


Figure 3. Circuit training no.1

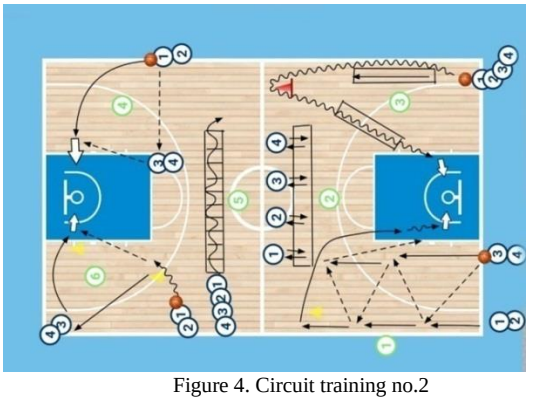


Figure 4. Circuit training no.2

Circuit no.1
Exercise no. 1 - dribbling with change of direction in front of each landmark, then throwing;
Exercise no. 2 - speed passes and running to the opposite side;
Exercise no. 3 - dribbling around the landmarks, then throwing it to the basket;
Exercise no. 4 - running - receiving the ball - throwing to the basket;
Exercise no. 5 - jumping over the gym bench;
Exercise no. 6 - dribbling at high speed with a throw from the half distance;
Dosage - The time spending on each exercise is 4 minute, and the pause between the exercises is 30 seconds.

Circuit no. 2
Exercise no. 1 - pass in two to the middle - speed dribbling - throwing to the basket;
Exercise no 2 - jumping on the bench with the ball above the head;
Exercise no 3 - dribbling to the middle with a running on the bench - dribbling to the bench - throwing;
Exercise no 4 - passing the ball - running at full speed - receiving the ball - throwing;
Exercise no 5 - dribbling in special squares;
Exercise no. 6 - running - receiving the ball - throwing to the basket;
Dosage - The time spending on each exercise is 4 minute, and the pause between the exercises is 30 seconds.

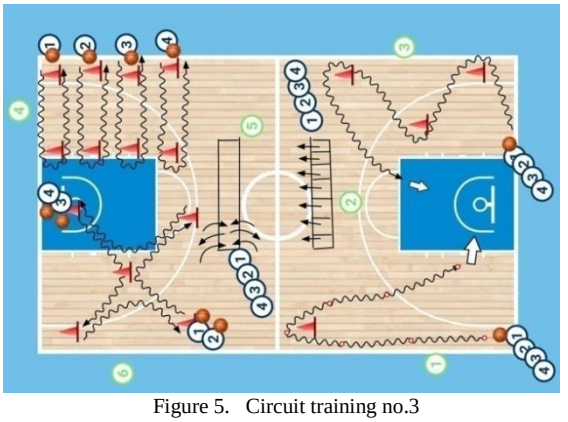


Figure 5. Circuit training no.3

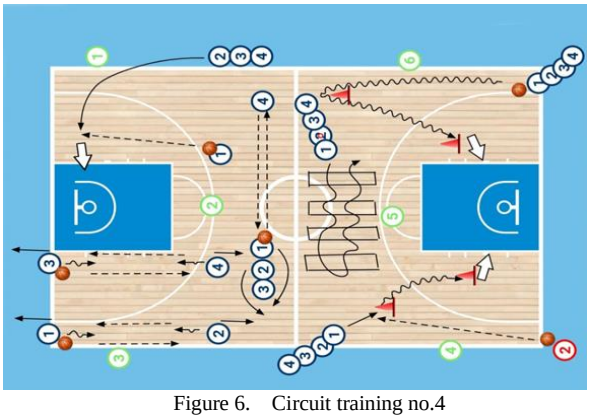


Figure 6. Circuit training no.4

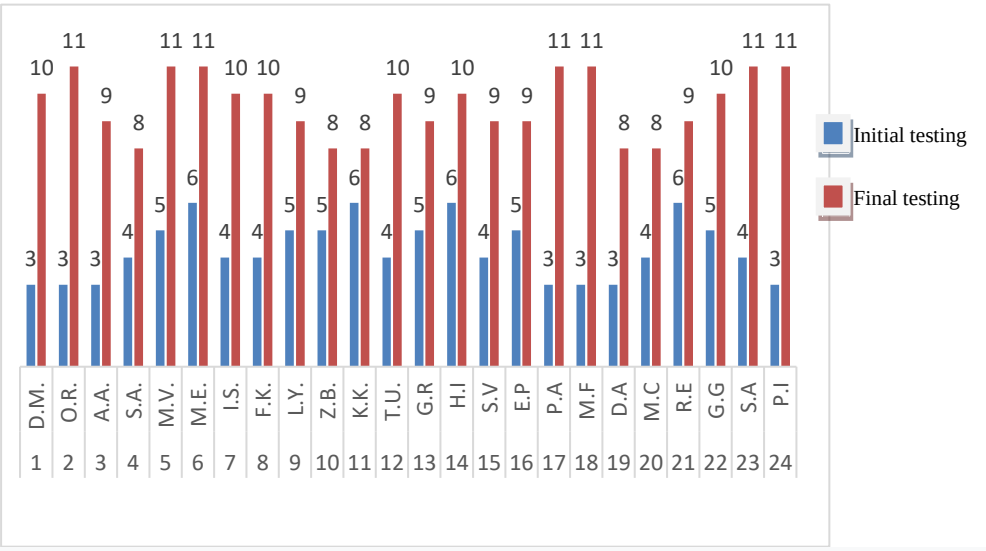
Circuit no. 3
Exercise no 1 - dribbling around the landmark - dribbling at full speed - throwing to the basket;
Exercise no 2 - jumping in and out of the square;
Exercise no 3 - dribbling forward and backward;
Exercise no 4 - running - receiving the ball - throwing;
Exercise no 5 - jumping over the gym bench;
Exercise no 6 - dribbling in speed from one landmark to another;
Dosage - The time spending on each exercise is 4 minute, and the pause between the exercises is 30 seconds.

Circuit no 4
Exercise no 1 - running speed - catching the ball - throwing to the basket;
Exercise no 2 - passing of the ball in full speed;
Exercise no 3 - on pairs, dribbling and ball passing;
Exercise no 4 - catching the ball - stopping at a time - overcoming the landmark - dribbling - throwing to the basket;
Exercise no 5 - dribbling over gymnastic bench;
Exercise no 6 - dribbling at speed with bypassing the landmarks and throwing to the basket;
Dosage - The time spending on each exercise is 4 minute, and the pause between the exercises is 30 seconds.

## 4. Results

Tabel 2. The results obtained at the first test

| Crt. no. | Subjects | Experiment group | |
|---|---|---|---|
| | | Initial testing | Final testing |
| 1 | D.M. | 3 | 10 |
| 2 | O.R. | 3 | 11 |
| 3 | A.A. | 3 | 9 |
| 4 | S.A. | 4 | 8 |
| 5 | M.V. | 5 | 11 |
| 6 | M.E. | 6 | 11 |
| 7 | I.S. | 4 | 10 |
| 8 | F.K. | 4 | 10 |
| 9 | L.Y. | 5 | 9 |
| 10 | Z.B. | 5 | 8 |
| 11 | K.K. | 6 | 8 |
| 12 | T.U. | 4 | 10 |
| 13 | G.R | 5 | 9 |
| 14 | H.I | 6 | 10 |
| 15 | S.V | 4 | 9 |
| 16 | E.P | 5 | 9 |
| 17 | P.A | 3 | 11 |
| 18 | M.F | 3 | 11 |
| 19 | D.A | 3 | 8 |
| 20 | M.C | 4 | 8 |
| 21 | R.E | 6 | 9 |
| 22 | G.G | 5 | 10 |
| 23 | S.A | 4 | 11 |
| 24 | P.I | 3 | 11 |

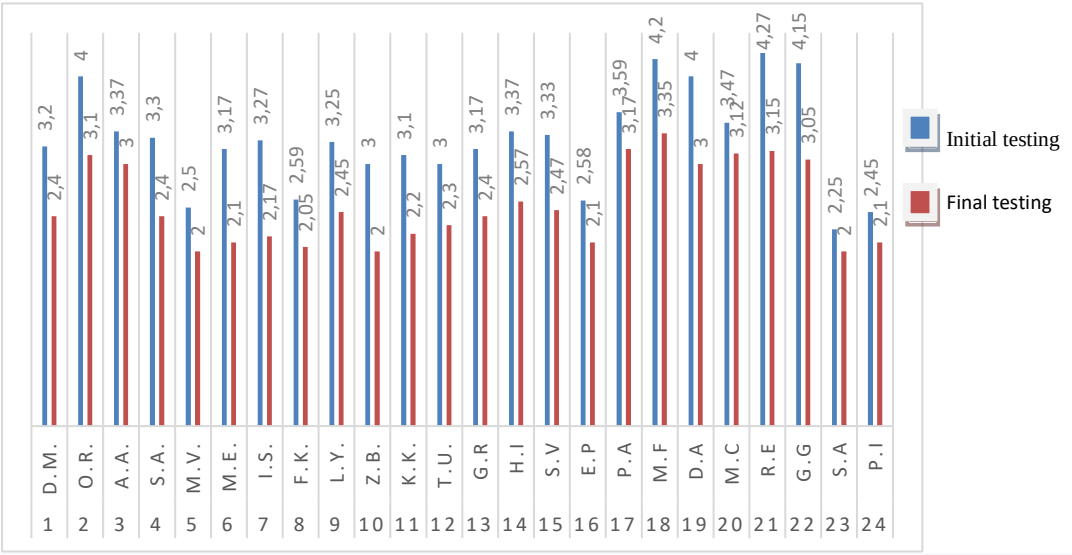



Graphic 1. The results obtained at the first test

At the first test, all subjects in the experiment group improved their initial results. The average of the group shows a significant progress. The greatest progress was achieved by a student who evolved from 3 baskets initially, to 11 baskets at the end. Many students have succeeded in doubling their success in throwing the ball into the basket.

Tabel 3. The results obtained at the second test

| Crt. no. | Subjects | Experiment group | |
|---|---|---|---|
| | | Initial testing | Final testing |
| 1 | D.M. | 3’20’’ | 2’40’’ |
| 2 | O.R. | 4’ | 3’10’’ |
| 3 | A.A. | 3’37’’ | 3’ |
| 4 | S.A. | 3’30’’ | 2’40’’ |
| 5 | M.V. | 2’50’’ | 2’ |
| 6 | M.E. | 3’17’’ | 2’10’’ |
| 7 | I.S. | 3’27’’ | 2’17’’ |
| 8 | F.K. | 2’59’’ | 2’05’’ |
| 9 | L.Y. | 3’25’’ | 2’45’’ |
| 10 | Z.B. | 3’ | 2’ |
| 11 | K.K. | 3’10’’ | 2’20’’ |
| 12 | T.U. | 3’ | 2’30’’ |
| 13 | G.R | 3’17’’ | 2’40’’ |
| 14 | H.I | 3’37’’ | 2’57’’ |
| 15 | S.V | 3’33’’ | 2’47’’ |
| 16 | E.P | 2’58 | 2’10’’ |
| 17 | P.A | 3’59 | 3’17’’ |
| 18 | M.F | 4’20 | 3’35’’ |
| 19 | D.A | 4’ | 3’ |
| 20 | M.C | 3’47’’ | 3’12’’ |
| 21 | R.E | 4’27’’ | 3’15’’ |
| 22 | G.G | 4’15 | 3’05’’ |
| 23 | S.A | 2’25’’ | 2’ |
| 24 | P.I | 2’45 | 2’10’’ |




Graphic 2. The results obtained at the second test

In the second test, all subjects in the experiment group improved their initial time. The lowest value obtained in the initial test was 2.25, and the highest value was 4.27. In the final test, however, the smallest value dropped to 2 minutes, and the highest did not exceed 3.35.

The average of the group shows a significant progress. I would like to mention that although the time allocated to these circuits was not very long, all the students improved their time, and even some of them managed to finish the route at least one minute faster.

## 5. Conclusions

Based on the date results, we can confirm that the circuit training applied is efficient and contribute to increasing the percentage of throws to the basket on the basis of tiredness, which is so necessary in the play of basketball.

Comparing the trial's results, we had observed the fact that the more were the attitude of students positive the higher were the results.

The results of the research show that the exercises, which were practiced, contributed to increasing the percentage of throws to the basket, so, we recommend that those should be used during physical education classes, mentioning that these are to be adapted and even supplemented according to the age of the children, the existing infrastructure and their training level.

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ICU 2019

# WEST UNIVERSITY OF TIMISOARA STUDENTS' ATTITUDE REGARDING THE PHYSICAL EDUCATION LESSON

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**Abstract**

The aim of this study is to analyze the attitude of the students regarding the PE lesson as part of the university curricula. As method of research, we used a questionnaire applied to a group of 400 students (77% female and 23% male) in the 1st and 2nd year of study at all faculties who compose the West University of Timisoara. To analyze data, we used SPSS Statistics 20 program. The results indicate that there are positive and significant Pearson correlation coefficient between Attitudes and PE Lesson (r=0.0458, p=0.000**), Attitudes and Scientific Basis (r=0.530, p=0.000**) and a strong correlation between PE Lesson and Scientific Basis (r=0.601, p=0.000**). The conclusions show us that the positive attitudes regarding the PE Lesson as part of university curricula influences the opinion of students regarding the importance of physical activity in their life. They will be interested for the scientific basis of physical activity who will be used practically in extracurricular physical activity.

*Keywords:* curriculum, physical activity, scientific basis, inactivity, youth.

## 1. Introduction

Obesity has become one of the causes of death among the population. Different studies analyze the link between death and obesity (Mokdad, Serdula, Dietz, Bowman, Marks, & Kaplon, 2000; Nolte, Franckowaiak, Crespo, & Anderson, 2002). Some studies show that this weight gain starts from the age of young adults. Some of them are in the years of study and are due to the various changes that occur in the student's life such as low physical activity (Irwin, 2007), nutrition problem, lack of motivation for physical activities, etc. (Gyurcsik, Bray, & Brittain, 2004; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005).

Romania is also experiencing an increase in the prevalence of obesity in adults over 18 years of age in both genders, so the data indicate an increase from 36% in 1975 to 57.75% in 2016 (WHO, 2015).

One of the risk factors for the onset of obesity is the lack or insufficiency of physical activity. Physical activity is considered insufficient when practiced with a moderate intensity, less than 150 minutes per week or with a high intensity (vigorous) less than 75 minutes per week. From the statistics performed at European level, it can be seen that Romania is on the last place regarding the percentage of people who carry out at least 150 minutes of moderate intensity physical activity per week (www.ec.europa.eu, http: / /insp.gov.ro/sites/cnepss/wp-content/uploads/2018/11/Analiza-de-situatie-ZEIO-2018.pdf.)

However, at the national level, several measures have been taken in this regard. Both, the Ministry of Health (National Health Strategy 2014-2020, Action Plan, http://www.ms.ro/wp-content/uploads/2016/10/Anexa-2-Plan-de-actiuni.pdf, accessed 15.06 .2019) as well as the Ministry of National Education (Program for schools of the European Union, https://www.madr.ro/docs/agricultura/program-scoli-2018/OG_13_2017-modificata.pdf) develops programs to combat obesity.

A study conducted on the school population in Romania shows that in terms of daily physical activity, adolescents in Romania - boys and girls - occupy the last positions in Europe (www.hbsc.org, Health Behavior in School-Aged Children). In this study, carried out in three stages (2005/2006, 2009/2010, 2014/2015), it was found

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that girls carry out less physical activities than boys. They decrease with age, along with the increase of sedentary behaviours that are more frequent as the age of the child is older. Statistical indicators show that in Romania, compared to other countries, children have among the highest prevalence of sedentary behaviours. Romania is the only European country where sedentary behaviours are most frequently encountered in families with high socioeconomic status. At the adult level, the highest proportion of obesity in women is registered in those with low education, while in men, those with high education had the highest proportion of obesity (INSP: Monitoring the inequalities in the health status of the population of Romania in 2015, http: //insp.gov.ro/sites/cnepss/wp-content/uploads/2017/12/Inegalitati-in-stare-de-sananate2016- 20-Feb.pdf).

Within the school programs managed by the Ministry of National Education, the discipline of physical education and sports is present at all educational levels, including the level of university education. At the West University of Timisoara this is compulsory for the bachelor's degree in the first two years, cumulating 4 semesters of study and a number of 56 practical hours.

Through the programs developed by MNE and MSP, but also by participating in the PES lessons, the young people from Romania were informed about the benefits of practicing physical activities, they were trained in scientific knowledge and skills regarding the practice of physical activities, as well as at their age the students have an opinion formed regarding the physical activity. However, as the statistics indicate, the young people in Romania do not practice vigorous or moderate physical activities during their free time.

Our study aims to see if these young people are informed about the importance of physical activity for their health in order to find answers to this type of sedentary behaviour. More specifically, the purpose of this study is to analyze the attitudes of students from the West University of Timisoara towards physical activity, the importance of the scientific arguments underlying this attitude and how the PES discipline is perceived within the university curriculum.

## 2. Materials and method

The study was conducted between March and April 2019 at West University of Timisoara. In order to find out the students' opinion about physical activity, a questionnaire developed by Mowatt, Depauw & Hulac (1988) was applied to a number of 400 students (92 male and 308 female, with age $x = 20.1$, $\sigma = \pm 1.80$) from year 1th and 2nd year of study, participants in the discipline of Physical Education and Sports.

The questionnaire consists of 20 questions that are evaluated on a five-point Likert scale (1 total disagreement, 5 strongly agree). These questions were divided into three categories described as follows:

1. General attitudes. Questions 1, 3, 4, 10, 20 question the respondent about a feeling or attitude towards the importance of physical activity in his life.

2. Physical education. Questions numbered 5, 8, 13, 14, 16, 18 describe how the student views the discipline of Physical Education and Sports as part of the school and university curriculum.

3. The scientific basis. Questions 2, 6, 7, 9, 11, 12, 15, 17, 19 describe how the student evaluated the scientific benefits of physical exercises.

For data analysis, we used the SPSS Statistics 20 program.

## 3. Results

### *3.1 Means*

As shown in Table no. 1, the answer of the students with a score higher than 3.5 to the questions regarding *Attitudes towards physical activity* was 96%. Of these, 76% had scores ranging from 3.50 to 4.00 and 20% were between 4.00 and 5.00. Only 4% had an average of 3.00. The total average in the field *Attitudes towards physical activity* is 3.70, a score which shows that in general, students have a positive attitude to physical activity.

Table 1. Procentage distribution of responses

| ITEMS | POINTS | PRECENT |
|---|---|---|
| ATITUDE | 3-3.5 | 4% |
| | 3.5-4 | 76% |
| | 4-4.5 | 20% |
| | 4.5-5 | 0% |
| PHYSICAL EDUCATION | 3-3.5 | 45% |
| | 3.5-4 | 31% |
| | 4-4.5 | 24% |
| | 4.5-5 | 0% |
| SCIENTIFIC BASIS | 3-3.5 | 0% |
| | 3.5-4 | 30% |
| | 4-4.5 | 70% |
| | 4.5-5 | 0% |

The results recorded in the questions related to the importance of the discipline *Physical Education and Sports* (PES) in the university education program revealed that 45% of the respondents answered with an average of 3.00 - 3.50 to the questions, 31% answered with an average of 3.50 - 4.00 and 24% had an average of >4.00. The average obtained for the whole domain is 3.50, with 1.00 above the average level. This helps us understand that even if students come from colleges that prepare them for other fields that are not related to sports science, they are pro-physical education. It was observed that due to the obligation to fulfil the requirement of the curriculum, many of them are aware of the importance of physical activity in adult life. This fact further suggests that the attitude of students participating in regular physical activity is positive and there is only a small percentage of students in this study who would not be interested in learning more about physical activity. Respondents who favoured physical activity considered that physical education was an important part of the school curriculum. The vast majority of students agreed that physical education is an important part of the university curriculum.

The results obtained at the questions regarding the *Scientific Basis of physical activity* (SB) were the highest. The assertions corresponding to the domain are summarized in basic knowledge about the role and importance of a physically active life. As a percentage, the resulting averages were distributed as follows: 30% of the answers scored a range from 3.50 - 4.00 and 70% for those with higher scores, students are aware that regular physical activity can reduce the risk of chronic diseases in adults, including cardiovascular disease, cancer, and diabetes. Because participation in physical activity as a young person influences participation in physical activity as an adult, this may contribute to lowering the risk for developing such chronic diseases.

### *3.2 The correlation between Attitudes towars physical activity and PES Lessons*

The correlation between *Attitudes and PES* (r = +0. 458 with the value p = 0.000**) as we can observe in table no. 2 indicates a positive and significant statistical correlation. The relationship between the two fields is confirmed because the attitudes influence the students' opinion regarding the physical education lesson as part of the university education curriculum. Students with a positive attitude towards physical activity strongly support physical education and sports as an important discipline of the university program. Physical education has a significant contribution to developing attitudes about physical activity, many students contacting and learning by doing that physical activity is beneficial to their health.

Table 2. The results obtained in the Pearson Correlation

| ITEMS | INDICATORS | AVEREGE ATITUDES | AVEREGE PES | AVEREGE SB |
|---|---|---|---|---|
| AVEREGE ATITUDES | PEARSON CORREL | 1 | 0.458 | 0.53 |
| | Sig(2) | - | 0.000** | 0.000** |
| | N | 400 | 400 | 400 |
| AVEREGE PES | PEARSON CORREL | 0.458 | 1 | 0.601 |
| | Sig(2) | 0.000** | - | 0.000** |
| | N | 400 | 400 | 400 |
| AVEREGE SB | PEARSON CORREL | 0.53 | 0.601 | 1 |
| | Sig(2) | 0.000** | 0.000** | - |
| | N | 400 | 400 | 400 |

**. The correlation is significant if p< 0.01; Sig (2)

*3.3 The correlation between Attitudes and Scientific Basis*

There is a significant positive correlation between *Attitudes and Scientific Basis* (r = +530, p = 0.000**). Students with positive attitudes are interested in the scientific basis of physical activity because they have knowledge about its importance in their daily life. Also having a scientific knowledge and basis in relation to the benefits of physical activity, they will automatically influence the student's attitude towards physical activity.

*3.4 The correlation between PES and Scientific Basis*

The most significant correlation obtained is between *PES and the Scientific Basis* (r = +0.601 with p = 0.000**). The correlation between the two areas shows that students who participate in physical education classes acquire useful practical and theoretical knowledge about physical activity, having good physical or psychological results. This indicates that physical education lessons are very beneficial for the students of Western University because there is a teaching process through which the teacher tries to teach them something useful, beneficial for their health and mental state. Having a scientific basis about physical activity, the knowledge can be practically used, through self-education and dosing the activity on several days of a week. Students who accumulate knowledge in the field of physical activity appreciate and encourage physical education as part of the educational program.

## 4. Discussion

Even if there is a significant positive correlation between attitudes and PES lesson, it does not determine the students to practice physical activities. Different studies carried out by students from other countries have highlighted some of the causes of this low participation in physical activities.

A study (Bebetsos & Antoniu, 2008) conducted on Greek students analyzes their attitude towards the use of the computer as compared to practicing physical activities in their free time. The results indicate that they use the computer more than they do physical activities and that this activity is perceived as a very pleasant one.

Another study (Rikard & Banville, 2009), carried out on high school students, indicates that they like this activity when games are organized or when their activities are fun (Fun). Probably the notion of fun and play should be retained even in adulthood.

Some of the barriers that stand in the way of practicing physical activities during leisure time by students have been divided by Lopez, Gallegos & Extremara (2010) into external barriers and internal barriers. If the external

barriers mention the lack of time and social support, the internal ones are listed: lack of pleasure and utility, laziness or apathy or lack of sports skills.

Another study, in which subjects are Egyptian students (El Gilany, Badawi, El Khawaga, & Awadalla, 2011) revealed that the independent predictors of physical inactivity were high socioeconomic standard of the family, female sex, medical education and non-membership in sports clubs.

A study by Swedish students (Von Bothmer & Fridlund, 2005) analyzed gender differences in health habits and motivation for healthy lifestyle and emphasized that stress has an impact on students' health while students are at risk for unhealthy eating habits combined with physical inactivity and alcohol consumption.

## 5. Conclusions

The results of this study show that there is a significant positive correlation between the three research items: attitudes towards physical activity, physical education and sports lessons and the scientific basis of physical activity. These results indicate that at this age, students are informed about the role and importance of physical activities for health, which generates a positive attitude towards their practice. Students appreciate the importance of the physical education and sports lesson as part of the university curriculum, even if their field of study is totally different from that of the science of sports and physical education.

We note that if at an informational level, the message regarding the theoretical importance of practicing physical activities has been well received and incorporated, there is a major difference regarding the practice of these activities.

This information can be used for future studies that examine how to move from positive attitude to regular physical activity by students to create beneficial strategies in adult life to implement them in combating sedentary lifestyle. Another direction of studies can be the analysis of the connection between gender and participation in physical activities during the student period in order to make a connection with statistics at European level which indicates that the highest proportion of obesity in Romania is registered in women with a level of low education and in men with high education level.

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ICU 2019

# PILOT STUDY REGARDING THE INFLUENCE OF SWIMMING ON POSTURAL DEFICIENCIES IN SAGITAL PLAN AT CHILDREN OF 7-14 YEARS

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**Abstract**

***Introduction***. Physical deficiencies disturb the normal growth and the harmonious developement of the body and its functions entirely or only at the level of some regions or segments. An important role in preventing and even treating various physical deficiencies is the practice of certain sports; Among them, swimming has a special place. The locomotive system is also influenced by the practice of swimming. Thus, if the beginners perform movements with an increased level of strain and imprecision, as they advance in their preparation, they improve their motor skills achieving a number of specific motor qualities due to the development of general flexibility, the increase of articular mobility, the degree of neuro-muscular control. ***The purpose*** of the research is to analyze the effects of a swimming program on childhood posture deficiencies. ***Material and method***. This study was attended by four atheletes, between the ages of 8 and 13, from Timișoara Swimming Team club. In order to achieve the aim of this study I carried out, during one year, a training programme which contains exercices specific to the sportive branch of Swimming, taking into account the particularities of the deficiencies presented by the subjects. Moreover, I also used a series of motor games in the water to ensure that the atmosphere during the swimming sessions is as enjoyable as possible as well as children to participate enthusiastically and willingly in these activities. Performing a statistical analysis using the Posture Pro system, I evaluated and quantified the postural deviation, the overloads which appear at the level of the spine as well as the posture score. ***Results***. Evaluation with PosturePro revealed in the study group subjects a favorable progression in the posture score in terms of the total deviation value (expressed as a percentage and in mm) and cervical overload in the case of girls with cytotic attitudes and lordotica was initially about 200-500% of the values that would not cause such overburden in the cervical spine. ***Conclusions***. A year of initiation in swimming is not enough to correct postural problems. Therefore, it is mandatory, especially in cases of severe disorder (score over 30) to associate swimming sessions with a specific kinetic programme. *Acknowledgement*. This research represents the pilot study of the PhD Thesis entitled: The influence of swimming and physical therapy on postural deficiences in sagital plan at children between 7-14 years.

*Keywords:* swimming, postural deficiencies, physical deficiencies, sagital plan.

## 1. Introduction

All sports bring health benefits when practiced correctly. But swimming has, without a doubt, some special features that no other aerobic exercises have. Here are some of these: it causes incredible cardio-pulmonary resistance, stimulates blood circulation, helps maintain stable blood pressure, reduces the risk of cardiovascular disease, develops most muscle groups, strengthens ligaments, develops flexibility, helps overcome anxiety and amelioration depression, stimulates physical and mental growth and development, improves psychomotor development ( Pasek, 2008; Bosco , 2007).

The great advantage of swimming is that, in water, according to the principle of Archimedes, the body "loses" by weight a part equal to the volume of water displaced by it. The movements thus become easier to perform and the recovery of the deficient muscle groups is carried out under much easier conditions as a task (Berthelsen, 2014; Plăstoi, 2008).

In recent years there has been an increase in the number of medical specialists who have recommended

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swimming for recovery in various pathologies. These include: asthma, muscle and joint pain, disc herniation, stress, stimulation of growth, controlled weakness, certain physical and motor disabilities, autism (Bielec, 2013; Azizi, 2012).
The problems that appear in the thoracic spine result from the prolonged adoption of the deficient positions during the daily activities. Such deficient positions, which are not discovered and corrected early, can lead to the installation of diseases that require surgical intervention. In these situations, swimming aims to relax the affected area, correct posture and develop physical condition on the trunk and upper limbs (Kim, 2013; Aliakbar, 2017).
The practice of swimming, in a systematic way, directed and controlled by specialists in the field, leads undoubtedly to the improvement of some diseases / neurological disorders such as paralysis, paresis, semi-partial seizures, post-traumatic disorders, rheumatic degenerative disorders, rheumatic disorders, rheumatism, cardiovascular rheumatism and last but not least, some segmental or global deficiencies of the locomotor system (Pasztai, 2011).
The latter category also includes the physical deficiencies or deviations of the spine with different etymologies, either inborn / congenital, due to the transmission through the genetic baggage of malformations, morphofunctional and structural disorders, or acquired, as a result of habitual positions and attitudes. deficiencies, or, ultimately, as a result of traumas that have modified structurally and functionally, globally or segmentally, the entire apparatus / system musculo-osteo-articularo-tendon (Mahjur, 2016).
The aim of the research is to analyze the effects of a swimming program on the postural deficiencies of children between the ages of 7 and 14 years.

**2.Assumptions and objectives**

The premise from which this research starts is that of the difficulty of accurately determining the negative or positive effects that a swimming program has on the posture deficiencies.
**Hypothesis**: Following a program of initiation and consolidation for children aged 7-14 , will directly influence the deficiencies of posture.
**The objectives** of this study are:
1. Evaluation and analysis of posture deficiencies among children selected to perform dynamic activities in the aquatic environment.
2. Analysis of the progress made in the training process in the aquatic environment.
3. Analysis of the impact of the training process on posture deficiencies.
4. Promote a healthy lifestyle, by understanding the importance of a correct posture, by presenting the beneficial effects of exercise and by combating sedentary lifestyle.

**3.Materials and methods**

The pilot experiment is set up to verify the entire system , thus having the possibility to correct or modify any mistakes.

In carrying out this study, 4 athletes from the Timișoara Swimming Team participated, having the following inclusion criteria: to present a deficient attitude or a deficiency, to present a written agreement, completed by the parents for the participation of the children in this study , to have the availability to carry out a training program established later, to have the age between 7 and 14 years, to present a medical certificate according to which it is allowed to him to carry out the physical exercises.
The research was extended over a period of one year, from September 2017 to September 2018. The trainings were held at the Olympic Aqua Sport Arena in Timișoara, with a frequency of 3 times a week and a duration of 60 minutes. /training. The children benefited from a training program that includes exercises specific to Swimming, taking into account the particularities of the deficiencies presented by the subjects, but also dinamic games in the aquatic environment, so that the atmosphere within the hours is as pleasant as possible, and the children participate enthusiastically and willingly in these activities. To analyze the posture, we used the Posture Pro system, which evaluates and quantifies the posture deviations, the overloads that appear at the spine level and the posture score.

## 4.Results

Table 1. The parameters evaluated with the PosturePro system in the study group

| The initial of the subjects ' names | Postural disorder | The score of the initial posture | The final score of posture | Initial total deviation | Final total deviation | Initial cervical overload | Final cervical overload |
|---|---|---|---|---|---|---|---|
| H.B. | Cytotic posture | 1 | 1 | 7°; 11mm | 6.3°; 10 mm | 0 N | 0 N |
| B.A. | Cytotic posture | 32 | 30 | 42.4°; 27mm | 39.4°; 25 mm | 103N 504.7% | 91.9N 450.31% |
| A.A. | Lordotic posture | 14 | 10 | 16.5°; 36mm | 13°; 32mm | 40.5N 198.45% | 37.6N 184.24% |
| A. P. | Lordotic posture | 34 | 31 | 32.3°; 93mm | 29.7°; 87mm | 96N 470.4% | 87.7N 429.73% |

After one year of practicing swimming exercises, the posture score in the study group had a positive evolution for most subjects (Fig.1). The most significant improvement was recorded by subject A.A., with the initial posture score 14, and after the final testing, the postural score being 10. Subject B.A. had at the beginning of the research the score of 32, and at the final evaluation we noticed an evolution with 2 units, respectively 30. Subject A.P. presented a positive progress with 3 units (34-31). In the case of H.B. subject, the Posture Pro system offered the same score at the initial (1) and final (1) tests.

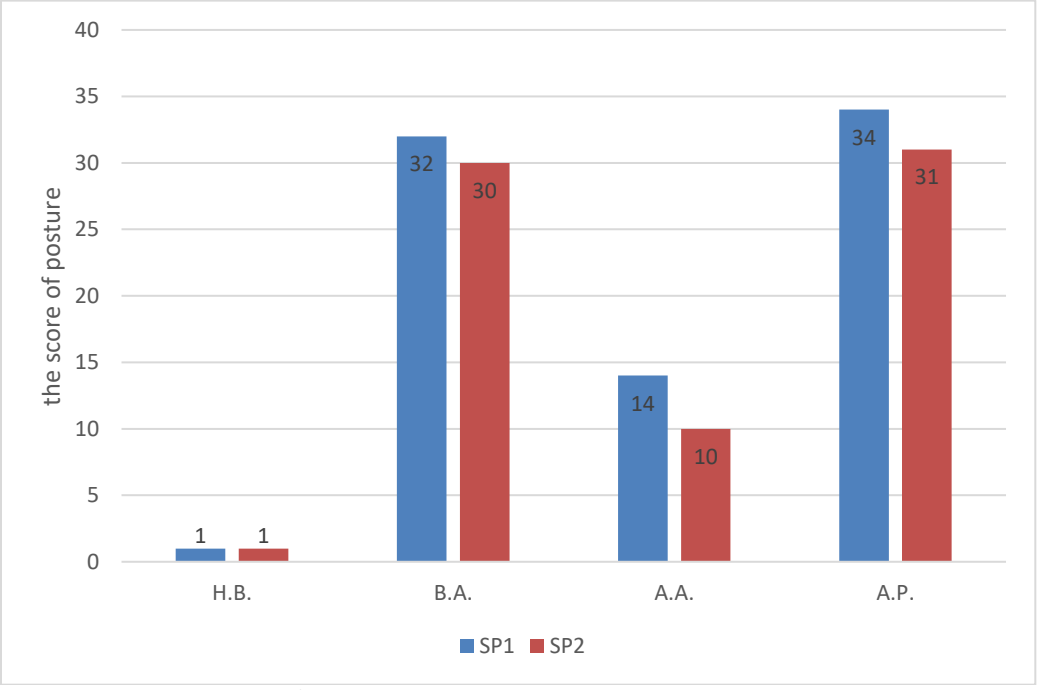


Fig.1. The evolution of the posture score evaluated with the PosturePro system in the study group
Legend: SP1 - initial posture score; SP2 - the final score of the posture

The results regarding the evolution of the total deviation of the tested subjects are as follows (Fig.2): Thus,

the most significant improvement was the subject A.A., with 3.5 degrees (16.5 initial - 13 final). Subject B.A. was evaluated at the initial test with a total deviation of 42.4 degrees, and at the final test the value was reduced by 3 degrees (39.4). Subject A.P. had a favorable evolution with 2.6 degrees at the final test (29.7), compared to the initial test (32.3). In the case of H.B. subject, the lowest regression (0.7 degrees) was observed, so at the initial testing the total deviation was 7 degrees, and at the final testing we can observe a total deviation of 6.3 degrees.

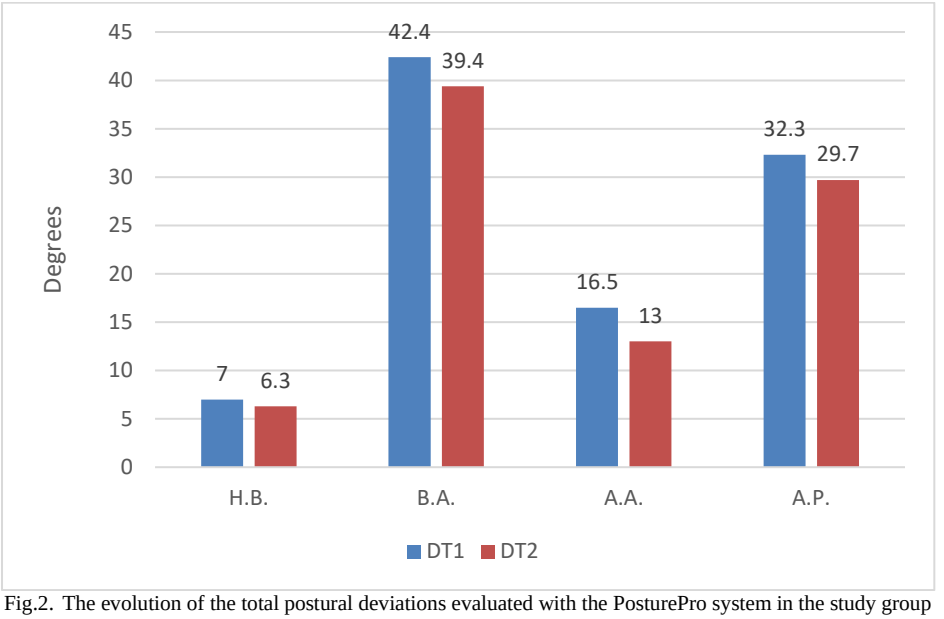


Fig.2. The evolution of the total postural deviations evaluated with the PosturePro system in the study group
Legend: DT1 - total initial deviation; DT2 - total final deviation

Another result quantified by the Posture Pro system is the degree of cervical overload expressed as a percentage. Thus, the subject with the highest evolution had B.A., of 54.39%, (504.7% initially - 450.31 final), instead on the subject H.B. there were no overloads in the cervical spine. Subject A.A. presented at the initial testing a value of 198.45% of the cervical overload, being reduced at the final testing up to 184.24%. While, the subject A.P. showed an evolution of 40.67% at the final testing (429.73%), compared to the initial testing (470.4%).

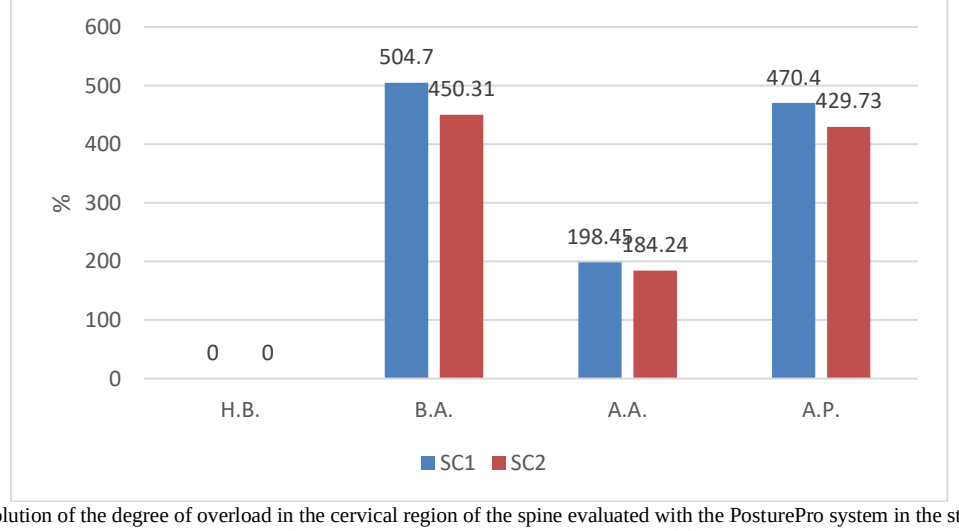


Fig.3. Evolution of the degree of overload in the cervical region of the spine evaluated with the PosturePro system in the study group
Legend: SC1 - degree of initial cervical overload; SC2 - the degree of final cervical overload

**5.Discussions**

According to the statistic data presented in the specialty literature in recent years, the physical deficiencies of the spine at puberty have become an unquestionable reality. Thus, after the study carried out on 308 students from secondary and high school cycles by Livia Avramescu-Opriţoiu, in the article "Study regarding the incidence of physical deficiencies of the vertebral column at puberty", published in the Timisoara Physical Education and Rehabilitation Journal in 2008, it turns out that, a very large percentage is represented by students with poor attitudes (45.12%) and actual deficiencies (34.45%), totaling 79.87% of students with postural deficiencies. The type of deficiencies detected are scoliosis (14.94%), kyphosis (8.77%), lumbar hyperlordosis (6.82%) and kyphoscoliosis (2.27%) (Avramescu, 2008).

Another study on 308 children aged 14 years, conducted by Latalski and his colleagues in the article "Risk factors of postural defects in children at school age", published in Annals of Agricultural and Environmental Medicine in 2013, confirms the fact that: 74.2% of the children participating in the study were examined for postural deficiencies, 14.7% of the students had physical deficiencies, and 56.6% were not detected asymmetry (Latalski, 2013).

Although performance swimming can cause, in some cases, postural disorders or other musculoskeletal disorders, its use as a complementary method of recovery in postural disorders has been confirmed by several specialized studies, provided that the training is individualized and perfectly adapted of the type of deficiency (Torlaković, 2013).

Swimming has traditionally been considered a healthy sport for the spine, so many experts have recommended swimming as a treatment for posture deficiencies, but more recent research has raised doubts about the effectiveness of swimming as a treatment for scoliosis (Zaina, 2014).

**6.Conclusions**

- Evaluation with the Posture Pro system showed in the case of the subjects in the study group a favorable evolution regarding the posture score (except for the HB subject whose value stagnated), regarding the value of the total deviation (expressed in percentages and in mm ) and of the cervical overload which in the case of girls with kyphotic and lordotic attitude was initially about 200-500% compared to the values that would not determine the occurrence of such overloads in the cervical spine;

- In the case of subject H.B., the Posture Pro system did not confirm a score of the pathological posture or other pathological values of the other parameters tested with this posture analysis system, which is why it was sent again to a specialized evaluation;

- One year of swimming initiation program is not sufficient to remedy the postural problems, which is why it is mandatory, especially in cases with serious disorders (score above 30), the association of a specific kinetic program.

- The analysis system, although objectively quantifying the deviations in the sagittal and frontal plane, evaluating several parameters specific to the postural analysis, was a relatively easy one to apply and easily accepted by children; highlighting and analyzing disorders and the possibility of negative evolution over time (with an application included in PosturePro) motivated children in the desire to quickly regain their correct posture.

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# POSITIVE EFFECTS OF SWIMMING PRACTICE FOR CHILDREN 6-10 YEARS OF AGE

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**Abstract**

The aim of this study is to show the importance of long term sport practice for children. A number of 52 subjects took part in the study, while the evaluation was undertaken using a questionnaire. The means determined are: physical activity 4.21 h, spare time 14.42 h, time spent at school 21.25 h and time spent for homework 5.72 h. The study shows an average level of physical activity undertaken by the subjects, i.e. a total of 48.1 %, and which represents a positive outcome.

*Keywords:* physical activity; health; time; childhood

## *1. Introduction*

Within an urban community, the rapid evolution of life and the society as a whole led to a number of social and cultural changes, which primary affect the level of physical activity undertaken by adults and children (Oliver, 2002). The increase of the incident risk of diseases such as obesity, hypertension, osteoporosis (Zan, Senlin, Haichun, 2018) and stress is mainly linked to the lower level of physical activity (Montoye, 1996; World Health Organization 2018).

Public health authorities together with centers specialized on disease, as well as disease control and prevention and the International Health Institute urge the general public to increase their level of physical activity, and the time spent on physical exercise and sports respectively both for adults and children and teens (Stewart, 2001).

For the age group of 5-17 year olds it is recommended that 60 minutes per day are spent doing moderate/rigorous physical activity (US Department of Health, 2008). Maintaining a balance as regarding physical activity may improve the physical development, reduce obesity risk, the risk of cardiovascular diseases and fight depression, as well as anxiety states in children and adolescents (Rochelle, 2013).

Studies show a great variety of psychological and social benefits directly linked to participation in sporting activities among children. Also, children indulging in sporting activities of sports clubs are more likely to be healthy from a psychological and social point of view, than children undertaking individual sporting activities (Rochelle, 2013).

Positive aspects of mental health and self-esteem in children and adolescents are stimulated by opportunities for social interaction. In addition to this, there are studies showing a direct link between undertaking physical activities and psychological health in adults (Rochelle, 2016). Nonetheless, starting with childhood, there is a tendency to indulge in individual spots, or, in other words the number of people undertaking a team sport or participating in sporting activities taking place in organized groups diminishes (Rohan, 2015).

The benefits of physical activity and of a healthy lifestyle have been emphasized over the last years (U.S. Department of Health, 1996), and it was shown that taking part in physical activities during childhood and adolescence as well, increases the probability of a high level of constant and long-term physical activity (Tuija, 2003).

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## 2. *Subjects and Methods*

### *2.1 Subjects*

A number of 52 children aged 6-10 years (classes 0 – 4), girls (48.1%) and boys (51.9%), took part in the study. The subjects are members of the Ego Cluj-Napoca Sports Club, where they participate in swimming trainings once or twice a week. The intensity of the training varies according to the level of performance and the age of the subject. The weekly schedule of the children also includes a class of physical education and sport in school, while some of them also indulge in other sporting activities in the second half of the day.

### *2.2 Methods*

The study was conducted using a questionnaire exclusively. It comprised of a series of questions addressed to the parents/legal guardians of the children and aimed at a number of different aspects, out of which we mention (table 1):

- time spent at school;
- time spent on homework;
- physical activity;
- spare time;
- positive/negative aspects as a consequence of swimming training.

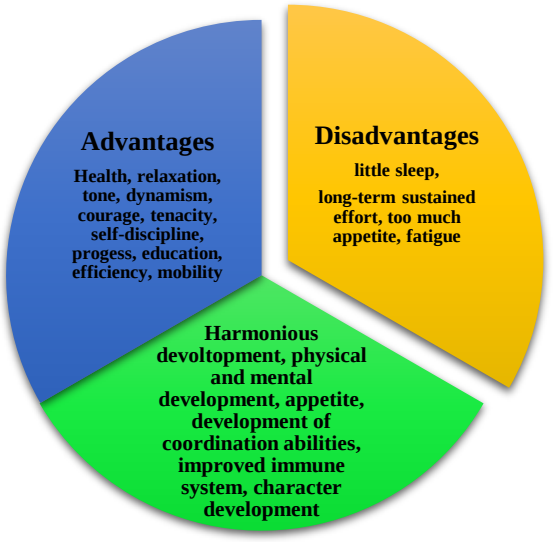


Fig.1. Positive and negative aspects as a result of swimming training

Table 1. Values of the parameter time during a 5 days' week

| | Interval | Mean | Standard deviation |
|---|---|---|---|
| Age, years | 6 – 10 | 7.75 | ± 1.493 |
| Physical activity, hours | 2 – 8 | 4.21 | ± 1.348 |
| Spare time, hours | 10 – 15 | 14.42 | ± 1.613 |
| Time spent at school, hours | 20 – 25 | 21.25 | ± 2.816 |
| Time spent on homework, hours | 2.5 – 10 | 5.72 | ± 3.296 |

## *3. Results*

### *3.1 Data Interpretation*

The statistical interpretation was carried out using the IBML Statistic SPSS 20 program, allowing to verify the reliability of the results with the help of the Paired T – Test, which verifies the differences between two paired samples (if $p<0.05$, the nil hypothesis is annulled and our hypothesis is accepted).

The diagrams were prepared using Microsoft Office 2013, as well as the IBML Statistic program, based on the T Test, while the aim was to show the differences between the parameters of interest.

### *3.2 Results*

Table 1 shows the parameter time from different perspectives: time as physical activity, time used on homework and spare time, as well as time spent at school.

After knowing how much time the subject indulges in physical activity, as declared in the questionnaire, we quantified the level of physical activity as a time function as follows:

- low level of physical activity (L) – between 1 and 3 hours assigned for physical activity during a week, 5 days (Monday – Friday);
- medium level of physical activity (M) – between 4 and 5 hours assigned for physical activity during a week;
- vigorous level of physical activity (V) – more than 5 hours per week.

Table 2. Frequency of levels of activity

| Level of physical activity | Frequency | Percentage from the total sample of subjects |
|---|---|---|
| Low (L) | 20 | 38.5 % |
| Medium (M) | 25 | 48.1 % |
| Vigorous (V) | 7 | 13.4 % |
| Total | 52 | 100 % |

The results obtained were validated using the Paired T Test. As summarized in the table 2 regarding the frequency, the medium level of physical activity is the most wide spread. The T test confirmed this fact through the value of the statistical coefficient p, where the value in both cases (low level of activity (L) as compared to medium level of activity (M) and medium level of activity (M) as compared to vigorous level of activity (V)) was smaller than 0.05.

In the case of the comparison between the low level of physical activity and the medium level of physical activity, the value of the coefficient p is of $0.02<0.05$, whereas in the case of the comparison of the medium level of physical activity and the vigorous level of physical activity, the value of the coefficient p is of $0.0099<0.05$. In both cases the nil hypothesis is rejected and the hypothesis of significant differences between the levels of activity carried out by subjects taking part in the study is accepted.

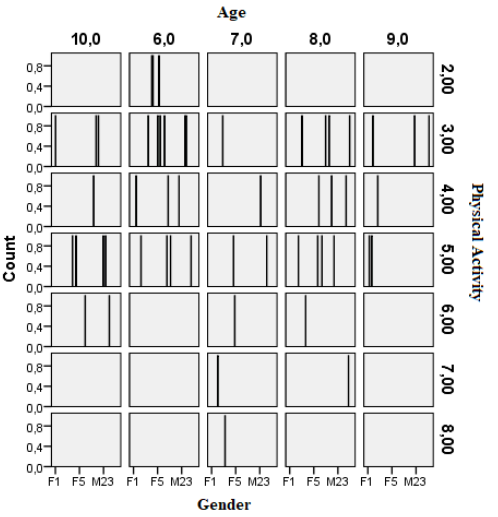


Fig. 2. Time assigned for physical activity by subjects during a week.

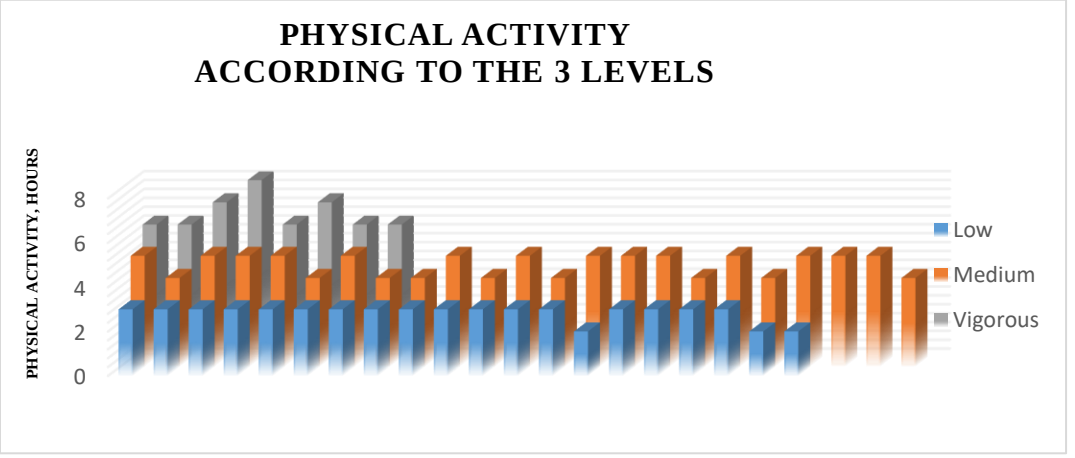


Fig. 3. Physical activity carried out by the subjects of the study

## *4. Discussions and Conclusions*

### *Discussions*

The main aim of the study was to evaluate the relation between the participation in different types of sports and the negative or positive influence on the subject. Society can act as a trigger for the population to indulge in more sporting activities (Tuija, 2003).

Taking part in sporting activities at a high level was reported as a reason which determines subjects to carry on with the sporting activity long term (Rochelle, 2013). The social and economic status did not play a major role in choosing the sporting activity outside of school (Eime 2009).

Participating in sporting activities within sport clubs is most common among youngsters. The peak period of time, when children indulge in sports is between 10-11 years of age (Rochelle, 2016). From the viewpoint of health policy, less active people are prone to a series of negative results regarding their health (Rochelle, 2016).

Because the time assigned in school per week for physical education and sport is relatively little, sporting activities outside of school became a key frame for promoting exercise in order to reduce excess weight in children and adolescents (Stewart, 2007).

***Conclusions***

The questionnaire revealed that the subjects have a structured schedule, organized around schooling activities, spare time and sporting activities. Sports represent an important factor, as positive aspects as a result of practicing sport are manifold, clearly overweighing the negative aspects.

After establishing the frequency of participating in sporting activities, it transpires that the subjects have a medium level of physical activity with a percentage of 48.1 %.

An increase in participating in sporting activities represents an aim, which is beneficial for the health, the character development, the increase in self-esteem, social integration and organizational development. Sporting activities carried out during childhood open the way for participating in physical activities in adolescence and not only.

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# STATIC UMBALANCE IN JUDO

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**Abstract**

Knowing the principles of biomechanics and applying them to the real conditions of current judo, gives the coach and judo practitioners a major advantage. Every movement performed by a judoka involves a series of reactions and counter-responses that can only be perceived under a particularly careful analysis. Applying the technique at maximum unbalance gives you the chance to execute the process without using the brute force. The theoretical study of this article can demonstrate that the principles of judo can be applied in close connection with biomechanical laws.

*Keywords: Jigoro Kano, Hoppo no Kuzuschi, power, force, Kumi-Kata, Sabaki, Tai-Sabaki, Kuzushi*

## 1. Introduction

**Hypothesis**: We believe that strict application of the principles of biomechanics to the principles of judo bring superior classical approaches to this sport. Our study, like as *Ikai, M., Matsumoto*, *Sacripanti*, etc, began with the first elements of initiation in judo: Kumi-Kata, Kuzushi, Tai-Sabaki, Sabaki, Happo no Kuzushi (this only for improvement. The study of balance is important not only in judo, but also in other sports. In handball, fencing, boxing, gymnastics, etc. For example, in handball, the lack of balance can result in the failure of a correct execution.

"*The study of balance stances and their impact over handball techniques should be conducted often to identify the level of influence balance has over the movements. A poor balance may lead to faulty execution of the technique and thus it may affect its result*" (Gherman, Gomboș, Pătrașcu, & Pop, 2017).

Even though they are basics in judo, they can only be achieved by performance athletes, who have gone through the elements for at least a 5-year period.

Starting from the principle that a rigid body supported on a horizontal plane is in equilibrium when kinetic energy (Ec) is lower, we will study the imbalance concept of the human body, placed vertically on a horizontal plane. This concept of imbalance is the basic element in the execution of a technical process.

The imbalance in judo can be defined from a biomechanical point of view, as a motor action of tori against uke, and consists in increasing the potential energy of UKE made by lifting the center of gravity of the uke take off projection of the center of gravity outside the supporting surface.

The term "unbalance" (Kuzushi) has been associated with the concept of achieving maximum efficacy (high yield) in a design using the minimum muscle energy. The biomechanical solution of such a problem, involves the study of the problem of the forces which intervene, of the direction in which the opponent's body is taken to unbalance.

In Figure 1 we present the characteristics of the imbalance in judo**:**

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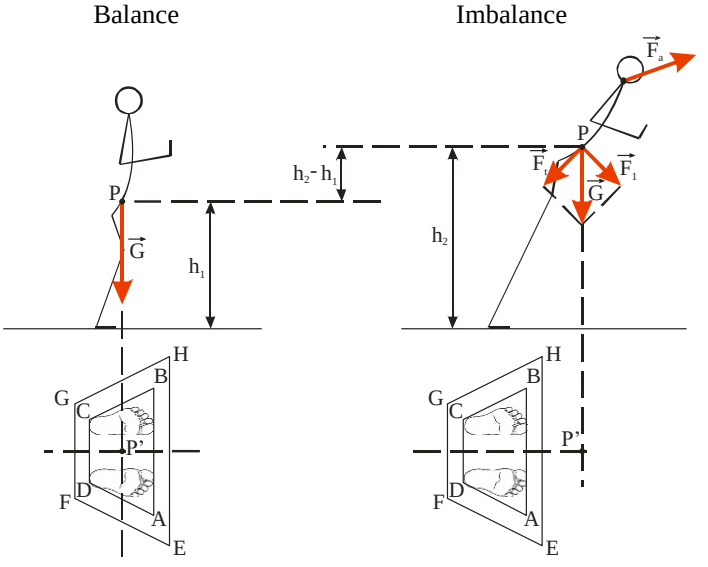


Fig 1.

Potential energy (kinetics) Ep1 Ec — Potential energy

$$Ec1 = m\ g\ h_1 \qquad Ep2 = m\ g\ h_2 \qquad (1)$$

$$h_1 < h_2 \Rightarrow$$

$$mgh_1 < mgh_2 \Rightarrow$$

$$Ep_1 < Ep_2$$

Analyzing the two situations in Figure 1, Balance - Imbalance, we observe conditions in which imbalance is achieved in judo. In order to have an imbalance in the execution of judo process, the two imbalance conditions must be found:

a) the potential energy of uke's body to be higher than in balance;

b) protection of the center of gravity from falling outside the support surface

In Figure 1, in the first case, is given equilibrium position, and in the second case, is given the imbalance. In the second case we see an elevation of the uke's center of gravity (h2> h1) resulting in a potential energy (Ep2> Ep1) leading to a higher degree of instability. The second condition is achieved by projecting the center of gravity (C) that falls outside the support surface.

**Nomenclature**

A *Kumi-Kata* (grip)
B *Kuzushi* (unbalancing an opponent)
C *Tai-Sabaki* (dodge the body, escape the body)
D. *Happo no Kuzushi* (the eight directions of off-balance.)

### 1.1. The 8 Judo Unbalance Directions (HOPPO NO KUZUSCHI)

Out of the many design procedures in judo, the Japanese school has synthesized eight imbalance directions that are grouped into *Hoppo no Kuzushi* (Ikai & Matsumoto, 1958; Koshida, Ishii, Matsuda, & Hashimoto, 2017; Hashimoto, Ishii, Okada, & Itoh, 2015).

Following the direction of the balancing at the end of the article, we observe a perfect symmetry of the eight imbalances that make up Hoppo no Kuzushi. For a good understanding of the important imbalances in the execution of a judo process we will analyze the eight directions of imbalance and their association with the execution of some technical procedures.

#### 1.1.1 Unbalance forward (MAE - KUZUSHI)

The moment of initiation of the imbalance is achieved by force (Fa) and under the weight of uke (G).

The force (Fa) by the composition (Fa2) will raise the uke's center of gravity by increasing the potential energy (Ep = m g h), and the (Fa1) acting horizontally will remove the center of gravity projection from the contour of the support surface. As a result of force (Fa), the external force and weight (G) will decompose into two components (F1) that will take the same meaning as (Fa1) and which will amplify the uke imbalance, by the projection of the center of gravity support, and a force (Ft) that presses the body of the uke's support surface.

Under the action of force (Fa1) and (F1) there is a momentum of tilting that no longer gives uke the chance to return to balance. Under the action of these forces, the uke is brought to the tip of both legs, thus decreasing the support surface with potential energy increased by lifting the center of gravity and the projection of the center of gravity outside the support surface. The moment is favorable for tori to come up with the support point under the uke's center of gravity to succeed execution of a throw..

Applying the force (Fa) on the uke is accomplished by the traction of the lapel, in the first moment, followed by the second moment of pulling the sleeve (uke's kimono)

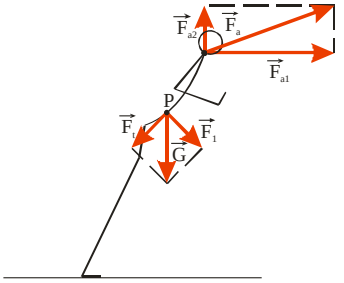


Fig. 2 (Mae-Kuzushi)

#### 1.1.2. Unbalance back (Ushiro - Kuzushi)

Backward unbalance is accomplished by pushing the uke's kimono and/or the right hand of uke.

In Figure 3 the forces acting on the body of uke, forces that make imbalances.

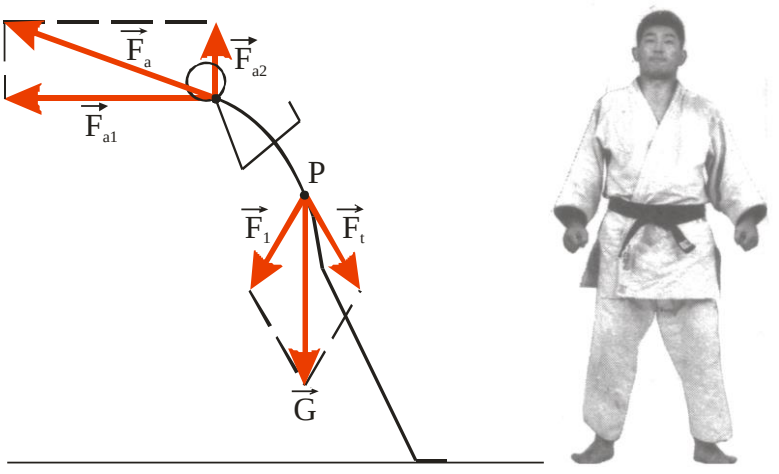


Fig. 3 (Ushiro – Kuzushi)

In the first phase under the action of force (Fa) is pushed back on both heels, decreasing the support surface. The composition (Fa2) raises the position of the uke's center of gravity (C), increasing the potential energy (Ec) component (Fa), will operate horizontally, blocking the uke's equilibrium. By moving the center of gravity in the horizontal plane under the action of (Fa), the weight (G) decomposes into (F1) and (Ft F1), acting in the same direction, sense with (Fa1), leads to the amplification of imbalance. Tori's favorable moment of attack is when the imbalance is maximum (Yaamaguchi, 1992).

### 1.1.3. Imbalance lateral-right (Yoko Migi Kuzushi)

In Fig. 4 are the forces that compete with the right side unbalance as well as the unbalance directions.

The imbalance is accomplished by Tori's traction in horizontal plane with the uke's right-hand sleeve.

Tori's left hand performs a diagonal upward push, which leads to lifting the center of gravity, increasing the uke's potential energy and at the same time loading the uke's body weight lateral left leg. In this position the weight of the body working as a force breaks into two components (F1) that amplify the imbalance in the same sense as (Fa) and (Ft) that presses the uke's body on the support surface.

By composing the two forces (Fa) and (F1), the projection of the uke's center of gravity is pulled out of the support surface, as a result of the tilting moments of these forces leads to uke overturning (Pucsok, 2001).

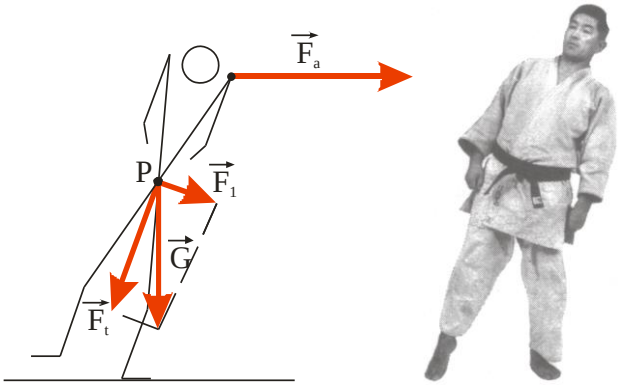


Fig. 4 (Yoko migi kuzushi)

### 1.1.4 Left Side Unbalance (Yoko Hidari Kuzushi)

As the possibility of unbalance in a circle – 360 degree within the eight basic unbalancesis, there are symmetries right - left, front-back, diagonal right - left.

This unbalance is the same as the lateral unbalance - right in terms of the action of the forces, with the distinction that loading and realization on the lateral side of the right foot of uke (Yamaguchi, 1992).

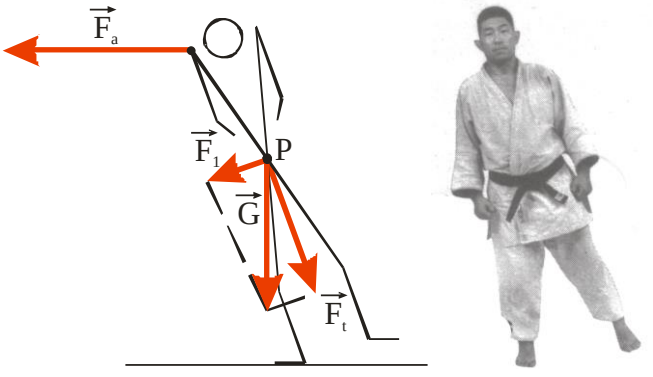


Fig. 5 (Yoko hidari kuzushi)

### 1.1.5. Front-Right Unbalance (Migi Mae Sumi Kuzushi)

The force loading system is shown in Fig.5. The unbalance is accomplished by Tori's traction with his left hand on the straight sleeve of the uke, forcing the uke to step straight. The force (Fa) by the composition (Fa2) will lead to the elevation of the center of gravity, increasing the potential energy of uke. The composition (Fa1) will take out the projection of the uke's center of gravity, outside the support surfaceAs a result of force action (Fa), the position of the center of gravity will move, leading to the decomposition of the force (G) into two components: (F1) force that has the same meaning as (Fa1) which will give an extra tilting moment to amplify Uke's unbalance materialized on a load on the tip of the right foot and the uke's inclination to the right.

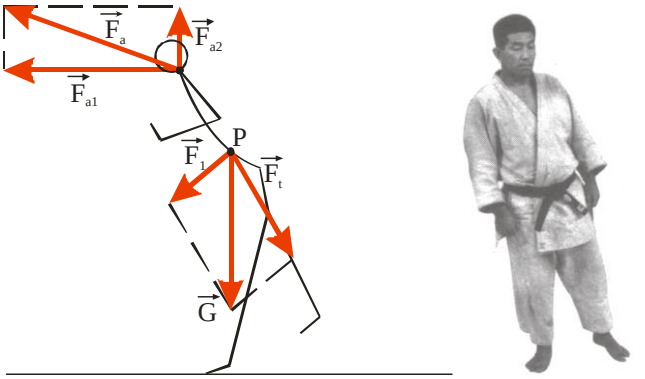


Fig. 6 (Migi mae sumi kuzushi)

### 1.1.6. Front-Left Unbalance (Hidari - Mae Sumi Kuzushi)

In Fig. 7 presents the conditions of the left-hand imbalance due to the load with the intervening forces. And in this case, we find ourselves in symmetry with the forward-right imbalance. The force system works the same, especially with the load on the left foot of uke (Pucsok, Nelson, & Ng, 2001).

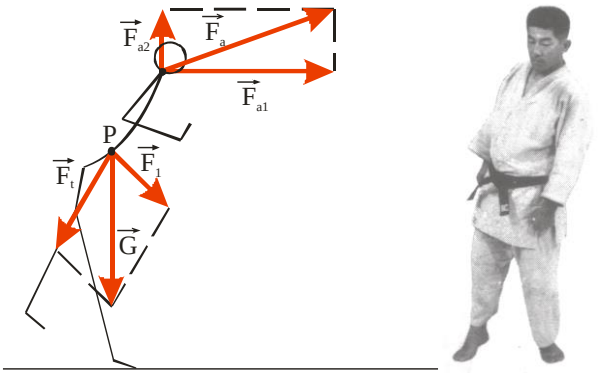


Fig. 7 (Hidari mae sumi kuzushi)

### 1.1.7. Umbalance right-back (Migi Ushiro Sumi Kuzushi)

An umbalance in this situation is shown in Fig. 8 and is accomplished by pushing with the right arm of the tori, the uke's left shoulder, in horizontally plane, towards back to up. The left hand of tori having kumi-kata at the right elbow of uke, pushes diagonally upright by loading the uke on the left foot heel.

The force component (Fa) will act vertically and will raise the weight of the uke in vertical plane, and the component (Fa1) will act horizontally, leading to the center of gravity being removed outside the support surface.

Force (G) decomposes into (F1) that amplifies the imbalance by creating (Fa1) tilting moments that do not give uke the ability to return to the equilibrium position. The force (Ft) presses the uke's body on the support surface, he stays with full weight on that foot.

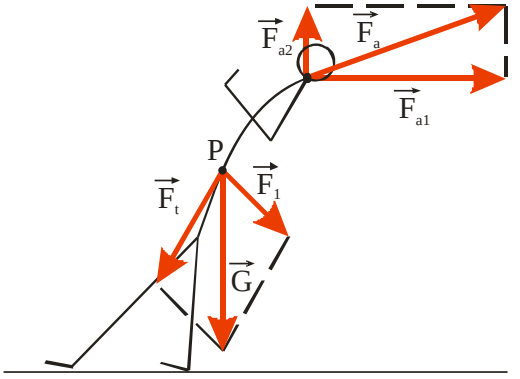


Fig. 8 (Migi ushiro kuzushi)

### 1.1.8. Umbalence back-left (Hidari Ushiro Sumi Kuzushi).

This imbalance is symmetrical with fig.8, and is performed in the same way with the right backward unbalance, with the difference that the load is made on the foot of the right foot of uke. Fig. 9

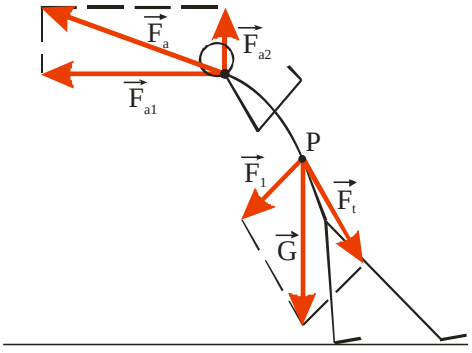


Fig. 9 (Hidari ushiro sumi kuzushi)

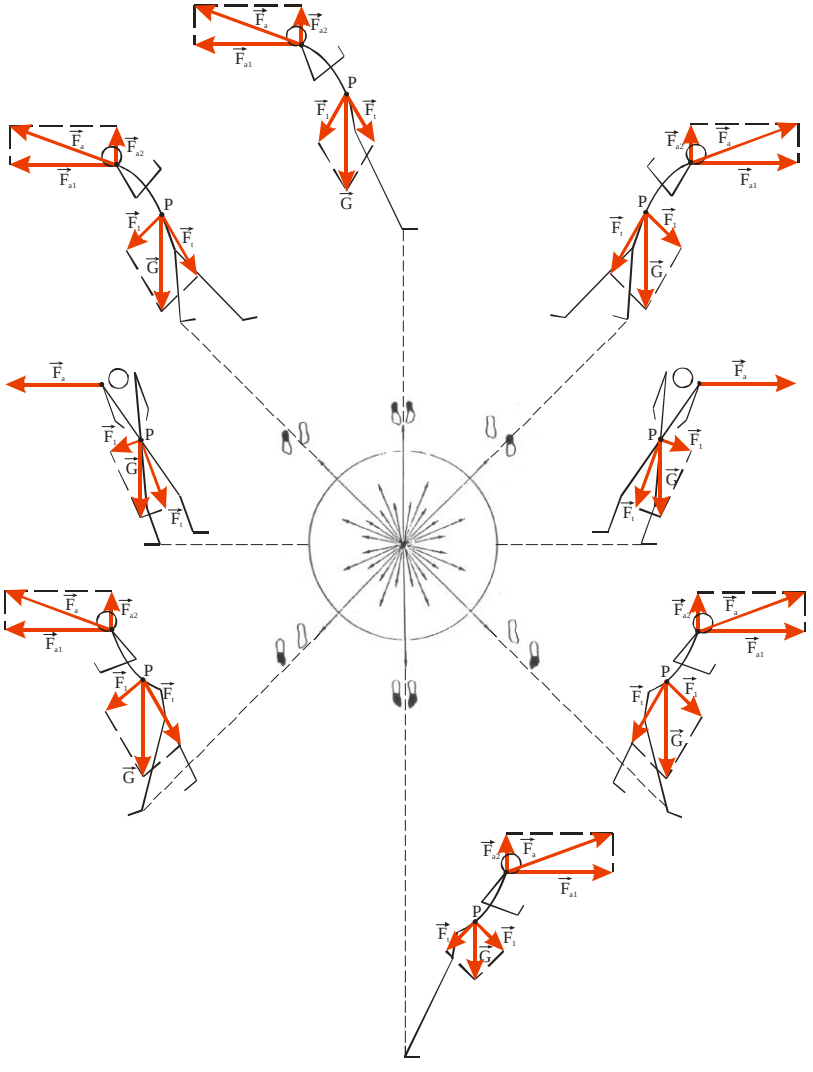

**Fig 10**

Judo Unbalance Directions (Hoppo no kuzushi)

## Conclusions

The success of a judo design action depends to a large extent on the quality of the unbalance on the opponent.

The term imbalance is associated with Jigoro Kano with the concept of maximizing efficacy in a design technique using the minimum muscle energy. The importance of unbalance derives from the previous paragraph by the way a judoka uses its the energy it has.

In order to bring the opponent into the position of imbalance, must follow two conditions:

a) the potential energy of the opponent (UKE) to increase from the initial balance position;

b) the projection of the center of gravity falls outside the support surface.

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# THE IMPORTANCE OF RUGBY IN PHYSICAL EDUCATION AND SPORTS IN SCHOOL

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## Abstract

**Background.** Rugby is a collective, wrestling, total commitment sport, being allowed direct contact with the opponent. The permissive and stimulating nature of rugby regulation is that players can use well-known techniques in unrestricted ball games (pass, kick, ball bearing). Rugby is a sporting game with special training values for the young generation. Rugby is practiced by both genders with non-discriminatory regulations, and there is also the Women's Rugby World Cup. The game of rugby offers broad opportunities for manifestation of all human attributes and qualities - physical, intellectual and moral. **Subjects and Methods**. The subjects are students from the school, with age between 13 and 14 years old. The subjects are organized in two groups, control group and experiment group. **Research methods** The complete fulfilment of the tasks of the work cannot be possible without the careful use of of the scientific research materials, of a real use being both the methods of data collection, those of processing and those of elaboration of the results. **Results.** The 10x5m blanket test provided us with guidance regarding the evolution of the subjects in terms of skill and coordination. The second item evaluated the repetition speed of the upper limbs. The third item followed the dynamic equilibrium and this time the experiment group had a considerable improvement of the results. **Conclusion**. All the results of the research contributed to the demonstration of the hypothesis that by systematically practicing rugby we will succeed in developing dynamic balance, repetition speed of the upper limbs, speed of movement and degree of coordination of movements. If the student is interested, the effective working time can be increased by avoiding the "dead" times, and a greater degree of progress can be achieved.

*Keywords:* rugby, physical training, school, emotional balance, education.

## 1. Introduction

Starting from the hypothesis that by systematically practicing rugby we will succeed in developing the dynamic balance, the speed of repetition of the upper limbs, the speed of movement and the degree of coordination of the movements. Step I is the sum of the information by which the teacher / coach presents a tactical component. Its description and explanations are always accompanied by a demonstration, in order to form a correct mental representation at the player's level (Chihaia, 2000). The second stage is the mirror of the concept lets the player try. It is characterized by the use of motion games or even rugby, in its different forms, in which the player tries to apply in practice what the teacher / coach has explained and demonstrated. Emphasis will be placed on the use of the forms of rugby, in which limiting factors will be introduced which, on the one hand, will stimulate the use of the targeted tactical component, and on the other, will allow the teacher / coach to control the game indicators in in relation to the level of training, learning phase, periodization, etc. The second stage follows two directions: (Chihaia, 2000). The first, of the player, satisfies the player's need to play (very important at the level children and juniors who come first to play), optimization and affective and motivational homogenization of the player and the team (will facilitate the subsequent work), the discovery of the tactical component under conditions of partnership, adversity, pressing etc. (Mitrea, 1975).

Second, the teacher, who observes the behavior of the players in order to perceive the level of their tactical manifestation in relation to the related topic (Scarlat & Scarlat, 2006). It is recommended as effective as possible, according to the level of training and the particularities of the theme. The degree of opposition is in relation to the learning stages of the technical-tactical process concerned (initiation, learning, consolidation, improvement) (Chihaia, 2000). The third stage is characterized by the use of games and drive systems in which the player will

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focus his effort in order to acquire the tactical component, under conditions of partnership and low pressing. Within this step, the recommendation consists in ensuring the premises of the tactical success. Thus, the numbers will be reduced, the semi-active opposition, the executors will be super-numerically obvious, the distance between opponents will be pushed to the maximum limits.

The fourth stage represents the moment of the use of driving systems and games in which the player will work individually. It will improve its tactical component under abstract conditions, break it down and practice the theme in component sequences, and will eventually introduce the theme into some game actions. The algorithm is as follows: (Scarlat & Scarlat, 2006) Exercise in abstract conditions, minimally effective, targeting each task, sequential role. Practice in the context of a game action; it only seeks to weave tactical actions, attack or defense, without the other indicators of the actual game action (Chihaia, 2000). At this level, the opposition may or may not be present. If present, it will be passive or semi-passive in relation to the level of learning. It is advisable to play the players regarding the different tasks within the tactical component - versatility. At the same time, it can be practiced with a view to the technical optimization related and indispensable to the tactical component (Bompa, 2006). The 5th step is the use of games and means with reduced cash in which the player improves his tactical component in conditions of increasing pressure.

The sixth stage represents the optimization of tactical behavior under game conditions. The game will be related to the level of training. It is recommended to stimulate the tactical behavior targeted by the theme through: bonus points for subsequent tests of the behavior pursued, the obligation to restart the game through the tactical component concerned, the obligation to use the tactical component in the game phases (penalty or failure to award points in case of non-compliance). Within this step, a self-evaluation is performed, by the players, and an evaluation by the teacher / coach, regarding the level of manifestation of the tactical behavior (Chihaia, 2000). The efficiency of the methodical scheme is conditioned by the completion of all the steps during the training lesson. Under certain restrictive conditions, the steps can be reduced from 6 to 4, but with the logic of the methodical scheme (Scarlat & Scarlat, 2006).

Other arguments in favor of the presence of methodical schemes are: Adapt to all phases of learning. It is in accordance with the hourly structure of the thematic links, presented above. · It is effective in all stages and stages of rugby player training (Bompa, 2006).

**1. Objectives**

Starting from the hypothesis that by systematically practicing rugby we will succeed in developing the dynamic balance, the speed of repetition of the upper limbs, the speed of movement and the degree of coordination of the movements.

**2. Subjects**

Table 1. Control Group

| Nr. Ctr. | Subject | Age | Sex |
|---|---|---|---|
| **1** | A C | 13 years | Male |
| **2** | A P | 14 years | Male |
| **3** | B I | 13 years | Male |
| **4** | B C | 14 years | Male |
| **5** | B M | 14 years | Male |
| **6** | C C | 13 years | Male |
| **7** | C M | 13 years | Male |
| **8** | C S | 14 years | Male |
| **9** | D A | 14 years | Male |
| **10** | D I | 14 years | Male |
| **11** | F A | 13 years | Male |
| **12** | F B | 14 years | Male |

Table 2. Experiment Group

| Nr.crt. | Subject | Age | Sex |
|---|---|---|---|
| **1** | B I | 13 years | Male |
| **2** | C R | 14 years | Male |
| **3** | F R | 13 years | Male |
| **4** | F R | 15 years | Male |
| **5** | H E | 13 years | Male |
| **6** | H C | 14 years | Male |
| **7** | I R | 13 years | Male |
| **8** | J S | 14 years | Male |
| **9** | M A | 14 years | Male |
| **10** | M V | 14 years | Male |
| **11** | M R | 13 years | Male |
| **12** | U S | 14 years | Male |

**3. Methods and Materials**

General methodical features Rugby, defining itself as an extremely complex collective fighting game, involves the human body in its entirety. Thus, the teacher / coach has five directions of intervention: (Chiriac, 1992)

- Affective sphere;
- The collective dimension;
- Perceptual sphere;
- The motor side;
- The logic of the game.

**AFFECTED AREA**

This direction of intervention of the teacher / coach is dominant in his concern, especially during the beginning period. Improving the affective sphere will induce the players an "optimal state" necessary for the correct analysis of the game situations and achieving an adequate motor response. During the game, the influences of the game are multiple, and the player must be educated to have a positive response. This is when the higher the level, the more significant the affective influences. So the player must be able to tolerate them (Badea, 2001). In order to improve the affective sphere, the teacher / coach will progressively dose the influences of affective nature by: (Badea, 2001)

- Change of intensity in the conditions of active, real opposition;
- Increasing the speed of travel, as a source of contact forces;
- Induction of uncertainty in the manifestation of the opposition;
- Changing the number of partners and positioning them.

I mention that the affective influences are minimal in situations of supranumeric, semi-active opposition, low speed and tactical solutions given (Constantin, 2002).

**COLLECTIVE DIMENSION**

Rugby as a collective game generates a lot of very dense and very complex actions. These are determined by the large number of players, their diverse and precise tasks within the three forms of play and two strategies (contact or avoidance). Thus, the team of a rugby team must achieve cohesion, materialized by coordinated actions in space and time (Duck & Duck, 2008). Particular situations raise the group-penetrating game which involves small spaces, large number of players, fine motor coordination and contact, which causes problems of recognition and structuring of the team (Chiriac, 1992). In order to build the team, we recommend operating systems that involve changes in space and time, changes in the role of players, etc. against the backdrop of a relatively constant group composition. (Cârstea, 2000)

**PERCEPTIVE FIELD**

The perceptive education of rugby is necessary as a result of the problems raised by the structuring of the perceptual sphere inherent in the activity and of the various sources of information required by the two modes of play: in contact and distance (Badea, 2001).Visual perceptions offer information about the opponent, positioned in front, about the partners, positioned in the side and back, complemented by the tactile, kinesthetic and proprioceptive sensations related, in particular, to the contact and technical-tactical coordination. Hearing and vestibular sensations complement the spectrum of rugby player-specific information (Sanislav, 2003). The level of the perceptual sphere is conditioned by: (Badea, 2001)

- Affective improvement; · Development of temporal pressure (diminished available time);
- Increasing the number of different modes of perception;
- Quantity and diversity of data;
- Uncertainty induced by sources.

A performance rugby player is able to quickly perceive and select relevant data, even if affective influences are involved and the information is complex because it is based on an experience built from the perception of a multitude of elements in different situations (Constantin, 2002). Perceptual education is recommended to be carried out through: (Mitra, 1975)

- variation of perceptual modalities;
- variation of available time;
- the intensity and proximity of the opposition;
- the speed of the situation;
- information complexity.

**MOTOR SIDE**

The rugby player who solves particular situations in the game must possess a specific and adapted luggage. Thus, the motility characteristic of the individual and collective struggle is optimized, as well as the specific motility of the avoidance game (ball handling, foot play, etc.) (Duck & Duck, 2008). The motor sphere is optimized in accordance with the level of training, with the particular game situations encountered by the player, with the corresponding game model (Chiriac, 1992). For motive education, it is recommended to use various drive systems and analogues to the game model, so that the player builds his motive act based on the experience gained in the different game situations.

Technical training under sterile, stereoptic conditions generates inefficient automatisms, as they are not functional in game situations (Badea, 2001).

**LOGIC OF THE GAME**

The logic of the game represents the system of strategic and tactical principles and rules. Thus, the logic of the game is at the center of the rugby universe, and the other spheres of intervention are in its service. Relevance of the logic of the game is outlined within the fundamental scheme and basic principles that govern rugby (previously presented in separate subchapters) (Mitra, 1975).

**METHODIC RECOMMENDATIONS**

The methodical recommendations are based on the formative stage of the rugby player (Cârstea, 2000).

The training of athletes in stage I is customized by the use of means and various methods, specific to a wide spectrum of sports branches: dynamic games, general motility exercises, individual or collective fighting games, gymnastic exercises, grids, etc. The training lessons should not have a significant physical and mental demand, it is recommended to use a more uniform and monotonous content. In terms of technique, learning and consolidation of processes should not aim at stabilizing the technique of movements that will allow to achieve precise sports results.

At this stage a multilateral (multipurpose) technical base is formed, which will be the platform for further improvement. The main methodical indication reflects the use in the educational-educational process of the global, in other words the player builds his own rugby game and the game builds the player. I must also mention the need to improve the passionate rugby - rational rugby relationship (Badea, 2001).

Stage II is characterized by the use of methods and means that will ensure it multilateral training and the start of the next specialization. The workload is high only in the case of general training and low in the case of specialized training. Otherwise very good results can be obtained in the short term, but with negative effects in the formation of the great performer (the pursuit of the coaches after the juniors). The intensity is carefully programmed so as to avoid the means with high load and short breaks. The characteristic methods and means are subordinated to the scheme: global-analytical-global. On the technical-tactical level, the versatile player's training continues with his orientation towards the future specialization. It is recommended to work with the general opposition movement. At the same time, it stimulates the player's pleasure to fight within the limits of fair play, to channel his own energy in the collective game and the fighting game. The main means will be: penetration of the defensive curtain “; the game in the mirror”; plywood games " (Chiriac, 1992).

Stage III is characterized by the two directions subordinated to the stages row. Thus, a direction is represented by the intensive specialization in the post and compartment, characterized by the increase of the weight of the methods and the means of special training, of reaching the maximum of means that stimulate the processes of adaptation, of increasing the competitive experience and of the sporting skills.

The methodological line is global-analytical-global, but with an increased share of the analytical. The other direction is represented by the achievement of the predicted performances, made possible by maximizing the volume and intensity, approaching an individualized method of preparation, resulting in the improvement of the sporting skills on a technical, tactical, psychic and physical level. At this stage, as we age, as a result of natural physiological changes, the functional potential of the body will gradually decrease. This limiting barrier will be compensated by improving the sportsmanship. Also in this context we mention the change of training methods and means (the appearance of new ones, new equipment, individual, non-specific means).

The methodical line in the rugby game remains global - analytical-global, but with an emphasis on analytics. It is recommended, at this stage, to use, in particular, means that involve solving problem situations (the opposition) (Badea, 2001). At the same time, the efficiency of the training lessons increases through the use of the hourglass structure. This structure aims to improve the form of the fundamental part of the lesson (links / thematic link), in

order to make the training process more efficient. Improvement consists in the modification of the classic, classical form of the fundamental part with the hourglass shape, according to the following scheme: overall effect - reduced effect - 1: 1 effect - reduced effect - global effect. The characteristics of such a structure are the following: (Cârstea, 2000)

- The hourglass" can include all the topics of the lesson, respectively all the components of his training, selectively, a certain theme (topics);
- The construction, the hourglass" is realized starting from the complete formation for the respective theme (s), passing through reduced formations to the simplest form related to the theme (s) and returning to the complete formation after the same reason;
- The first sequences of the hourglass" follow the behavior of the player, the couple, the line, the compartment, the team, under similar conditions and close to the game, depending on the target topic. In these sequences we observe the strengths and weaknesses of the behavior pursued, so that the subsequent intervention is improved in order to optimize the behavior. In other words, in these sequences the objectives (tasks) of the theme (s) are accurately outlined.
- The optimal intervention of the teacher / trainer in order to improve the targeted behavior is achieved between the sequences of reduced number of students.
- The 1: 1 effective sequences allow to improve on an individual level the behavior followed by the theme (s) of the lesson;
- The last sequence - total effective / active adversity - follows both the optimization of the behavior and its verification under game conditions;
- We notice the differences in the degree of adversity between the halves, the hourglass" and between their sequences. Thus, if the first half has all the degrees of adversity, the second half has degrees of semi-active and active adversity, with the obligation of active adversity in the last sequence of the hourglass". The degree of adversity is in relation to those previously stated and the degree of training.

The hourglass form of the fundamental part has been the subject of a 4-year research, and the obtained results signify the efficiency of the training process by: (Bompa, 2006)

- the rate of progress within the structures in, hourglass" is significantly better (15-30%);
- the integration of the targeted behavior within the general game-specific behavior is improved;
- the optimal formula of the hourglass is: total number - reduced number - 1: 1 count - 1: 1 count - reduced count - total count, with the particularities listed above;
- this form allows the faithful observation of the behavior and implicitly the precise outline of the tasks related to the theme;
- it is recommended to weave the technical-economic component with the corresponding physical component, within the same, hourglass";

**Methodology of learning the technique**

The technical-tactical universe of rugby is, by its very nature, extremely complex and diverse. Therefore, the idea that the related methodology is also complicated would be introduced. In the following lines I will present a reliable and easy methodological scheme, comprising 6 steps: (Bompa, 2006)

Step I represents the sum of the information by which the teacher / coach presents a technical-tactical process. Its description and explanations are always accompanied by a demonstration, in order to form a correct mental representation at the player's level (Mitra, 1975).

The second stage is the mirror of the concept lets the player try. It is characterized by the use of motion games or even rugby, in its different forms, in which the player tries to apply in practice what the teacher / coach has explained and demonstrated. The second stage follows two directions: (Cârstea, 2000)

- The first, of the player, satisfies the player's need to play (very important for the children and juniors who come, first of all, to play), optimizing and homogenizing the affective and motivational of the player and the team (will facilitate the subsequent work), discovering the technical-tactical process under conditions of partnership, adversity, pressing etc.
- Second, of the teacher, who observes the players' behavior in order to perceive the level of their technical-tactical manifestation in relation to the related topic (Duck & Duck, 2008).

It is recommended as effective as possible, according to the level of training and the particularities of the theme.

The degree of opposition is in relation to the learning stages of the technical-tactical process concerned (initiation, learning, consolidation, improvement) (Scarlat & Scarlat, 2006).

The third stage is characterized by the use of games and drive systems in which the player will focus his effort in order to acquire the basic mechanism of the technical-tactical process, under conditions of partnership and low pressing. Thus the numbers will be reduced, the semi-active opposition, the executors will be super-numerically obvious (3/1; 4/2; 5/3), the distance between opponents will be pushed to the maximum limits (Chihaia, 2000).

The fourth stage represents the moment of use of driving systems and games in which the player will work individually. It will improve the basic mechanism of the technical-tactical process under abstract conditions, break it down and practice the process in component sequences. The algorithm is as follows: (Bompa, 2006)

- Exercise in isolated and sequential conditions;
- Practice in the context of other technical-tactical procedures;
- Practice in the technical-tactical routes.

At this level, the opposition may or may not be present. If present, it will be passive or semi-passive in relation to the level of learning (Scarlat & Scarlat, 2006). The degree of deepening of this stage is in accordance with the particularities of the stages and stages of preparation of rugby players. Thus, in the first stages (stage I) the fixation of the basic mechanisms will not be pursued, this being accomplished in the following stages (stages II and III) (Chihaia, 2000). The fifth stage is the use of games and means with reduced cash in which the player improves the basic mechanism of the process under conditions of increasing pressure. This will increase by: minimizing the distance between opponents, reducing or canceling the numerical difference between them, increasing the freedom of the opponents, etc. These will be achieved in relation to the level of learning (Chihaia, 2000). The sixth step represents the optimization of the execution of the technical-tactical procedure under playing conditions. The game will be related to the level of training. Within this step, a self-evaluation is performed, by the player, and an evaluation, by the teacher / coach, regarding the level of mastery of the technical-tactical process. (Cârstea, 2000) The efficiency of the methodical scheme is conditioned by the completion of all the steps during the training lesson. Under certain restrictive conditions, the steps can be reduced from 6 to 4, but with the logic of the methodical scheme. (Mitra, 1975) Other arguments in favor of the present methodical scheme are: (Chihaia, 2000)

- Adapt to all phases of learning.
- It is in accordance with the hourly structure of the thematic links, presented above.
- Efficient in all stages and stages of rugby player training.

## 4. Results

Table 3. Control group results

| Nr. Ctr. | Subject | Race"shuttle" 10X5m | | Touching the plates (topping | | Bass Test | |
|---|---|---|---|---|---|---|---|
| | | TI. | TF. | TI. | TF. | TI. | TF. |
| **1** | A C | 24.4 | 23.1 | 14.5 | 13.3 | 37 | 49 |
| **2** | A P | 22.5 | 21.8 | 14.4 | 12.9 | 41 | 53 |
| **3** | B I | 21.8 | 19.8 | 15.9 | 13.1 | 46 | 57 |
| **4** | B C | 24.2 | 22.6 | 13.6 | 12.8 | 49 | 60 |
| **5** | B M | 23.4 | 21.9 | 14.7 | 12.6 | 50 | 61 |
| **6** | C C | 23.4 | 22.2 | 15.3. | 12.7 | 53 | 55 |
| **7** | C M | 21.9 | 20.3 | 14.7 | 13.9 | 55 | 51 |
| **8** | C S | 22.3 | 22.3 | 14.1 | 12.6 | 32 | 44 |
| **9** | D A | 22.9 | 21.7 | 14.6 | 12.9 | 42 | 59 |
| **10** | D I | 24.4 | 23.1 | 14.5 | 13.3 | 47 | 48 |
| **11** | F A | 22.5 | 21.8 | 14.4 | 12.9 | 40 | 57 |
| **12** | F B | 21.8 | 19.8 | 15.9 | 13.1 | 50 | 62 |
| **13** | Average | 22.3 | 21.7 | 14.3 | 13.6 | 45 | 54 |

Table 4. Experiment group results

| Nr. Ctr. | Subject | Race"shuttle" 10X5m | | Touching the plates (topping) | | Bass Test | |
|---|---|---|---|---|---|---|---|
| | | TI. | TF. | TI. | TF. | TI. | TF. |
| **1** | B I | 23.7 | 21.1 | 13.7 | 12.0 | 32 | 53 |
| **2** | C R | 23.8 | 20.8 | 14.2 | 11.5 | 47 | 64 |
| **3** | F R | 20.8 | 19.8 | 14.7 | 10.8 | 45 | 60 |
| **4** | F R | 24.6 | 20.6 | 14.1 | 12.2 | 50 | 68 |
| **5** | H E | 20.9 | 18.9 | 13.9 | 11.2 | 51 | 76 |
| **6** | H C | 23.2 | 21.2 | 14.5. | 12.5 | 43 | 54 |
| **7** | I R | 23.5 | 21.3 | 14.7 | 11.6 | 38 | 75 |
| **8** | J S | 24.0 | 20.3 | 15.2 | 11.9 | 44 | 56 |
| **9** | M A | 23.06 | 20.5 | 14.3 | 11.7 | 48 | 55 |
| **10** | M V | 23.7 | 21.1 | 13.7 | 12.0 | 40 | 58 |
| **11** | M R | 23.8 | 20.8 | 14.2 | 11.5 | 32 | 53 |
| **12** | U S | 20.8 | 19.8 | 14.7 | 10.8 | 47 | 64 |
| **13** | Average | 23.6 | 21.5 | 14.7 | 12.8 | 43 | 61 |

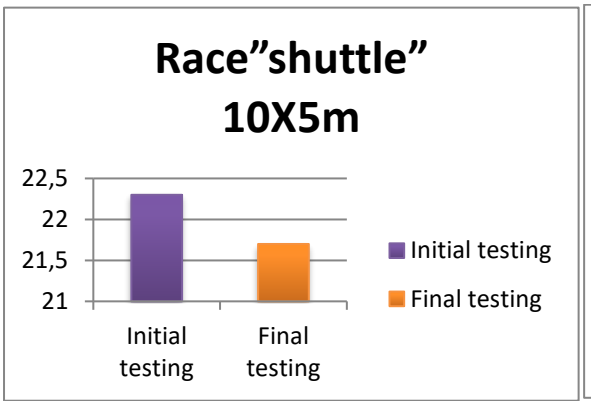


Fig. 1. The average of the control group results

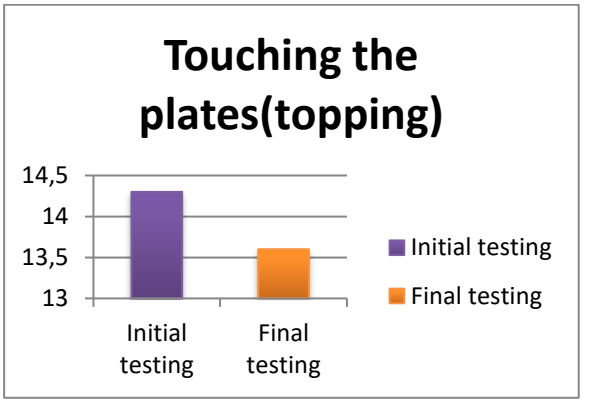


Fig. 2. The average of the control group results

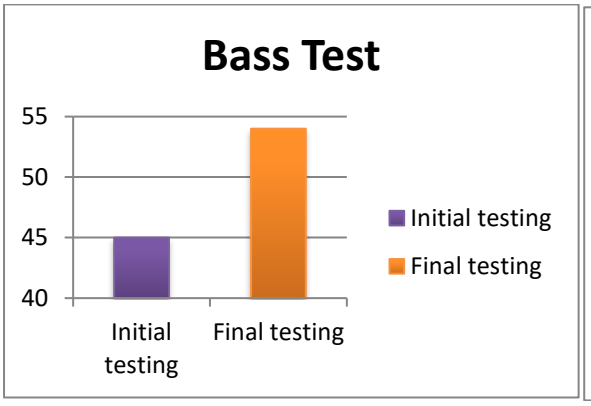


Fig. 3. The average of the control group results

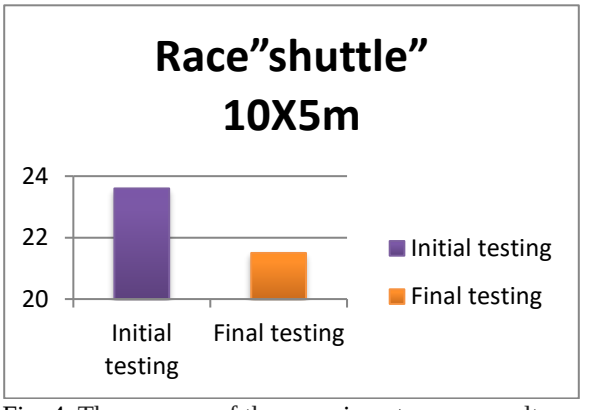


Fig. 4. The average of the experiment group results

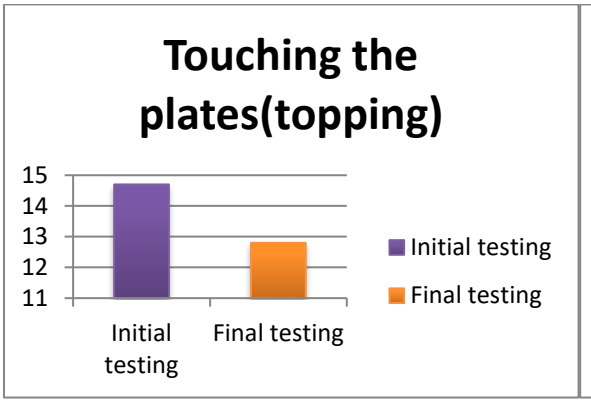


Fig. 5. The average of the experiment group results

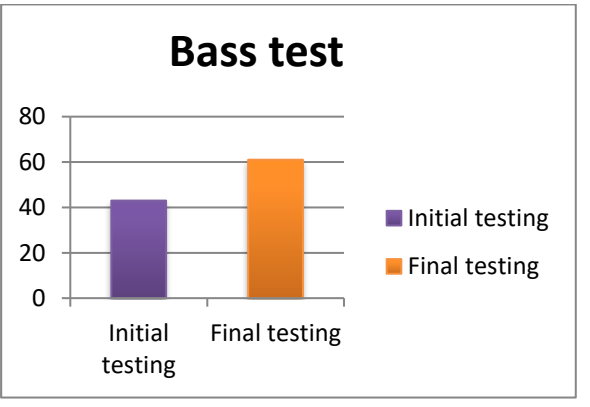


Fig. 6. The average of the experiment group results

5. **Conclusion**

All the results of the research contributed to the demonstration of the hypothesis that by systematically practicing rugby we will succeed in developing dynamic balance, repetition speed of the upper limbs, speed of movement and degree of coordination of movements. Through the means and methods used for research specific to the game of rugby, it was found an improvement of the motor qualities development - the speed and the coordination capacity balance.

The systematic practice of rugby influences the development of motor quality - by means used not to damage the physical training as a whole, but on the contrary, these means form skills that can help in the future, to acquire other more complex motor actions (catching balls, dribbling, throwing balls).

In the school physical preparation, a selection of the most effective means and methods must be made. The most diverse use of the means to make the physical activity as attractive as possible and to ensure the interest of the students.

If the student is interested, the effective working time can be increased by avoiding the "dead" times, and a greater degree of progress can be achieved.

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# SPORTS ACTIVITIES AND THEIR IMPORTANCE IN THE SOCIAL INTEGRATION OF CHILDREN WITH MIGRANT PARENTS ON THE LABOUR MARKET

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**Abstract**

Sport – through its attributes – (regulations, referees, safe space, and rankings) may provide a field of manifestation for the needs of young people, for them to ease the accumulated tensions and to highlight their latent qualities, to underline and acknowledge identity in the work group or in the public space.
Sport is considered a social dynamic activity with the purpose of improving the human being. Seen as a phenomenon of modern social life, sport is differentiated from other social phenomena through universality but also uniqueness. It has the role of bringing people together without conditions, of forming characters, of identifying skills that can be educated and transformed into a profession, thus highlighting the human being, thus outlining his identity.
The sports activity will focus on integrating young people with migrant parents in the labour market force in Europe, through sports activities.

*Keywords:* sports activities, social integration, migrant parents.

## 1. Introduction

Migration represents the movement of a population, a process of populations or groups moving from one place to another, while crossing the borders of a country or moving inside its borders, (The International Organisation for Migration). In the current socio-economic and political conditions, migration can be voluntary or involuntary, legal or illegal, internal or external. The European Union is characterised by accentuated migration, the labour market in the west of the old continent being attractive for the eastern states. Actually, in the Union, there are around 30 million foreign citizens, migrants on the labour market, among whom 10.6 million intra-EU migrants. The 40% of the migrants are represented by the citizens of the new member-states of the European Union, most of them from Romania (2 million), Poland (1.3 million), Bulgaria (310,000), etc. These data – with an accepted margin of error – show that around 7.2% of the Romanian population exercise their right to free circulation in order to live outside their country of residence as citizens of the European Union. Predictions regarding the migration of citizens in the new member states are influenced by numerous factors: the economic factors (low salaries, high unemployment rates, decline of specific industrial sectors), the general desire to improve the standard of living and to ensure a better future for the family and the children.
Migration has an important role in the contemporary social transformations. It is a result of global changes and an impulse for future changes in the states of origin and in the receiving states. Schulte B. (2001) states that this phenomenon of inter-state circulation has an economic representation, thus affecting the labour market but also the social relationships, obviously, the social protection system, the national culture and policies, the international relations, thus leading to a loss of identity.
Emigration has – besides many financial, cultural, technological advantages – social effects on the families of

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migrant workers: leaving their families, even for a determined period of time, in order to work abroad, which may have negative effects on the education of children or on the future evolution of the family.
Parents leaving means, for children and young people, a limitation of the personal, familial, social universe; it creates communication barriers between them and the others. Many young people feel abandoned, without support and disoriented. Especially if both parents leave, children/young people the feeling of belonging, of security, of altruist advice when they need a secure, intimate space, of unconditional assistance.
Among the difficulties faced by many children whose parents migrated, one may note: lower academic performances than before the departure of the parents; lower motivation for improving their cognitive baggage, absenteeism and school dropout; reduced involvement in school and community activities; multiplication of house management roles; limited time for homework, free time activities, rest, communication with the others; ,wrong administration of financial resources; deviant behaviours; more prone to behaviours that put health at risk: smoking, alcohol consumption, etc.
Many times, these problems are interdependent; they determine and support each other. Sport – through its attributes – (regulations, referees, safe space, rankings) may provide a field of manifestation for the needs of young people, for them to ease the accumulated tensions and to highlight their latent qualities, to underline and acknowledge identity in the work group or in the public space.
Sport is considered a social dynamic activity with the purpose of improving the human being. Seen as a phenomenon of modern social life, sport is differentiated from other social phenomena through universality but also uniqueness. It has the role of bringing people together without conditions, of forming characters, of identifying skills that can be educated and transformed into a profession, thus highlighting the human being, thus outlining his identity.
Besides the family, the first and the most important group of socialisation, other groups contribute to the socialisation of individuals: school colleagues, the group of peers and later the professional collective.
Seen as a means of integration, sport may be transformed into a strategy of support for young people facing this phenomenon in their families, namely the migration of parents, and we will determine through the activities of the project, through the actions that may be conducted, the quantifiable result of our endeavour.
In Romania, Dinu, M. (2004) did an experiment meant to observe whether sport is related to social integration. The statistics of the study shows that the experimental group achieve a much more significant social integration than the control group, the means of social integration being 8.47 for the first compared to 7.15, for the second. Other studies (Mocanu, 2008) show that systematic sports practice models the personality harmoniously. All the female athletes investigated mentioned that sport encourages certain personality traits such as tenacity, perseverance, willpower, audacity, courage. Furthermore, sport disciplines and forms mental and physical hygiene skills, mandatory for social assertion.
The National Strategy for the Protection of Children's Rights, 2014-2020, within which children left at home were introduced into the category of vulnerable children: "Children separated from their parents and also those whose parents work abroad. For some of them, the situation of the separation from their parents is all the more serious as they are left in the care of members within the extended family or of family friends, who are not legal representatives of the children, which makes it impossible for these children to benefit from their statutory rights, or for them to be included in the special protection system, as unique alternative". In this context, the motivation of the project is based on the need of easy social integration, through pleasant activities, adapted to the energy of childhood and adolescence.

## 2. **Work strategy**

We have organised with the 56 children, aged between 10 and 14, psychomotor education workshops, sports competitions and a sports hub (with the help of which we have organised educational socialisation and communication activities), for 6 months.

### *2.1. Research design*

The application of the research tool – the questionnaire

We have assessed the objective of the research topic also by applying a questionnaire, which is an investigation technique, to the 56 children (with migrant parents on the labour market) participating in the sports activity, in the psychomotor workshops. The questionnaire comprised 10 questions meant to lead to indicators useful for solving

the issues of the proposed research. Before the presentation and the modus operandi of the questionnaire, we have requested honest answers, protected by anonymity, stating at the same time that the answers would be used for scientific purposes only. Unlike the questionnaire, the interview or the conversation involves a closer relationship between the interviewer and the interviewee. We have also used free discussion or unstructured interview, focused on a topic with a special information purpose. We have considered this type of dialogue more flexible, leaving room for our "key" interventions. The opinions resulted upon applying this method provided us with the possibility of learning a series of aspects related to the contents of handball activity.

Sport contributes to the adaptive needs of the system, thus helping to maintain the health of social actors; thus, we can see this field as a functional part of the social group.

Questionnaire questions

The questions focused on: the need for emotional support, the desire to migrate with parents, the need to learn a foreign language, if the sports activities in the team are socializing, the involvement of a tutor in personal life, competitive recreational activities.

**3. Results**

Table 1. Percentages of responses

Multiple choice answers

| Question 1 | Yes | No | Undecided | - | - |
|---|---|---|---|---|---|
| Percentages | 69.6% | 19.6% | 10.7% | - | - |
| Answers | 39 | 11 | 6 | - | - |
| Question 2 | Intellectual activities | Artistic activities | Sporting activities | Free time | |
| Percentages | 16.1% | 21.4% | 42.9% | 19.6% | - |
| Answers | 9 | 12 | 24 | 11 | - |
| Question 3 | 25% | 50% | 75% | 100% | - |
| Percentages | 16.1% | 32.1% | 37.5% | 14.3% | - |
| Answers | 9 | 18 | 21 | 8 | - |
| Question 4 | Yes | No | Undecided | - | |
| Percentages | 69.6% | 7.1% | 23.2% | - | - |
| Answers | 39 | 4 | 13 | | - |
| Question 5 | Yes | No | Undecided | - | - |
| Percentages | 73.2% | 3.6% | 23.2% | - | - |
| Answers | 41 | 2 | 13 | - | - |
| Question 6 | Yes | No | Undecided | - | - |
| Percentages | 50,0% | 37.5% | 12.5% | - | - |
| Answers | 28 | 21 | 7 | - | - |
| Question 7 | Yes, 25% | Yes, 50% | Yes, 75% | Yes, 100% | No |
| Percentages | 16.1% | 14.3% | 19.6% | 23.2% | 26.8% |
| Answers | 9 | 8 | 11 | 13 | 15 |

| | | | | | |
|---|---|---|---|---|---|
| Question 8 | Yes | No | Undecided | - | - |
| Percentages | 75,0% | 10.7% | 14.3% | - | - |
| Answers | 42 | 6 | 8 | - | - |
| Question 9 | Yes, integral | Yes, partially | No | | - |
| Percentages | 10.7% | 21.4% | 67.9% | - | - |
| Answers | 6 | 12 | 38 | - | - |
| Question 10 | Yes, fully | Yes, partially | No | - | - |
| Percentages | 75,0% | 16.1% | 8.9% | - | - |
| Answers | 42 | 9 | 5 | - | - |

Sport reunites the members of a community, be it small or the size of a nation, because it has the capacity of generating a feeling of unity social solidarity. From a functionalist perspective, sport can also be seen as a means to release destructive energies in an environment allowing them to do so, with the limits of sports regulations, to approach a combative behaviour (with a positive connotation), which in social life is not monitored by referees.
Sport reflects and even exacerbates many of the social division, even those based on gender, social class or race. In this context, its diversification is related to promoting values deriving from contemporary lifestyles: collaboration, fair play, etc.
Education must assume from a procedural perspective all the dimensions of human personality, from harmonious physical development, to the one of instincts, affectivity, will, to the organisation of thought, of attitudes, of expressive behaviours, etc. Thought is formed and consolidated through sport, too, just like intellectual training can strengthen or consolidate positive attitudes towards psychomotricity, towards the body, towards body health and integrity. It is certain that sport educates them both.
Any formative horizon is based on and also sediments a series of subsequent values exceeding the strictly technical dimension of a limitative educational exercise (on an intellective, affective, moral, spiritual, professional direction, etc). Doing sports goes beyond physical gestures, body mechanics, performance for the sake of performance, but it restructures the entire personality in consensus with values regarding self-knowledge, self-achievement desire, responsibility for one's health, fair play in the relationship with the opponents, action consistency, moral probity, respect and altruism, etc.

## 4. Conclusions

Physical education, as topic of a formative program, opens a whole array of values based on or harmoniously articulating with values of the same caliber, which are assumed by other academic disciplines, too. Thus, sport becomes an occasion to outline and highlight a person based on values, starting from the manifestation of the body, of the culturally outlined biological, of a basic vitality in relation to which other human achievements are harder to imagine.

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# PROMOTION AND IMPLEMENTATION OF PHYSICAL SPORTS ACTIVITIES THROUGH EDUCATIONAL EXCHANGES BETWEEN TEACHERS AND STUDENTS

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**Abstract**

Practicing sports physical activity is an important element in maintaining a good health of the population. The quality of life of the population of any age can be greatly improved by following a balanced way of life that contains a proper diet, but also independently or organized sports physical activity. In order for the population to act consciously, it is important the presence of the specialists who guide and direct the process of changing the existing harmful habits (incorrect feeding, sedentarism, etc.). We mention that sedentarism and incorrect nutrition determine, over time, the appearance of a functional and somatic imbalance that will subsequently lead to the appearance of degenerative diseases. Thus, it is important for trainers with expertise in the field to lead the process of improving the quality of life. The study undertaken, meets this social need by creating informal and non-formal educational exchanges between trainers and which aim to implement the strategies and solutions resulting from these meetings. The research was carried out in partnership with the State University of Physical Education and Sport in Chisinau, Republic of Moldova and Alexandru Ioan Cuza University in Iași, Faculty of Physical Education and Sport. During the study there were 10 educational exchanges between teachers and 10 educational exchanges between students from the two institutions. These were of a theoretical and mainly practical nature. The applied educational exchanges consisted in the teachers' actual involvement in the project's sports and social activities (sports activities, ecological camps, development of social initiatives).

Results: 10 educational exchanges between teaching staff attended by 58 teaching staff, 23 from Romania and 35 from the Republic of Moldova; 10 educational exchanges between students. Participants in the activities were 78 students, 59 from the Faculty of Physical Education and Sports from "Alexandru Ioan Cuza" University of Iași and 28 from the State University of Physical Education and Sports from Chișinău, the Republic of Moldova. Following the educational exchanges, the trainers (teachers and students) promoted, organized and coordinated physical sporting activities, ecological camps, sports festivals for the local community in both cities (Iasi and Chisinau).

*Keywords: Sports activities - health - promotion – trainers*

## Introduction

The physical sports activities offer a great variety of means through which the aim is to reach objectives set according to the area of interest. Thus, the sports activities have the content structured for different age levels and social needs, namely: physical sports activities for preschoolers, for small school children, for children, for adolescents, for adults, for persons of the third age, for persons with special needs, for persons with specific aptitudes for certain sports branches. They have as common objective, the maintenance, the obtaining of an optimal state of health as well as the prevention of the appearance of deficiencies, of the obesity and the degenerative diseases, determined by vicious positions, sedentarism and the appearance of the problems determined by the aging of the organism.

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The level of development of a society is largely determined by the health of the population that composes it, through productivity at work, the quality of social relations, etc. Involvement in practicing sports physical activities adapted to age and physical possibilities, is one of the best decisions for improving general health. Although physical activity requires will and physical exertion, the benefits obtained from practicing them are much greater in the long term for health. Regularly practicing sports physical activity can prolong life, improve the quality of life, decrease the risk of cardiovascular disease, diabetes, cancer, osteoporosis and is also an important component in body weight management. What remains a challenge is the successful promotion of regular physical activity in a predominantly sedentary population (Graham, Nhi, Hank, 2017). In order to maintain an optimal state of public health, there is a need for approaches that include strategies aimed at changing the individual behavior regarding the way of life, which consists in the regular practice of physical sports activities, as well as the change of eating behavior.

Education plays a very important role in the formation of habits and habits of practicing physical sporting activities among the members of the local communities. Professor Mărgineanu (1999), in one of his studies on the structure of personality in terms of individual differences and the differences between adaptive and social integration capacities, emphasized that the intelligence of our conduct and the chances of integration depend decisively "on the organization of our culture and intellect" and "this culture valorized by intellectual organization must be seen in behavior, not only in the storage of information and knowledge", says Professor Salade (2000). Thus, Cristea emphasizes that "behavior management orientates the attitudinal and aptitude resources of the personality and their full exploitation within open interindividual relations, perfectable in different social environments" (1996, p. 11).

Sports physical activity also requires an approach to the implementation of primary prevention. There are studies that demonstrate the benefits and beneficial influence of sports physical activity and on mental health at different ages and especially in adolescence. Adolescent mental health problems represent a global public health problem, with increasing burden of disease (Whiteford, Degenhardt, Rehm, Baxter, Ferrari, Erskine, 2010). Although adolescents have fewer clinical mental illnesses than adults, their mental well-being should not be overlooked, as many adult mental disorders originate in childhood (Johnson, Roth, Schultz, Breslau, 2006). With regard to sedentarism, for example, employees working in IT are exposed to a dangerous level of sedentary work. To promote the health of sedentary workers, interventions are needed that integrate elements of health promotion and health protection (Lucas, Carr, Christoph, Sharon, Nathan, Benzo, 2016).

Arguing the importance of the physical sports activities through the exposed ones, we ask the question of the necessity of promoting them, an aspect that we will discuss during the proposed study. The usefulness, the necessity and the way of practicing these activities are learned in the training framework in the physical education discipline and it is realized by specialists with training in this field. Contrary to the long-term educational process (12 years), we are confronted at the level of the Romanian society with an acute lack of knowledge regarding the way of practicing sports physical activities, as well as awareness of the population regarding the usefulness of the presence of these activities in daily life. every day. Due to these inconsistencies, it is necessary to supplement the information of the local communities by promoting sports physical activities and the benefits obtained from practicing them.

In this study, we set out to highlight that through the collaboration between students and teachers from the faculties of profile, they will be able to achieve the promotion of physical sports activities among the local community where they come from. The communication, the establishment of the implementation strategies are means by which, the teachers and students from the faculties with the specialization Physical Education and Sport, will inform the local community about the benefits of the physical sports activities and will demonstrate by practical activities the way to practice them.

## Research methods

The research methods used in the study were the specialized literature analysis method, the observation method and the survey method. Analyzing the specialized literature, we can say that at national level there are relatively few documents to support the promotion of physical sports activities in order to maintain the health status and to consolidate it. This phenomenon is also explained by the fact that the discipline of physical education and sport within the training framework has the role of transmitting information and of forming skills and habits so that physical sporting activities are part of the daily program and thus lead to a higher quality of training. life. The

method of analyzing the specialized literature was also used for the purpose of evaluating the level of documentation of the field and highlighting new research directions for solving the exposed problem. The observation method was used throughout the study, both directly and indirectly. With this method, the behavior of the population from the local community from the two partner countries / cities (Romania and the Republic of Moldova / Iași and Chisinau) was monitored. Through the survey method, the people from the local community were interviewed, so we gathered information on their level of information regarding the practice of physical sports activities and if they practice frequently.

**Research methodology**

Two universities, Alexandru Ioan Cuza University from Iași, the Faculty of Physical Education and Sport and the State University of Physical Education and Sport from Chisinau, Republic of Moldova participated in this study. For the implementation of the study, we initially proposed to take part in the following number and categories of subjects: 250 students and 25 teachers from the two universities, 5 persons with disabilities and 234 members of the local community from Romania and the Republic of Moldova with age. between 26 and 65 years.

The study undertaken meets the social needs regarding maintaining and strengthening the state of health, by creating informal and non-formal educational exchanges between trainers and students and aimed at implementing the strategies and solutions resulting from these meetings. The research was carried out in partnership with the State University of Physical Education and Sport in Chisinau, Republic of Moldova and Alexandru Ioan Cuza University in Iași, Faculty of Physical Education and Sport. During the study there were 10 educational exchanges between teachers and 10 educational exchanges between students from the two institutions. These were of a theoretical and mainly practical nature. The educational exchanges carried out consisted of the effective involvement of the teachers in the social activities of the project (sports activities, ecological camps, development of social initiatives, etc.). The educational exchanges between teachers and students were carried out in a non-formal - informal setting, and their selection was made according to their desire to involve them in solving the exposed problem.

Strategies to promote sports physical activities were analyzed and organized within the educational exchanges that were organized over the weekend and were called weekend-schools, as these activities were carried out at the end of the week to allow the partners to move. In order to determine the local population to participate in the proposed activities, the students, the teachers involved and the implementation team designed leaflets through which information was transmitted on the activities that will be carried out and the benefits obtained from their practice, the promotion of physical activities through mass channels. media (radio and television), website, etc.

During one year, the activities proposed by the implementation team to promote a healthy lifestyle, were: 10 educational exchanges between teachers, 5 educational exchanges between students, 2 round tables, 19 physical sports activities carried out in Romania (10) and in Republic of Moldova (9), two ecological camps and a festival in Romania. The activities were organized and carried out by students and teachers, who also have the role of involving the population in the local community in both countries involved. The following sports activities were carried out within the 18 physical sports activities: sports games (football, handball, basketball,), dance, gymnastics, wrestling, sambo, swimming, skiing, sports activities specifically for people with disabilities, etc.

The ecological camps aimed at greening some spaces / locations in the areas involved in the project and carrying out physical sports activities.

The festival to promote the practice of physical activities in a healthy environment, contained a show of sports activities.

The beginning of the physical sports activities was launched by the participating students (from Romania and from the Republic of Moldova), with specific demonstration activities, and then participants from the local community were involved, receiving indications, recommendations and support from the students.

Students, teachers and members of the local community participated in the ecological camps, promoting the idea of practicing sports physical activities in an ecological and healthy environment.

The HES Festival (Health, Environment, Sport) was a show organized by students, teachers and the implementation team through which the idea of movement, health, well-being was promoted.

**Results and discussions**

As a result of the activities carried out, a much larger number of participants from the students, teachers and the local community was compared to the number initially proposed. This aspect demonstrates the effective involvement and communication of teachers and students in promoting sports physical activity and informing the local community members about the benefits of sports physical activities.

In table no. 1, the results materialized in the number of participants in the activities proposed within the project undertaken during one year are presented.

Table 1. Number of participants in the activities proposed to promote the practice of physical sports activities.

| Description | Target value | Achieved value |
|---|---|---|
| **Educational exchanges between 10 teaching staff from the Faculty of Sport of Al.I.Cuza University of Iasi and 10 teaching staff from the State University of Physical Education and Sport from Chisinau** | | |
| Number of teaching staff (10 teaching staff from Applicant and 10 teaching staff from the Moldovan partner) | 20 (10 Ro, 10 Md) | 58 teaching staff: 35 Md, 23 Ro, 29 from Md and Ro participated in several educational exchanges. 29 participated only once |
| Number of educational exchanges | 10 | 10 |
| **Educational exchanges between 30 students from the Faculty of Sport of Al.I.Cuza University of Iasi and 30 students from State University of Physical Education and Sport from Chisinau in 5 week-end schools.** | | |
| Number of students | 60 students 30 from the Applicant and 30 from the Moldavian partner | 87 students 52 Ro, 28 Md; 9 from Ro took part in several educational exchanges; 78 students participated only once |
| Number of week-end schools | 5 | 5 |
| **Developing social initiatives at cross-border level in ecological camps** | | |
| Number of students | 20 from the Applicant and 20 from the Moldavian partner | 89 students and teaching staff: 35 from Ro and 10 from Md, totally 45 for the first ecological camp and 38 from Ro and 6 from Md, totally 44 for the second ecological camp. |
| Number of ecological camps | 2 | 2 |
| **Organizing one cross-border festival HES – Health-Environment-Sport** | | |
| Number of students | 35 participants | 145 participants (85 Ro, 10 Md, 50 local community) |

| Description | Target value | Achieved value |
|---|---|---|
| Number of HES Festivals | 1 | 1 |
| **HES information caravan in Iasi county and Chisinau city** | | |
| HES caravans | 8 (6 in Iași and 2 in Chișinău) | 8 (6 Ro and 2 Md)<br>53 students (Ro) + 29 students (Md) |
| mass media featurings | 18 | 18 |
| **Completion of 18 sport contests offered to students and local community members from the cross-border area** | | |
| number of sport contests | 18<br>18 in Romania 18 in the Republic of Moldova | 19<br>19 (10 in Romania and 9 in the Republic of Moldova) |
| number of participants in every contest | 20 participants X 18 sport contests | 1.In Md 66xsport contests,<br>2.In Ro 87xsport contests,<br>3.In Ro 72xsport contests,<br>4.In Md 59xsport contests,<br>5. In Md 72xsport contests,<br>6.In Ro 65xsport contests,<br>7. In Md 85xsport contests,<br>8. In Ro 48xsport contests,<br>9. In Md 100xsport contests,<br>10.In Ro 57xsport contests,<br>11.In Ro 51xsport contests,<br>12.In Md 55xsport contests,<br>13. In Ro 50xsport contests,<br>14. In Md 41xsport contests,<br>15. In Ro 46xsport contests,<br>16. In Md 50xsport contests,<br>17. In Ro 43xsport contests,<br>18. In Md 50xsport contests,<br>19. In Ro 46xsport contests.<br>Total = 1143 participants |
| mass media featurings | 18 | 18 |
| **Round table meeting with experts in sport activities for the design of bilingual practice guide book** | round table | Round table with 14 participants, 6 from Ro and 8 from Md<br>Round table with 14 participants, 10 from Ro and 4 from Md |

As a result of the activities presented and the results obtained and represented in the table, we consider that the actions are required to be continued within the universities but also within similar projects. It is found that the proposed activities require support from specialists in the field.

**Conclusions**

During the course of the project it was found that the members of the local community, in the majority of cases, do not have information on the correct and regular practice of sports physical activities, as well they do not know what are the benefits that can be obtained from practicing sports physical activities.

The students from the two universities have benefited from the effective involvement in the promotion of sports physical activities and implicitly in the practical participation with the local community, so they have developed specific skills for organizing and promoting such activities.

The teachers who participated in the educational exchanges collaborated effectively with the students, creating a beneficial partnership for the promotion of physical sports activities among the local community.

The two partner universities support the promotion of physical sports activities for any social category and encourage the local community to request support for the development of activities that promote the maintenance of health and by practicing physical physical activities.

We propose the involvement of the health specialists and the collaboration with the specialists in the field of sport and physical education in order to prevent various diseases and deficiencies as well as to maintain an optimum state of health.

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# STUDY ON DYNAMICS OF SWIMMING SPEED IN RELATION TO AGE, IN BUTTERFLY MEN EVENTS, IN MASTERS SWIMMING

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**Abstract**

***Introduction***. Competitive activity is one of the directions in wich the practice swimming by adults is directed. In masters swimming competition, the participants compete in age groups of 5 years, from 25 years: 25-29 years, 30-34 years, 35-39 years, etc. Butterfly as a swimming style, is a spectacular and difficult, participation in butterfly distance requiring a good specific training. In this study, we analyze the dynamics of swimming speed in relation to age, in butterfly masters men events (50 m, 100 m, 200 m). ***Material and method***. In order to carry out this study we analyzed the best 10 times obtained by the master swimmers, in a long swimming pool, for the following butterly events: 50 m, 100 m, 200 m. ***Results***. By calculating the reference speed in the 50 m men butterfly event, for each age group, we obtained a set of 16 values. The maximum speed was 2.07 m / s (00: 24.18 min:sec,hun ; age category 25-29 years) while the minimum speed was 0.40 m / s (02: 06.36 min:sec,hun, age category 95-99 years). The average of the 16 values of the reference speed, in the 50 m men butterfly event , is 1.59 m / s, which corresponds to a time of 00: 38.70 (min: sec,hun). ***Conclusions***. According with the results obtained in this study, we can state that, in butterfly events, the speed of movement decreases with age

*Keywords: age, butterfly, masters, speed, swimming.*

## 1. Introduction

Sports activity, which can be viewed with an interdisciplinary character, is over time in terms of care, care that takes place after a special dynamic, still remaining the most outstanding specialists (Stoica, 2013).
This process of rapid development is caused by discovery in the biological sphere (physiology of effort, recovery techniques, biomechanics), in the field of specialized pedagogy (training methods and techniques, conditions, forms of organization) and in the field of psychology (psychodiagnosis, psychotherapy, sociology) (FRNPM, 2009-2012).

Each individual has its own dynamic behind it. There is not always a perfect correlation between chronological age and motor possibilities. All this is necessary to apply the principles of individualization (Vasile, 2013).

The Masters Swimming movement involves adults who practice swimming as a hobby, the interest in swimming might be different, the main reasons being related to the benefits of swimming on the individuals (FINA, Rules, 2019).

The Masters Swimming competitions are regulated at an international level by the FINA (Federation Internationale de Natation) and by the LEN (Ligue Europeenne de Natation). The Swimming Masters competitions are divided in age groups starting at the age of 25, as follows: 1st cat. 25-29 years , 2nd cat. 30-34 years, 3rd cat. 35-39 years etc. ; the last category, 10th cat. , is the one that corresponds to the interval 95-99 years (FINA, 2019).

The butterfly stroke is one of the most spectacular and at the same time the most difficult of all four strokes. Taking into account the difficulty of the butterfly events, in this paper we wish to present a study concerning the dynamics of the speed of swimming in the butterfly events, depending on the age category (Plăstoi, 2008).

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## 2.Assumptions and objectives

The hypothesis from which we started to carry out the present paper was that the speed of swimming decreases with age.

The objectives pursued in this study were the following:

- to calculate the reference speed for all masters age categories in the butterfly events;
- to evaluate the dynamics of the reference speed according to the event and the age category of the masters;
- to compare the dynamics of the reference speed obtained by age categories, according to the event.

## 3.Materials and methods

In order to carry out this study we analyzed the best 10 times obtained by the master swimmers, in a long swimming pool, for the following butterly events: 50 m, 100 m, 200 m (FINA, A lifelong passion, 2019).

The reference speed for each age category was calculated as the average of the best 10 times for that specific category. By reasons of calculus simplification we supposed that the speed is constant and uniform and it was calculalted by dividing distance by time.

## 4.Results

By calculating the reference speed in the 50 m men butterfly event, for each age group, we obtained a set of 16 values. The maximum speed was 2.07 m / s (00: 24.18 min:sec,hun ; age category 25-29 years) while the minimum speed was 0.40 m / s (02: 06.36 min:sec,hun, age category 95-99 years). The average of the 16 values of the reference speed, in the 50 m men butterfly event , is 1.59 m / s, which corresponds to a time of 00: 38.70 (min: sec,hun).

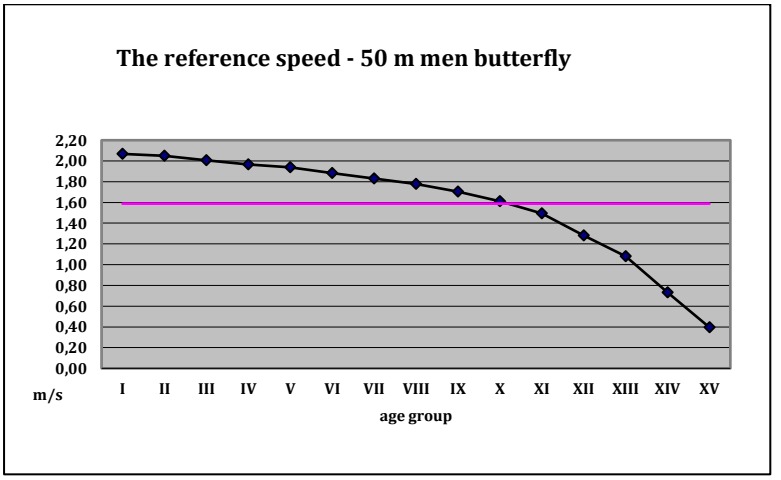


Fig. 1. Reference speed in the 50 m men butterfly event regarding the age group.

The reference speed decreases constantly, with differences between cosequent categories of maximum 3%, up to the age category 60-64 years, interval in which the reference speed represents approximately 86% of the maximum reference speed. The decrease in the reference speed is accentuated in the following age categories , with differences between consecutive age categories ranging from 3% to 6%, up to the 75-79 age category. In this age category the reference speed is about 72% of the maximum reference speed. For the following age categories the reference speed continues to decrease, with differences between consequent age category between 10% and 17%, up to the age category 95-99 years old. The reference speed at this age being about 19% of the maximum speed.

By grouping the reference speed values, according to the percentage values and the maximum reference speed, we obtain the graph ilustrated in figure 2. In the range 100-80% there are 9 values of the reference speed. The difference between consecutive age groups in this range being between 0.8% and 3.6%.

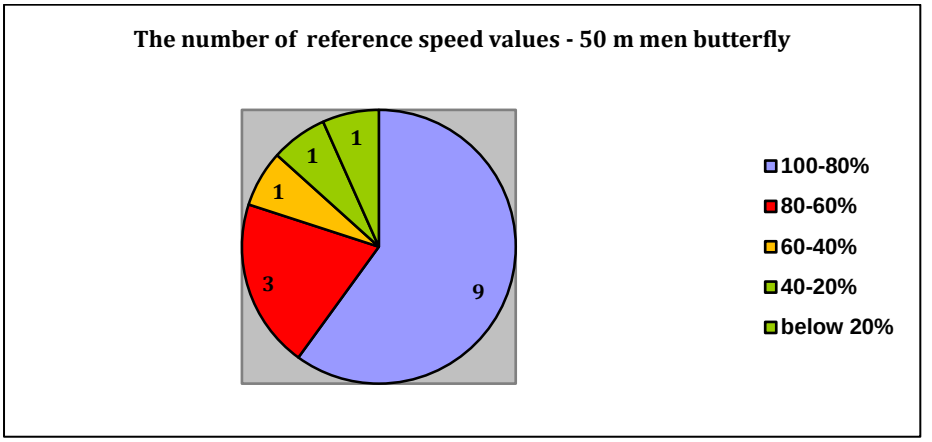


Fig. 2. Number of reference speed values, in percentage intervals, in the 50 m men butterfly event.

In the range 80-60% there are 3 values of the reference speed, the difference between the consecutive age categories in this interval ranges between 4.5% and 10.3%. In the intervals 60-40%, 40-20% and below 20%, a single value is included in each interval and the difference between consequent age categories ranges between 9.7 and 16.9%. By calculating the reference speed in the 100 m men butterfly event, for each age group, we obtained a set of 15 values; the maximum speed being 1.84 m / s (00: 54.31 min: sec, hun; age category 25-29 years), and the minimum one 0.34 m / s (04: 50.89 min: sec,hun ; age category 95-99 years). The average of the 15 values of the reference speed, in the 100 m men butterfly event, is 1.36 m / s, which corresponds to a time of 01: 32.71( min: sec, hun).

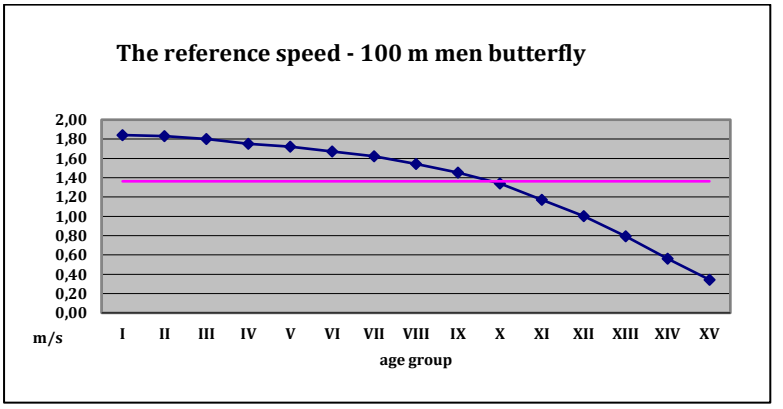


Fig. 3. Reference speed in the 100 m men butterfly event, according to the age category.

The reference speed decreases constantly, with differences between consecutive categories of maximum 3%, up to the age category 55-59 years. In this interval the reference speed represents approximately 88% of the maximum reference speed. The decrease in the reference speed is accentuated in the following 3 age categories, with differences between consecutive age groups ranging from 4% to 7%, up to the category 70-74 years. The reference speed at this age category being about 72 % of maximum reference speed. For the following age categories the reference speed continues to decrease with differences ranging from 9% to 13%, up to the age category 95-99 years. The reference speed at this age being about 18% of the maximum reference speed. By grouping the reference speed values according to the percentage values and the maximum reference speed, we obtain the graph in figure 4. In the 100-80% interval, there are 8 values of the reference speed. The difference between consecutive age categories in this interval is between 0.5% and 4.2%.

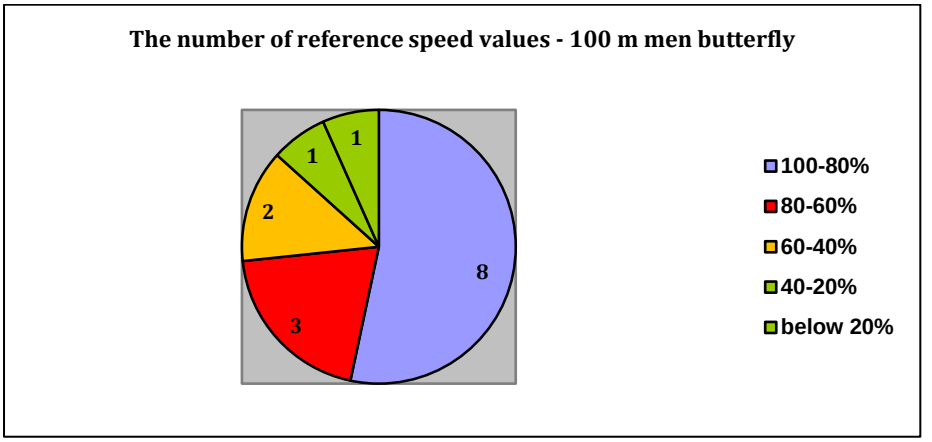


Fig. 4. Number of reference speed values, in percentage intervals, in the 100m men butterfly event.

In the 80-60% interval, there are 3 values of the reference speed. The difference between consecutive age categories in this interval ranges between 4.8% and 9.2%. In the 60-40% interval, there are 2 values of the reference speed and the difference between consecutive categories ranges between 9.2% and 11.3%. In the intervals 40-20% and below 20% there is a single value in each interval, the difference between consecutive categories being between 11.7 and 12.6%.

By calculating the reference speed in the 200 m men butterfly event, for each age category, we obtained a set of 15 values. The maximum speed was 1.59 m / s (02: 05.17 min: sec,hun; age category 25-29 years), and the minimum speed was 0.25 m / s (12: 56.47 min: sec,hun; age category 95-99 years). The average of the 15 values of the reference speed, in the event of 200 m men butterfly, is 1.15 m / s, which corresponds to a time of 03: 51.03 (min: sec,hun).

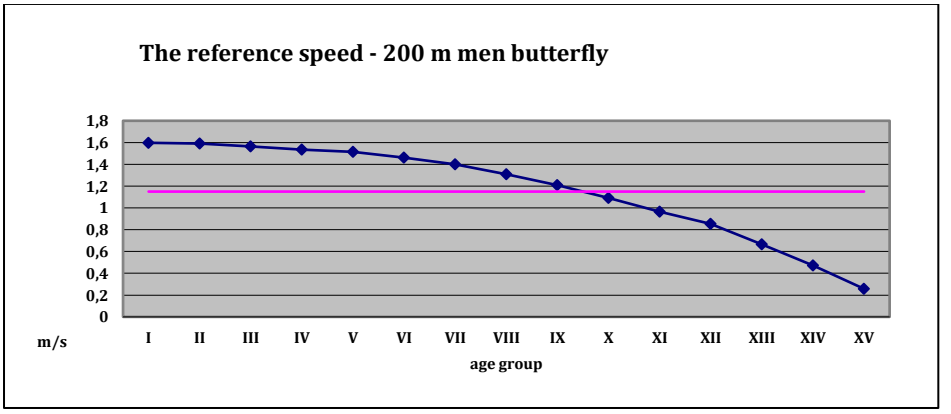


Fig. 5. Reference speed in the 200 m men butterfly event, according to the age category.

The reference speed decreases constantly, with differences between consecutive categories of maximum 4%, up to the 55-59 years of age category. In this age category the reference speed represents approximately 87% of the maximum reference speed. The decrease of the reference speed is accentuated for the following 5 age groups, up to the 80-84 age category, with differences between consecutive age categories ranging from 5% to 8%. The reference speed at this age being about 53 % of maximum reference speed.

For the following age categories the reference speed continues to decrease with differences in consecutive categories ranging from 11% to 14%. In the age category 95-99 years old, the reference rate is about 13% of the maximum reference speed. By grouping the reference speed values, according to the percentage values and the

maximum reference speed, we obtain the graph presented in figure 6.

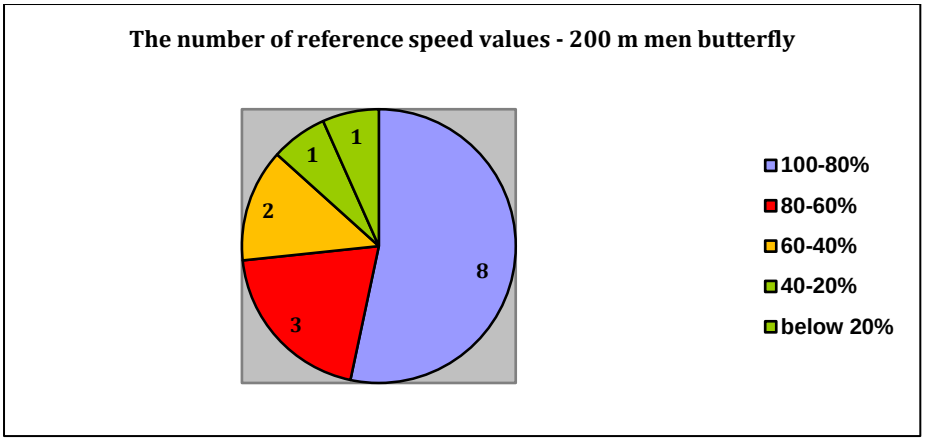


Fig. 6. Number of reference speed values, in percent intervals, in the event of 200 m butterfly.

The 100-80% interval includes 8 values of the reference speed, the difference between consecutive categories in this range is between 0.4% and 5.7%. In the 80-60% interval,there are 3 values of the reference speed. The difference between consequent categories in this interval ranges between 6.2% and 8%.

The 60-40% interval includes 2 values of the reference speed and the difference between consecutive categories was between 7% and 11.7%. In the intervals 40-20% and below 20% there is a value in each interval. The difference between consecutive categories ranges between 12.1% and 13.3%.

**5.Discussions**

In 1975 there was a study conducted in US, where the times obtained by the masters swimmers were compared. It showed that the swimming speed decreases by about 1% per year, until the age of 57.5 years. In the same study it was stated that the speed in the butterfly stroke decreases by 1.47% per year (Rahe, 1975).

Another study ,published in 2010, analyzed the effects of aging in masters swimming. It stated that after 70 years the speed of swimming drops exponentially, in both women and men events (Rubin, 2010).

In order to compare the speed decreasing trend for speed according to the age and the length of each swimming event, we designed fig. 7, which represents the speed curve for each of the three analysed sporting events (50 m, 100 m, 200 m men butterfly).

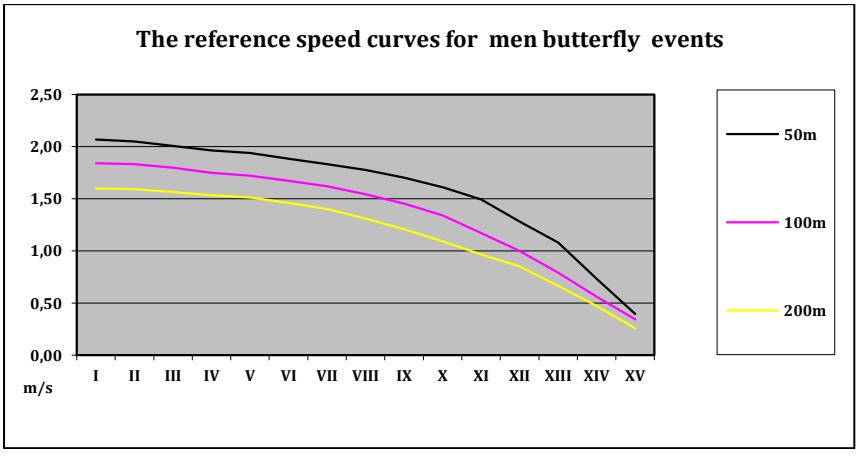


Fig. 7. Reference speed curves for men butterfly events acording to age category.

By analyzing the obtained curves, we can observe that the concavity of each curve accentuates if the event is of a shorter lenght. On the other hand, speed values are more similar for higher age groups.
In order to observe the decrease level for the reference speed depending on the swimming distance, we can analyze the amplitude of these values for each event. (Fig.8).

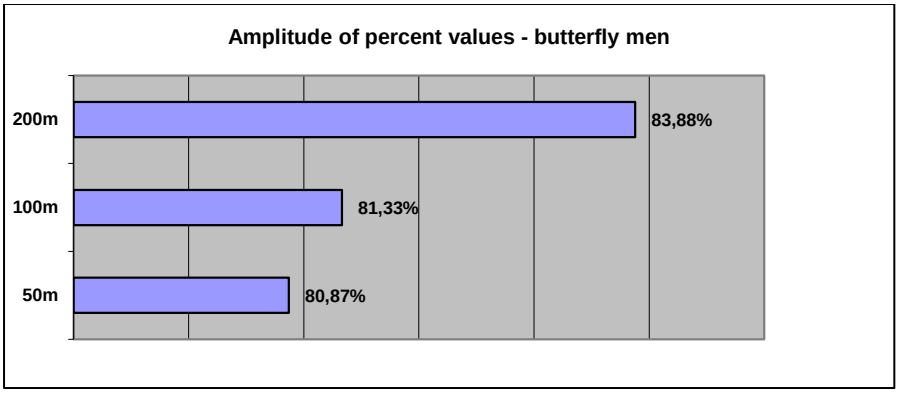


Fig.8. Amplitude of percent values for reference speed in butterfly men events.

We observed that for the 50m event the amplitude for reference speed value was 80.87%, for the 100 m event it increased up to 81.33% meanwhile for the 200 m event it increased even more, up to 83.88%.

**6.Conclusions**

According with the results obtained in this study, we can state that, in butterfly events, the speed of movement decreases with age. It reaches 80% of the maximum value, between 60 and 69 years and decreses between 80% and 60%, at ages between 70 and 79 years. After 85 years the speed decreases up to 16% to 53% of the maximum speed.

Regarding the values of speed according to age and type of event, we can state that it decreases more abruptly for older age in shorter distance events. Following the study, we propose a set of approximate values for swimming speed, according to age and type of event, in order to improve the training of masters swimmers by establishing achievable performance goals, which can be reached in butterfly events for masters age categories (table 1).

Table 1. Percentage values for swimming speed –Butterfly men

| | Butterfly events | | |
|---|---|---|---|
| Age group | 50m | 100m | 200m |
| 25-29 | 100% | 100% | 100% |
| 30-34 | 99% | 99% | 99% |
| 35-39 | 97% | 97% | 97% |
| 40-44 | 95% | 95% | 95% |
| 45-49 | 94% | 94% | 94% |
| 50-54 | 91% | 91% | 91% |

| Butterfly events | | | |
|---|---|---|---|
| Age group | 50m | 100m | 200m |
| 55-59 | 89% | 89% | 89% |
| 60-64 | 86% | 86% | 86% |
| 65-69 | 82% | 82% | 82% |
| 70-74 | 78% | 78% | 78% |
| 75-79 | 72% | 72% | 72% |
| 80-84 | 62% | 62% | 62% |
| 85-89 | 52% | 52% | 52% |
| 90-94 | 35% | 35% | 35% |
| 95-99 | 19% | 19% | 19% |

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# UPPER AND LOWER LIMB ASYMMETRY IN MALE AND FEMALE VOLLEYBALL PLAYERS

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**Abstract**

**Study aim:** To determine the level of asymmetry of lower limb stability using the Y Balance Test for male and female elite volleyball players. Also, parameters for mobility and rotation force have been measured in both shoulders of the players, in order to determine the asymmetry at this level. **Material and methods:** A total of 20 volleyball players (n=20), 10 males and 10 females, from the Romanian first league have been tested in order to determine the level of asymmetry of their lower and upper limbs. For the lower limbs, we measured unilateral stability using the Y Balance Test and the composite reach distance (CRD) was calculated for both legs. Mobility of the shoulder was measured for flexion, extension, internal and external rotation using the goniometer. Force was also measured in the case of internal and external rotation of the shoulder using a digital dynamometer. **Results:** Female volleyball players (right CRD=101.81 %, left CRD=101.18 %) had a better composite reach distance than male players (right CRD=89.69 %, left CRD=89.76%). The fact that the male CRD is lower than 100% implies that the tested males are more exposed to lower limb injuries. There were no significant differences between the lower limb stability in the tested lot. Surprisingly, males had better values for shoulder flexion and extension. In the case of rotational force, females displayed a mean of 15 kgf, for both shoulders, whereas in males we had a mean of 23 kgf with a 1 kgf difference between the right and left shoulder.
**Conclusions:** There is no statistically significant asymmetry in neither upper or lower limbs of the tested volleyball players.

*Keywords:* volleyball; asymetry; stability; shoulder; lower limbs;

## 1. Introduction

Volleyball is an "overhead" type of sport where, except for the bump pass, the contact with the ball takes place above the head. This repetitive process, subjects the shoulder joint and the adjacent muscle groups to high mechanical stress, eventually leading to overload trauma. Common lesions encountered at this level are rotator cuff and impingement syndrome. A major factor in the trauma of the rotator cuff is the imbalance between the internal and external rotators of the shoulder (Ilinca, Avrămescu, Călina, & Mangra).

Limitation of mobility, muscular imbalance, and scapular asymmetry were found at the level of the dominant arm of elite volleyball players in a study by Wang in 2001. Athletes with imbalances of internal and external rotator muscles had a higher probability of showing pain. or shoulder injury. In the published article a program was recommended to maintain the balance both in the agonist and antagonistic muscles of the rotation of the shoulder and in close bilateral values (H-K Wang, 2001).

Another article from 2011 presents the asymmetry of explosive power in volleyball and basketball players. In this paper it is mentioned that a difference of more than 10-15% between the strength of the limbs is an indicator of the risk of injury (Fort-Vanmeerhaeghe, 2014).

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## 2. Purpose and objectives

The purpose of the study was to determine the level of asymmetry of lower limb stability using the Y Balance Test for male and female elite volleyball players. Also, parameters for mobility and rotation force have been measured in both shoulders of the players, in order to determine the asymmetry at this level.

The objectives were to measure parameters of lower limb stability and shoulder range of motion and force for comparing the dominant and nondominant limbs of first league volleyball players from Romania.

Research hypothesis: There are significant differences between dominant and non-dominant limbs of volleyball players.

## 3. Material and methods

The research took place in the two gymnasiums of the Faculty of Physical Education and Sport at the Western University of Timișoara during September 2017. The subjects that were included in this study were part of the following volleyball teams: UVT Agroland Timișoara, first league women team and CSU Universitatea de Vest din Timișoara, first league male team.

The female lot consisted in 10 players aged between 18 and 30 years with the following position distribution: 2 outside hitters, 3 middle blockers, 2 opposites, 2 liberos and 1 setter. The male selected players were aged 19 to 34 and had the next positions: 3 outside hitters, 3 middle blockers, 1 opposite, 1 libero and 2 setters.

A battery of tests was assembled for evaluating the players. Single testing was performed for each player and the values registered bilaterally were compared for asymmetry.

The YBT or Y balance test, shortened to YBT is part of the functional protocol of Functional Movement Systems screening and is used in the assessment of dynamic balance and functional symmetry to determine the risk of injury to a person or his ability to return to sports activity after an accident. This measurement method was developed by simplifying the Star Excursion Balance Test (SEBT). It evaluates the performance during unipodal balance while with the other leg the subject tries to obtain the highest reach values in the 3 directions: anterior, posteromedial and posterolateral (Walker, 2019). After performing the test, the Composite Reach Distance is calculated as follows:

$$\text{Composite reach distance} = \frac{anterior\ dist. + \ posterolateral\ dist. + \ mediolateral\ dist.}{lenght\ of\ lower\ limb\ \times 3} \times 100$$

This index is associated with the risk of injury. A value close to or below 90% indicates an increased risk of injury. Ideally, the value should exceed 100% (Shaffer, et al., 2013).

We also measured shoulder flexion/extension and external/internal rotation range of motion with the goniometer. Shoulder external and internal rotation force was measured for both arms using the Chatillon hand held dynamometer.

## 4. Results

The results were introduced in summary tables and graphically represented. For the statistical analysis, the software GraphPad Prism 6.01. As statistical indicators we calculated the mean and standard deviation. T test was used for verifying the existence of significant statistical differences between the means of the analyzed parameters.

Y balance test

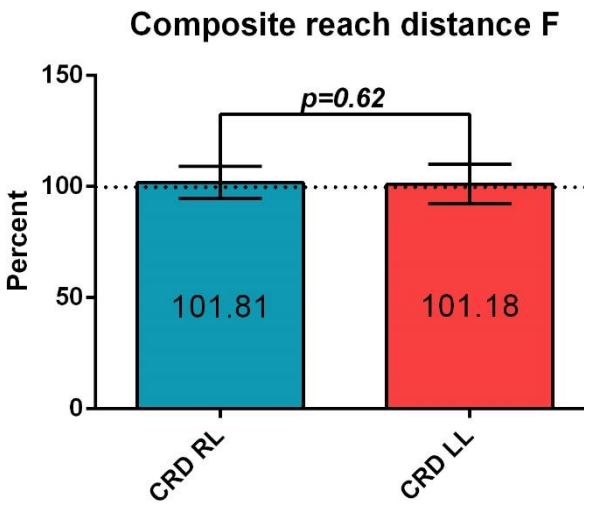


Fig. 1. Female composite reach distance

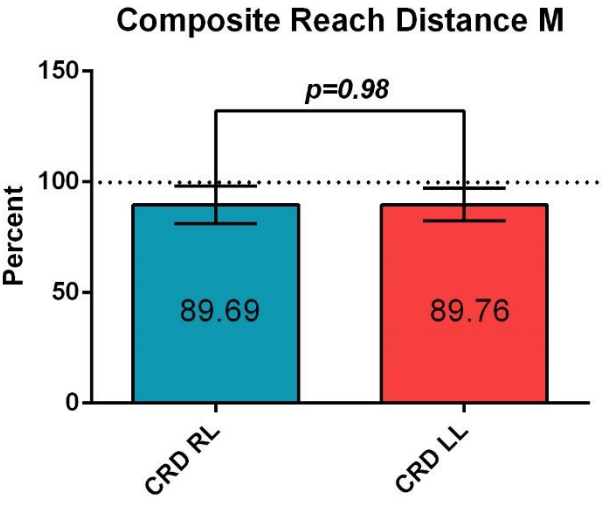


Fig. 2. Male composite reach distance

As we can see from the two charts, the CRD value of the subjects in the women's team is a normal one. The same cannot be said for the men's team, where CRD is on average below 90% for both lower limbs. W e did not observe differences between the left leg and the right leg for the tested subjects. In conclusion, they have a high degree of symmetry in terms of stability in the joints of the lower limb. However, the value of CRD is worrying for male athletes. Although there is no imbalance between the lower limbs, the tested players are at risk of injury.

Shoulder flexion and extension range of motion

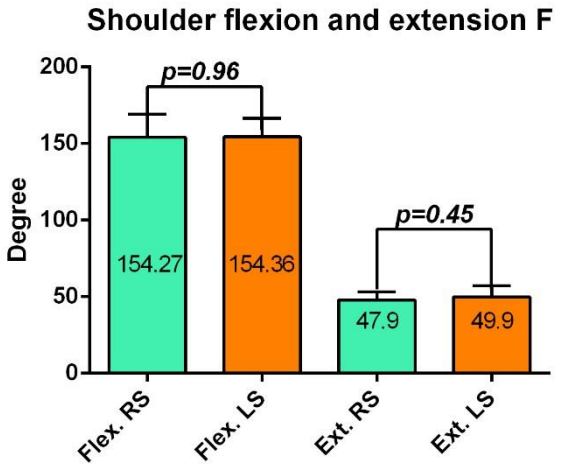


Fig. 3. Female shoulder flexion and extension ROM

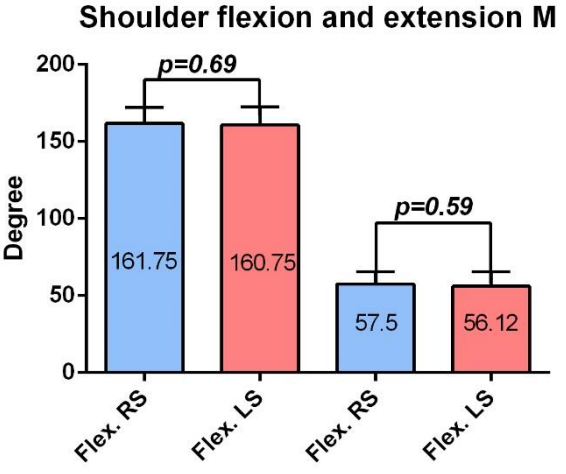


Fig. 4. Male shoulder flexion and extension ROM

We do not observe differences in the range of motion in the sagittal plane at the level of the right and left shoulder joints, respectively, from the measurements made ($p > 0.05$). The mobility of the left shoulder is slightly higher than of the right shoulder for female athletes, but this difference is not detectable, not exceeding the value of 2° (Fig. 3.). The values of left and right shoulder range of motion of male athletes are almost identical. There is a

maximum difference of 1° between the flexion and extension mean values for this joint. Surprisingly, we observe a higher level for the range of motion in the case of male players compared to female athletes.

Shoulder external and internal rotation range of motion

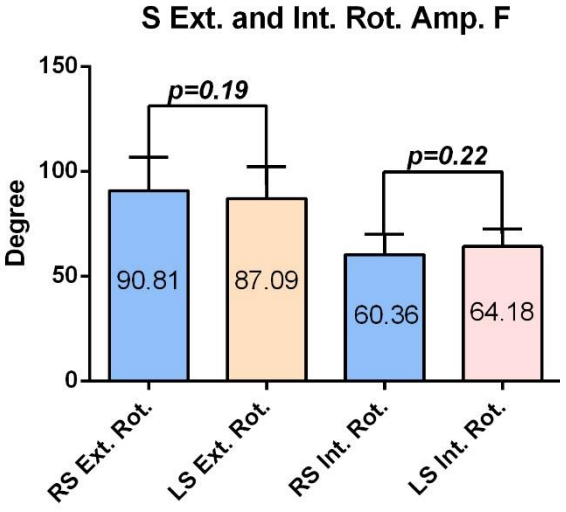


Fig. 5. Female external and internal rotation ROM

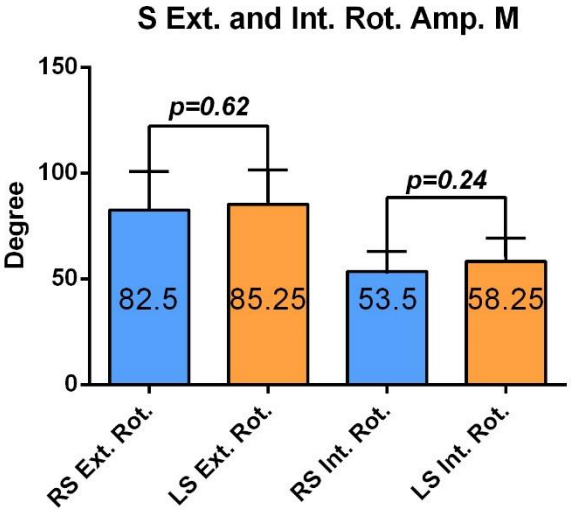


Fig. 6. Male external and internal rotation ROM

We did not observe significant differences in the amplitude of the internal and external rotation at the level of the shoulders of players of both sexes ($p > 0.05$), but we noticed a limitation of the internal rotation of the right shoulder of about 5°. In this chapter, the female athletes (Fig. 5.) recorded higher values of the amplitude of the movement compared to male athletes (Fig. 6.).

Shoulder external and internal rotation force

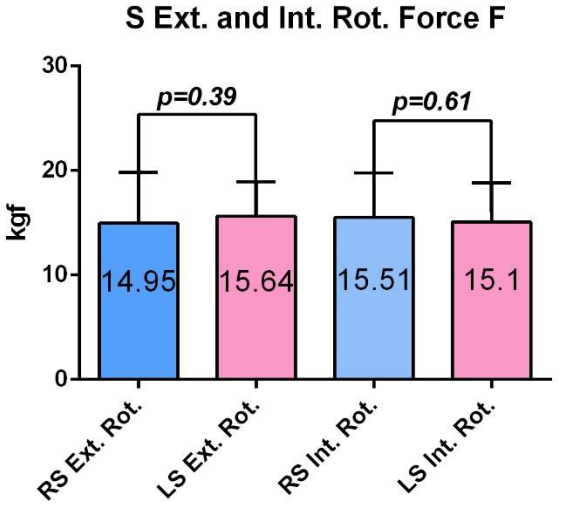


Fig. 7. Female shoulder external/internal rotation force

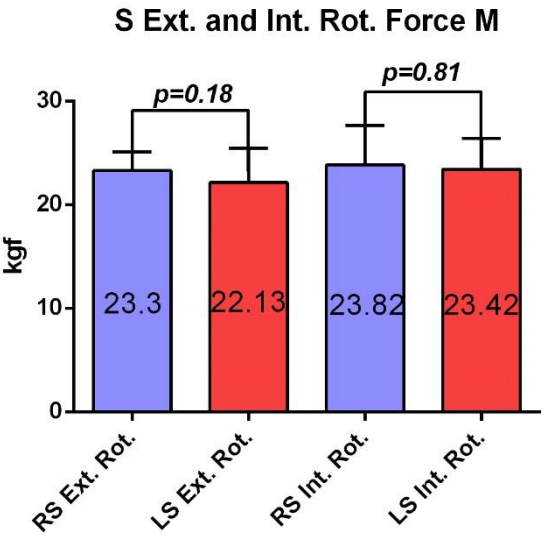


Fig. 8. Female shoulder external/internal rotation force

As with range of motion, there are small differences in force between internal and external rotation at the shoulders of measured male and female athletes, but these are not statistically significant ($p > 0.05$).

The same pattern is repeated in the case of the internal rotation force for both shoulders of the male and female volleyball players. No significant differences were obtained.

For female athletes, the force stalls around 15 kgf while men peak at 23 kgf. For male athletes the right shoulder is slightly stronger for both types of rotation.

**5. Discussions**

The need for an in-depth analysis of trauma in volleyball persists. Analyzing the literature, we begin to understand the mechanisms of accident occurrence and we must find ways to avoid these unpleasant events before they happen. It is no longer enough to recover from an accident, it should be fully prevented if possible, and if not, the chances of it occurring will decrease considerably. The time spent by a player recovering, time outside the playing field, can adversely affect the performance of the team.

Accident prevention measures should play an important role in training. Physical trainers and coaches should consider all the factors that influence the incidence of trauma and create the training plan accordingly. Unfortunately, the close surveillance of the athletes, the rigorous testing and monitoring of their somato-functional parameters is a topic that is little discussed in our country. Often, coaches feel that the time required for testing can be better utilized through training. Also, not all teams have the staff and equipment needed to conduct such an investigation constantly.

**6. Conclusions**

As a result of the research, the following conclusions were drawn:

The values recorded by the male group in the Y-Balance Test indicate a low stability in the lower limbs. Not the same can be said about the women's lot, which is approaching 100%. It is recommended to intervene with a program to improve stability for male athletes and maintain parameters for female athletes. The results obtained by us in the lower limbs for the two groups are not alarming, but it must be considered that we have not measured the actual

strength of the segments but only the stability. An improvement to the study could also be the monitoring of the force at this level.

Surprisingly, sagittal mobility of the shoulder is higher in male volleyball players, a fact most likely due to superior muscular strength.

The internal rotation does not differ significantly from one shoulder to the other, nor does the external rotation differ in both cases. However, we have differences between the internal and external rotation of the same arm, favoring the external rotation. This difference manifests itself bilaterally and therefore should not be considered abnormal.

If in the case of amplitude, we had differences between internal and external rotation, the same cannot be said about the force of the movements. In the case of females, the average is about 15 kgf and is constant for both shoulders at internal and external rotation. For male volleyball players as usual, the right shoulder is slightly stronger with about 1 kgf.

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# PSYCHOLOGICAL INFLUENCE ON SPORTS PERFORMANCE IN THE FOOTBALL GAME FOR THE YOUTHS BETWEEN 14-16 YEARS

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**Abstract**

**The football game succeeds by the day to gather more and more supporters, the attractiveness for this sport being known all over the world.** All these "praises" are due to the increased sports performance, they being implemented in the mindset of athletes since the junior years. The football game has succeeded to attract more and more researchers from the sports field, but also from other fields, such as the psychological field, bringing an increased sports performance (the training of athletes becoming more and more complete). It is known that at the age of 14-16, between puberty and adolescence, due to the better awareness of the undertaken actions, the children's emotional experiences are stronger and can play a decisive role in achieving the performance. A**im of the research** consists in determining the psychological influence on the motor one, to football players between 14-16 years old. M**aterials and methods**: the SPM psychological test, the Motivational Persistence Scale that helps us evaluate, with the items, the degree of motivational persistence and the speed and skill motor tests: sprint 30m in a straight line and the Arrowhead Agillity Drill test, to the right and left. , with ball and without ball, to determine the level of development of the motor qualities: speed and skill. **Conclusions:** The level of the athletes from a psychic point of view puts their mark on the results obtained in reaching the sports performance in the football juniors.

*Keywords:* Football game, performance, motor qualities, psychological level.

## Introduction

The performance in the football game amazes us every day with new records, self-relegation, s achieved performances, things that make the football game to become one of the most attractive sports (Enoiu, 2004).

In order to reach the highest peaks of football, it is recommended to start as soon as possible the training of the athlets, at 6, 7 years old, because this age of childhood is considered appropriate to start playing the football game (Georgeta, 1983).

"Being a social activity, in which citizents of all ages are involved, the football game represents a means of improving the physical skills, movement and skills specific to the football game." (Nețа, 2005)

At this age, both visual and mental images, help them the most to reproduce the movements, the actions, developing the motor qualities and the intellectual developments (Donos, 2012). Selection in sport is a complex phenomenon "which plays a priority role, in certain stages, having even a decisive (limiting or favorable) character" (Drăgan, 1979).

The analysis of the preparation process is becoming more complex, the researchers in the field of sport, but also in physiology, psychology fields, etc. form together a complex training that helps to increase the degree of success in achieving sports performance (Popovici, 2010). According to Alexe Mircea (2006), the interdisciplinarity, "is a conception, a paradigm that represents the answer to problems of major concern, bringing together researchers from the field and specialists from different specialties, engaged in a continuous effort to overcome the limits of human knowledge". Psychology plays a vital role in achieving sports performance and maintaining a high level of training (Christmas, 2014).

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By the simple presence of psychologists in football teams, we can realize the importance given to the psychological level of the athletes. By creating a psychologically favorable climate, we can offer the opportunity to reach goals faster and easier (Epuran, 2001).

In addition to interdisciplinarity, a very important role in the achievement of the performances has the quality of the training process, which must be selected, well established, optimal, according to the age particularities, the level of preparation of the subjects and the proposed objectives (Dumitrescu, 2011).

The training plan has an important role in achieving the sports performance, the attractiveness of the training, the overloading, the recovering after the effort, the occurrence of the over-training state, represent for children and not only, decisive factors in their evolution as athletes (Bompa, 2009).

One of the coaches' concerns is to prepare the football players in order to achieve a higher speed of play, the increased level of the coordinating capacities, being responsible for reaching or not, the maximum performance (Dragnea, 2002).

**Hypothesis**

The football game favors, by its both content and interdisciplinary, the development of the motor qualities, of the skills and moral-volitional qualities, thus creating a favorable environment for the harmonious physical and psychological development. In addition, it can create a favorable climate in order to achieve the sports performances.

**Purpose of the study**

The purpose of this study is to find that there are links between the level of motor qualities: speed and skill and skill and the psychological level of football players, juniors between 14-16 years old, the psychological level influencing the performances of the subjects in the tested sport's samples. We want to highlight the mental state and the level of the motor qualitie, establishing in that way, to what extent the performance is conditioned by the mental state of the athletes.

**Research methods**

The research consists of testing 20 football players, C juniors, born in 2004, legitimated by the Football Clubs University Cluj Luceafărul and Glass Arieșul Turda. In the first phase the psychological level of the athletes was tested by filling in the SPM questionnaire, and then the motor testing, using the control samples: speed in a straight line 30 meters (see image no. .2.), Arrowhead with no ball to the right, then to the left and arrowhead with ball to the right and left. (see picture 1.)

The Motivational Persistence Scale (SPM) envisages: Long Term Purposes Pursuing (LTPP), Current Purposes Pursuing (CPP), Recurrent Unattained Purpose (RUP), Motivational Persistence (P.M).

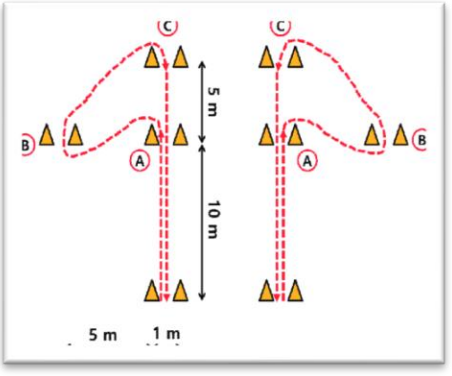


Fig.1. Arrowhead Agillity Drill

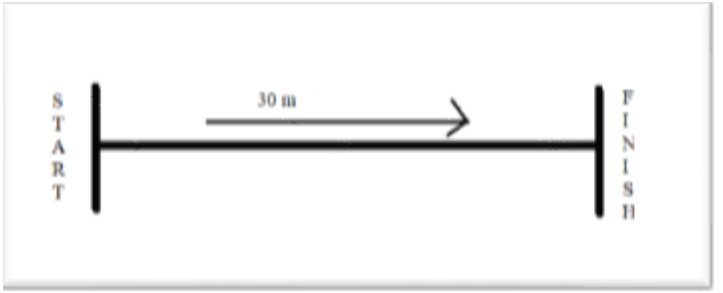


Fig. 2. Sprint 30 meters

**Results**

Table 1. Motor Testing – A.S. F.C. ARIEȘUL TURDA

| No. Crt. | First and last nick name | Speed 30m sec. | | Arrowhead | | | |
|---|---|---|---|---|---|---|---|
| | | | | No ball | | With ball | |
| | | I | II | I-Right sec. | II- Left sec. | I.Right sec. | II-Left sec. |
| 1. | B.E. | 4.75 | 4.74 | 8.72 | 8.93 | 12.34 | 11.32 |
| 2. | B.L. | 4.48 | 4.52 | 8.36 | 8.58 | 10.21 | 10.78 |
| 3. | B.A. | 4.60 | 4.57 | 8.71 | 8.88 | 13.00 | 11.50 |
| 4. | B.AN. | 4.62 | 4.69 | 8.77 | 8.79 | 11.37 | 11.71 |
| 5. | P.C. | 4.70 | 4.68 | 8.65 | 8.60 | 10.77 | 11.12 |
| 6. | C.A. | 4.40 | 4.47 | 8.51 | 8.81 | 11.58 | 11.68 |
| 7. | H.A. | 4.90 | 4.92 | 9.46 | 9.46 | 13.53 | 12.80 |
| 8. | L.M. | 5.15 | 4.92 | 9.63 | 9.66 | 11.88 | 13.40 |
| 9. | S.A. | 4.36 | 4.45 | 8.59 | 8.34 | 10.27 | 10.94 |
| 10. | N.B. | 4.25 | 4.26 | 8.21 | 8.17 | 10.31 | 9.91 |

Table 2. Motor Testing – A.S. F.C. ACADEMIA DE FOTBAL ”U” CLUJ-LUCEAFĂRUL

| No. Crt. | First and last nick name | Speed 30m sec. | | Arrowhead | | | |
|---|---|---|---|---|---|---|---|
| | | | | No ball | | With ball | |
| | | I | II | I-Right sec. | II-Left sec. | I-Right sec. | II-Left sec. |
| 1. | O.L. | 4.57 | 4.35 | 8.41 | 8.42 | 9.69 | 10.05 |
| 2. | G.V. | 4.05 | 4.17 | 8.32 | 8.23 | 10.62 | 11.32 |

| No. Crt. | First and last nick name | Speed 30m sec. | | Arrowhead | | | |
|---|---|---|---|---|---|---|---|
| | | | | No ball | | With ball | |
| | | I | II | I-Right sec. | II-Left sec. | I-Right sec. | II-Left sec. |
| 3. | C.I. | 4.36 | 4.38 | 8.35 | 8.23 | 10.20 | 10.20 |
| 4. | B.D. | 4.81 | 4.56 | 8.42 | 8.30 | 10.78 | 9.93 |
| 5. | C.R. | 4.47 | 4.63 | 8.50 | 8.20 | 10.81 | 11.54 |
| 6. | S.P. | 4.90 | 4.40 | 8.14 | 8.26 | 10.40 | 10.32 |
| 7. | W.C. | 4.17 | 4.30 | 8.20 | 8.03 | 10.05 | 10.30 |
| 8. | D.D. | 3.99 | 3.96 | 7.65 | 7.55 | 10.05 | 9.21 |
| 9. | C.C. | 4.36 | 4.45 | 8.40 | 8.11 | 10.20 | 10.00 |
| 10. | C.CL. | 4.72 | 4.60 | 8.45 | 8.40 | 10.51 | 9.90 |

Table 3. Test records S.P.M. ARIEȘUL TURDA

FACTOR ANALYSIS

| NO. CRT. | NAME OF THE PLAYERS | P.M. | S.P.M. L.T.P.P. | C.C.P. | R.U.P. |
|---|---|---|---|---|---|
| 1 | B.E. | 3- low | 2- v.low | 7-good | 2- v.low |
| 2 | B.L. | 3-low | 4-low | 4-low | 2- v.low |
| 3 | B.A. | 2-v.low | 2- v.low | 3-low | 1-v.low |
| 4 | B.AN. | 4-low | 5-medium | 5-medium | 4- low |
| 5 | P.C. | 8-good | 8- good | 5-medium | 7-good |
| 6 | C.A. | 2-v.low | 2- v.low | 3-low | 1-v.low |
| 7 | H.A. | 2- v.low | 5-medium | 2-v.low | 2- v.low |
| 8 | L.M. | 5-medim | 2- v.low | 8-good | 4-low |
| 9 | S.A. | 2-v.low | 2- v.low | 4-low | 2-v.low |
| 10 | N.B. | 3-low | 2- v.low | 5-medium | 2-v.low |

Table 4. Test records S.P.M. ”U” CLUJ-LUCEAFĂRUL

| FACTORY ANALYSIS | | | | | |
|---|---|---|---|---|---|
| | | | S.P.M. | | |
| NO. CRT. | NAME OF THE PLAYERS | P.M. | L.T.P.P. | C.C.P. | R.U.P. |
| 1 | B.E. | 3-low | 2- v.low | 7- good | 2-v.low |
| 2 | B.L. | 3-low | 4-low | 4-low | 2-v.low |
| 3 | B.A. | 2- v.low | 2- v.low | 3-low | 1-v.low |
| 4 | B.AN. | 4- low | 5-medium | 5-medium | 4-low |
| 5 | P.C. | 8- good | 8- good | 5-medium | 7-good |
| 6 | C.A. | 2-v.low | 2- v.low | 3-low | 1-v.low |
| 7 | H.A. | 2-v.low | 5-medium | 2-v.low | 2-v.low |
| 8 | L.M. | 5-medium | 2- v.low | 8-good | 4-low |
| 9 | S.A. | 2-v.low | 2- v.low | 4-low | 2-v.low |
| 10 | N.B. | 3- low | 2- v.low | 5-medium | 2-v.low |

Table 5. Test records S.P.M. ”U” CLUJ-LUCEAFĂRUL

| | | FACTORY ANALYSIS | | | |
|---|---|---|---|---|---|
| | | | S.P.M. | | |
| NO. CRT. | NAME OF THE PLAYERS | P.M. | L.T.P.P. | C.C.P. | R.U.P. |
| 1 | O.L. | 10-v.good | 10-v.good | 8-good | 10-v.good |
| 2 | G.V. | 1- v.low | 1- v.low | 4-low | 1- v.low |
| 3 | C.I. | 9-v.good | 9-v.good | 5-medium | 7-good |
| 4 | B.D. | 2-v.low | 2-v.low | 3-low | 1-v.low |
| 5 | C.R. | 2- v.low | 1- v.low | 4-low | 2-v.low |
| 6 | S.P. | 4-low | 6-medium | 2- v.low | 6-medium |
| 7 | W.C. | 1- v.low | 1- v.low | 3-low | 1-v.low |
| 8 | D.D. | 2- v.low | 3-low | 3-low | 2-v.low |
| 9 | C.C. | 9-v.good | 5-medium | 4-low | 10-v.good |
| 10 | C.CL. | 5-medium | 7-good | 6-medium | 8-good |

**Statistical results**

Speed 30 meters:

Team / lot no. 1. – Sticla Arieșul Turda;

Team / lot no. 2. – Universitatea Cluj Luceafărul.

In the statistical analysis of the speed values on the distance of 30m (30m) for unpaired tests, no statistically significant differences were observed between the two teams at the first repetition (T1) ($p > 0.05$) but statistically significant differences were observed between the two teams at the second repetition (T2) ($p < 0.05$).

In the statistical analysis of the speed values over the distance of 30m (30m) for paired samples, no statistically significant differences were observed between the two repetitions (T1 and T2) in any team. ($p > 0.05$).

Table 6. The testing of speed over a distance of 30m at the studied lots and the statistical significance

| Indicators | Team | Mean | ES | Median | DS | Min | Max | *Statistical significance (p)* | T1 - T2 |
|---|---|---|---|---|---|---|---|---|---|
| **30m T1** | **I** | 4.62 | 0.0853 | 4.61 | 0.2699 | 4.25 | 5.15 | 0.1834 | **Team I** |
| | **II** | 4.44 | 0.0992 | 4.42 | 0.3136 | 3.99 | 4.90 | | 0.973 |
| **30m T2** | **I** | 4.62 | 0.0664 | 4.63 | 0.2099 | 4.26 | 4.92 | **0.0177** | **Team II** |
| | **II** | 4.38 | 0.0647 | 4.39 | 0.2045 | 3.96 | 4.63 | | 0.3947 |

**Arrowhead Agility Drill test**

**To the statistical analysis of values** for **arrowhead agility drill test (Arrow):**

• for both teams I and II

o in the ball-free trial - no statistically significant differences were observed between the two sides, right and left: Arrow I vs Arrow II (p> 0.05)

o in the ball-to-leg test - no statistically significant differences were observed between the two sides, right and left: Arrow III vs Arrow IV (p> 0.05)

• between the two samples - without ball and with the ball at the foot, for group I and for group II

a statistically significant difference between the two samples, both to the right and to the left: Arrow I vs Arrow III (p <0.001) and Arrow II vs Arrow IV (p <0.001)

• between the two lots

a statistically significant difference (p <0.001) for the ball-to-right sample (Arrow I), for the ball-to-left sample (Arrow II) and for the ball-to-left sample (Arrow IV)

a statistically significant difference (p <0.05) for the right-foot ball sample (Arrow III).

Table 7. Arrowhead Agility Drill test on the studied teams and statistical significance

| Indicators | Team | Mean | ES | Median | DS | Min | Max | *Statistical significance (p)* | | Team I - Team II |
|---|---|---|---|---|---|---|---|---|---|---|
| **Arrow I** | **I** | 8.76 | 0.1421 | 8.68 | 0.4493 | 8.21 | 9.63 | **Team I, I-II** | 0.5423 | **I** |
| | **II** | 8.28 | 0.0787 | 8.38 | 0.2489 | 7.65 | 8.50 | **Team I, III-IV** | 0.9838 | **0.0029** |
| **Arrow II** | **I** | 8.82 | 0.1449 | 8.80 | 0.4583 | 8.17 | 9.66 | **Team I, I-III** | **0.0001** | **II** |
| | **II** | 8.17 | 0.0786 | 8.23 | 0.2486 | 7.55 | 8.42 | **Team I, II-IV** | **0.0001** | **0.001** |
| **Arrow III** | **I** | 11.53 | 0.3706 | 11.48 | 1.1721 | 10,2 | 13.53 | **Team II, I-II** | 0.1277 | **III** |
| | **II** | 10.33 | 0.1133 | 10.30 | 0.3582 | 9.69 | 10.81 | **Team II, III-IV** | 0.8276 | **0.0108** |
| **Arrow IV** | **I** | 11.52 | 0.3147 | 11.41 | 0.9950 | 9.91 | 13.40 | **Team II, I-III** | **0.0001** | **IV** |
| | **II** | 10.28 | 0.2166 | 10.13 | 0.6848 | 9.21 | 11.54 | **Team II, II-IV** | **0.0001** | **0.0045** |

Motivational Persistence Scale (SPM)

In the statistical analysis of the values for **the long-term pursuit of goals (LTPP), the pursuit of current tasks (CPP), the recurrence of unmet goals (RUP), the motivational persistence score (PM)**, no statistically significant differences were observed between the two groups (p> 0.05).

Table 8. Motivational Persistence Scale for the studied teams and statistical

| Indicators | Team | Meean | ES | Median | DS | Min. | Max. | *Statistical significance (p)* |
|---|---|---|---|---|---|---|---|---|
| **PM** | **I** | 3.40 | 0.6000 | 3 | 1.8974 | 2 | 8 | 0.8998 |
| | **II** | 4.50 | 1.1279 | 3 | 3.5668 | 1 | 10 | |
| **LTPP** | **I** | 3.40 | 0.6532 | 2 | 2.0656 | 2 | 8 | 0.7335 |
| | **II** | 4.50 | 1.0775 | 4 | 3.4075 | 1 | 10 | |
| **CPP** | **I** | 4.60 | 0.5812 | 4,5 | 18379 | 2 | 8 | 0.5823 |
| | **II** | 4.20 | 0.5538 | 4 | 1.7512 | 2 | 8 | |
| **RUP** | **I** | 2.70 | 0.5783 | 2 | 1.8288 | 1 | 7 | 0.4587 |
| | **II** | 4.80 | 1.2000 | 4 | 3.7947 | 1 | 10 | |

**Statistical correlation analysis between the values of the SPM items showed:**

**• at team I**

a very good and similar correlation between PM-CPP and PM-RUP (p <0.01)

a good and similar correlation between CPP-RUP (p <0.05) and LTPP-RUP

an acceptable and similar correlation between PM-LTPP

**• at team II**

a very good and similar correlation between PM-LTPP, PM-RUP (p <0.001) and LTPP-RUP (p <0.01)

a good and similar correlation between PM-CPP, LTPP-CPP, CPP-RUP.

Table 9. Statistical correlation analysis between item and score val

| Itemi | Team I | | | Team II | | |
|---|---|---|---|---|---|---|
| | r / rho | Colton | *p* | r / rho | Colton | *p* |
| **PM-LTPP** | 0.4084 | ** | 0.2475 | 0.9125 | **** | **0.0005** |
| **PM-CPP** | 0.8099 | **** | **0.0072** | 0.5949 | *** | 0.0806 |
| **PM-RUP** | 0.8779 | **** | **0.0016** | 0.9403 | **** | **0.0002** |
| **LTPP-CPP** | -0.1222 | * | 0.7072 | 0.5221 | *** | 0.1334 |
| **LTPP-RUP** | 0.5890 | *** | 0.0806 | 0.8250 | **** | **0.0058** |
| **CPP-RUP** | 0.6566 | *** | **0.049** | 0.6076 | *** | 0.0734 |

**Correlations between physical test indicators**

Statistical correlation analysis between the values of the physical tests' indicators showed:

• for 30m T1

o at lot I

• a very good and similar correlation with 30m T2, Arrow II, Arrow IV (p <0.001) and Arrow I (p <0.01);

• a good correlation with the same meaning with Arrow III;

- at lot II
  - a very good and similar correlation with Arrow II ($p < 0.05$)
  - a good and similar correlation with 30m T2 ($p < 0.05$)
  - an acceptable and similar correlation with Arrow I and Arrow III
- for 30m T2
  - at lot I
    - a very good and similar correlation with Arrow I, Arrow II and Arrow IV ($p < 0.001$)
    - a good and similar correlation with Arrow III ($p < 0.05$)
  - at lot II
    - a very good and similar correlation with Arrow I ($p < 0.01$)
    - a good correlation with the same meaning with Arrow III
    - an acceptable and similar correlation with Arrow II and Arrow IV
- for Arrow I
  - at lot I
    - a very good and similar correlation with Arrow II and Arrow IV ($p < 0.01$)
    - a good and similar correlation with Arrow III ($p < 0.05$)
  - at lot II
    - a good correlation with the same meaning with Arrow III
    - an acceptable correlation of the same meaning with Arrow II
- for Arrow II
  - at lot I
    - a very good and similar correlation with Arrow IV ($p < 0.001$) and Arrow III ($p < 0.05$)
- for Arrow III
  - at lot I
    - a good and similar correlation with Arrow IV ($p < 0.05$)
  - at lot II
    - a good and similar correlation with Arrow IV
    - for Arrow IV
  - at lot I
    - a very good correlation but in the opposite direction with SLL T1 ($p < 0.01$)

Table no. 10. Statistical correlation analysis between physical test values

| Items | | Team I | | | Team II | | |
|---|---|---|---|---|---|---|---|
| | | r / rho | Colton | *p* | r / rho | Colton | *p* |
| 30m T1 - | **30m T2** | 0.9589 | **** | **0.0001** | 0.7414 | *** | **0.0141** |
| | **Arrow I** | 0.8909 | **** | **0.0011** | 0.4620 | ** | 0.1912 |
| | **Arrow II** | 0.9171 | **** | **0.0002** | 0.7530 | **** | **0.0174** |
| | **Arrow III** | 0.6019 | *** | 0.0656 | 0.2865 | ** | 0.4222 |
| | **Arrow IV** | 0.8739 | **** | **0.0009** | -0.0571 | * | 0.8756 |
| 30m T2 - | **Arrow I** | 0.9240 | **** | **0.0005** | 0.8182 | **** | **0.0058** |
| | **Arrow II** | 0.9010 | **** | **0.0004** | 0.3769 | ** | 0.2957 |

| Items | | Team I | | | Team II | | |
|---|---|---|---|---|---|---|---|
| | | r / rho | Colton | *p* | r / rho | Colton | *p* |
| Arrow I - | Arrow III | 0.6550 | *** | **0.0398** | 0.5024 | *** | 0.1389 |
| | Arrow IV | 0.8740 | **** | **0.0009** | 0.3062 | ** | 0.3896 |
| | Arrow II | 0.8424 | **** | **0.0037** | 0.4985 | ** | 0.1548 |
| Arrow II - | Arrow III | 0.7091 | *** | **0.0268** | 0.5244 | *** | 0.1231 |
| | Arrow IV | 0.8667 | **** | **0.0022** | 0.0303 | * | 0.946 |
| Arrow III - | Arrow III | 0.7523 | **** | **0.0121** | 0.1743 | * | 0.6321 |
| | Arrow IV | 0.9644 | **** | **0.0001** | -0.0608 | * | 0.8382 |
| | Arrow IV | 0.6650 | *** | **0.0359** | 0.5306 | *** | 0.1146 |

## Conclusions

As a result of the processing and interpretation of the recorded data, conclusions can be drawn regarding our research that focused on the influence of the psychological state of the athletes, on the level of development of the motor qualities speed and skill.

Starting from the hypothesis, we conclude that in the recordings of the specific motor tests, the psychic level positively favors the results of the players' spirit and skill tests.

Thus, it is confirmed that if you have an optimum psychological level, the positive psychic effects are correlated with the great results from the sports performance.

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ICU 2019

# PHYSICAL ACTIVITIES PRACTICED IN FREE TIME BY 15-16 YEARS OLD STUDENTS: DETERMINANTS, AIMS AND PARENTS' INFLUENCE IN ROMANIA AND THE REPUBLIC OF MOLDOVA

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**Abstract**

The main aim of our paper is to deepen the influence of parents on Romanian and Moldavian-Romanian schooled adolescents who use to practice physical activities in their free time. The study aims to understand parents' impact on the motivation for physical activity practice in their daughters and sons. In this regard, we will show some data regarding this influence collected through a questionnaire administered to a group of students from Romania and the Republic of Moldova. The questionnaire was administered to a sample of 100 adolescents in each country. Our data show the role of parents, as main educational agents, in influencing the involvement of adolescents in physical activities. In conclusion, this study wants to encourage Romanian and Moldavian parents to take awareness of their role as both sports and educational agents who, in their respective countries, are influencing the motivation for physical activity in their children.

*Keywords: physical activity, parents, education, philosophy.*

## 1. Introduction

Nowadays, few data are available on the dynamic behaviors of Romanian and Romanian Moldavian adolescents. Even fewer are the data on physical activity behavior patterns of adolescents from the historical region of Transylvania and the region of Chisinau. The citizens of Romania and the Romanian population of Moldova Republic are very similar because they belong to the same ethnic and linguistic group. Even if the current societies of these two countries are economically, politically, socially, demographically different, we think that on both sides of the Prut River, the practice of physical activities has the same motivational valences.

Physical activity and sport are relevant for their contribution to the development and building of modern society. Currently, both in Romania and the Republic of Moldova, these activities have increased more and more. After the collapse of the socialist block, Romania has developed as a country and nation. After joining the European Union, Romanians' lifestyles went through a significant transformation. Behaviors have become more like those of Western Europeans, especially in the higher socioeconomic status groups. Data on how physical activity influences the behavior of Moldavian adolescents is very scarce, and our study aims to collect information to understand that better.

Some theorists argue that personality can be modeled by practicing physical activity in free time. Furnham (1990) has explored the effects of sport and recreational activities, showing that by socializing and changing the way of life through different patterns of interaction with different individuals, the functioning of personality could be substantially changed.

The family plays a fundamental role in changing the attitude and motivation of youngsters towards physical and

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sports activities. The different ways parents conceive education within their families play a crucial role in helping children to develop values through physical activities.

Parents are the first educational agent for their children. Through their behavior, they act as a model and show them the benefits of being physically active. In a country like Moldova, whose economy is based on agriculture, people are used to manual and physical labor. Moreover, the values of the family are highly valued in that country. Within this culture, parents play a key role in passing on the values of a physically strong and muscular body to their children.

Some studies (Sandor, 2010; Isidori et al., 2014; Isidori, 2012) have focused on some aspects regarding family's influences and involvement in physical activity of Romanian and Romanian Moldavian children. The influences regarding children from the Republic of Moldova have not yet explored.

The main determinant factors through which parents influence the perception of physical activity by their adolescents, there is the social status of the family, its social environment, the size of the family members, housing conditions, parents' education, level of education, urbanization, everyday circumstances and the quality of nutrition.

Urbanization, which is related to the settlement of population, can influence both motor behaviors and development of adolescents. In the same way, different geographical environments and lifestyles (rural or urban) can have a similar impact (Rusu, et al., 2010; Sandor, et al., 2010).

Therefore, in this study, we will analyze and interpret data on how Romanian and Moldavian families influence adolescent's involvement in physical activity in the free time. Our scope is to provide prospective researchers with useful baseline data to investigate the changes in lifestyle and attitudes towards physical activity by adolescents in areas like Transylvania (Romania) and Călărași, Cahul, Chișinău, and Ialoveni regions in the Republic of Moldova.

In the last three decades, after Romania became a member of the European Union, the Romanian family, due to relevant economic, social and demographic changes, has experienced significant changes regarding lifestyles. As an adaptation response, people have changed their behaviors. In so doing, Transylvania, like all other Romanian geographical areas, has adopted a particular and specific way of life, which has affected and influenced the behavior of its inhabitants. These effects and influences are mirrored in the main attitudes towards the practice of physical activity in free time. They determine active or sedentary behavior.

Our study is based on statistic data, which show that families from the Republic of Moldova, having an agriculture-based economy, are the mirror of their sociological and cultural status. It aims to show how the lifestyles of Romanian and Moldavian Children aged between 15 and 16 years old have similarities and also differences. This study is interested in knowing which factors determine or not and with which aims, the motivation of 15-16 years adolescents to practice or not physical activities in their free time. Also, the study wants to grasp if there are similarities concerning the influence of the family on the practice of physical activities.

## 2. Method

### *2.1. Participants*

A sample of 200 Moldavian and Romanian high school students aged between 15-16 years old has taken part in the study. The characteristics of the sample (sample size, gender, age) have been summed up in table 1.

Table 1. Sample Size, Age, and Standard Deviation (SD) of the research participants, divided by nationality and gender

| Participants (Age, SD) | | Gender | | |
|---|---|---|---|---|
| | | Male | Female | Total |
| Nationality | Romanian | 66 (15.68, ±0.84) | 34 (15.32, ±0.47) | 100 (15.56, ±0.76) |
| | Moldavian | 40 (15.28, ±0.45) | 60 (15.48, ±0.50) | 100 (15.40, ±0.49) |
| | Total | 106 (15.52, ±0.74) | 94 (15.42, ±0.49) | 200 (15.48, ±0.64) |

*2.2. Questionnaire*

To carry out the research, a questionnaire validated in a previous study was used (Isidori et al., 2014). The questionnaire was aimed to detect the motivations, attitudes, and behaviors of students concerning physical activity practice in free time. The original Italian version has been translated into Romanian language and validated with a forward-backward process by verifying its comprehensibility, clarity, and conformity. In the Republic of Moldova, students speak and are fluent in the Romanian language. Thus, there was not any difficulty in understanding the questions and answer them.

In this study, only the data relating to questions about the influence of parents and various educational agents on the choice and practice of physical activity by Romanian and Moldavian adolescents were analyzed. Participants had to answer the statement-question: «your parents have influenced you to practice regular physical activity in your free time» and they had to indicate their level of agreement on a 5-point Likert scale (1=at all; 2=less; 3=moderate; 4=much; 5=very much).

When asked «who did influence you most in choosing the type of physical activity you are engaged in your free time» participants had to choose between the following options: 1. Parents; 2. Brothers or sisters; 3. My Physical Education teacher; 4. Another teacher; 5. The coach; 6. My friends; 7. Church; 8. Somebody else/who?

Also, other items from the same questionnaire aimed to detect the influence relating to who had influenced more the start of sporting activities in the young Romanians, they have shown again how parents are more influential than other agents (Codification of answers: A=Thanks to my parents, who have motivated me to join clubs, associations or sports circles; B=In the school through the participation in extracurricular activities; C= Through the suggestion of friends who practiced various sports activities; D=Through my Physical Education teacher; E=Thanks to the sports offered within the activities endorsed by the municipality ; F=Thanks to the sports offered at the county or national level; G=Other).

Also, in the questionnaire, the students were asked to write freely about their motivation, objectives, and purposes regarding the practice of physical activity.

*2.3. Data analysis*

A descriptive analysis was carried out by taking into account and focusing on variables of interest.

The answers to the following questions were taken into consideration:

- *Do you practice physical activity and sport as free-time activities?*
- *What has been your parents' influence to practice regular physical and sports activities?*
- *Who did influence you most in choosing the type of physical activity you practice?*
- *What importance do you give to physical activity and the sports regularly practiced?*
- *How did you start practicing physical activities?*

## 3. Results

Among the students questioned, it appears that 90% (Romanians) and, respectively, 82 % (Moldavians) practice physical activities during their free time (Fig. 1).

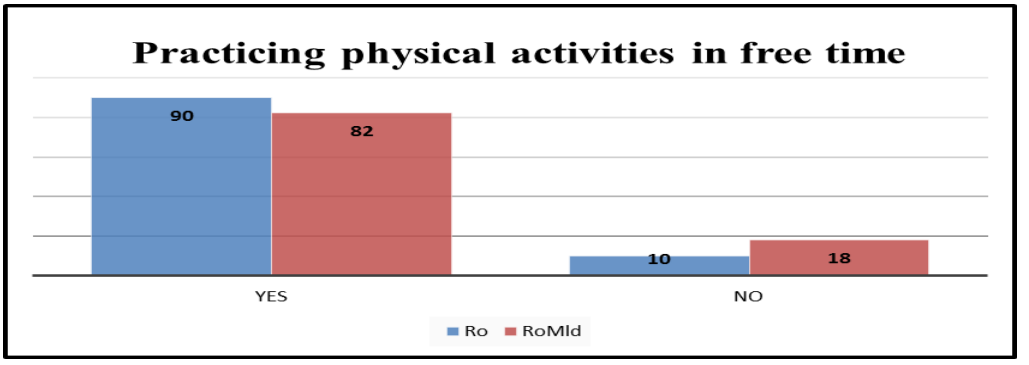


Fig. 1. Practicing physical activities in free time (Ro-Romanian Students, RoMld-Moldavian Students)

The data show that overall, 40% of the Romanian and 37 % of the Moldavian students who participated in the survey consider the influence of parents to be moderate in physical activity regular practice. In the analysis, the answers 1 and 2 (at all/less) and 4 and 5 (much/very much) were grouped. 18% of Romanian students and 23 % of Moldavians ones have declared that their parents had little or no influence on their attitudes towards physical activity, while 42 % of Romanian and 40% of Moldavan considered the influence of parents relevant or very relevant (Fig. 2).

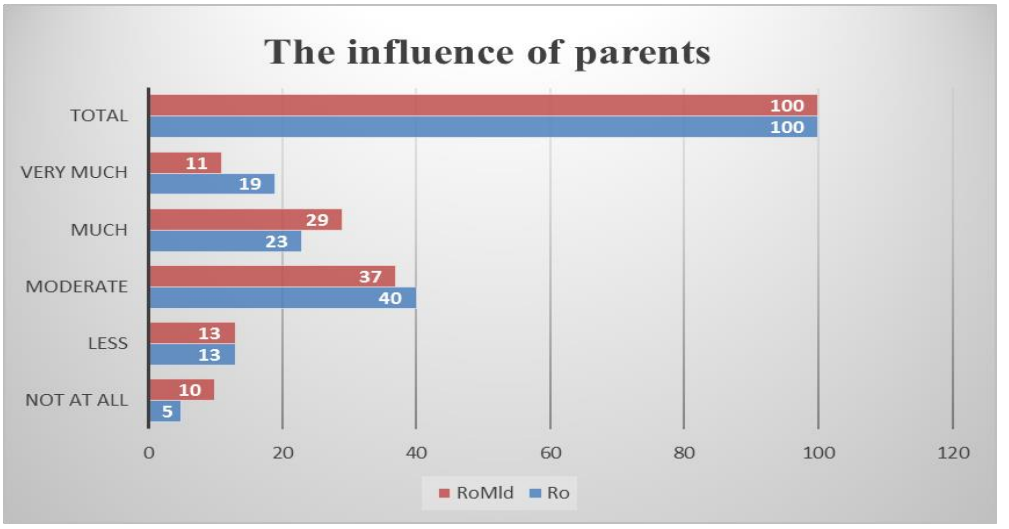


Fig. 2. Parents' influence on physical activity regularly practice (Ro-Romanian Students, RoMld-Moldavian Students)

Also, the data showed that the parents had influenced most of the students in choosing the type of physical activity (58 Ro, 49 Mld) and, after that, the PE teacher, the teacher of another subject, or the coach. We must point out that some of the respondents gave multiple responses. For example, some have chosen either PE teacher, coaches or another teacher. By using this criterion, also the school/sport club seems to have a certain weight in the choice of students. Moreover, being Romania and Republic of Moldova two countries predominantly Orthodox, it surprises that the Church has a minimal impact in terms of influencing young people to choose any type of physical activity (2% Ro, 3% Mld) (Fig. 3).

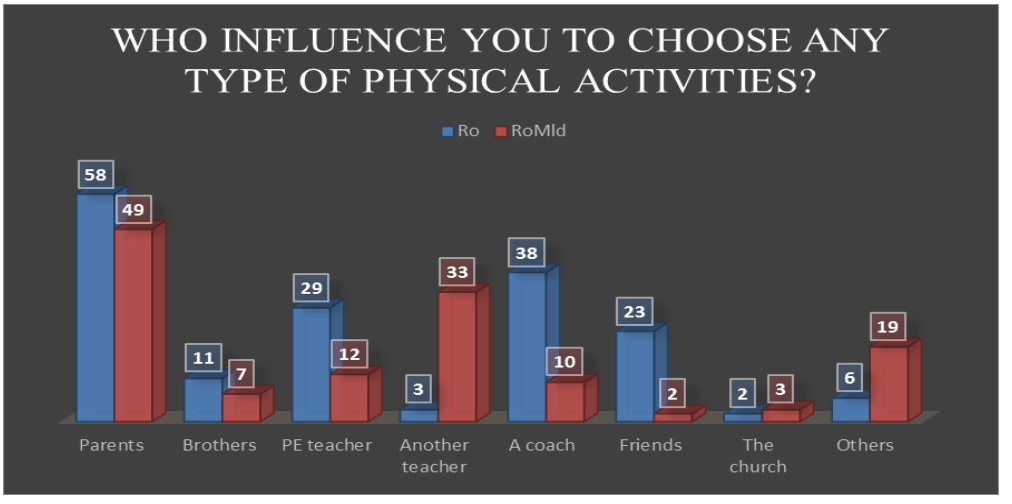


Fig. 3. Answers to the question: *Who did influence you most in choosing the type of physical activity you practice?* (Ro-Romanian Students, RoMld-Moldavian Students)

In both countries, parents act as determining factors in influencing students in being regularly engaged in physical activities. The PE teacher in Romania and the socialization groups (friends or extracurricular activities practiced with friends) also have an important impact factor according to these criteria. The sport clubs and the sports endorsed by the Municipality are shown as not relevant factors (Fig. 4).

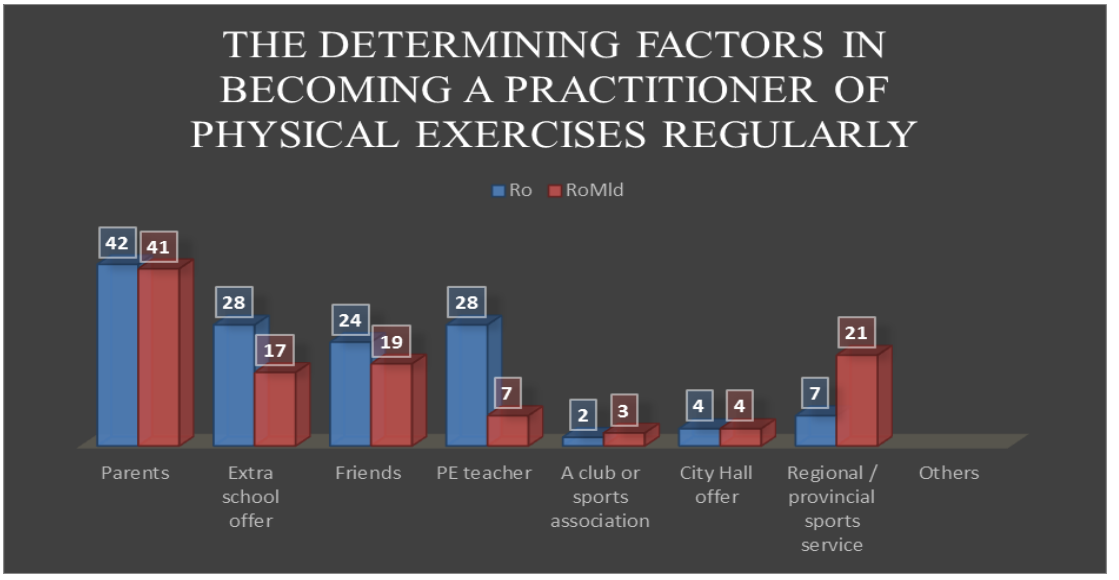


Fig. 4. The determining factors in becoming a regular practitioner of physical exercises (Ro-Romanian Students, RoMld-Moldavian Students)

However, the study has shown cases in which young people do not practice any kind of physical activity. Although they are few in percentage (10% Ro, 18% Mld), the causes differ from country to country. In Romania, the most common reason is the lack of time for this activity, while in Moldova, the most frequent response is that "they do not care about that" (Fig. 5).

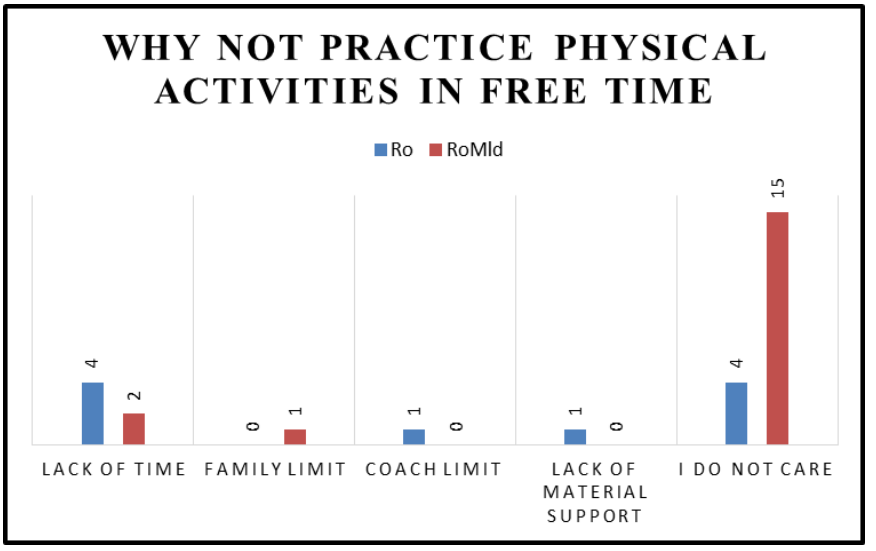


Fig. 5. Reasons for NOT practicing physical activities in free time (Ro-Romanian Students, RoMld-Moldavian Students)

Also, in the part of the questionnaire provided with an open question, Romanian students show to be convinced

that the practice of physical activities will influence the shaping of their personality, while Moldavian students consider being a priority to maintain the state of health and harmonious physical development (Fig. 6).

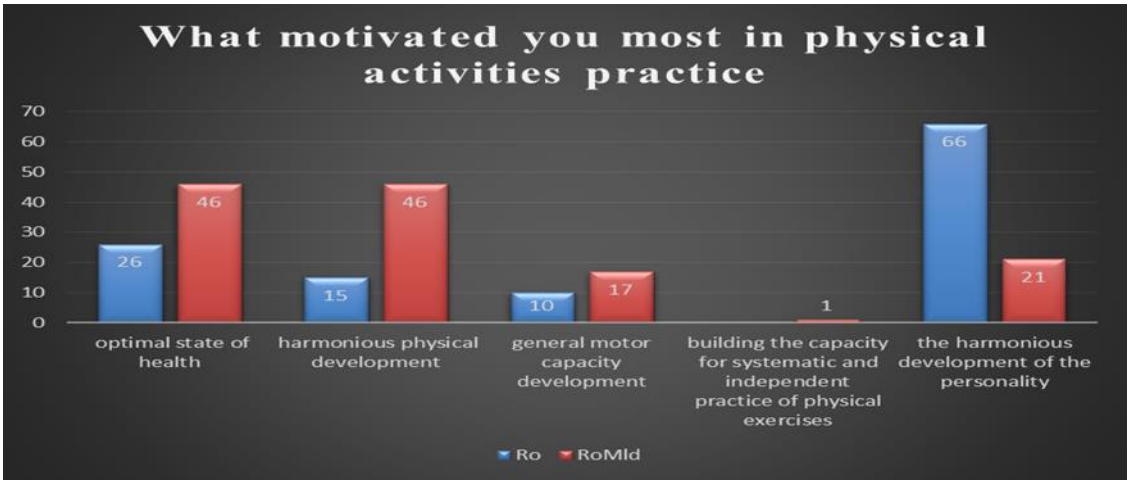


Fig. 6. The motivation for practicing physical activities in free time (Ro-Romanian Students, RoMld-Moldavian Students)

## 4. Discussion and conclusions

From this research, we can derive that the perception of physical activities by Romanian Transylvanian and Romanian Moldavian 15-16 students is almost the same. Actually, almost everybody practices some physical activities in free time (90% Ro, 82% Mld). Parents' role in influencing the regular physical activity practice in their children is moderate, but the parents play a key role in influencing the choice of the type of physical activities practiced. The analysis regarding parent's influence on physical activity involvement by children could be due to socio-economic factors, social problems, and national or local policies concerning sports facilities, as well as the policies of the labor market (more than 3 million of Romanians and 283 thousand Moldavians are working abroad).

Moreover, the study reveals a different perception of physical activities by Romanian and Moldavian students. Romanian students think that the practice of physical activities plays a key role in shaping their personality. The Moldavian students, instead, consider a priority to stay healthy and maintain a harmonious physical development of the body.

In conclusion, this study aims to encourage young students to be physically active in their free time and, via educational support, Romanian and Moldavian parents to reflect on the role the act as educational agents who promote physical activities practice in their children.

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# STUDY ON THE CAUSES OF ABANDONMENT IN PERFORMANCE AND LEISURE SPORTS

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**Abstract**

This article presents a study on the sports abandonment, irrespective of the fact that performance athletes or people who practice sport as a leisure activity. Abandonment of sports is a social phenomenon affecting people with different socio-demographic characteristics, but which is frequently encountered. For this reason the desire to do a performance sport or even physical activities is decreasing. Even if the sport in general has changed, from all points of view, here we refer to materials used, as well as the method of teaching and transmitting the information. The majority of the population avoids the performance sport on the grounds that there is no purpose in this area and even if there is, it is a lot of work and hard to get there and then inevitably it is possible to reach sports abandonment (as a performer), with the great possibility of not realizing professionally. Garcia (2001) explains that this phenomenon is a consequence of the complexity of modern social life. It is known that the performance athletes, when they decide to give up the sporting activity have a reason or even many that constrict the decision to abandon sports, so this work aims to analyse these factors and the causes that led to it's creation.

*Keywords:* sport, abandonment, causes, youth, performance, leisure activity

## Introduction

Performance sport is an activity whereby the athlete and the coach wish to reach or even exceed certain values / times / scores. This is the ideal to get results in various competitions. For athletes, in addition to these principles of performance sports or great performance, it can also mean a way to release one's person in an environment where he feels comfortable and free.

However, performance sports, whether we talk about individual sports or team sports, have certain factors that the athlete can give up performance or, in extreme cases, the sport itself. These factors are different and can be both extrinsic and intrinsic and can influence directly or indirectly. Nowadays, as compared to previous years, more and more athletes abandon performance sports, at different ages, for various reasons.

If we are talking about leisure activity, many researchers made statements that every single physical activity helps your body and mind. Moreover, we cannot agree more with them:

"Sports, defined as a subset of physical activity that is structured, goal-oriented, competitive and contest-based, has demonstrated physical, psychological and social benefits among children and youth. Early and continued participation in sports is associated with increases in cardiovascular and musculoskeletal fitness, enhanced motor coordination, higher levels of physical activity; and less time spent watching television, lower body mass indices and percentage body fat, and reduced health problems. For example, Krustrup and colleagues prospective two-year multicentre study of regular participation in small-sided games of football (soccer) resulted in significant

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improvements in exercise endurance, coordination and maximal oxygen uptake among children and youth. In addition, these small-sided games were at least as effective in improving health-related fitness parameters as a standard exercise programme among obese children" (Crane & Temple, 2015).

"Converging evidence suggests that sport is a powerful context for promoting the health and well-being of youth. Although sport is associated with some negative outcomes such as underage drinking, injuries and negative affect, positive outcomes are considered to be more substantial. Young people who participate in sports maintain healthy lifestyle habits including continued physical activity and healthy nutrition. They also experience positive emotions, sense of belonging, life-satisfaction, and supportive peer relationships. In addition, sport participation is associated with increased academic achievement and decreased depression and suicidal ideation. Given the potential benefits of youth sports, sporting professionals as well as applied social scientists have highlighted the need to use established empirical research to engage in an ongoing redesign of the sport-relevant environment. Moreover, as the majority of youth sport occurs in an organized fashion wherein rules, procedures, and practices are intentionally designed and largely implemented in a top-down manner, this ongoing redesign is often considered viable" (Balish, McLaren, Rainham & Blanchard, 2014).

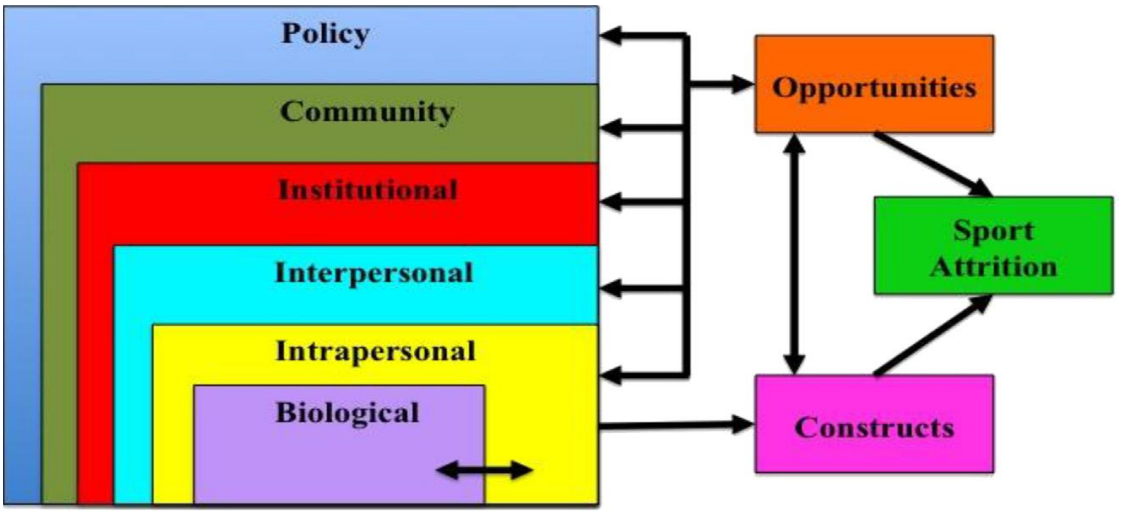


Fig. 1. The social ecological model of sport attrition (Balish, McLaren, Rainham & Blanchard, 2014)

Regarding performance sports, this article and research targeted the local clubs, the High School with Sport Program (LPS), "Viitorul" Sports Club, Municipal Sports Club and their junior sections. We have found some reasons why juniors' dropout the sport of recreation.

1. Motivation

In general, the performance athletes, dropout training and give up participation in competitions due to lack of motivation. The athlete no longer finds the motivation necessary to go further to overcome his condition and performance. This comes from both inside and outside. Here I'm referring to the motivation and perseverance that the athlete induces. That is the intrinsic motivation and also the way the coaches choose to push their athletes. It is very difficult to continue with a particular activity in which you make a considerable effort, sometimes an effort that you never think you can achieve, without having the pleasure of doing so.

2. Psychological

The vast majority of the population concerned about sports agrees that a sportsman besides the physical training, the achievement of performance and especially of great performance, must be prepared psychologically also. What

each sportsman goes through, regardless of the sport we are talking about, cannot be linked to another occupation, job or hobby. "Coaches spend a lot of time and energy to provide valuable life experiences to athletes. Communication skills and awareness are important for successfully applying these principles" (Crăciun, 2014, p. 52).

3. Infrastructure

In many cases, during the study, infrastructure appeared to be the main problem of abandonment, which is very worrying and concerning. Since we are in the 21st century, a century full of technological development, ascent, material, etc., this issue of sports infrastructure should no longer be discussed. However, it seems that in Romania, we are still deficient in this regard. The sports bases are at a great distance or, the access routes inexistent.

4. Coach - athlete relantionship

"The quality of the relationship between the coach and the sportsman has a decisive contribution to the efficiency of the coaching and in the increase of the sports performance. The relation of the trainer with the sportsman affects the latter, both as a performer and as personal development. The coach should not be regarded as a mere sports instructor; he is a teacher, a psychologist replaced by a parent and an important role model" (Crăciun, 2014, p. 35).

5. Medical problems

Medical problems are the most common in performance sports and the first ones that affect this activity. Whether we are talking about team sports or individual sports, they appear in different forms depending on the activity that the athletes perform. Because of these medical problems, the dropout rate increases.

First, a medical problem comes with a break in training or competitions, as well as the decrease in intensity and volume of training. This affects performance ability but also removes the athlete or team from the training and competition program. Because every year there is a competitive calendar, different in structure, from year to year, and different in terms of competitions of major importance, the coach makes an annual plan especially on the Olympic cycle, where he prepares his goals and objectives which he wants to reach with the athlete/athletes. Any medical problem, of any kind, can confuse this training plan, given that the effort made during the training is not the same. Any pain during the effort affects the athlete, and the exercise performed by him is not at full capacity or not technically-methodically correct.

6. Education-training ratio

Most athletes try to combine education with sports. Since we are talking about performance and high-performance sports, we are talking about a minimum of 6 workouts per week, which means a minimum of 18 hours that you spend as an athlete in the gym, on the field, in the pool, etc. But this number of training sessions and hours can increase significantly, even double, and for this reason, the recovery period after the effort must increase. The lack of interest in sport performance is high, and when you choose to do performance sports you are sent to vocational, sports high schools, where there is no emphasis on school and the requirements are much lower or none. Some responded that they were not accepted into the class because they are performing performance sports. And when it comes to higher education (college), few university teams have remained in the country. Even if in middle school and high school, every athlete has somehow managed to combine performance sport with school, making certain choices and compromises when it comes to college, things change radically.

7. Financial support

Financial support is the chapter where Romania is quite low. Compared to other European countries, our country has a very small number of contracts with athletes. This is due to the lack of financial power in sports. As the sports is modernised from day to day, the training equipment multiplies, and these are expensive. Not to mention the

competitive equipment that can be more expensive than participating in the competition itself. In the case of swimming, the costs can rise quite high, provided that high performance is desired. From training materials, swimming simulators, renting training lanes, paying coaches, traveling, cantonments, etc. In general, this financial support comes first from family, then is largely taken over by the club. Unfortunately, few clubs allow themselves to take on this responsibility. In these cases, the athletes abandon performance sport for fear of not achieving performance even if they invest, due to the risks they are exposed to.

The lack of interest in sports performance is high, and when you choose to do performance sports, you are sent to vocational, sports high schools, where there is no emphasis on school and the requirements are much lower or there are none. Some responded that they were not accepted into the class because they are performing performance sports. And when it comes to higher education (college), few university teams have remained in the country. Even if in middle school and high school, every athlete has somehow managed to combine performance sport with school, making certain choices and compromises when it comes to college, things change radically.

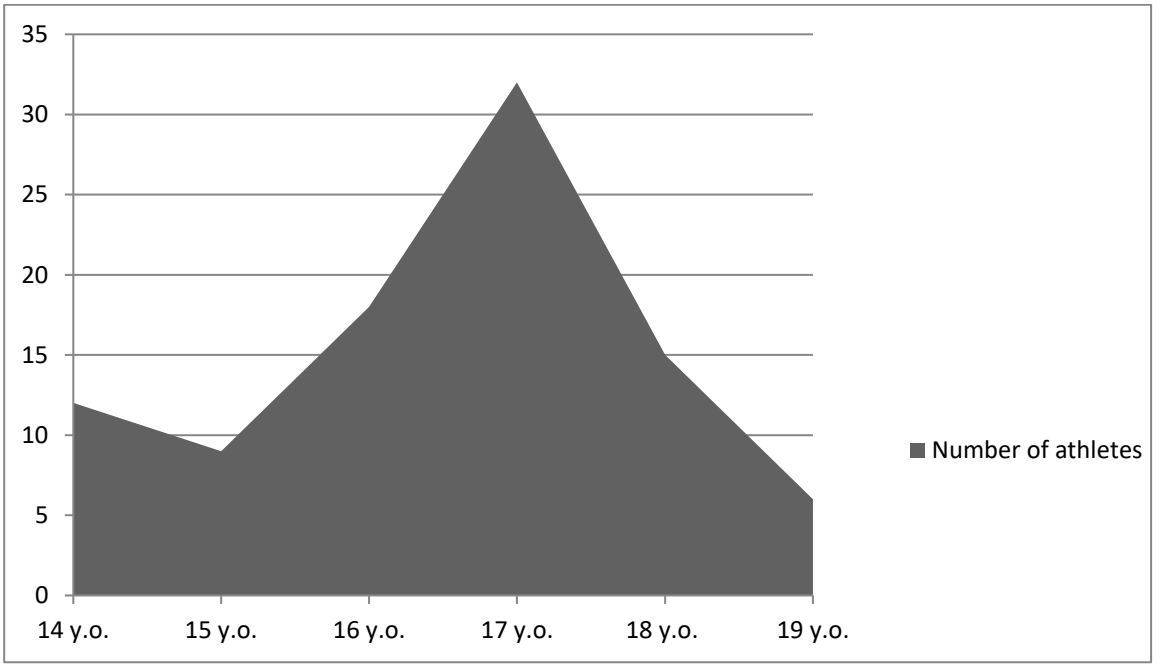


Chart 1. The age where athletes dropout sports from the junior sections of the local sports clubs

At a conference held in March 27, 2018, one of the authors participated, and had the opportunity to talk to some people from various sports federations or sports club managers. Along with them I expressed my opinion in various polls organized at the conference, but I also heard the opinion of specialized people who were doing research on sports abandonment called *Keep Youngsters Involved* (KYI). The project *Keep Youngsters Involved* developed Good Practice Statements to explain how factors found to be associated with the prevention of youth sports dropout could be implemented as part of the youth sports experience. Each statement was accompanied by examples of strategies already in use by clubs across Europe to achieve this good practice. He was surprised by some opinions, but at the same time he noticed some of the answers he expected but better sustaine.

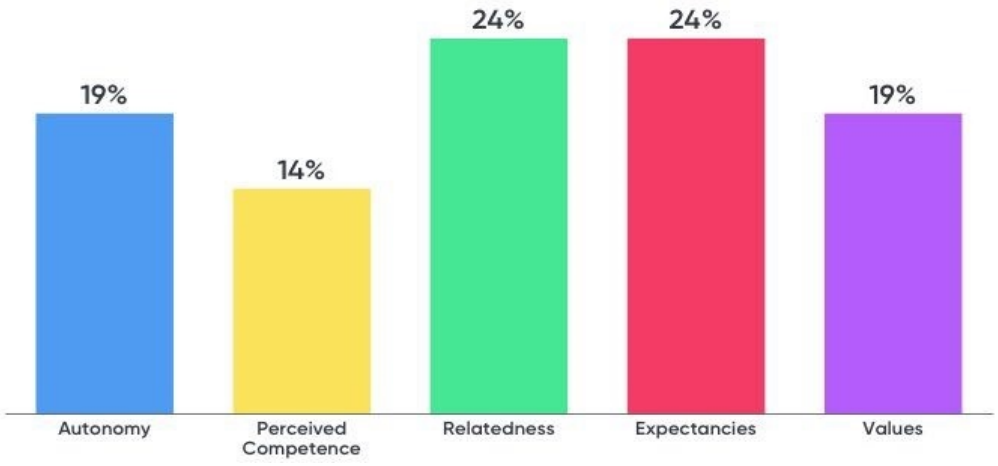


Fig. 2. What are your key factor that leads to youth sport dropout?

But most of them believe that a relationship coach - athlete can reduce considerably the percentage of drop sports, but they did not disregard that the differences in sports exist when it comes to sport abandonment. Of course, parent support also plays an important role and can help in numerous sports situations. This group defined sports abandonment as: "The prolonged absence of systematic practice and competition, either in one sport (sport-specific dropout) or all sports (sport-general dropout)" (www.kenniscentrumsport.nl/en/international 2019).

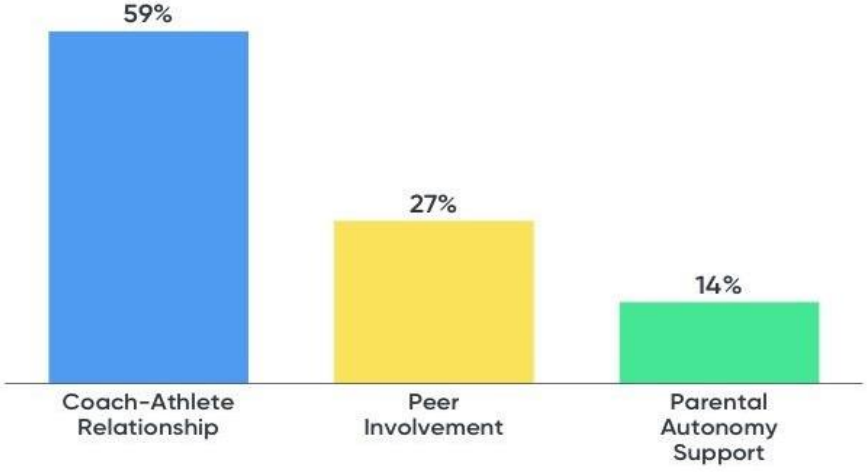


Fig. 3. What is your key factor for preventing youth sport dropout?

They also came up with some suggestions that can alter the situation of sports abandonment in Romania, whether it is financial or not, as follows:

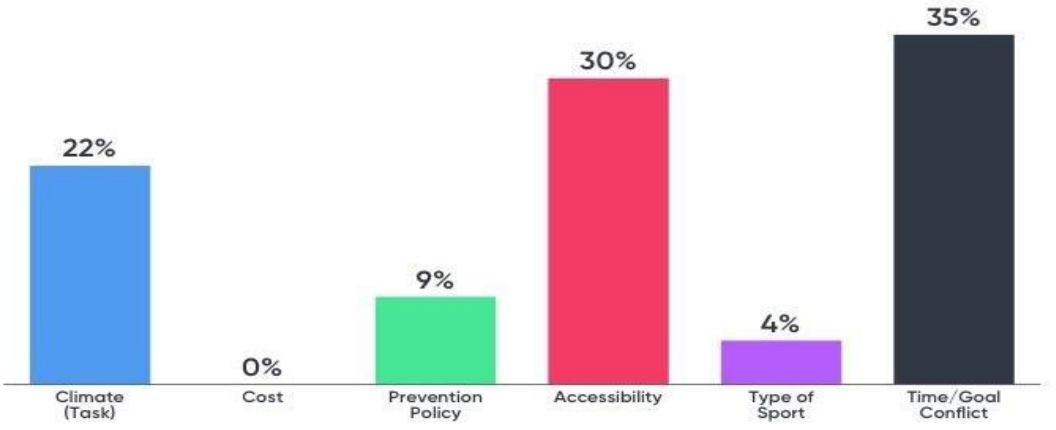


Fig. 4. What you propose to improve to avoid sport dropout?

When it comes to leisure sports, we notice that most children and adolescents are increasingly attracted by the electronic side. Mass media places great emphasis on these products, and sport is left behind. So, the new generations are steeped in all that electronic means. Simpler and with less effort.

"Sports abandonment is a social and dynamic phenomenon, which affects people of different socio-demographic features in a similar way. It is best explained by relating it to personal and family circumstances rather than belonging to a particular group or social class (García, 2006). This generalised lack of adherence to physical activity is one of the main barriers when promoting a healthy lifestyle. García (2001) explains that this phenomenon is a consequence of the complexity of modern social life and personal development. García also attributes this to the relegation of physical activity to leisure time, thus having to compete with a wider range of offers and volunteering options that sometimes are more appealing" (Gómez-López, Granero-Gallegos, Baena-Extremera, & Ruiz-Juan, 2011).

Also, as in performance sport, the sports bases are quite a few, deficient or far. But lately we saw administrative staffs involved in this problem and some communities strongly involved in this plan.

If we were to take students of a high school class, ninth graders, after eliminating the performance athletes, we can see that 21 out of 120 students practice regular sports (4/5 days out of 7), it is a percentage of 17%, other 15 (13%) practice sports once or twice a week, and the rest have a sedentary lifestyle, being attracted to other activities or simply do not want to leave the comfort zone, which means around 70%.

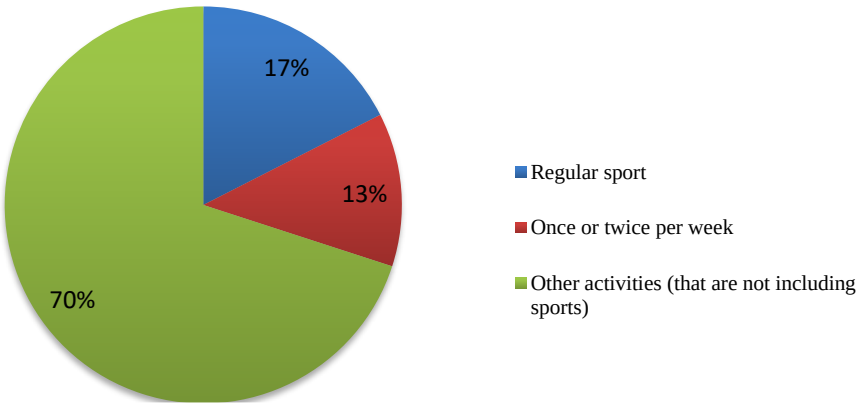


Chart 2. Teenagers from ninth grades involved in sports activities

Also 1 out of 10 young people claim that they know how to perform a physical activity in an efficient and correct way, other 3 say that they are not sure if the physical activity they carry out is correct and efficient and would accept the opinion of a specialist at any time, and the rest of 6 claim that they need an instructor to exercise.

**Proposals**

The society has a lot of work to do to reduce the dropout rate. The Romanian society is not aware of the lack of sports, that rots and destroys life. Sports can increase patriotism and love for one's country. It keeps the life rate high, but also the welfare at a high level. I propose that within the framework of heritage development, it is compulsory to enter and develop sports bases and complexes, but in partnership with the associated federations. Of course, at the same time, in the case of the maintenance works, to ensure conditions of preparation for the athletes already in activity, and next to be invited to enjoy these benefits and leisure sports.

The education system in Romania no longer works in conjunction with sport, and the school sports clubs have easily disappeared, and for this reason, education with sport is becoming increasingly deficient. In the case of higher education, the system does not help the athletes to continue their studies in parallel with the training. An American-like system should be adopted to support performance sport and not one that impedes performance. Also, the development of the university clubs is a priority and the support of the athletes in the faculties, according to sports results, but without neglecting the school ones.

We can also observe both the American system and the British style as they combine within the school curriculum a variety of sports and activities through which each person can integrate into his or her way. They also promote a lifestyle through sports so that society is fully involved in everything that sports mean being more disciplined. We talk about sports of tradition and the obligation to carry out certain activities that can help their own rescue, such as swimming. People need to be pushed more towards sports and beyond the comfort zone. We raise generations of "vegetable children" or "grown up in the tube", much weaker psychically and more sensitive. Our sports society is like a trinket. If it breaks it is lost.

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# BODY ADIPOSITY CHANGES DURING THE PRACTICE OF TENNIS AS A LEISURE ACTIVITY FOR ADULTS WITH A SEDENTARY LIFESTYLE

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**Abstract**

**Introduction**. Excessive weight and a sedentary lifestyle, along with dyslipidemia, high blood pressure and hyperinsulinemia are risk factors for the apparition of cardiovascular diseases. In this context, leisure-time physical activities have a well-known role in improving lipid profile, body composition and blood pressure. **Objective**. The purpose of the research was to observe the changes in the percentage and distribution of adipose tissue of some employees whose workplace implied a sedentary activity as a result of their involvement in a program of playing tennis during their leisure time. **Methods**. The research was carried out on a sample of 43 subjects working in Cluj-Napoca in the IT field. During the study, which lasted 4.5 months, the subjects from the experiment group (n = 27) participated in a program of recreational tennis. During this time, subjects from the control group (n = 16) continued their daily activities without participating in an organized manner at new activities involving physical exercises. The physical fitness of the subjects was evaluated using the Eurofit Test Battery for Adults at the beginning and at the end of the intervention program. The data were statistically processed using SPSS, version 20. **Results**. In the case of the experimental group, significant differences can be observed between the two measurements in the estimation of the adipose tissue and in the body adiposity index meanwhile, as regards the control group, there are no significant differences between the average of the initial and final measurements. At the end of the intervention we can observe that there is a statistical significance between the averages of the variables measured in the subjects of the experimental group and the control group in the case of the following variables: estimation of the percentage of adipose tissue, the waist-to-hip ratio and the body adiposity index. In the case of the body mass index, there was no statistically significant difference. **Conclusions**. The index changes at the end of the intervention support the hypothesis that a tennis training program can improve the percentage of adipose tissue of the participants.

*Keywords:* body composition; sedentary lifestyle; leisure time; tennis; adult physical activities;

## 1. Introduction

Obesity and the excess of body weight are considered by some researchers as "an epidemic with major health repercussions, which comes with increased costs related to treatment" (Sarmiento Quintero, Ariza, & Barboza García, 2016). The same authors conclude that "the body mass index (BMI) is the most accepted tool for the assessment of overweight, obesity and severe obesity."

In addition to dyslipidemia, high blood pressure, smoking and hyperinsulinemia, obesity has been listed as a risk factor for cardiovascular disease (CVD) (Banz, Maher, et al., 2003). Furthermore, there are studies that show that sedentary lifestyle, combined with increasing age, also contributes to the emergence of CVD indirectly, through their effect on blood pressure and body composition (Wannamethee & Shaper, 2001).

Nowadays, many adults move around to and from their workplace seated in cars, they spend a lot of time seated on the office chair and during their free time, they often take part in other sedentary activities such as watching TV or using the computer. This lifestyle has aroused researchers' interest in sedentary behavior, which is much more

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obvious today than in the past (Ng & Popkin, 2012). Sedentary behavior is defined to be constituted of those "activities with none or with little energy consumption undertaken from the sitting or lying position during the day (not during sleep) (Network, 2012). In the United States, research estimates conclude that adults have sedentary behavior between 7.2 and 9.5 hours per day and that the number of hours increases with age (Matthews, Chen, Freedson, Buchowski, & Beech, 2008).

Obesity and associated problems cost the United States budget $ 147 billion in 2008 and even in this situation, costs are expected to increase year by year. Although the prevalence of obesity has slowed down since the 2000s and it reached certain stability, the percentages of extreme obesity continued to rise in both adults and children. Because obesity became such an expensive issue from a financial point of view, an entire industry of diets and physical activity programs was created (Obert, Pearlman, Obert, & Chapin, 2017).

A few health indicators have been studied in the context of adult sedentary behavior including mortality, CVD, diabetes, cancer and weight /adiposity status (Biddle, et al., 2016; Wilmot et al., 2012; Rezende, Rodrigues Lopes, Rey-Lopez, Matsudo, & Luiz, 2014).

Although the mechanisms by which physical inactivity increases the risk of CVD was not fully understood, it was shown that both aerobic and endurance training improve lipid profile (Gullu, et al., 2013), body composition (Atashak, Piraeus, Azarbayejani, Stannard, & Mosalman Haghigi, 2011), high blood pressure (Murphy, Neville, Murtagh, & Holder, 2007) and reduce other risk factors for CVD.

Leisure-time sedentary behavior is present in middle-aged adults, several studies indicate that sedentary lifestyle during this period is associated with a high risk of mortality from CVD (Warren, et al., 2010).

In this context, we want to see the consequences of practicing a leisure-time physical activity program, consisting of playing tennis, on the body mass index and on the percentage and distribution of adipose tissue.

## 2. Hypothesis

This research started from the assumption that following the involvement of some employees with a sedentary type of activity at their workplace in a tennis program, the percentage and distribution of adipose tissue of the participants would change.

## 3. Materials and methods

The study was conducted on a sample of 43 subjects which worked in a sedentary environment in the IT field in Cluj-Napoca. They were divided into two groups - 27 subjects (12 women and 15 men) in the experiment group (EG) and 16 subjects (5 women and 11 men) in the control group (CG). The sampling was non-random and from the non-probabilistic sampling category, the criterion of convenience was used. All participants were informed about the content and purpose of the research and gave their written consent for participation before the beginning of the study.

In order to find out the availability of the employees, a form made up of Google Docs was sent through the internal messaging service of the collaborating companies. The form contained questions addressed to the individuals who wished to participate in this project. The subjects who expressed interest, accepted to participate in measurements and training were selected. They agreed with the usage of the results obtained in the research, with the guarantee of anonymity.

The research was conducted between the 1st of November 2016 and 5th of April 2017, period during which the subjects of the experiment group participated in a program of recreational tennis, containing tennis lessons which lasted 90 minutes, twice a week. During this time, the subjects of the control group continued their daily activities without participating in other physical activities.

The research started with the initial assessment of the physical fitness of the subjects by applying tests included in the Eurofit Test Battery for Adults (Council of Europe, 1995): anthropometry (height, weight, skin folds, abdominal and thigh perimeter).

The data obtained from the measurements provided by the Eurofit Test Battery for Adults were statistically processed using the SPSS statistical analysis software, version 20.0. Initially, the Shapiro-Wilk test was used to verify the normality of the distribution and the descriptive analysis (average and standard deviation), followed by comparison of the averages using parametric (T-test) or non-parametric tests (Wilcoxon and U Mann-Whitney), depending on the data distribution.

## 4. Results

The study participants (N = 43) were adults between the ages of 23 and 38 (28.95 ± 4.31), of which 60.46% were male (n = 26) and 39.54% were female (n = 17), all of them being employed in IT companies. The distribution in the experiment or control group was made according to the option chosen by the subjects, they could participate or not at the training.

The research started with the initial measurements, followed by the application of the proposed intervention program for 4.5 months. At the end of this period, the final measurements were made under conditions identical to those from the initial testing. Below, in table 1, the averages and standard deviations of the measured indices are presented.

Table 1. Mean and standard deviation of measured variables

| Test | EG (n=27) | | CG (n=16) | |
|---|---|---|---|---|
| | Initial testing M (±SD) | Final testing M (±SD) | Initial testing M (±SD) | Final testing M (±SD) |
| Body Mass Index (kg/m$^2$) | 25.18(±5) | 25.08(±4.75) | 24.43(±3.62) | 24.71(±3.91) |
| Fat tissue percentage (%) | 27.77(±7.66) | 25.24(±7.69) | 23.87(±5.96) | 24.46(±6.5) |
| Waist-to-Hip ratio | 0.81(±0.07) | 0.80(±0.07) | 0.80(±0.06) | 0.81(±0.07) |
| Body Adiposity Index (%) | 26.27 (±5.63) | 25.54 (±5.36) | 24.44 (±4.78) | 24.61 (±5.19) |

With the help of the Shapiro-Wilk test, the normality of the distribution of the collected data was tested. It can be observed that not all the data obtained from the measurements have a normal distribution, so both the parametric and the non-parametric tests will be used to analyze the significance of the difference of the averages. Thus, in the experiment group the data were normally distributed for the variables "percentage of adipose tissue" and "waist-to-hip ratio", and in the control group for all variables except "body adiposity index".

Table 2. Initial testing – normality of the data distribution

| Dependent variable | Shapiro-Wilk Test | | | |
|---|---|---|---|---|
| | EG (n=27) | | CG (n=16) | |
| | Statistic | p | Statistic | p |
| Body Mass Index (kg/m$^2$) | 0.81 | <0.001 | 0.95 | **0.42** |
| Fat tissue percentage (%) | 0.96 | **0.34** | 0.92 | **0.18** |
| Waist-to-Hip ratio | 0.96 | **0.44** | 0.93 | **0.29** |
| Body Adiposity Index (%) | 0.8 | <0.001 | 0.82 | 0.004 |

Taking into account the distribution of data and the number of subjects, the significance of the difference between the initial averages was analyzed using the parametric t-test for independent samples in the case of variables with a normal distribution, but for the variables which did not have a normal distribution, the non-parametric U-Mann Whitney test was used. The results are presented in table 3.

Table 3. Pre-intervention independent samples test

| Dependent variable | t/U | df/z | p |
|---|---|---|---|
| Body Mass Index ** | 210 | -0.15 | 0.88 |
| Fat tissue percentage* | 1.74 | 41 | 0.09 |
| Waist-to-Hip ratio* | 0.16 | 41 | 0.88 |
| Body Adiposity Index** | 161 | -1.38 | 0.17 |

* Independent samples T-test

** U Mann Whitney Test

According to the above table, it was found that there are no statistically significant differences between the averages of the two groups before the intervention.

Furthermore, the significance of the difference between the initial and final averages was analyzed using the parametric T-test for paired samples, for the variables with a normal distribution, and for the variables which did not have a normal distribution the Wilcoxon non-parametric test was used. The comparative analysis of the significance of differences for the paired samples is presented in the table below.

Table 4. Paired samples tests

| Dependent variable | EG (N=27) | | CG (N=16) | |
|---|---|---|---|---|
| | t/Z | p | t/Z | p |
| Body Mass Index | -0.43** | 0.67** | -1.67* | 0.12* |
| Fat tissue percentage | 5.37* | <0.001* | -1.39* | 0.18* |
| Waist-to-Hip ratio | 1.83* | 0.78* | -1.59* | 0.13* |
| Body Adiposity Index | -3.32** | 0.001** | -0.96** | 0.34** |

* Paired samples T-test

** Wilcoxon Test

According to Table 4, in the case of the experimental group, significant differences can be observed between the two measurements at, the estimation of adipose tissue ($t = 5.37$, $df = 26$, $p < 0.001$) and at the body adiposity index ($Z = -3.32$, $p = 0.001$). As regards the control group, there are no significant differences between the averages of the initial and final measurements.

At the end of the intervention, using the U Mann-Whitney test, the statistical significance of the differences between the averages of the variables measured in the case of the subjects from the experimental and control group was verified. From the data presented in table 4, we can see that after the intervention, there is a statistical significance between the averages for the following variables: estimation of the percentage of adipose tissue ($U = 51$, $p < 0.001$), the waist-to-hip ratio ($U = 137$, $p = 0.05$) and body adiposity index ($U = 101$, $p = 0.004$). In the case of the body mass index, there is no statistically significant difference ($U = 141$, $p = 0.06$).

Table 5. Post-intervention U Mann Whitney Test

| Dependent variable | U | z | p |
|---|---|---|---|
| Body Mass Index | 141 | -1.88 | 0.06 |
| Fat tissue percentage | 51 | -4.15 | <0.001 |
| Waist-to-Hip ratio | 137 | -1.98 | 0.05 |
| Body Adiposity Index | 101 | -2.89 | 0.004 |

## 5. Discussions

There is a paradigm in the specialized literature that associates excessive sedentary behavior with a higher level of overweight and obesity in adults. There is evidence for a higher level of obesity and increased BMI in adulthood caused by sedentary behavior in childhood and adolescence and emerging evidence for an association between the frequency of sedentary interruption and decreased BMI.

According to the Council of Europe (1995), some studies did not find any significant risk associated with a BMI between 25 and 28, and that there are indications that a slightly higher than average body weight could be advantageous in terms of health and life span in the case of older people. Willett, Manson, & Stampfer (1995) identified, however, that in the case of women, there is a higher risk of cardiovascular disease as the BMI increases. Also, related to BMI, the Council of Europe (1995) mentions that values between 25 and 27 should not necessarily be interpreted as a requirement for weight reduction if the percentage of adipose tissue and / or the waist-to-hip ratio is within normal parameters.

The percentage of adipose tissue is considered dangerous for health if it exceeds with 3-5% the average correspondent of the age and sex of the individual in question. The tables with these scores are presented in the Eurofit Handbook for adults of the Council of Europe (1995).

The limits of the waist-to-hip ratio suggest that the risks of cardiovascular diseases are 1.00 for men and 0.8 for women (Larsson, et al., 1984).

Similar results with those presented by us were also obtained in a study that included a program of competing exercises - a combination of strength and endurance training (Hickson, 1980). The authors of this research (Atashak, Stannard, & Azizbeigi, 2016) state that there are changes in body composition for both men and women participating in strength training (Atashak, Piraeus, Azarbayejani, Stannard, & Mosalman Haghigi, 2011) or in resistance training (McTiernan, and others, 2007). In connection with the association between concurrent training - a combination of strength and endurance exercises and changing body composition, Tan, Li, & Wang (2012) reported that it significantly reduced body mass index and waist-to-hip ratio in the case of older patients.

Ho, Dhaliwal, Hills, & Pal (2012) studied the effect that a 12-weeks aerobic, endurance and combined aerobic-resistance training had on the risk factors of cardiovascular diseases, the subjects being overweight or severely obese middle-aged individuals. These researchers concluded that compared to aerobic or endurance exercise, combined training (aerobic-endurance) offered greater benefits in terms of reducing body weight, fat mass and cardio-respiratory fitness. If we analyze the effects of the specific tennis training (mixed effort, aerobic-anaerobic) in our study, we find that they are similar to those of the mentioned study.

The duration of the program application period and the duration of a training session influence the efficiency of such programs. In this regard, we compared the results recorded in this research with those of a previous research (Șerban & Baciu, 2017). The methodological differences between the present study and the previous one are that the duration of the intervention was extended from 6 weeks to 4.5 months, the duration of the training lesson was 90 minutes instead of 60 and that other technical elements and processes were included in the training plan.

Comparing the results of the significance tests of the averages differences of the two studies (Table 6), we determine that in the 2017 study the U Mann-Whitney test confirmed that there are changes with statistical significance only in the waist-to-hip ratio ($p = 0.04$), while in the present study, progress with statistical significance was recorded in the case of estimation of the percentage of adipose tissue ($p < 0.001$), waist-to-hip ratio ($p = 0.05$) and in the case of the body adiposity index ($p = 0.004$). In the case of the averages of the other variables, there is no statistical significance.

In the case of the experimental groups of the both studies, statistically significant differences were discovered between the initial and the final measurements for two of the four variables. In the previous study, there were differences in the estimation of the percentage of adipose tissue ($p = 0.002$) and that of the body adiposity index ($p = 0.003$). In the current study, the same two variables registered statistically significant differences: estimation of the percentage of adipose tissue ($p < 0.001$) and body adiposity index ($p = 0.001$).

Also, in the case of the control groups of the two studies, there were no statistically significant changes between the measurement averages.

Table 6. Results of mean differences statistical significance tests

| Dependent variable | Study of 2017 | | | Study of 2019 | | |
|---|---|---|---|---|---|---|
| | p (U M-W)[a] | p (W, GC)[b] | p (W,GE)[c] | p (U M-W)[a] | p (W, GC)[b] | p (W,GE) |
| Body Mass Index | 0.39 | 0.07 | 0.94 | 0.06 | 0.08 | 0.67 |
| Fat tissue percentage | 0.81 | 0.07 | **0.002** | **<0.001** | 0.28 | **<0.001** |
| Waist-to-Hip ratio | **0.04** | 0.10 | 0.17 | **0.05** | 0.16 | 0.09 |
| Body Adiposity Index | 0.09 | 0.65 | **0.003** | **0.004** | 0.34 | **0.001** |

[a] - Post-intervention U Mann-Whitney Test

[b] - Wilcoxon Test for CG

[c] - Wilcoxon Test for EG

## 6. Conclusions

We consider admitted the hypothesis according to which a tennis training program will improve the body mass index, the adipose tissue percentage, the waist-to-hip ratio and the body adiposity index of the participants. Positive changes were found at the end of the physical activity program, all in the advantage of the participants of the experimental group, the statistical tests indicating the existence of significant changes in the estimation of adipose tissue ($p < 0.001$) and the body adiposity index ($p = 0.001$).

The difficulties encountered in carrying out this study were: the small number of participants due to the

particularities of the tennis training, the relatively late hours at which the intervention took place, the employees having to start the training after the work program, the costs, but it can be asserted that it would represent a minor issue if such programs would be supported by employers as well as employees.

We can conclude that such programs have a certain utility and we encourage their implementation in companies and business environment units. We also consider necessary the study of new methods of implementation and deployment of such interventions.

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# DANCE MOVEMENT THERAPY BY PRACTICING AUTHENTIC MOVEMENT AND EPIMOTORICS

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**Abstract**

**Research Goals**
This study aims to investigate the methods of measuring the efficiency of the Authentic Movement and of the model based on EpiMotorics in the improvement of the therapists' movement through dance and in the improvement of emotional intelligence, of self-efficiency.
**Gap in Knowledge:** The combination of the model between body movement, free-metaphorical writing and professional terminology was designed to learn about the verbal and nonverbal interaction. The monitoring model examined in this study is a unique model, about which there is no previous study and that hopes to contribute to new perspectives, to instruments and directions for further research. The proposed model could be universal, intercultural and international.

*Keywords:* Dance Movement Therapy and Physical Activity, EpiMotorics;

## 1. Problem statement

Dance Movement Therapy is based on a multidisciplinary knowledge of the body ad of psychology, starting from the theories and methods of individual and group psychotherapy, Weiner & Craighead, (2010); research on nonverbal communication, Davis & Skupien (1982); body development - movement; and developmental psychology, Shahar-Levy (2009); Kestenberg (1975). Furthermore, a Dance Movement therapist may use movement analysis systems to get a better insight into the qualities of movement, Shahar-Levy (2009); Kestenberg Amighi, Loman, Lewis, & Sossin (1999); Laban (1974).

In this type of therapy, the client develops the capacity of becoming aware of his emotional and physical experience and of the close connection between them. This may be done during individual and group therapy. Group setting enables the examination and practice of interpersonal behaviours and relationships, Schmais (1981), through movement interactions and verbal sharing, as well as potential associations or images.

In Dance Movement Therapy, the therapist understands the meaning of movement depending on measures such as space, quality, time, rhythm, form, weight and symbolical contents. These meanings are conveyed to the client through the nonverbal answers of the therapist, through verbal comments and reflective and interpretative interventions. Thus, body/movement work is also processed through verbal discussions; verbal and nonverbal communication are both integrated in Dance Movement Therapy. The underlying principle of Dance Movement Therapy, Wengrower (2009) also summarizes its significance:

1. Uniting body and mind.

2. Gestures, postures and movements express parts of the personality and they allow self-knowledge and psychotherapeutic change. Integrative psychotherapeutic information exists in movement and dance.

3. The relationship between therapist and patient is essential for the efficiency of Dance Movement Therapy.

4. Movement is based on unconscious processes and it contains the space of dreams and free association. Movement and dance serve as a path towards the unconscious and aspects of a person's wellbeing.

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5. In the creative process, anchored in free associative movement, there is a therapeutic effect; dance and movement favour change and wellbeing.

Another aspect is the relationship between: emotional intelligence - nonverbal communication and Dance Movement Therapy. Walter (2013) and Mayer et al. (2000) discovered that the capacity of interpreting nonverbal signals is one of the components of emotional intelligence; it is considered an independent factor within emotional intelligence. Dance Movement Therapy is based on the recently developed approach to dance as a multi-sensory experience, engaging the skills of bodily, emotional, cognitive and cultural movement, Shalem-Zafari & Grosu, (2017). Dance favours a connection with the bodily self with support in handling daily problems.

Federman (2011) has compared art therapy students with dance movement therapy students and he concluded that the use of movement and bodily engagement among dance movement therapy students led to greater kinaesthetic changes, thus increasing the kinaesthetic empathy skills, which are based on nonverbal language and emotional knowledge. The intelligent use of emotion fits the definition provided by Elfenbein et al. (2006).

## 2. Research hypotheses

Current research studies will examine three hypotheses:

1) The new self-monitoring model will modify the movement parameters of Dance Movement therapists by: practicing the self-monitoring model based on authentic movement and EpiMotorics will lead to movement:

a) Safer and more self-aware (for instance, for less inward movements, quick, fragmentary and indirect), or

b) To a more emotional and interaction-centred movement (for instance, to a greater outward movement, round (curved), (straight) linear, horizontal (alignment), vertical (alignment), continuous, slow and indirect movements.

**The main objective of this research** is to determine to what extent the self-monitoring model is able to improve the skills of beginner Dance Movement therapists. This general objective may be differentiated into the following specific objectives:

1. To explore how beginner Dance Movement therapists experience the self-monitoring model;
2. To understand the factors and processes promoting change.

## 3. Findings and results

Hypothesis 2, according to which the practice of the Authentic Movement and of the self-monitoring model based on EpiMotorics would improve emotional intelligence and self-efficiency among beginner therapists was test quantitatively. This was done by comparing the values obtained before and after the participation in the new self-monitoring model, by applying the standard mean comparison procedure, namely t test, to the corresponding questionnaires. Furthermore, this hypothesis was appraised qualitatively by analysing the open questionnaires of the participants to the research groups and by organising a focus group discussion.

Table 1. Means and standard deviation for the scores of group-based movement parameters (N = 36 control group and N = 36 experimental group)

| | Control (n=36) | | Study (n=36) | | $t_{(70)}$ | $p$ |
|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | | |
| Inward Movement | 2.86 | 0.49 | 3.14 | 0.49 | -2.42 | 0.02 |
| Outward Movement | 1.39 | 0.87 | 1.25 | 0.69 | 0.75 | 0.46 |
| Round Curved Shapes | 1.66 | 0.84 | 1.47 | 0.81 | 0.95 | 0.35 |
| Straight Linear Shapes | 1.69 | 0.86 | 1.47 | 0.74 | 1.18 | 0.24 |
| Horizontal Alignment Shapes | 1.86 | 0.93 | 1.61 | 0.93 | 1.14 | 0.26 |
| Vertical Alignment Shapes | 1.64 | 1.02 | 1.44 | 1.08 | 0.79 | 0.44 |
| Quick Movement | 1.53 | 1.06 | 1.86 | 1.10 | -1.31 | 0.19 |
| Slow Movement | 2.50 | 0.81 | 2.25 | 1.05 | 1.13 | 0.26 |
| Fragmentary Movement | 2.14 | 0.96 | 2.47 | 1.00 | -1.44 | 0.15 |
| Continuous Movement | 1.75 | 1.08 | 1.56 | 0.97 | 0.80 | 0.42 |
| Indirect Movement | 2.83 | 0.56 | 3.03 | 0.51 | -1.54 | 0.13 |
| Direct Movement | 1.22 | 0.87 | 0.72 | 0.91 | 2.38 | 0.02 |

Table 1 shows that we have found basic significant differences for inward movement and direct movement,

which means that the values obtained by the participants in the research group were significantly higher in inward movement and significantly lower in direct movement, compared to the control group. No mean basic differences were found for the rest of the movement parameters and no group differences in the movement parameters following the implementation of the self-monitoring model. In order to compare the effect of the self-monitoring model on the movement parameters between the research groups, an independent sample test was carried out only for the "after" measurement. The results are presented in Table 2.

Table 2. Means and standard deviation for the scores of the movement parameters by groups, following the implementation of the self-monitoring model (N = 72)

| | Control (n=36) | | Study (n=36) | | *t* | *p* |
|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | | |
| Inward Movement | 2.19 | 0.95 | 1.50 | 0.88 | 3.22 | 0.002 |
| Outward Movement | 1.78 | 0.87 | 2.83 | 0.74 | -5.57 | < 0.001 |
| Round Curved Shapes | 2.33 | 0.59 | 2.83 | 0.67 | -3.42 | 0.001 |
| Straight Linear Shapes | 2.03 | 0.85 | 2.52 | 0.56 | -2.96 | 0.004 |
| Horizontal Alignment Shapes | 1.97 | 0.77 | 2.72 | 0.66 | -4.43 | < 0.001 |
| Vertical Alignment Shapes | 2.42 | 0.69 | 2.92 | 0.37 | -3.83 | < 0.001 |
| Quick Movement | 1.50 | 1.00 | 1.36 | 0.90 | 0.62 | 0.54 |
| Slow Movement | 2.58 | 0.73 | 2.86 | 0.54 | -1.83 | 0.07 |
| Fragmentary Movement | 2.00 | 0.93 | 1.17 | 0.61 | 4.51 | <0 .001 |
| Continuous Movement | 2.00 | 0.93 | 1.58 | 1.03 | 1.81 | 0.08 |
| Indirect Movement | 2.42 | 0.81 | 1.61 | 0.69 | 4.56 | < 0.001 |
| Direct Movement | 1.28 | 0.85 | 2.81 | 0.71 | -8.28 | < 0.001 |

Table 2 and Figure 1 show that, besides "quick movement", significant and marginally significant differences were found for all the other movement parameters. As shown in Figure…, the research group recorded significantly higher values concerning outward movement, round curved shapes, straight linear shapes, horizontal alignment shapes, vertical alignment shapes, slow movement (marginally significant) and direct movement, compared to the values obtained by the control group. In contrast, the control group recorded significantly higher values in inward movement, fragmentary movement, continuous movement (marginally significant) and indirect movement.

The differences within the group for the scores of the movement parameters (before and following the implementation of the self-monitoring model), were as follows: in order to examine whether the self-monitoring model initiated modifications in the movement parameters, we carried out a "before and after" comparison for each group separately, through a series of paired sample t tests. Modifications within the control group for the scores of the movement parameters were recorded in: the first series of paired sample t tests was conducted within the control group. The results are presented in Table 3.

Table 3. Means and standard deviation for the movement parameters in time, for the control group (N = 36)

| | Before | | After | | $t_{(35)}$ | *p* |
|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | | |
| Inward Movement | 2.86 | 0.49 | 2.19 | 0.95 | 4.06 | <0 .001 |
| Outward Movement | 1.39 | 0.87 | 1.78 | 0.87 | -2.79 | 0.009 |
| Round Curved Shapes | 1.66 | 0.84 | 2.34 | 0.59 | -6.43 | < 0.001 |
| Straight Linear Shapes | 1.69 | 0.86 | 2.03 | 0.85 | -2.09 | 0.05 |
| Horizontal Alignment Shapes | 1.86 | 0.93 | 1.97 | 0.77 | -1.44 | 0.16 |
| Vertical Alignment Shapes | 1.64 | 1.02 | 2.42 | 0.69 | -5.02 | <0 .001 |
| Quick Movement | 1.53 | 1.06 | 1.50 | 1.00 | 0.27 | 0.79 |
| Slow Movement | 2.50 | 0.81 | 2.58 | 0.73 | -0.68 | 0.50 |
| Fragmentary Movement | 2.14 | 0.96 | 2.00 | 0.93 | 1.71 | 0.10 |
| Continuous Movement | 1.75 | 1.08 | 2.00 | 0.93 | -1.67 | 0.11 |
| Indirect Movement | 2.83 | 0.56 | 2.42 | 0.81 | 3.85 | < 0.001 |
| Direct Movement | 1.22 | 0.87 | 1.28 | 0.85 | -0.37 | 0.71 |

Table 3 shows that we have found significant differences and little significant differences for inward

movement, outward movement, round curved shapes, straight linear shapes, vertical alignment shapes and for indirect movement. It has been noted that the basic measurement was higher than the "after" measurement for inward movement and indirect movement; Outward movement, round curved shapes, straight linear shapes and vertical alignment shapes proved to be higher "after" the implementation of the program. Moreover, we have not found significant differences between other movement parameters within the control group. Modifications within the study group for the scores of the movement parameters: the second series of paired sample t tests was conducted within the study group. The results are presented in Table 4.

Table 4. Means and standard deviation for the movement parameters in time, for the study group (N = 36)

| | Before | | After | | $t_{(35)}$ | $p$ |
|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | | |
| Inward Movement | 3.14 | 0.49 | 1.50 | 0.88 | 14.41 | <0.001 |
| Outward Movement | 1.25 | 0.69 | 2.83 | 0.74 | -10.14 | < 0.001 |
| Round Curved Shapes | 1.47 | 0.81 | 2.83 | 0.66 | -11.29 | < 0.001 |
| Straight Linear Shapes | 1.47 | 0.74 | 2.53 | 0.56 | -9.40 | < 0.001 |
| Horizontal Alignment Shapes | 1.61 | 0.93 | 2.72 | 0.66 | -5.98 | <0.001 |
| Vertical Alignment Shapes | 1.44 | 1.08 | 2.92 | 0.37 | -8.16 | < 0.001 |
| Quick Movement | 1.86 | 1.10 | 1.36 | 0.90 | 4.07 | < 0.001 |
| Slow Movement | 2.25 | 1.05 | 2.86 | 0.54 | -3.80 | 0.001 |
| Fragmentary Movement | 2.47 | 1.00 | 1.17 | 0.61 | 9.15 | < 0.001 |
| Continuous Movement | 1.56 | 0.97 | 1.58 | 1.03 | -0.16 | 0.87 |
| Indirect Movement | 3.03 | 0.51 | 1.61 | 0.69 | 10.54 | <0.001 |
| Direct Movement | 0.72 | 0.91 | 2.81 | 0.71 | -12.55 | < 0.001 |

Table 4 and Figure 1, show that, besides "continuous movement", we have found average significant differences for all the other movement parameters: outwards movement, round curved shapes, straight linear shapes, horizontal alignment shapes, vertical alignment shapes, slow movement and direct movement - the scores increased following the implementation of the self-monitoring model. In addition, following the implementation of the self-monitoring model, the scores decreased for inward movement, quick movement, fragmentary movement and indirect movement.

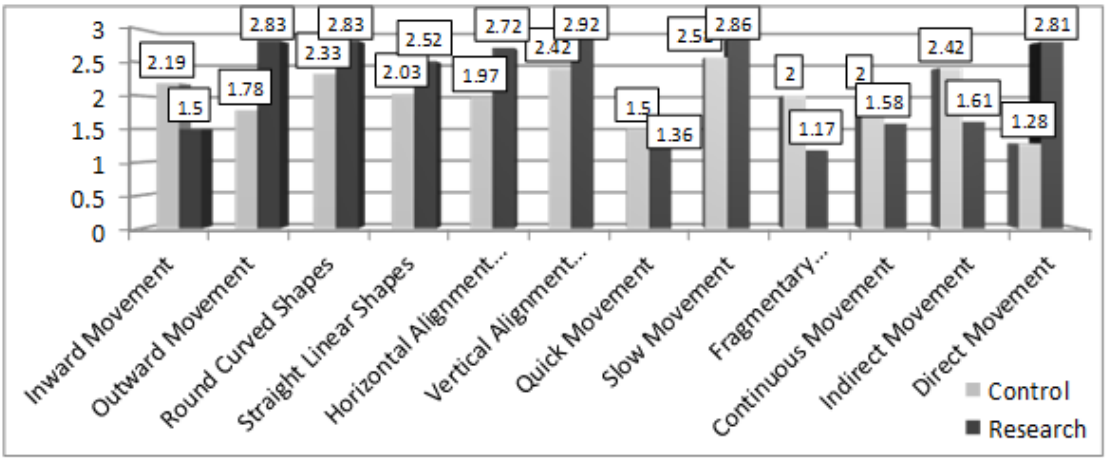


Figure 1. Mean differences in movement parameters, after the implementation of the self-supervision model.

Differences between groups in contrasting the movement parameters may be observed in order to examine whether the self-monitoring model initiated modifications of the movement parameters for the research groups beyond those of the control group, a "gap" variable was calculated, ("after" minus "before"). Was conducted a unidirectional ANOVA to examine the mean differences between the gaps. The results are presented in Table 5 and figure 2.

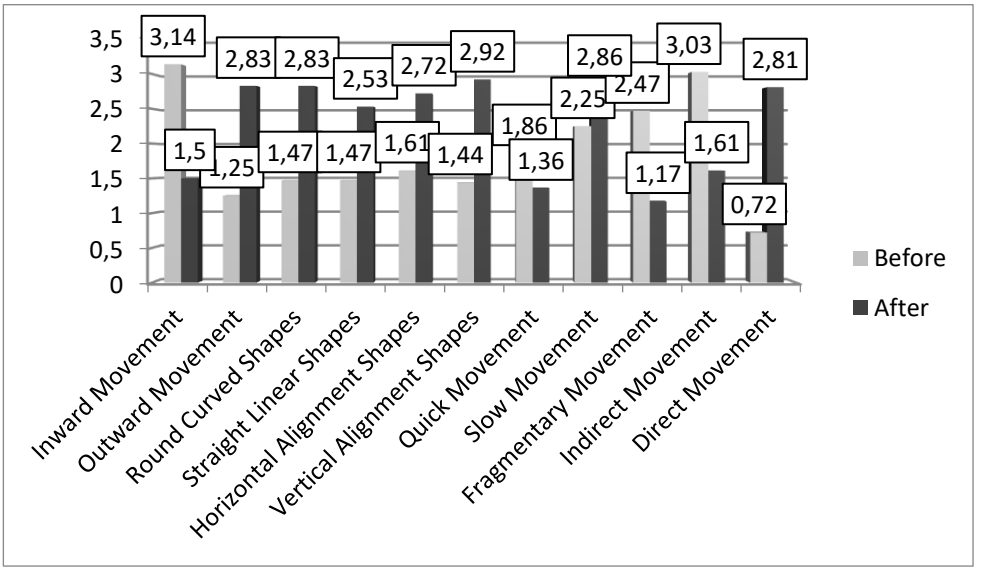


Figure 2. The mean differences in the movement parameters, before and following the implementation of the self-monitoring model, within the study group.

Table 5. Means and standard deviation for the differences between the "before" and "after" measurements, by groups (N = 72)

| | Control (n=36) | | Study (n=36) | | *t* | *p* |
|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | | |
| Inward Movement gap | -0.67 | 0.99 | -1.64 | 0.68 | 4.87 | <0.001 |
| Outward Movement gap | 0.39 | 0.84 | 1.58 | 0.94 | -5.70 | < 0.001 |
| Round Curved Shapes gap | 0.69 | 0.63 | 1.36 | 0.72 | -4.42 | < 0.001 |
| Straight Linear Shapes gap | 0.33 | 0.96 | 1.06 | 0.67 | -3.71 | < 0.001 |
| Horizontal Alignment Shapes gap | 0.11 | 0.46 | 1.11 | 1.12 | -4.97 | < 0.001 |
| Vertical Alignment Shapes gap | 0.78 | 0.93 | 1.47 | 1.08 | -2.92 | 0.005 |
| Quick Movement gap | -0.03 | 0.61 | -0.50 | 0.74 | 2.96 | 0.004 |
| Slow Movement gap | 0.08 | 0.73 | 0.61 | 0.96 | -2.62 | 0.01 |
| Fragmentary Movement gap | -0.14 | 0.49 | -1.31 | 0.86 | 7.11 | < 0.001 |
| Continuous Movement gap | 0.25 | 0.91 | 0.03 | 1.03 | 0.97 | 0.33 |
| Indirect Movement gap | -0.42 | 0.65 | -1.42 | 0.81 | 5.80 | < 0.001 |
| Direct Movement gap | 0.06 | 0.89 | 2.08 | 1.00 | -9.10 | < 0.001 |

Table 5 shows that, besides continuous movement, we have found significant differences for tall the other comparisons. In relation to the aforementioned observations, the difference between the "before" and "after" measurements in the implementation of the program was significant in favour of the study group, compared to the control group.

**Conclusions**

The summary of the conclusions regarding the movement parameters in relation to the research hypotheses. Briefly, after comparing all the results featured above, three main conclusions are worth drawing:

1. It has been observed that the intervention of the self-monitoring model has a robust effect on the following movement parameters: inward movement, outwards movement, round curved shapes, straight linear shapes, horizontal alignment shapes, vertical alignment shapes, quick movement, fragmentary movement, indirect movement and direct movement.

2 The self-monitoring model had a moderate effect on slow movement.

3. The self-monitoring model had a low and even non-existing effect on continuous movement.

Consequently, the first section of the first hypothesis was confirmed; practicing the self-monitoring model based on authentic movement and EpiMotorics has led to a safer, more self-aware movement also for less inward movements, quick, fragmentary and indirect. The second section of the first hypothesis was partially confirmed; the practice of the Authentic Movement and of the self-monitoring model based on EpiMotorics has led to a more emotional and interaction-centred movement – to a greater outward movement, round (curved), (straight) linear, vertical (alignment), slow and direct movements. Continuous movement in the research group has not changed more than in the control group.

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# EFFECT OF SUB-MAXIMAL WEIGHT TRAINING ON FORCE, VELOCITY AND POWER IN JUNIOR SPEED SKATERS

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**Abstract**

The purpose of this study was to assess the effect of 12 week weight training intervention with sub-maximal load, on jump height, peak force, velocity and power by testing a squat jump under different load conditions determined of 1RM (repetition maximum) of junior speed skaters from national team, in the pre-season period. 20 subjects participated in this study, 10 junior speed skaters (n=10, 17.8 ± 2,6 years, 186.3 ± 3,2cm) and 10 volunteers (n= 10, 18.1 ± 2,2 years, 189.4 ± 4,3cm). The squat jump was analyzed with different loads 30%, 55% and 80% from 1RM, pre and post testing with Tendo Weightlifting Analyzer, measuring 4 variables. For the junior speed skaters results obtained show a significant increase ($p \leq 0.001$) of peak power (2074 [$kg \cdot m^2 \cdot s^{-3}$], DS= 10.29) and peak velocity (1.84 [m/s], DS = 0.01) with 30% of 1RM. Concerning the peak force with 55% of 1RM, 1436 [$kg \cdot m \cdot s^{-2}$], DS = 2.90 and 80% of 1RM, 1542 [$kg \cdot m \cdot s^{-2}$], DS = 4.20) were similar and for the peak power with 55% of 1RM, 1836 [$kg \cdot m^2 \cdot s^{-3}$], DS = 6.14) and 80% of 1RM, 1634 [$kg \cdot m^2 \cdot s^{-3}$], DS = 3.17) results confirmed significant increases ($p \leq 0.001$) with both loads. Thus results indicate that a 12-week training intervention with a sub-maximal load induces an increase in peak force and power output. Designing an optimal training program requires planning of various combinations of methods and weights around the weak and strong points, specific to each skater.
*Keywords:* power; force; velocity; squat jump; repetition maximum;

## 1. Introduction

Resistance-training programs aimed at muscular-power enhancement are desired to improve sports performance. Because power is the product of force and velocity, both components need to be addressed in a training program to develop muscular power.

Some investigators have advocated resistances in the range of 10–80% of 1RM to maximize mechanical power output, depending on the nature of the exercise (upper vs. lower body, single- vs. multi-joint, traditional vs. explosive), the training experience of the athlete and the training status of the athlete within a yearly training cycle (Baker, 2001; Baker, 2001; Dugan, Doyle, Humphries, Hasson, & Newton, 2004; Newton, & Dugan, 2002; Stone, et al., 2003).

However other investigators (Hoffman, Ratamess, Kang, Rashti, & Faigenbaum, 2009; Rhea, Peterson, Lunt, & Ayllo´n, 2008; Newton, Cormie, & Cardinale, 2011) have suggested the use of heavy loads (>80% of 1RM) to induce recruitment of high-threshold fast-twitch motor units, which produce more power output than do low-threshold slow-twitch motor units (Haff, Whitley, & Potteiger, 2001). In addition, peak power has been shown to be correlated with percentage of fast-twitch muscle fibers (Haff, et al., 2015). Therefore, having a higher percentage of fast-twitch muscle fibers may be advantageous in high-power outputs.

Heavy resistance training uses a relatively heavy load (>80% of 1RM) and is performed with a relatively slow velocity because of a large external resistance that must be overcome (Izquierdo, et al,. 2001). This method has been reported to increase maximum muscular strength and to result in enhanced muscular power or dynamic performance (Wilson, Newton, Murphy, & Humphries, 1993).

There are excellent arguments for a high load approach 50-70% of 1RM as well as for a low load approach

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<50% of 1RM in exclusion but most a mixed methods approach combining both appears to be most beneficial (Cormie, McGuigan, & Newton, 2011).

Additionally, in some studies authors have suggested that speed of movement could be enhanced through heavy resistance training in which the actual movement velocity is low, provided that there is an intention to lift weights as rapidly as possible, which results in a high RFD (rate of force development) (Cronin, Mcnair, & Marshall, 2002).

Furthermore, another possible reason to support heavy resistance training in developing muscular power is the high correlations that have been reported between maximum strength and high-power outputs at light as well as at heavy resistance (Stone, et al., 2003).

Although some other investigators found or insisted that resistance training at relatively heavy load is more effective than lighter loads in developing muscular speed and power (Behm, & Sale, 1993) but the majority of researchers support also the idea of explosive-type resistance training to improve muscular power and dynamic athletic performance (Derenne, Ho, & Murphy, 2001; Mcbride, Triplett-Mcbride, Davie, & Newton, 2002).

In addition to intensity or load of training, exercise selection is also important when considering training programs for muscular-power development because exercise selection would dictate the mechanical specificity of training. It is suggested that the degree of transfer of training effects is high when the training exercise is mechanically specific or similar to the actual performance (Stone, et al., 2003; Newton, Cormie, & Cardinale, 2011).

For speed skaters, favourable is using multi-joint exercises in which muscles act as functional task groups rather than as an isolated apparatus and that intra- and intermuscular coordination of movement pattern, which probably is improved through multi-joint or complex movements, being an important factor contributing to high-power output (Stone, et al., 2003).

As a method of training, explosive-type resistance training uses relatively light loads (40–60% of 1RM) that are lifted in an explosive manner, which results in a high velocity of movement and a high RFD (rate of force development) (Jones, Bishop, Hunter, & Fleisig, 2001; Newton, Cormie, & Cardinale, 2011). The rationale for the explosive-type resistance-training method is based on the velocity specificity of resistance training (Behm, & Sale, 1993). In other studies have been suggested that maximum mechanical power output occurs at higher percentage of maximum load (40–70% of 1RM) (Baker, 2001; Baker, Nance, & Moore, 2001; Izquierdo, et al., 2001; Cronin, Mcnair, & Marshall 2002).

For this study, the researchers hypothesized that force, velocity and power variables would change significantly when training with sub-maximal load 80% of 1RM during a 12-week weight training (explosive type training); that these assessments would result in superior scores for junior speed skaters and that these measures would be sensitive to training induced changes after a 12-week training period. The testing protocol was assessed by evaluating two groups, junior speed skaters and athletes as volunteers before and after an intensive 12 week training period. Each week of training included 2 sessions of weight exercises (e.g. back squat, front squat, etc.)

Therefore, the aim of this study was to investigate the effect of a 12-week weight training intervention measuring peak power output, peak force and velocity, jump height, under various load conditions respectively 30%, 55% and 80% of 1RM and determine the optimal load for peak power output but also the degree of correlation between variables measured in ballistic exercise like squat jump in junior speed skaters, in pre-season.

## 2. Material and methods

### *2.1. Participants*

In this study participated 20 athletes aged between 16-18 years, 10 speed skaters participated in experiment group SJ (80) (n=10), 17.8 ± 2.6years, 186.3 ± 3.2cm, following the 12-week training protocol respectively were part of a full time training program that included regular jump exercises and weighted squat jumps training and 10 volunteers as control group (C) (n= 10), 18.1 ± 2.2years, 189.4 ± 4.3cm. Each subject was required to fill out a medical history questionnaire that was, screened by a physician to eliminate individuals with contraindications for participating in the investigation. Prior approval by the national coach was obtained for this study. All subjects were informed of any risks associated with participation in the study and signed an informed consent document before any of the testing.

### *2.2. Study design*

The study has a longitudinal design, in which two groups participated SJ (squat jump) (80%) and (C) (control) group. The experiment group followed a 12-week training protocol with a sub-maximal load respectively 80% of 1RM (determined for each subject) after which they performed a squat jump test under various load conditions, with 30%, 55% and 80% of 1RM to determine the peak power output, force and velocity, jump height and optimal load that maximizes power. The second group served as control (C).

### *2.3. Training protocol*

To assess the squat jump various measures were obtained during the execution under a range of loads (30%, 55%, 80%) of twenty athletes from which ten junior speed skaters and ten volunteers, that were familiarized with the experimental procedures and tested in one week (48h before test). Training period intervention was 12-weeks of strength exercises with 80% of 1RM, 2 times a week with a duration of approx. 60*min*. All sessions were assisted by the researcher and national team coach.

All trainings were performed using an Olympic bar (Olympic Sportmann Romania, 20*Kg*) to which the load was added according to 1RM determined on each subject. To evaluate the peak power (PP), peak force (PF), peak velocity (PV) and jump height (JH) for each repetition we used Tendo Weightlifting Analyzer. The subjects in the experiment group performed a warm-up of 10 minutes on the ergometric bike with a standard resistance - 105[$kg \cdot m^2 \cdot s^{-3}$] (XTPRO Bike 600, Tehnogym Usa Corp., U.S. A), followed by 5 minutes stretching exercises. Approximately 2 minutes later testing began (Murray, 2005). After warm-up the load was progressively increased, each subject having 3-4 attempts (maximum efforts) to determine 1RM. The repetition was considered correct when the angle formed by the knee flexion was 90-100˚degrees specific to each subject, which was marked by an adjustable fence.

Each repetition was considered correct when the angle determined by the knee flexion was 90˚ degrees, representative for speed skating, ideal for producing maximal power in a side push, followed by an explosive jump to achieve maximum jump height. The task of each subject was to perform each repetition at maximum speed, exerting a maximum force. The control group did not perform additional explosive exercises and were told to follow their daily training regimen between the test periods.

### *2.4. Squat jump testing protocol*

Subjects attended a familiarization session before each testing period. Physical activity 48 hours before the assessment was standardized to reduce the potential impact of pervious training activities on performance of the tests.

After the warm up, subject performed a maximal effort squat jump with 30%, 55% and 80% of 1RM (repetition maximum), with the intend to jump as explosively as possible. 3 attempts were allowed for each load. The variables measured were peak power (PP), peak velocity (PV), peak force (PF) and jump height (JH) with Tendo Weightlifting Analyzer (TENDO Sports Machines, Trecin, Slovak Republic) was attached on the Olympic weight-lifting bar (total load 30%, 55% and 80%) and the mat (Tendo WL package) was used to measure the jump height. The data was collected using the software Tendo Softaware Computer V-5 (Version 6.0.1, Slovak Republic) that allowed a direct measurement of force-time characteristics.

### *2.5. Statistical analysis*

All statistical tests were performed with StatsDirect version. 2.7.2 (StatsDirect Ltd, Cambridge, UK). Mean and standard deviations (mean ± SD) were calculated as descriptive statistics. The difference between groups pre~ and post-test was analyzed using Independent T-Test (Student), Mann-Whitney (U) or Wilcoxon test. To determine the correlation between two variables, the Pearson correlation coefficient (r) and Spearman ranks (ρ) were used. For the degree of association, Colton's empirical rules were applied. Probability values of ($p < .05$) were used to assume significant effects.

## 3. Results

Taking into consideration the values obtained for the 3 loads tested, we observed in both of the test periods, statistically significant differences ($p < 0.001$) between all the load conditions. In the comparative analysis for the high jump, post intervention we observed statistically significant differences ($p < 0.001$) between the 30% and 55%, 30% and 80%, 55% and 80% and also between pre and post intervention period for the same loads mentioned.

This differences were observed also between the SJ(squat jump)(80) and (C) groups and loads with 30%, 55% and 80% of 1RM. Between pre and post intervention for the SJ(80) group results present a very significant difference ($p < 0.001$) in jump height with all the loads, a progress as shown 30% (+2.17cm, 9.63% progress), 55% (+2.07cm, 12.6%) and 80% (+1.38cm, 11.8%) and for the (C) group significant ($p < 0.01$) with 55% of 1RM tested (14.62cm ± 0.13) Tabel 1.

Table 1. High jump comparisons for both groups and test periods (mean ± SD)

| Period | Load | Mean ± SD for SJ(80) | Mean ± SD for (C) | Between the loads | P Value |
|---|---|---|---|---|---|
| Pre-test | 30% | 20.38 ± 0.14 | 20.33 ± 0.16 | | |
| | 55% | 14.28 ± 0.06 | 14.12 ± 0.10 | 30%-55% | < 0.0001*** |
| | 80% | 10.26 ± 0.15 | 9.43 ± 0.09 | | |
| Post-test | 30% | 22.55 ± 0.19 | 20.78 ± 0.22 | 30%-80% | |
| | 55% | 16.35 ± 0.08 | 14.62 ± 0.13 | | < 0.0001*** |
| | 80% | 11.64 ± 0.18 | 9.56 ± 0.04 | 55%-80% | |
| P Value between Pre-test and Post-test for SJ(80) | | | | | |
| | 30% | 55% | 80% | | |
| | 0.0002*** | 0.0002*** | 0.0001*** | | |
| *Note:* * significant at $p < 0.05$; ** significant at $p < 0.01$; *** significant at $p < 0.001$ | | | | | |

Tabel 2. Peak power comparisons for both groups and test periods (mean ± SD)

| Period | Load | Mean ± SD for (C) | Mean ± SD for SJ(80) | Between the loads | P Value |
|---|---|---|---|---|---|
| Pre-test | 30% | 1739.88 ± 14.22 | 1883.50 ± 9.49 | 30%-55% | < 0.0148*** |
| | 55% | 1577.42 ± 2.71 | 1625.66 ± 3.24 | 30%-80% | |
| | 80% | 1285.14 ± 3.59 | 1365.93 ± 4.37 | 55%-80% | < 0.0001*** |
| Post-test | 30% | 1808.94 ± 9.21 | 2074.76± 10.29 | 30%-55% | < 0.0148*** |
| | 55% | 1619.20 ± 4.38 | 1836.95 ± 6.14 | 55%-80% | |
| | 80% | 1362.19 ± 7.32 | 1534.18 ± 3.17 | 55%-80% | < 0.0001*** |
| P Value between Pre-test and Post-test for SJ(80) | | | | | |
| | 30% | 55% | 80% | | |
| | 0.0001*** | 0.0001*** | 0.0001*** | | |
| *Note:* * significant at $p < 0.05$; ** significant at $p < 0.01$; *** significant at $p < 0.001$ | | | | | |

For peak power, post intervention in SJ(80) group we observed very significant differences ($p < 0,001$) between the loads 30% and 80%, 55% and 80% and only significant ($p < 0,05$) between 30% and 55% ($p = 0.01$) in both of the testing periods. At the moment of comparative analysis between pre and post intervention we found very significant differences under all load conditions tested for SJ(80) (30%, 1883[$kg \cdot m^2 \cdot s^{-3}$] ± 9.49) vs. 2074[$kg \cdot m^2 \cdot s^{-3}$] ± 10.29, 9.22% progress), (55%, 1625[$kg \cdot m^2 \cdot s^{-3}$] ± 3.24 vs. 1836[$kg \cdot m^2 \cdot s^{-3}$] ± 6.14, 11,5%) and (80%, 1365[$kg \cdot m^2 \cdot s^{-3}$] ± 4.37 vs. 1534[$kg \cdot m^2 \cdot s^{-3}$] ± 3.17, 11%) while for the (C) group only significant ($p < 0,01$) with 55% (1577[$kg \cdot m^2 \cdot s^{-3}$] ± 2.71 vs. 1619[$kg \cdot m^2 \cdot s^{-3}$] ± 4.38) Tabel 2.

Table 3. Peak velocity comparisons for both groups and test periods (mean ± SD)

| Period | Load | Mean ± SD for (C) | Mean ± SD for SJ(80) | Between the loads | P Value |
|---|---|---|---|---|---|
| Pre-test | 30% | 1.73 ± 0.02 | 1.77 ± 0.02 | | |
| | 55% | 1.26 ± 0.01 | 1.30 ± 0.03 | 30%-55% | < 0.0001*** |
| | 80% | 0.94 ± 0.02 | 0.97 ± 0.02 | | |
| Post-test | 30% | 1.75 ± 0.03 | 1.84 ± 0.01 | 30%-80% | |
| | 55% | 1.29 ± 0.01 | 1.34 ± 0.02 | | < 0.0001*** |
| | 80% | 0.97 ± 0.01 | 1.03 ± 0.01 | 55%-80% | |
| P Value between Pre-test and Post-test for SJ(80) | | | | | |
| | 30% | 55% | 80% | | |
| | 0.0001*** | 0.001*** | 0.0007*** | | |
| *Note:* * significant at p < 0.05; ** significant at p < 0.01; *** significant at p < 0.001 | | | | | |

For the third variable measured during a squat jump respectively peak velocity, we observed post intervention very significant differences for both groups, between the loads 30% and 55%, 30% and 80%, 55% and 80%. We did not found any statistical differences (p > 0,05) post intervention between the groups with 55% (p = 0.06) and 80% (p = 0.78). In comparative analysis between pre and post intervention period we found very significant differences (p < 0.001) for SJ(80) group, for 30% (1.77[m/s] ± 0.02 vs. 1.84[m/s] ± 0.01, 3,9% progress) and 80% (0.97[m/s] ± 0.02 vs. 1.03[m/s] ± 0.01, 5,9%) and only significant (p < 0.01) with 55% (1.30[m/s] ± 0.03 vs. 1.34[m/s] ± 0.02, 3%), while for (C) group only with 55% and 80% Tabel 3.

Table 4. Peak force comparisons for both groups and test periods (mean ± SD)

| Period | Load | Mean ± SD for (C) | Mean ± SD for SJ(80) | Between the loads | P Value |
|---|---|---|---|---|---|
| Pre-test | 30% | 1084.45 ± 6.73 | 1087.78± 10.69 | | |
| | 55% | 1216.37 ± 2.34 | 1278.89 ± 1.80 | 30%-55% | < 0.0001*** |
| | 80% | 1335.07 ± 3.09 | 1371.36 ± 2.52 | | |
| Post-test | 30% | 1110.07 ± 4.57 | 1184.82± 10.53 | 30%-80% | |
| | 55% | 1369.63 ± 4.94 | 1436.56 ± 2.90 | | < 0.0001*** |
| | 80% | 1420.39 ± 7.15 | 1542.96 ± 4.20 | 55%-80% | |
| P Value between Pre-test and Post-test for SJ(80) | | | | | |
| | 30% | 55% | 80% | | |
| | 0.0001*** | 0.0001*** | 0.0001*** | | |
| *Note:* * significant at p < 0.05; ** significant at p < 0.01; *** significant at p < 0.001 | | | | | |

Last variable measured was peak force. We could observed at the post intervention a similar result as previous mentioned for both groups, respectively very significant difference (p < 0.001) between all load conditions and within the groups. When analysis between the results obtained pre and post intervention was made, we found the same statistic difference for SJ(80) group (p < 0.001), with 30% (8.2% progress), 55% (11%) and 80% (11.2%), while for (C) group only significant with 55% (1216[$kg \cdot m \cdot s^{-2}$] ± 2.34 vs. 1369[$kg \cdot m \cdot s^{-2}$] ± 4.94) Tabel 4.

Tabel 5. Correlations between high jump, peak power, peak velocity and peak force for SJ(80) group

| | | Pre-test | | | | Post-test | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | HJ | PP | PV | PF | HJ | PP | PV | PF |
| 30% | HJ | 1 | | | | 1 | | | |
| | PP | 0.9399** | 1 | | | 0.9616** | 1 | | |
| | PV | 0.9855*** | 0.9272* | 1 | | 0.9875** | 0.9898** | 1 | |
| | PF | 0.891* | 0.9905** | 0.8787* | 1 | 0.8033* | 0.7860* | 0.8112* | 1 |
| | | Pre-test | | | | Post-test | | | |
| | | HJ | PP | PV | PF | HJ | PP | PV | PF |
| 55% | HJ | 1 | | | | 1 | | | |
| | PP | 0.8933* | 1 | | | 0.9393** | 1 | | |
| | PV | 0.9224** | 0.7893* | 1 | | 0.9446** | 0.8504* | 1 | |
| | PF | 0.6921* | 0.4867 | 0.5322 | 1 | 0.8226* | 0.9377** | 0.7598* | 1 |
| | | Pre-test | | | | Post-test | | | |
| | | HJ | PP | PV | PF | HJ | PP | PV | PF |
| 80% | HJ | 1 | | | | 1 | | | |
| | PP | 0.7325* | 1 | | | 0.9724*** | 1 | | |
| | PV | 0.9584*** | 0.6684* | 1 | | 0.9415*** | 0.8464* | 1 | |
| | PF | 0.9231*** | 0.6997* | 0.9888*** | 1 | 0.9754*** | 0.9322*** | 0.9300*** | 1 |

*Note:* HJ = High Jump (cm); PP = Peak Power (W); PV = Peak Velocity (m/s), PF = Peak Force (N)
* significant at $p < 0.05$; ** significant at $p < 0.01$; *** significant at $p < 0.001$

Another aspect that we wanted to analysis in this study was the correlation between variables measured high jump, peak power, force and velocity under all load conditions from 1RM (repetition maximum) previous determined for each subject. As a result, for the first load with 30%, post intervention we found a very good correlation between HJ-PP, HJ-PV, HJ-PF, PP-PV, PP-PF, PV-PF. For the second and third load tested, 55% and 80% we found a very good correlation between HJ-PP, HJ-PV, HJ-PF, PP-PV, PP-PF, PV-PF. Tabel 5.

## 4. Discussion

The purpose of this research study was to evaluate the change in jump height (HJ), peak power (PP), peak force (PF) and peak velocity (PV) assessment utilizing a range of loads on a group of junior speed skaters. The primary finding of this study is that results showed a significant change, observed for all the variables outlined in the incremental load power profile and that some change in variables were also observed in control group. After a -12-week weight resistance- training period, notable changes were detected by the testing protocol. These results suggest that the incremental load power profile can be a useful method in testing and monitoring for the use with junior speed skaters during off season.

From a practical perspective, utilizing jumps test, that have a similar pattern of the actual speed skating movement, are important in the evaluation of physical performance as this allows testing athletes in laboratory conditions during off –ice season. In other words, this type of training induces changes in peak power output, peak force and velocity that has a direct impact in the final score of height of the jump even though this values decreases slightly as the load is greater.

Trough our comparative analysis between, SJ(80) and (C) groups and loads range (within the group and between groups and loads, 30% and 55%, 30% and 80%, 55% and 80%) at post period intervention and between pre and post intervention, we wanted to see the change induce - weight resistance training, using mainly explosive type exercises. We observed significant changes in all load conditions tested, 30%, 55% and 80%, concerning each of the four variable measured.

The incremental load power profile seems to be advantageous to measure if there are changes in variables measured and find the optimum load that enhances the power output, both in skaters and non-skaters. In particular, it seems that HJ, PP, PF and PV for SJ(80) group have the higher change in performance ($p < 0.001$) with all the loads tested post and pre and post period intervention, except the peak velocity where very significant changes were observed with 30% and 80%, and only significant ($p < 0.01$) with 55% of 1RM.

Another interesting aspect found concerning the peak velocity, was that at the post period intervention there were no significant changes ($p > 0.05$) with 55% and 80% between groups (C) 55% -SJ(80) 55% and (C) 80% - SJ(80) 80% of 1RM.

As for the control group post intervention, in high jump and peak power, changes were greater with all load conditions, were greater with 30% and 80% and less with 55% no matter the period of the evaluation. When comes about the peak velocity, changes were greater with 55% and 80%, between pre and post period intervention, while for peak force at the same period changes were greater with 30% and 80% of 1RM.

Considering that this phenomenon is prominent indifferently the load tested, this suggest that a key performance indicator in improving physical and speed skating performance is force, speed and power. As the value of this characteristics increases, athletes, have considerably greater force and velocity producing capabilities and consequently greater power outputs with lither and heavier loads.

Also there have been in scientific literature a debate, ranging from measurements methodology, inclusion or exclusion of body mass in calculation, reporting average versus peak power and peak force (Dugan, Doyle, Humphries, Hasson, & Newton, 2004; Newton, Cormie & Cardinale, 2011). The present study used data collection with Tendo WL Analyser device, in which force, velocity and power were collected indirectly with no body mass included and only the additional load was considered for peak power calculation. This device has been used in many studies for the comparison of different trials to each other, which has confirmed the reliability of the measurements (Thompson, et al., 2010).

Previous findings, for example in their study by Stone, et al., (2003) was observed that heavy resistance training develops muscular power and that high correlations have been reported between maximum strength and high-power outputs at light as well as at heavy loads and our results determine us to come to the same conclusion, also this method is supported by other authors to increase maximum muscular strength and to result in enhanced muscular power (Wilson, Newton, Murphy, & Humphries, 1993). In fact, a strong correlation was observed between all variables HJ, PP, PF and PV based on the scores across the entire load spectrum Tabel 5. Therefore, it would seem that, when measuring force-time characteristics, high correlation between variables is observed in loaded jump testing.

It is our finding that the testing methodology as outlined is valid for the use of monitoring physical performance of speed skaters and that the load range between 30-55% of 1RM seems to be the optimal load for maximizing power output (due to high velocity and force exertion). Importantly, it is our belief that this training and testing methodology is useful for interpreting individual strength and power characteristics of athletes. Besides, this approach to training for power has been suggested as optimal since it combines heavy resistance training with higher velocity work in order to develop power production across the entire force/velocity spectrum (Cormie, MgGuigan, & Newton, 2010).

## 5. Conclusion

After the 12-week weight training period, notable improvements were observed in all variables measured, high jump, peak power, force and velocity for the both groups tested but most significantly in speed skaters group, with 30%, 55% and 80% of 1RM jump testing (Tabel 1-4). The improvements observed in (C) group may be attributed to outside activity and not to a specific intervention.

The change observed over the 12 – week training period, across the variables assessed under different load conditions, highlight the utility of the testing protocol in assessing specific areas of improvement induced by training and determining the individual needs of each athlete. As external load increases, peak velocity is decreasing. The extent to which the velocity capabilities (peak velocity, acceleration) diminish as external load increases is a potential method for insightful interpretation of the test results. For example, athletes with well-developed force capabilities have less relative drop off in velocity qualities as the load increases.

Theoretically force is composed of mass and acceleration, this observation is predictable in that stronger athletes can accelerate larger masses comparative with weaker athletes that can not accelerate and achieve high peak velocities during a squat jump. This idea is sustained by the correlation analysis in our study where strong interaction was observed between force and velocity reported to the load used.

The results obtained in our study show that incremental load power profile also allows for a determination of optimal load range between 30-55% of 1RM and peak power output that seems an important aspect in designing training programs for juniors. When the aim of training is increasing PP (peak power) may be correct to train using a range of loads that are above and slightly below the load that optimized peak power with that athlete. For example if during a squat jump peak power for a specific load is higher (e.g. observed to be achieved at 50*Kg* of additional load

mass) the coach may design the program that involves and emphasis on load of 40-60*Kg*. Ulterior testing would not only determine whether increases in variables measured in particular peak power occurred but also determine whether the load at which peak power occurred changed as a result of the training intervention.

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# FACTORS AFFECTING CHILDHOOD OBESITY AND THE IMPORTANCE OF A REAL BODY WEIGHT PERCEPTION IN COMBATING AND TREATING OBESITY

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**Abstract**

Obesity is one of the major health problem that affects more and more children worldwide and scientists are focusing their research on identifying the factors that may lead to childhood obesity. These factors can be social, psychological, behavioral, metabolic, genetic and cellular.

The aim of this study is to identify the correlation relationships between some of the above-mentioned factors, which may influence obesity, and body composition.

In this study, 30 girls (age mean 9.5 ± 1.40) and their parents participated. We used the Inbody720 for measuring the girls body composition. Testing protocol included also collecting data regarding family eating habits, the level of children's physical activity and the parent's perception about their body weight and the body weight of their children.

The obtained results showed that a healthy eating behavior is a critical factor in combating and treating obesity when the child level of physical activity is low. Also, we observed a major difference between girl's real weight category (based on BMI) and the parent's perception on the body weight of their own children.

*Keyword*: obesity; body weight perception; body composition; lifestyle

## Introduction

Obesity is one of the major health problems that affects more and more children worldwide (Zong, Li, & Zhang, 2015). This condition consists in excessive accumulation of adipose tissue, well above the normal values and thus, the health condition becomes affected (Aronne & Segal, 2002). Scientists are focusing their research on identifying the factors that may lead to childhood obesity (Zong, Li, & Zhang, 2015).

These factors can be social, psychological, behavioral, metabolic, genetic and cellular (Gafencu, et al., 2013; Popa, Brega, Alexa, Drăgan, & Raica, 2001).

An effective management of obesity, all the above-mentioned factors should be considered. Literature data shows that genetic factors are very important. In families where at least one parent is diagnosed as overweight or obese, there is an increased risk for the child to develop the same condition (Vos & Welsh, 2010). However, this is not necessarily a rule, obesity can occur even without having a genetic predisposition, mainly due to the interaction between the other factors. For example, a bad eating behavior, characterized by an increased intake of energy as a result of excessive food consumption, on a sedentary lifestyle background, may favor the appearance of this condition (Krebs, et al., 2007).

Because the majority of the parents have a false perception over their children body weight, erroneous parental perception is another cause of childhood obesity (Keller, Olsen, Kuilema, Meyermann, & Belle, 2013)

Based on the literature data regarding the influence of genetic, social and physiological factors on a normal weight person, this study aims to identify the relationships between each of these factors and their role in childhood obesity and body composition.

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## Material and methods

In this study, the participants were 30 girls (age mean 9.5 ± 1.40) and their parents (age mean 41.1 ± 4.161), who were selected from a volleyball private club in Timișoara, România. Subjects were previously informed only of the testing procedures and not of the study hypothesis. The study was divided into two phases, as follows:

### *Anthropometric measurements*

This phase consisted in analyzing the body compositions of the subjects with the InBody720 device (South Korea) using multi-frequency bioimpedance analysis. The device generated data on total muscle mass, total body fat mass, percentage of adipose tissue and body mass index (after pre-evaluation of the waist). In order to obtain the most accurate data, the girls were weighed without shoes or heavy clothing (wearing a bathing suit). Moreover, the participants were informed not to eat or drink water at least 3 hours before testing.

### *Parent questionnaire*

The questionnaires filled by the parents, both for the children and for themselves, provided data on eating habits, physical activity level and body weight perception.

One of the questionnaires used, elaborated by Golan and Weizman (1998), is an instrument designed to provide information on the activity and eating habits of family members, in their home environment. The Family Eating and Activity Habits Questionnaire (FEAHQ) consist in 21 items that provide information regarding the frequency on which the family members engage in physical and sedentary activities (items 1-4); the amounts and type of food products (items 5-12), eating style (items 13-16), eating habits, either eating while watching TV or reading, etc. (items 17-21) (Golan & Weizman, 1998).

## Results

The data obtained from the evaluations were analyzed using the statistical program Graph Pad Prism 6 and the results are presented in the graphs and tables below. Table 1 shows the data obtained from anthropometric measurements. Therefore, based on BMI determination, the subjects were divided into four weight categories (Figure 1).

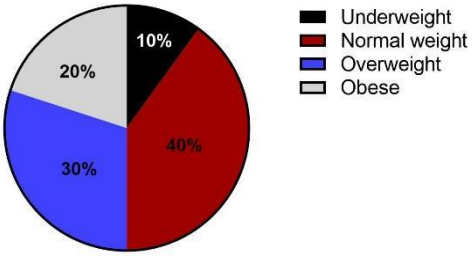


Fig 1. Distribution of subjects from the study group based on BMI

Table 1. Anthropometric measurements and body composition characteristics of subjects

| Statistical data / Parameter | Minimum | 25% Percentile | Median | 75% Percentile | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|---|---|
| Height (cm) | 120 | 131.5 | 140.5 | 149 | 161.5 | 140.1 | 11.14 |
| Weight (kg) | 25.3 | 31.03 | 38.1 | 45.1 | 59.5 | 38.95 | 9.405 |
| Skeletal Muscle Mass (kg) | 8.7 | 12.08 | 13.7 | 15.65 | 22.3 | 14.14 | 3.249 |
| Percent of Skeletal Muscle Mass(%) | 27.19 | 33.67 | 36.77 | 39.8 | 46.71 | 36.67 | 4.488 |
| Body Fat Mass. (kg) | 2.8 | 8.125 | 11.5 | 14.23 | 23.7 | 11.68 | 5.342 |
| Body Mass Index (kg/m2) | 14.2 | 17.75 | 19.45 | 21.75 | 27 | 19.66 | 3.021 |
| Percent of Body Fat (%) | 9.6 | 23.25 | 29.35 | 35.63 | 44.9 | 28.93 | 8.531 |
| Soft Lean Mass | | | | | | | |
| Right Arm (kg) | 0.67 | 0.92 | 1.06 | 1.198 | 1.93 | 1.113 | 0.3284 |
| Left Arm (kg) | 0.68 | 0.8975 | 1.025 | 1.22 | 1.91 | 1.103 | 0.3219 |
| Trunk (kg) | 7.9 | 10.08 | 11.35 | 12.95 | 17.9 | 11.87 | 2.547 |
| Right Leg (kg) | 2.03 | 2.973 | 3.53 | 4.198 | 6.14 | 3.713 | 1.001 |
| Left Leg (kg) | 1.99 | 2.923 | 3.51 | 4.218 | 6.21 | 3.706 | 1.024 |

The results obtained from Family Eating and Activity Habits Questionnaire, summarized in Table 2, are showing the average values for each item and BMI category.

Table 2. Average values obtained from FEAHQ based on subjects BMI category

| BMI Category / Question | Underweight | Normal weight | Overweight | Obese |
|---|---|---|---|---|
| Q1 | 13.67 | 10.08 | 13.78 | 11.92 |
| Q2 | 15.00 | 8.83 | 12.83 | 10.83 |
| Q3 | 2.50 | 5.38 | 4.22 | 4.17 |
| Q4 | 0.67 | 1.67 | 1.67 | 1.67 |
| Q5 | 4.33 | 3.83 | 4.33 | 3.17 |
| Q6 | 3.00 | 2.92 | 3.22 | 3.17 |
| Q7 | 0.67 | 0.67 | 0.56 | 0.50 |
| Q8 | 0.67 | 0.83 | 1.06 | 1.17 |
| Q9 | 0.33 | 0.58 | 0.67 | 0.67 |
| Q10 | 1.67 | 1.33 | 1.33 | 1.33 |
| Q11 | 3.00 | 2.08 | 0.78 | 1.67 |
| Q12 | 1.67 | 1.67 | 1.56 | 1.33 |
| Q13 | 0.33 | 0.08 | 0.22 | 0.17 |
| Q14 | 0.67 | 0.45 | 0.44 | 0.50 |
| Q15 | 1.33 | 1.50 | 1.22 | 1.00 |
| Q16 | 1.33 | 1.08 | 1.22 | 1.33 |
| Q17-1 | 0.00 | 0.42 | 0.44 | 0.83 |
| Q17-2 | 0.00 | 0.00 | 0.22 | 0.17 |
| Q17-3 | 0.67 | 1.42 | 1.89 | 1.17 |
| Q17-4 | 0.00 | 0.58 | 1.00 | 0.50 |

| BMI Category | Underweight | Normal weight | Overweight | Obese |
|---|---|---|---|---|
| Question | | | | |
| Q17-5 | 0.00 | 0.25 | 0.22 | 0.17 |
| Q17-6 | 0.00 | 1.17 | 1.44 | 0.67 |
| Q17-7 | 0.67 | 0.75 | 0.89 | 1.00 |
| Q18-1 | 0.33 | 1.25 | 1.89 | 1.83 |
| Q18-2 | 0.67 | 0.58 | 0.78 | 0.83 |
| Q18-3 | 0.00 | 0.42 | 0.33 | 0.50 |
| Q19 | 2.00 | 1.92 | 2.11 | 1.33 |
| Q20 | 1.67 | 1.50 | 1.44 | 1.50 |
| Q21total | 2.08 | 1.27 | 1.66 | 1.41 |

Based on the results obtained from the questionnaires and anthropometric measurements, different correlation between these variables have been identified.

First of all, the statistical analysis shows a weak, invers correlation between the body fat percentage and the age of the girls, thus, as the age increases, not only the percentage of body fat decreases ($r = -0.29$, $p = 0.1$), but the BMI also ($r = -0.21$, $p = 0.24$). Furthermore, there is a correlation between the age of the girls and the muscle mass percentage, therefore, the muscle mass percentage increases as the age of the subjects increases. ($r = 0.40$; $p = 0.02$).

According to the results described above, the following hypothesis can be considered: the adipose tissue percentage decreases as the age of the girls increases, due to an increased physical activity of the subjects. However, once more a weak, negative correlation is observed and this theory is dismissed by the fact that as the girls age increases, their participation on different leisure activities, including physical exercises is reduced ($r=-0.20$, $p=0.3$).

Hence, this decrease of adipose tissue percentage is due to the improvement of the eating habits, initially improper. This statement is based on the following results: the girls with a high adipose tissue mass have the habit of eating directly from the pan ($r=0.3$, $p= 0.1$), or while watching TV or reading ($r=0.22$, $p=0.2$). The habit of having meals in the dining room is correlated with the presence of a high adipose tissue mass ($r=0.38$, $p=0.03$).

The decrease of adipose tissue percentage may be influenced also by the children's habit of eating while standing ($r=-0.32$; $p=0.07$), or eating in the bedroom ($r=-0.31$; $p=0.08$). This case was observed at older girls, compared to younger ones, who showed a higher percentage of adipose tissue.

A further analysis of the actors that influence childhood obesity indicated a relationship between parents age and increased body fat mass. Therefore, the girls with older parents had a higher body fat mass ($r=0.24$, $p=0.2$). This fact was sustained by a strong positive correlation between the advanced parental age and their approval of an inadequate eating habit, such as permission to eat sweets or having snacks often ($r=0.65$, $p=0.0002$).

The girls who have breakfast with their parents have a higher percentage of adipose tissue, compared to those who rarely have breakfast with their family ($r=-0.21$, $p=0.2$), hence we observe once more the influence parents have over childhood obesity. Moreover, parents have underestimated their children weight by an average of 2.3 kg, a statistically significant difference ($p=0.0001$).

When measuring the concern of the parents over their children weight, on a scale from 1 to 7, (where 1 means no concern and 7 means very concern), the average score obtained was 3.1, which shows the erroneous parental perception on children body weight.

Regarding the average time spent weekly watching TV, or playing video games, there is no significant difference ($p=0.46$) between the girls form the two categories analyzed (normal weight and obese) (Figure 2). This data confirms the fact that eating habits and type of foods play an important role in preventing and treating obesity.

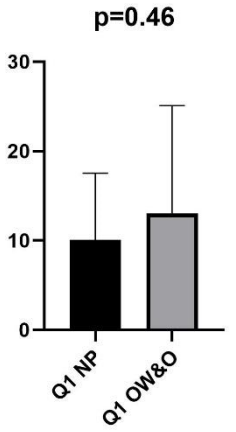


Fig. 2. Comparison between responses to Q1 question from normal weight (NP) and overweight and obese (OW&O) girls to Q1 question

Figure 3 shows that there is no significant difference (p = 0.39) between normal weight and overweight/obese girls in terms of physical activity levels (leisure activity, including exercises), this confirming once more the importance of a healthy eating style in controlling body weight and preventing obesity.

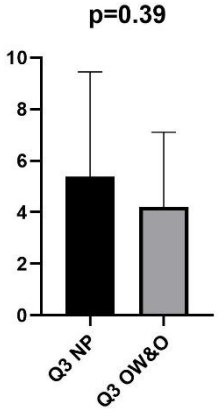


Fig. 3. Comparison between responses to Q3 question from normal weight (NP) and overweight and obese (OW&O) girls

**Discussions**

Through FEAHQ questionnaire, body composition analysis and the parental perception over their weight and their children as well, we obtained valuable information that allowed us to correlate different variables like the eating habits, level of physical activity and body composition of the subjects. Thus, the majority of the results were as we initially expected.

Professional nutritional counseling and an improved physical activity level can easily control the factors, associated with adipose tissue excess, considered in this study. By following these recommendations and considering the young age of the subjects involved in this study (50% overweight/obese), positive result can be obtained.

Literature data shows the importance of these factors in the onset of childhood obesity. The faulty eating habits caused by external stimuli such as stress, depression, social pressure, or the unlimited access of children to high calorie food products, remaining one of the main concerns (Wadden, 1992; Epstein, 1996; Wardle, 1996).

Mostly, the family and home environment influence children's unhealthy eating habits (Epstein, 1996), therefore an obesity combating strategy must be initiated as soon as possible.

The longer the obesity prevention interventions on children and adolescents is delayed, the greater the risk of becoming obese in the adult stage, developing serious health problems such as cardiovascular and metabolic diseases (insulin resistance, high blood pressure, hyperglycemia etc.) (Cali & Caprio, 2008).

**Conclusions**

In order to prevent or successfully treat childhood obesity, the home environment if very important - the eating behavior, the parents' implication and lifestyle, their objectivity regarding the children's physical appearance and weight. Both family and friends must encourage children to adopt a healthy lifestyle, including adequate diet and regular physical activities.

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# COMPARATIVE STUDY ON IMPLEMENTATION OF ONE LEG TAKE OFF IN THE VOLLEYBALL GAME TO CENTER PLAYERS

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**Abstract**

Jumping is a fundamental issue of several collective or individual sports including volleyball. The ability to jump is a basic requirement of a volleyball player to be able to execute different game-specific actions like jump set, jump serve, attack and block. High-performance volleyball players can record 250-300 of actions in a five-set match.

The attack with one leg take-off is a specific volleyball attack very hard to block if it's done correctly. servers. It aims to delay the time and place of the opponent players that are involved in the defensive actions. That's why is considered to be a surprise attack.

The purpose of this study was to analyze the differences, accounted for in the number of executions of the center players in the volleyball game using one leg take-off as a way of approach to the volleyball attack. Component teams were participants in the European Volleyball Championship (CEV) women.

The data collected were analyzed and compared with Microsoft Office Xcel and they followed: the total of plays of the center player, the total of the actions that the players have used one leg take-off, number of points obtained from the one leg take-off attack, number of points obtained from a normal take-off attack, and attack errors in both types of take-off attack.

*Key words: one leg take-off, attack, efficiency*

## 1. Introduction

Sports games can be characterized as dynamic systems, self-adjusting, with the ability to adapt to unavoidable situations caused by the opposing team (Castro, Souza, & Mesquita, 2011).
These sports games include volleyball which is one of the most popular sports in the world, played by more than 800 million people on the planet at least once a week (Miller, 2005).
It belongs to the category of means for improvement of human physical development and movement skills (Zahálka, Malý, Malá, Ejem, & Zawartka, 2017).

It's a simple sports game accessible to practitioners of any age and gender with summary requirements for equipment in which participants have no direct contact with each other (Mureșan, 2005).
The purpose of the game is to make the ball fall into the opponent's field without touching its playing surface or determine the opponent to make a mistake as amended by the regulation (Mureșan, 2005).

Two types of actions can be distinguished from the three touches: the concrete or terminal actions by which the point is won, or action which put in difficulty the actions of the opposing team and continuity actions aimed at neutralization of the attack possibilities of the opposing team (Gupta, Neptune, Jensen, & Abraham, 2016).

These actions to neutralize or eliminate adverse opportunities can result in sending a very difficult ball to the opponent or sending a ball to his teammate to increase or facilitate the winning of the next point (Gupta, et.al. 2016).

After (Zahálka, et al., 2017) to obtain volleyball performance players need to have the skills needed to complete the offensive stages. Among these actions, we will detail a little the attack and more precisely, the one leg take-off attack

The individual attack is the main form by which the offensive action of a team materializes. The attack is one of the specific actions of the game which contributes to the point difference. (Palao, Santos, & Ureña, 2004) after (Cox, 1973; Marelic et al., 1998) presents the attack as the most important way a volleyball team can win a

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match, but also the relationship between the attack and the execution errors of the attack as elements with direct influence in obtaining victory.

The one leg take-off attack is the solution for completing sets that require distance greater than 2-3 meters from the net and is made parallel or slightly oblique and consists of a jump after one leg jump continued by hitting the ball in an unbalanced position at landing (Zahálka, et al., 2017).

Initially, the one leg take-off attack was used by the strong players on the net, who were either too late for the ball, or they received a bad set and used the one leg take-off attack as a means to act on one of the situations mentioned above (Castro, et al., 2011).

In most cases, the take-off is made towards the net almost perpendicular to it, allowing the blocking player to make a proper move and optimal triggering of the defensive phase (Myres, 2018). During the one leg take-off attack, the player executes the take-off behind the setters back, oblique or parallel to the net forcing opposing players to move with the spiker thus failing an efficient settlement to achieve the defense phase.

## 2. Methods

Indices pursued during the investigation covered all the offensive actions at the net of center players completed with momentum and detachment from one leg. The data obtained with the offensive actions at the net finalized with the detachment of both legs and one leg were recorded, analyzed and compared using the Microsoft Excel program.

To be able to compare the totality of the actions at the net with the detachment from one leg we have formed the following categories: won attacks, recovered attacks, blocked attacks and out attacks.

Thus, several players, participants in the CEV Cup with an average height of 194 cm and the average age of 26 were recorded.

The actions recorded at the net represented only the offensive phases and they totaled 255 executions, out of which 114 final attacks by winning the point, 33 balls attacked out, 71 balls saved by the opposing team and 37 balls blocked by the opponent.

To highlight the differences between the two types of take-off graphs were created from which we can observe the differences related to the total of executions for each category mentioned above.

Using the calculation formula after (Grădinaru, 2003) for calculating the efficiency coefficient in the attack, we will highlight if there are differences in the efficiency of the executions between the one leg take-off attack and both feet take-off attack. The calculation formula will be applied to all the successful, recovered and failed executions for both types of attack take-off.

$$w = \frac{x + 0,5y}{x + y + z} \quad (1)$$

W - the coefficient of efficiency of the attack;
X = (+) – won attacks;
Y= (x) – recovered attacks;
Z= (-) – out attacks.

## 3. Results

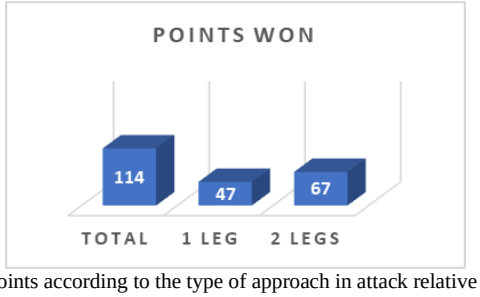


Fig.1. Distribution of points according to the type of approach in attack relative to the total executions

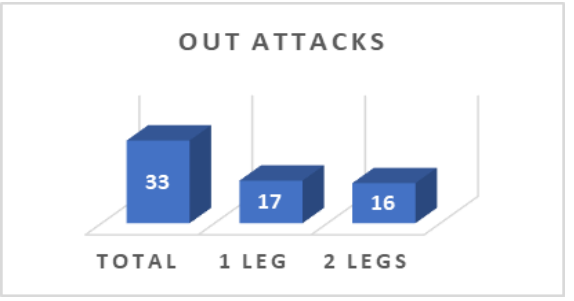


Fig. 2. Distribution of the balls attacked in out depending on the type of take-off relative to the total number of executions

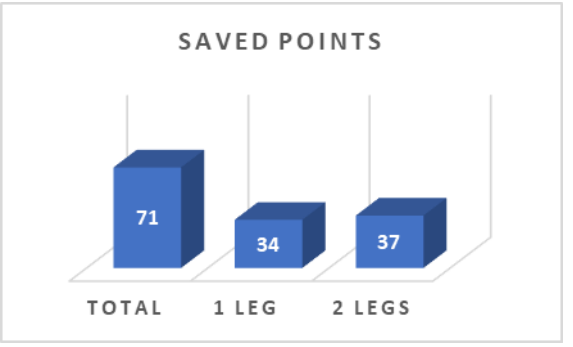


Fig. 3 Distribution of the balls saved by the opponent according to the type approached in the attack compared to the total of executions

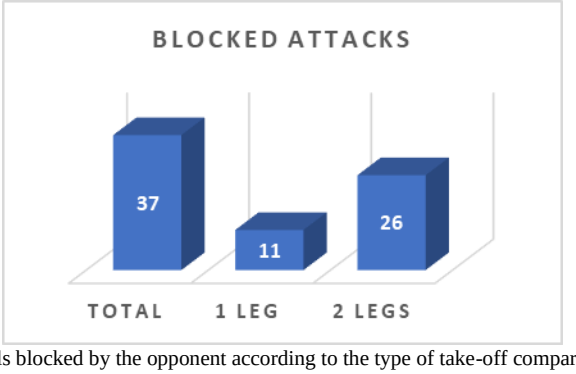


Fig. 4. Distribution of the balls blocked by the opponent according to the type of take-off compared to the total of executions

The values for the efficiency coefficient of attack hits obtained the following score:
W= 1.53 for one leg attacks
W= 1.40 for both leg attacks

## 3. Conclusions

Our study aimed to analyze if the one leg detachment is the main mode of action in the offensive actions of the center player from a volleyball team in an International Championship.

Analyzing results obtained in Fig. 1. we can say that this type of approach is present in 47.88% of the total offensive actions finalized by winning the point and the service.

Analyzing Fig. 3. in which are presented the balls recovered by the opponent, and Fig. 4. in which the blocked action by the opponent is presented, we observe that the values recorded in the executions with detachment on one leg are lower than the executions recorded in the classical approach take-off.

This fact can be linked to one of the purposes of volleyball, namely, to make the ball fall into the opponent's playing field. Expressed as a percentage the values obtained indicate the inability of the opposing team to act individually or collectively at the net or in the second line to attacks made with detachment from one leg.

Thus 47.88% of the balls were recovered in the second line following the one leg approach and take-off, compared with 52.12% recovered in the second line following the classic detachment from both legs.

Regarding the defensive actions of the opposing team, 29.72% of the balls were blocked using detachment from one leg, and 70.28% of the balls were blocked using detachment from both legs.

Looking at execution errors, the attack made with detachment from one leg according to Fig. 2. they registered higher values 51.52%, compared to the attacks made with detachment from both who recorded 48.48% of the total executions.

According to the calculation formula for the efficiency coefficient of the attack in volleyball games, higher values were recorded in favor of the attack approach with the detachment of one leg. This fact attests to the increased efficiency in the elaboration of the offensive phases completed by winning the point and the service.

In our opinion, this type of impeller brings an advantage to the user against the adverse defense either by the speed of execution, either by delaying the player performing the defensive phase**,** due to the approached achieved almost parallel to the plane of the net fact that makes it difficult to organize and realize the collective block.

Another advantage that brings to the table is the manner of execution and movement, which allows the player to act in two different areas depending on the organization of the adverse block. All this being conditioned by the quality of the reception.

These findings suggest that a one-legged approach should be used more frequently in women's volleyball and not only, because of the completion possibilities it brings to the opponent defense, through the time with which it is realized, being an attack with high execution speed.

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# DYNAMIC BALANCE, REACTION SPEED TO VISUAL STIMULATION AND MAXIMUM STRENGTH ON UPPER AND LOWER TRAIN IN CHILDREN WITH AND WITHOUT INTELLECTUAL DISABILITIES AND CHILDREN WITH DOWN SYNDROME

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**Abstract**

Children with intellectual disabilities of varying degrees but also children with Down syndrome often present balancing problems, spatial temporal coordination and difficulties in performing simple tasks such as performing leg flexures or stitches. The purpose of this study was to investigate whether there are differences and how big they are in dynamic balance tests, visual stimulus response and upper and lower train strength in children with and without intellectual disabilities as well as children with Down syndrome. This study included 40 urban subjects with and without disabilities aged 14 ± 3 years of age, from three Special Education Centers, and a Normal School from Iasi, Romania. Four groups were formed that were tests to determine dynamic balance, response velocity to visual stimulus, and maximum force on upper and lower train. Testing took place on different days but at the same time of day. We should mention that at the beginning of the study, we had the consent of parents or legal guardians because some subjects came from the placement center. Through analyzing the values of the speed of response to visual stimulus, by comparing the differences between the four groups, we can state that they are statistically significant for $0.001 < p < 0.05$. For $p \leqslant 0.001$, we can see significant statistic differences between normal children and children with severe intellectual disability, between children with mild intellectual disability and children with severe intellectual disability, as well as between children with severe intellectual disability and children with Down syndrome. Children with mild intellectual disabilities record, at all tests, values close to those of children without intellectual disability. At the maximum force on the lower train the highest average is recorded in the group of children with mild intellectual disability, with 1.76% higher than the average of children without intellectual disability.

*Keywords:* Intellectual disabilities, Down syndrome, Dynamic balance, Reaction Speed;

## 1. Introduction

According to the Ministry of Labor and Social Justice on 30 June 2018, in Romania the total number of persons with disabilities was 805.653 persons. Of these, 97.76% (787.592) are in family care and / or living independently (non-institutionalized) and 2.24% (18.061) are in residential social care institutions. Of these, 128.410 are intellectual disabilities and 9.973 are children. However, studies of the particularities of the coordinating skills for these children are very few or missing (Ministry of Labor and Social Justice, 2018).Children with intellectual disabilities of varying degrees but also children with Down syndrome often present balancing problems, spatial temporal coordination and difficulties in performing simple tasks such as performing leg flexures or stitches.

The purpose of this study was to investigate whether there are differences and how big they are in dynamic balance tests, visual stimulus response and upper and lower train strength in children with and without intellectual disabilities as well as children with Down syndrome. Following the International Classification of Functioning, Disability and Health (ICF) developed by the WHO in 2001 disability is "the negative aspects of the interaction between an individual (with a health condition) and that individual's contextual factors (environmental and personal

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factors)" (WHO, 2001). Intellectual disability (ID) is a label used to describe a constellation of symptoms that includes severe deficits or limitations in an individual's developmental skills in several areas or domains of function: cognitive, language, motor, auditory, psychosocial, moral judgment, and specific integrative adaptive (ie, activities of daily living).

Terms used synonymously with intellectual disability include cognitive disability, global developmental delay, mental retardation and learning disability (Pratt& Greydanus, 2007; Hinckson & Curtis, 2013). Studies to date show that children with intellectual disabilities defined as "significant limitations in terms of both intellectual functioning and adaptive behavior expressed in social and practical skills" (Beets & Pitetti, 2011) are less active than both quantitative and qualitative motricity (Foley & Jeffrey, 2009; Rimmer & Rowland, 2008) compared to children without intellectual disability (Rimmer et al., 2004). The incredible possibilities of people with disabilities as well as their permanent desire to self-achieve their own performance combined with the desire for man-made competition have made the attitude towards motor activities re-oriented towards the activity adapted to people with disabilities (Castro et al., 2018). Despite the remarkable successes of molecular biology, we do not have a rigorous definition of life so far, so we usually limit ourselves to the characterization of living systems by their essential attributes, which allows their thermodynamic description (Lynch et al., 2019) .

The World Health Organization (W.H.O.) considers improving the quality of life one of the major goals of modern medicine. The category of children with intellectual disabilities requires special attention from specialists, given their heterogeneity, but also the possibility of educational intervention, with very good results, by practicing physical exercise (Peterson-Besse, 2009). Within this category, due to particular characteristics, children with Down syndrome are the most common organic form of mental retardation (Pitetti, 2013).

The motor activity of intellectual deficiencies is a peculiarity of them that derives from the state of maturation of the nervous system and from the degree of physical development, and the disorders that can occur in the psychomotricity are even more pronounced as the degree of deficiency is deeper (Schalock et al., 2010).Thus, in deep intellectual deficiency (IQ below 20, mental age 3-4 years) there are numerous physical and motor deficiencies. Motor activity is deprived of coordination and control, lacking in purpose and precision (stereotypical movements - torso balancing, tics, excessive slowness of movements). Against the backdrop of many physical deficiencies, the organization of psychomotricity also shows profound disturbances in body, temporal and spatial orientation. In fact, this category of population is completely dependent on the help of others (Matthew et al., 2013).

In severe intellectual deficiency (IQ is between 25-49, mental age is 5 - 7 years) it is found that motor activity is better than that of subjects in the previous category, but it is still insufficiently developed. Voluntary motricity is marked by tremors, impressive movements, subtle movements, and synchines. Other disturbances of general motricity (walking, balance) may be encountered.

Psychomotricity disorders will be reflected in the difficulties these subjects have in acquiring spoken, written language, as well as self-service skills (Camden et al., 2015). In the mild intellectual deficiency (IQ 50-70, mental age 7-12 years) there are mainly delays in the development of psychomotricity components, lack of speed and coordination of movements, synchronicity. Under these circumstances, we can say that the subject with Down's syndrome must face the many challenges in controlling their own movements (Camden et al., 2016).

From the point of view of the simple reaction time, an increase in latency was observed, in parallel with a decrease in sensory activity and postural alterations, to various types of disturbances. Another feature is the inconsistency of the response from one stimulus to another, which can lead to the idea that the speed of information processing differs widely in successive executions. Experts believe that response time provides information on the integrity of cognitive function and the duration of motion training (González-Agüero et al., 2017).

## 2. Subjects and Methods

This study included 40 urban subjects with and without disabilities aged between 14 ± 3 years of age, from three Special Education Centers from three Special Educational Centers, and a Normal School from Iasi, Romania. Participants in this study were divided into four groups of 10 subjects as follows: group 1 - children without

intellectual disabilities, group 2 - children with mild intellectual disabilities, group 3 - children with severe intellectual disability and group 4 - children with Down syndrome.

Hypothese: At children with intellectual disabilities the values of the functional and motor indices are altered.

Testings: 1.In order to test the dynamic balance , we used an simple applicative path with the following structure: rolling forward on a gymnastic cushion – moving in balance on the gymnastic bench with the small basis upwards – stepping on six 20x12 cm rectangles at 30 cm from one another, in steps – avoiding an obstacle – stepping through two lids in the gymnastic box – avoiding an obstacle – stepping in four circles in zigzag, rolling over on a gymnastic cushion, stepping on six 25 cm obstacles. All subjects had to complete this itinerary twice and we also noted the best result. 2. Measurement of simple reaction time to visual stimulus. The method allows indirect measurement of reaction time. We used a computer and adapted keyboard. The keyboard presents four buttons close to each other, so that they form a square. We also used our own design software, which allows recording and storing of reaction times, showing the average, maximum and minimum values for a number of determinations. When a large dot, colored red, appears on the monitor (on a white background), the subject must press a default key as soon as possible, using the index finger, which is in contact with the key. There are 30 executions for each subject (Cojocariu, 2011). 3. Maximum force on the upper train. From the support on the arms, the floats were counted over a maximum of 30 seconds. 4. Maximum force on the lower train. Standing, counting the genuflexions performed over a maximum of 30 seconds.

## 3. Results

The values of times registered for the the dynamic balance test vary between 22.31 sec. (minimum), for normal children and 76.78 sec (maximum), for children with severe intellectual disability. For $p \leqslant 0.001$, we can see significant statistic differences between normal children and children with severe intellectual disability, between children with mild intellectual disability and children with severe intellectual disability, as well as between children with severe intellectual disability and children with Down syndrome. For the second group the average time for the dynamic balance test is 32.14 sec., and for the fourth group it is 36.4 sec. The difference is 4.26 sec. and it is insignificant from the statistical point of view (according to and Table 1).

Table 1. Characteristics of the dynamic balance test for children with and without intellectual disability

| Group | N | M | M% | E.Std. | C.V.% | t | p |
|---|---|---|---|---|---|---|---|
| 1 | 10 | 22.31 | 100% | 0.753 | 10.68 | 2.818 | 0.018 |
| 2 | 10 | 32.14 | 144.06% | 3.406 | 33.52 | | |
| 1 | 10 | 22.31 | 100% | 0.753 | 10.68 | 6.358 | p<0.001 |
| 3 | 10 | 76.78 | 344.15% | 8.533 | 35.15 | | |
| 1 | 10 | 22.31 | 100% | 0.753 | 10.68 | 3.891 | 0.015 |
| 4 | 10 | 36.4 | 163.15% | 3.542 | 21.76 | | |
| 2 | 10 | 32.14 | 144.06% | 3.406 | 33.52 | 4.858 | p<0.001 |
| 3 | 10 | 76.78 | 344.15% | 8.533 | 35.15 | | |
| 2 | 10 | 32.14 | 144.06% | 3.406 | 33.52 | 0.779 | 0.45 |
| 4 | 10 | 36.4 | 163.15% | 3.542 | 21.76 | | |
| 3 | 10 | 76.78 | 344.15% | 8.533 | 35.15 | 4.37 | 0.001 |
| 4 | 10 | 36.4 | 163.15% | 3.542 | 21.76 | | |

Legend: N - number of subjects; M - arithmetic mean; M% - percentage mean; Std.E. - average standard deviation; V.C.% - variation coefficient; t – Student test; p - significance threshold.

The values of the variation coefficient (according to Table 1) show that the most heterogeneous groups are: the group of children with severe intellectual disability (CV = 35.15%) and the group of children with mild intellectual disability (CV = 33.52%). From our knowledge, this is the first study that takes into account the influence of mental disability on motricity and dynamic balance. Such relationships have been demonstrated in previous research for

children with and without mental disabilities, although limited (Mikołajczyk & Jankowicz-Szymańska, 2017; Tsimaras et al. 2012). Studies on the effect of multi-task functional exercises on the dynamic balance of people with mental disabilities have not been sufficiently documented so far and the authors have found it difficult to refer to the results of other attempts at dynamic balance . Observations to date have shown significant differences between people with Down syndrome and children without disabilities in carrying out multiple tasks, seen in some time and space parameters of walking. Since multiple tasks require greater concentration, rehabilitation of people with cognitive impairment should include both physical training and incentives for tasks to be undertaken. Through analyzing the values of the speed of response to visual stimulus in table 2, we can see that they vary between 263.2 milliseconds (minimum) for normal children and 2265 milliseconds (maximum) for children with severe intellectual disability. By comparing the differences between the four groups, we can state that they are statistically significant for $0.001 < p < 0.05$ (according to Table 2).

Taking into account the values of the variability coefficient, we can see that the most homogeneous group is that of children with Down syndrome, with CV = 12.2 %. The group of normal children is also homogeneous, with a variation coefficient 24.74%. The two other groups arte heterogeneous, with CV between 57.73 % for children with mild intellectual disability and 77.59% for children with severe intellectual disability. In other studies, it has been demonstrated that the response rate is lower in subjects without disability compared to children with intellectual disabilities (Peinado et al., 2015).

Table 2. Characteristics regarding the speed of response to visual stimulus for children with and without intellectual disability

| Group | N | M | M% | E.Std. | C.V.% | t | p |
|---|---|---|---|---|---|---|---|
| 1 | 10 | 263.2 | 100% | 20.58 | 24.74 | 2.073 | 0.053 |
| 2 | 10 | 432.2 | 164.20% | 78.89 | 57.73 | | |
| 1 | 10 | 263.2 | 100% | 20.58 | 24.74 | 3.599 | 0.006 |
| 3 | 10 | 226.5 | 860.56% | 555.8 | 77.59 | | |
| 1 | 10 | 263.2 | 100% | 20.58 | 24.74 | 14.421 | p<0.001 |
| 4 | 10 | 911.8 | 346.42% | 49.74 | 12.2 | | |
| 2 | 10 | 432.2 | 164.20% | 78.89 | 57.73 | 3.265 | 0.009 |
| 3 | 10 | 226.5 | 850.56% | 555.8 | 77.59 | | |
| 2 | 10 | 432.2 | 164.20% | 78.89 | 57.73 | 4.043 | 0.001 |
| 4 | 10 | 911.8 | 346.42% | 49.74 | 12.2 | | |
| 3 | 10 | 226.5 | 850.56% | 555.8 | 77.59 | 2.425 | 0.038 |
| 4 | 10 | 911.8 | 346.42% | 49.74 | 12.2 | | |

Table 3. Characteristics regarding the maximal force upper train strength for children with and without intellectual disability point of view

| Group | N | M | M% | E.Std. | C.V.% | t | p |
|---|---|---|---|---|---|---|---|
| 1 | 10 | 12.6 | 100% | 1.571 | 39.45 | 2.782 | 0.012 |
| 2 | 10 | 6.1 | 48.41% | 1.728 | 89.61 | | |
| 1 | 10 | 12.6 | 100% | 1.571 | 39.45 | 6.268 | p<0.001 |
| 3 | 10 | 1.3 | 10.31% | 0.882 | 214.68 | | |
| 1 | 10 | 12.6 | 100% | 1.571 | 39.45 | 5.417 | p<0.001 |
| 4 | 10 | 3.2 | 25.39% | 0.734 | 51.35 | | |
| 2 | 10 | 6.1 | 48.41% | 1.728 | 89.61 | 2.473 | 0.027 |
| 3 | 10 | 1.3 | 10.31% | 0.882 | 214.68 | | |
| 2 | 10 | 6.1 | 48.41% | 1.728 | 89.61 | 1.544 | 0.149 |
| 4 | 10 | 3.2 | 25.39% | 0.734 | 51.35 | | |
| 3 | 10 | 1.3 | 10.31% | 0.882 | 214.68 | 1.391 | 0.123 |
| 4 | 10 | 3.2 | 25.39% | 0.734 | 51.35 | | |

After calculating the averages for the maximal force on the superior train, that there are significant statistic differences between the group of normal children and children with severe intellectual disability and between the group of normal children and children with Down syndrome (9.4 repeats), for $p \leqslant 0.001$ (according to Table 3). There is also a great difference between the group of normal children and that of children with mild intellectual disability. This difference is (6.5 repeats) and it is very important from the statistical perspective ($p < 0.02$). By analyzing the variation coefficient, with values between 39.45% and 214.68% we can say that the four groups are heterogeneous.

As we can see from table 4, the values of the force for the inferior train are very close for normal children (18.18 repeats) and for children with mild intellectual disability (18.5%). The difference is superior children with mild intellectual disability, 0.32 and it is not significant from the statistic.

Table 4. Characteristics regarding the maximal for the inferior train for children with and without intellectual disability point of view

| Grupa | N | M | M% | E.Std. | C.V.% | t | p |
|---|---|---|---|---|---|---|---|
| Grupa 1 | 10 | 18.8 | 100% | 0.879 | 14.79 | 0.111 | 0.913 |
| Grupa 2 | 10 | 18.5 | 98.40% | 2.552 | 43.64 | | |
| Grupa 1 | 10 | 18.8 | 100% | 0.879 | 14.79 | 4.554 | 0.001 |
| Grupa 3 | 10 | 9.3 | 49.46% | 1.891 | 64.33 | | |
| Grupa 1 | 10 | 18.8 | 100% | 0.879 | 14.79 | 2.413 | 0.06 |
| Grupa 4 | 10 | 12.4 | 65.95% | 2.502 | 45.12 | | |
| Grupa 2 | 10 | 18.5 | 98.40% | 2.552 | 43.64 | 2.895 | 0.01 |
| Grupa 3 | 10 | 9.3 | 49.46% | 1.891 | 64.33 | | |
| Grupa 2 | 10 | 18.5 | 98.40% | 2.552 | 43.64 | 1.505 | 0.156 |
| Grupa 4 | 5 | 12.4 | 65.95% | 2.502 | 45.12 | | |
| Grupa 3 | 10 | 9.03 | 49.46% | 1.891 | 64.33 | 0.965 | 0.352 |
| Grupa 4 | 5 | 12.4 | 65.95% | 2.502 | 45.12 | | |

## 4. Discussions

The greatest difference is between the group of children with mild intellectual disability and that of children with severe intellectual disability. According to other recent research, mental disability has a negative influence on tasks such as strength. Some studies indicate that the main factor that can explain this deficiency is the immature technique and perhaps the inferior mechanical power of the joints and rigidity in combination with neopathic neuromuscular activation (Anthi et al., 2014). After identifying such shortcomings, it is important to test the application of specific work programs on this population to improve the quality of life first and foremost. Such an improvement could be feasible if we consider the positive response of such interventions in previous studies (Hassani et al., 2013). For the maximal force on the inferior train the greatest value was that of children with mild intellectual disability, with 1.76% bigger than that of normal children. The two other groups have inferior values comparing to normal children, 65.95% for children with Down syndrome, and 49.46% for children with severe intellectual disability. As regards the speed of the response to visual stimulus, the most critical value is that of children with severe intellectual disability 860.56%, greater than that of normal children.

## 5. Conclusions

Although children with Down syndrome don't have a lower IQ than children with mild intellectual disability, they have inferior values for motor parameters. In general, a higher level of motor activity and speed of reaction to visual stimulus was found in the group of children without intellectual disability, to the groups of children with intellectual disabilities, to most of the samples they were tested except for the maximum force on the lower train,

where the group of children with mild intellectual disability registered a better outcome than the normal children group, so intellectual disability does not negatively affect all motor parameters, and in a later study we will see if there are other parameters that are not directly influenced by intellectual disability.

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# THE IMPORTANCE OF MASSAGE AND PHYSICAL THERAPY IMPINGEMENT SYNDROME OF THE VOLLEYBALL PLAYERS

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**Abstract**

We assume that the use of physical therapy and massage methods appropriate for impingement syndrome, will shorten the recovery and reintegration of the athlete in work performance. The study aims to show that, after recovery program and massage techniques applied hypothesis from which we will be confirmed or refuted. The objectives of the work were: detection of pathology; measuring mobility and muscle strength; toning muscles affected area; relapse prevention; maintaining the progress made after the physical therapy program; reinsertion work competitive athletes. Physical therapy sessions were conducted with a frequency of about 2-3 times a week starting in November 2018 until March 2019 month on a group of four sports (played zone 4 and zone 2). Measurement and evaluation was made through the range of motion variables, muscle balance, Neer impingement test, painful arc test, the test Hawkins, imaging and pain by visual analogue scale (VAS). Following the recovery program with two patients, both known problems with the rotator cuff shoulder, namely impingement syndrome, we concluded that, in addition to other means healing used physical therapy and massage are the means of basic treatment they can not be replaced. Since results obtained we can conclude that therapeutic recovery program was applied to the four sports led to positive results, athletes are integrated into competitive activity performance. At the same time the study hypothesis was confirmed. However, it was noted that the reintegration in competitive activity was faster for older athletes. In these cases (3) intervened anatomical and biomechanical peculiarities, subjects with more developed musculature and skeleton in the topic younger. By using physical therapy and massage in the rehabilitation program had a decrease in pain, improvement in joint mobility, while an increase in muscle strength in those four sports.

*Keywords:* performance; volleyball; health.

## Introduction

Sub acromial impingement syndrome (SIS) is the most common disorder of the shoulder, accounting for 44%–65% of all complaints of shoulder pain during a physician's office visit (Van der Windt & Koes, de Jong & Bouter, 1995). It is the most common cause of shoulder pain (Pribicevic & Pollard, 2004). It encompasses a spectrum of sub acromial space pathologies including partial thickness rotator cuff tears, rotator cuff tendinitis (RCT), calcific tendinitis, and sub acromial bursitis (Koester & George & Kuhn, 2005). Workers who continuously hold their arms in a horizontal position or higher, carpenters, and individuals who are involved with sports, such as swimming and throwing, comprise the risk group. Since it can cause a limitation in movement, as well as pain during rest, moving, and sleeping, SIS can pose serious problems in daily and working life (Hawkins & Abrams, 1984). The main consequences of SIS are functional loss and disability (Koester & George & Kuhn, 2005).

Conservative and surgical treatments are used to stop the inflammatory process, relieve pain, maintain joint mobility, and prevent the development of progressive degenerative changes in SIS. Conservative treatment methods include prevention, rest, medical treatment, steroid injections to the subacromial space, and various conventional methods of physical therapy (PT) and exercises, as well as kinesio taping (KT) application as a relatively novel method (Hawkins & Abrams, 1984; Kase & Wallis & Kase, 2005). KT is used in SIS and RCT to reduce edema, relieve pain, and increase joint range of motion (ROM) and muscle activity (Kase & Wallis & Kase, 2005). Three current accepted approaches to the treatment of SIS include conservative management, arthroscopic surgery and

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open surgical interventions. All of these therapeutic modalities have been found to be effective, even though there are arguments in the medical literature (Bölükbasi & Güzel & Simsek & Kanatli & Cila, 2002; Van der Heijden & Van der Windt & Kleijnen, Koes, Bouter, 1996) about their success rates. Conservative approaches are preferred in therapy for stage I and II patients. The overall clinic may also be observed to be asymptomatic in patients with complete and partial ruptures. The literature indicated that most patients who have impingement syndrome eventually recover with non-operative interventions. The general therapy approach includes conservative interventions for stage I and II. In stage III, a long-term conservative approach is needed before a probable surgical procedure.(Morrison, Frogameni, Woodworth, 1997; Michener, Walsworth, Burnet, 2004)

**Material and method**

We assume that the use of physical therapy and massage methods appropriate for impingement syndrome, will shorten the recovery and reintegration of the athlete in work performance.

Purpose of this paper is to show that, after recovery program and massage techniques applied hypothesis from which we will be confirmed or refuted. Objectives: Detection pathology; Measuring mobility and muscle strength; Toning muscles affected area; Prevention of relapses; maintain progress achieved after the physical therapy program; Athlete's reinsertion competitive activity. Physiotherapy sessions were held at the residence of the pacients. They were made at a rate of about 2-3 times a week. 4 volleyball players were selected B.T. (Outside-hitter) 23 year, L.B. (midlebloker) 25 year, P.R. (Outside-hitter) 25 year, A.L. (Opposite) 26 year.

The complexities and peculiarities of biomechanics, shoulder joints is one of the most prone to pathology. Shoulder joint is less stable than most other joints in the body, this feature allowing it to roll on all axes and a high amplitude, but also prone to numerous shoulder injuries. The main procedures used in this research are: Massage - plays an important role in the framework of the rehabilitation program of impingement syndrome, which are intended to stimulate circulation, tone the muscles that participating in the movements of the shoulder and the heat and prepare joint for physiotherapy. Physical therapy - is one of the main means of recovering the impingement syndrome. This includes both passive movements and those active is to regain normal movement amplitudes lost due to trauma, this objective is accomplished by regaining muscle strength and joint mobility. Recovery Phase I program, each patient was immobilized with the elbow upper member attached to the body (type Dujarrier) - with the front of the chest, forearm, for two weeks; During this period, the following techniques were applied: • mobilization of the wrist, the fingers and the cervical spine active free exercises, repeated three times per day: Ex.1: The subject performs supination and pronation of the wrist flexion of the fingers bent, or semiflectate stretched; Ex 2: The subject performs supination and pronation extension of the wrist, fingers flexed to allow greater amplitude wrist extension; Ex. 3: flexion and extension carried out subject head, and circumducţii slow. respiratory gymnastics; massage cervical and trapezius. In phase II, after the authorized period of immobilization, we applied the following methods and techniques: massage and therapeutic analgesic-decontracturant properly executed cervical dorsal area; restoring mobility through posture, passive mobilization and mobilization autopasive, such as: passive motion - antepulsie - where we plug shoulder and elbow contrapriza leading patient hand by slight vibration antepulsie, to a degree that it can be patient; retropulsie outlet is all shoulder and elbow contrapriza envelope is made all the easier by vibration moving hand behind the patient. And retropulsie antepulsie movements are performed around an axis transverse to the sagittal plane: - internal rotation (around a vertical axis); external rotation (about a vertical axis); - abduction and adduction executed foreground around a sagittal axis. Besides these basic movements and shoulder can perform compound movements such as: hand opposite shoulder; palm cervical region.

**Results**

Following the completion of the rehabilitation program, we obtained results on the scale of pain, joint testing, respectively muscular testing. I realized pain assessment using a visual analog pain scale. We conducted three evaluations, one original, one intermediate and one final. The greatest progress it has sports car ela LB initial testing was 9 of 10, and at the end only 2 of 10. mentioning is the fact that sport has the same progress but various intermediate testing

Table 1. VAS assessment of the affected limb.

| Athletes | Initial evaluation | Interim evaluation | Final evaluation |
|---|---|---|---|
| B.T. | 8 | 5 | 3 |
| L.B. | 9 | 5 | 2 |
| P.R. | 8 | 6 | 3 |
| A.L. | 9 | 6 | 2 |

If B.T patient, initially, the visual analogue scale of pain, a pain recorded with a value of 8 of 10 on this scale, with 10 being the maximum value of the pain. At mid-term review after I start the recovery program on the same scale of pain, recorded a lower 2 points, namely 6 of 10. Finally, the final evaluation, the patient showed the lowest value, 3, 5 points lower than the first assessment and away from three points against the interim.

Table 2. Balance sheet upper limb joints as patient P.R.

| Regiunea | Mișcarea | Valori normale | | Evaluarea inițială | | Evaluarea Intermediară | | Evaluarea finală | |
|---|---|---|---|---|---|---|---|---|---|
| | | L | R | L | R | L | R | L | R |
| Braț | Flexie | 170° | 170° | 170° | 114° | 170° | 133° | 170° | 151° |
| | Abducție | 180° | 180° | 180° | 93° | 180° | 104° | 180° | 126° |
| | Rotație internă | 90° | 90° | 90° | 54° | 90° | 61° | 90° | 75° |
| | Extensie | 35° | 35° | 35° | 23° | 35° | 29° | 35° | 32° |
| | Adducție | 45° | 45° | 45° | 29° | 45° | 36° | 45° | 41° |
| | Rotație externă | 90° | 90° | 90° | 70° | 90° | 78° | 90° | 84° |
| Antebraț | Flexie | 140° | 140° | 140° | 140° | 140° | 140° | 140° | 140° |
| | Extensie | 0° | 0° | 0° | 0° | 0° | 0° | 0° | 0° |
| | Pronație | 90° | 90° | 90° | 90° | 90° | 90° | 90° | 90° |
| | Supinație | 90° | 90° | 90° | 90° | 90° | 90° | 90° | 90° |

It can be seen in the table above (Table 2), the patient recorded the P.R. flexion, initial 114°. In the mid-term to achieve an increase in the flexion mobility of 19°. The final evaluation of the flexion movement of the 151° registered with 37° more than the initial assessment and to the intermediate 18°. For flexion we as a benchmark 170°. If the extension, the patient P.R. originally registered 23°. In the mid-term to an increase in the mobility of 6°. The final evaluation of the extension movement of the 32° registered with 9° more from baseline and to the intermediate 3°. For extension movement 35° have as reference values. PR has the greatest progress from 4 to flexion of the shoulder joint.

AL patient registered in flexion initially 119°. In the mid-term to achieve an increase in the flexion mobility of 12°. The final evaluation of the recorded value 142° flexion with 23° more than the initial assessment and to the intermediate 11°. For flexion we as a benchmark 170°. If the extension, patients originally registered AL 21°. In the mid-term to an increase in the mobility of 9°. The final evaluation of the extension movement of the 32° registered with more than 11° from baseline and to the intermediate 2°. For this movement we have as reference value 35°. LB recorded patient movement abduction initially 91°. In the mid-term to achieve an increase of the mobility of 11° abduction movement. The final evaluation of the recorded value 132° abduction, with 41° more than the initial assessment and to the intermediate 30°. To move abduction as a benchmark we 180°. If adduction patient LB originally registered 24°. In the mid-term to an increase in the mobility of 11°. The final evaluation of the recorded movement of 42° adducted with 18° more from baseline and to the intermediate 7°. For this movement we have as reference value 45°. BT patient recorded the internal rotation initially 51°. In the mid-term to achieve an increase of mobility in the rotational movement of the internal 8°. The final evaluation of the internal rotation of the 74° registered with 23° more than the initial assessment and to the intermediate 15°. For internal rotation as a benchmark we 90°. If external rotation, the patient BT originally registered 72°. In the mid-term to an increase in the mobility of 8°. The final evaluation of the amount of external rotation has been 86° with 14° more from baseline and to the intermediate 7°. For this movement we have as reference value 90°. AL patient registered in internal rotation, initially 51°. In the mid-term to achieve an increase of mobility in the rotational movement of the internal 8°. The final evaluation of the internal rotation of the 74° registered with 23° more than the initial assessment and to the intermediate 15°. For internal rotation as a benchmark we 90°. If external rotation, the patient AL originally

registered 72°. In the mid-term to an increase in the mobility of 8°. The final evaluation of the amount of external rotation has been 86° with 14° more from baseline and to the intermediate 7°. For this movement we have as reference value 90°

**Discussions**

The physiological mechanisms of decreasing pain and disability can be explained as pain modulation via gate control or guidance of the shoulder through an arc of improved glen-humeral motion, reducing mechanical irritation of the involved soft tissue structures. These effects can be derived from supporting periarticular structures as well as reducing soft tissue inflammation and pain (Camargo & Haik & Ludewig & Filho & Mattiello-Rosa & Salvini, 2009; Khan & Nagy & Malal & Waseem, 2013; Canaghan, 2013). Through its effect on the sensorimotor and proprioceptive systems, massage can assist in postural trunk and scapula alignment and support weak rotator cuff muscles (Djordevic & Vukicevic & Katunac & Jovic, 2012). The difference of our results between the aforementioned studies might be due to the exclusion.

Of patients with total rupture, the obedience of the patients to regular exercises, and changing daily routine activities as well as placebo effect or self-healing. These factors might play a role in the decrease of shoulder pain, causing recovery in ROM values and functional indexes. Although the literature on painful shoulder includes conservative treatments, we feel that massage as a physiotherapeutic method is neglected. Up to this point, studies on classic massage do not appear to show evidence to be included in the treatment program for these ailments (Ojr & Johansen & Westgaard, 1995). One study analyzed the effectiveness of physical treatments applied to painful shoulder including massage; however, the effect was small. Often massage studies lack detail, including defined treatment methodology (ie, massage techniques, duration of treatment, duration of a given session, and the order and number of massaged muscles). A precisely defined massage methodology applied in painful shoulder syndrome taking into account all information necessary for treatment performance can be a key in showing appropriateness and effectiveness of this form of therapy (Albright & Allman & Bonfiglio et al., 2001).

In this study, the increased passive and active ROM in flexion and abduction for those who had massage based on tensegrity principles suggests that the effects of this type of massage may be able to assist beyond classic massage to increase function of the shoulder complex. However, if we only focus on pain as a symptom and not function, both types of massage were shown to be equally effective for this group of patients. The mechanism of internal rotation ROM limitation may be complex. Studies in the literature have proposed a dual mechanism, including a capsular tightness that results in rotation and abduction ROM limitation of shoulder joint (Bunker, 1997) and a muscular tightness that specific muscular tightness is related to glen-humeral internal ROM limitations (Lintner & Mayol & Uzodinma & Jones & Labossiere, 2007; Myers & Laudner & Pasquale & Bradley & Lephart, 2006; Liu & Hughes & Smutz & Niebur & Nan, 1997).

**Conclusions**

Following the recovery program with four patients diagnosed with the disease in the rotator cuff of the shoulder, specifically impingement syndrome, we concluded that, in addition to other means healing used physical therapy and massage are the means basic treatment, they can not be replaced. Given the results we can say that therapeutic recovery program was applied to patients, led to positive results, athletes being reintegrated into competitive activity. At the same time the study hypothesis was confirmed. However, it was noted that the reintegration in competitive activity was faster in subjects PR to the subject AL In this case occurred peculiarities anatomical and biomechanical subject PR with muscles and skeleton developed to subject Using physical therapy and massage in the rehabilitation program had a decrease in pain, improvement in joint mobility, while an increase in muscle strength in patients.

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ICU 2019

# RECOVERING MOBILITY AFTER KNEE ANTERIOR CRUCIATE LIGAMENT TEAR

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**Abstract**

The purpose of our present work is to track the functional deficit of the knee and to create an optimized, individualized recovery program specially designed forthe healing of the anterior cruciate ligament.

Thus, we assume that by using the most effective methods and procedures in physiotherapy, we could achieve a speedy recovery of the athlete and hisreintegration into the performance sports activity. The research was carried out on a group of 3 athletes (2 female and one male) practicing volleyball and performance handball.

Patients started recovery 5 days after surgery. The tests and measurements performed during the research were: anamnesis, somatoscopy, joint testing, muscular balance rating and visual analogue pain scale (VAS). The recovery techniques used were: cryotherapy, electrotherapy, massage for muscle toning, circulatory drainage, analgesic, anti-edema, hydro-kinetotherapy and personalized kinetotherapy based on gender, age, physical abilities,and possible traumatic complications (meniscus tears, fractures etc.) ) and post-surgical complications (pain, edema, stiffness).

The study on the recovery of the mobility of the knee following traumatism in athletes, carried out between March and June 2019, had the following results:

- the recovery protocol performed for the rehabilitation of the knee after surgery on anterior cruciate ligament was successfully performed, the patients recovering their full mobility of the knee;
- there was a decrease in pain, which allowed a much more correct and extended exercise, thus allowing a more efficient recovery of the mobility of the knee;
- the muscular recovery of the flexors, extensors, abductors and adductors was possible mostly due to kinetotherapy, combined with electrotherapy;
- as a result of our treatment, edema decreased significantly from 52 cm to 48 cm.

*Keywords:*sports activity; volleyball; handball; health.

## 1. Introduction

Despite recent improvements in the understanding of anterior cruciate ligament (ACL) anatomy and surgical techniques, restoration of normal rotational stability with current ACL reconstructive techniques has been questioned(Bin, 2017; Riboh & Hasselblad & Godin & Mather, 2013; Kim &Seon & Jo, 2013).Such abnormal biomechanics have led surgeons to focus more on anterolateral structures, since Claes et al(Claes &Vereecke &Maes & Victor &Verdonk &Bellemans, 2013) published a detailed anatomical description of the anterolateral ligament (ALL).

ACL injuries most often result from pivot shift-like mechanism, consisting of combined extreme anterior tibial translation and internal tibial rotation(Shimokochi & Shultz, 2008;Quatman & Quatman-Yates & Hewett, 2010; Oh & Lipps & Ashton-Miller &Wojtys, 2012; Griffin &Albohm & Arendt, 2006). Injury to the ALL is known to be associated with a concomitant tear of the ACL, as the ALL is put under stress with knee flexion and internal rotation of the tibia(Lording & Corbo & Bryant & Burkhart & Getgood, 2017; Ruiz & Filippi & Gagnière & Bowen & Robert, 2016; Tavlo & Eljaja & Jensen & Siersma & Krogsgaard, 2016; Rasmussen & Nitri & Williams. 2016; Parsons & Gee & Spiekerman & Cavanagh, 2015).The rapid evolution of professional sportsconsequently generated major requests imposed onto athletes, demandsthat could lead to the stagnation or even to a decrease in athletic performance, meaning they are unable to cope with the new criteria. Results show that most athletes are not equipped to support these demands, which led to an increase in injuries, illnesses and thus a decrease in athletic performance. Also, the quantitative increase of the athletes' training hours incurred led to a growing interest in

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giving more attention to para-medical care, too. Furthermore, this required the constant presence of physiotherapists in the immediate entourage of club or national teams, as they are now deemed to be indispensable to the well-being of the team members. A new scientific branch, namely sports traumatology, dealing with the study of disease injury occurring during practice related to sports performanceprovides, starting from theresults of the past few years, a classification of the pathogenic factors at play, directing both therapeutic and especially preventive measures.

**Material and method**

After knee ligament reconstruction surgery by arthroscopy, the patient clearly appears to be physically affected (especially muscle strength, joint mobility, proprioceptive properties). Therefore rehabilitation treatment is required to optimize these functions. The purpose of this study is to demonstrate the efficacy of the treatment protocol for patients who received knee ligament surgery. This protocol shall be adapted according to specific criteria: age, sport, and development capabilities of each athlete, being designed by the physician in conjunction with a kineto-therapist. The objective is to determine the most efficient physical therapy recovery protocol, in order to optimize the return to full knee mobility. Our working hypothesis is that only the most effective physiotherapeutic methods and procedures will also result into a swift recovery of the athlete and thereintegration in sports activities.

We took under observationthree subjects: H.D. aged 25 years, male, handball; U.M. aged 23, female, volleyball player, and G.F. aged 26, female volleyball player, all diagnosed with a torn anterior cruciate ligamentat the leftknee. The patientsbegan their participation 5 days after the operation, showing a slight deviation in valgus, swelling of the thigh and a diameter of 52 cm in the case of H.D. and 50 the other two.

The first phase in rehabilitation examines and uses the activities of daily life, as LDAs takes around 4-6 weeks. Gradual adaptation is done by walking, driving one's car, climbing and descending stairs. Among the objectives:to resume driving without help, obtaining a bent knee support, obtaining a complete extension, obtaining an active flexion range greater than 120°. Support walking is suppressed when athletes get good control of the knee when standing, 30-40 days after surgery,followed by scheduled home exercises to gradually returnto sports activity without constraints, for strengthening knee muscles over a period of 4-6 months, with 4 physiotherapy sessions per week.This phase allows for maximum recovery of strength, range of motion and stability of the knee. This way, athletes can resume sporting activities and return to participating to competitions. In some sports (volleyball, handball, surf, basketball, soccer, tennis) is indicated to resume such activities only after 6 months after surgery.

In this paper we are interested in demonstratingkinetotherapy's part in recovery after surgery, among other methods, such aselectrotherapy, cryotherapy - highlyrecommended to reduce joint swelling and inflammation, different massage techniques to relax and invigorate.

Besides the usual contraindications, massage is also recommended because it has the following effects: muscle toning, circulatory drainage, analgesic, antiedema. Massage techniques most commonly used are: friction, kneading, vibration. Tapotement (tapping) of the knee not recommended, therefore massage sessions begin and end with the same smooth, relaxing maneuver; if not contraindicated by the experts, any massage session can be followed by mobilization of the knee joint. Massage sessions are performed once per day before physical therapy exercises and have the duration of 5-25 minutes. These parameters are set by the doctor for each patient.

"Electrotherapy uses electric current for influencing the functional properties of the body in the desired and necessary". Associated with manual techniques, it canreduce muscle pain and boost muscle strength recovery. The most common techniques are: low-frequency currents, i.e. galvanic current (DC) with analgesic action, hyperemiain joint inflammatory phenomena;with diadynamic trophic effects, resorption, hyperemia; TENS currents (Transcutaneous Electrical Nerve Stimulation); Trabertcurrents for the resorption of edema and hematoma andtoboost counter pain inhibitory mechanisms, in the theory of pain"control gate". TENS is defined by a sequence of rectangular pulses. High frequency currents also have an analgesic effect, in short dosage, as they accelerate the reabsorption of hematoma and increase the synthesis of antibodies. The use of the DIAPULSE device has analgesic and anti-inflammatory effect, too, similarly to the Ultrasound VHF device, with analgesic effects in hyperemia, vasomotor rhinitis, inflammatory and metabolic diseases, the LASER device (Light Amplification by Stimulated Emission of Radiation) with the following results: pain relief, anti-inflammatory, booster (connective tissue, cartilage, epithelium,) vasodilation, increased immunity.

**Results**

The visual analogue scale (Table 1) for pain is a subjective method and is frequently used to measure the intensity of the pain felt by the patient. The method used involves interviewing patients regarding the levels of pain they perceived during recovery. The greatest progress in terms of VAS hasathlete U.M., with a decrease from 9 to 2 and athlete G.F.,from 8 to 3. Very high pain intensity is found in athletes H.D. and G.F., the latter experiencing the first major injury of his career. However, we believe that the 3 VAS value can also be attributedto stress factors.

Table 1. VAS assessment of the affected limb.

| Athletes | Initial evaluation | Interim evaluation | Final evaluation |
|---|---|---|---|
| H.D. | 9 | 6 | 3 |
| U.M. | 9 | 5 | 2 |
| G.F. | 8 | 6 | 3 |

Table 2. Evolution of the range of motion of the damaged knee compared with healthy one.

| | Type of movement | Healthy limb (right) | Affected limb (left) | |
|---|---|---|---|---|
| | | | Initial stage | Final stage |
| H.D. | Flexion | 150° | 75° | 135° |
| | | | Initial stage | Final stage |
| U.M. | Flexion | 150° | 73° | 140° |
| | | | Initial stage | Final stage |
| G.F. | Flexion | 150° | 73° | 135° |

As seen in the table above (Table 2), the results are more than satisfactory, with H.D.'s recovery of 60° of flexion in the first 3 months after surgery, 67° in the case of U.M. and 62° for the third sportsman. INTI values are the combined result of reduced edema, restrictions imposed by orthopedic surgeons and pain.

Because of toning exercises, modeled after the recovery protocol as shown in Table 3, we registered an increase in the force of the knee muscles, also by making exercises for flexion, extension, abduction and adduction with a medium to high resistance (F4, F5), compared with the healthy limb.

Table 3. Evolution of the affected knee's muscle strength compared with a healthy member.

| Athletes | Muscles | Affected knee | |
|---|---|---|---|
| | | Initial stage | Final stage |
| H.D. | Flexors | 2 | 4 |
| | Extensors | 3 | 5 |
| | Abductors | 3 | 4 |
| | Adductors | 2 | 4 |
| U.M. | Flexors | 2 | 4 |
| | Extensors | 3 | 4 |
| | Abductors | 3 | 5 |
| | Adductors | 2 | 5 |
| G.F. | Flexors | 2 | 5 |
| | Extensors | 3 | 5 |
| | Abductors | 3 | 4 |
| | Adductors | 2 | 4 |

**Discussions**

As previously demonstrated in the above tables, returning to play after anterior cruciate ligament (ACL) reconstruction is a gradual, long-term process that must not be hurried. Therefore, we deem of crucial importance

two key elements in recovery: giving it time and accompanying it with a carefully motion schedule, both of which are essentialto healing. Scientific literature regarding the topic in discussion here generally state that a period lasting up to 60 weeks is generally needed for a full rehabilitation of the ligament, customized for each and every one of the athletes in question. However, there is a wide consensus regarding the perils of accelerated rehabilitation protocols and the urgent need to design optimized protocols that mostly include patient education and training, in order to create a realistic view of the situation.

Kinetotherapy seems the approach to answer such preoccupations, since its protocols propose a progressive strengthening of the stabilizing muscles, a gradual regaining of previously-held range of motion. In the period of time the participants to or survey were held under observation, they had to compel with customized exercise schedules, and transition from range-of-motion exercises and gradual weight bearing on the knee, to balance exercises, half-squats, partial lunges, calf raises, lateral (side-to-side) stepping and lateral step-ups and step-downs, up to light jogging, agility and plyometric exercise. The registered progress was also possible due to decreasing of the perceived pain levels, which made it all possible. There were no significant gender differences,

However, according to resent research, the risk of a repeating the ACL injury within 2 years is six times greater than in someone who has never had an ACL tear. Further study should be done regarding an optimized maintenance program and how to decrease the risk for re-injury.

## Conclusions

Protocolsespecially designed for knee rehabilitation after anterior cruciate ligament surgery were successful, the patients recovered, among other skills, knee mobility with a wide range of movement.People who practice contact sports such as basketball, handball, rugby, football etc. are more prone to injury due to repeated and sudden movement in the joints. There was a decrease in pain, which allowed a more accurate and comprehensive schedule for conducting exercises, thus a more efficient recovery of knee mobility. Exercises carried following the recovery methods have been effective as they increased articular mobility, the rage of movement of the flexion and extension. The recovery offlexor, extensor, adductor and abductor muscles was favored mainly by physical therapy, combined with electrotherapy. We discovered that the most effective way to prevent injuries to the anterior cruciate ligament is to strengthen muscles inlower limbs, in particular aforementioned muscles and the posterior quadriceps: hamstrings. Following treatment edema decreased significantly from 52 cm to 48 cm, proving to be the optimal solution for the recovery from anterior cruciate ligament rupture.

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# A COMPARISON BETWEEN TRADITIONAL TEACHING METHODS AND VIDEO TECHNOLOGY TEACHING METHODS OF BEGINNING SWIMMING SKILLS FOR CHILDREN

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**Abstract**

Nowadays the instructors use the new teaching methods more and more often, while the traditional teaching methods are less used, because today's generation of children learns much easier with these modern teaching methods. Instructors have a lot of new possibilities in what they can do with children, in terms of teaching methods, in order to make it more effective for them. This research is focused on the comparison of the effectiveness of the two types of teaching methods on two children groups. On one of the groups are used the traditional teaching methods, while on the other group is used the video technology teaching method. In the research three criteria are considered: pulse, time, trainer's evaluation.

***Keywords:*** *swimming , children , video replay , traditional*

## 1. Introduction

Today's children are considered the digital generation, because they are born into a media-rich, networked world. As a result of this fact, one of their features is that more than 60% of them are visual or visual kinesthetic learners. Instructors should respond to the needs of the digital generation rather than trying to fit a new generation into old models of teaching (Reade, Rodgers, & Spriggs, 2008). They have a lot of new possibilities in what they can do with children, in terms of teaching methods, in order to make it more effective for them (Bradley, Mandy, 2019). They use the new teaching methods more and more often, while the traditional teaching methods are less used (Kos, Wei & Tamazic, 2018). Technology is playing a leading role in the development of sport and enhances performance in all faces because it offers possibility to obtain information that is out of reach of human senses or the information that is beyond human senses capabilities (Giannousi, Mountaki., Kioumourtzoglou, 2019). It is not arguable that technology can outperform human senses in precision, variety of quantities measured, speed, detail of measurement, etc. It is also safe to state that technology gives objective results, while humans make subjective assessments (Pogalin et al., 2017).

The use of video in swimming is widespread, because underwater video cameras can record what the coach cannot see from the pool deck (Kretschmann, 2017). This is essential to ensure that swimmers develop a good technique, not just for performance gains but also to reduce the risk of injury (Mooney et al., 2015).

This research is focused on the comparison of the effectiveness of the two types of teaching methods on two children groups. On one of the groups is used the traditional teaching method, while on the other group is used the video technology teaching method. In the research three criteria are considered: pulse, time, trainer's evaluation.

## 2. Hypothesis

The use of videotape replay teaching method is more effective than the traditional teaching method in the technique correction of children.

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**3. Resources and methods**

The research was conducted on beginner level children who are 9 years old. The research took place within Ebihalak Sports Club in Cluj-Napoca.

40 children, members of the Ebihalak Cluj Napoca Sports Club, took part in the research. They were split into two groups of 20 children each. In the group in which the traditional teaching method was used, which consists in explanation of the mistakes that the instructor could observe and in the demonstration of the correct technique. In this group were 11 girls and 9 boys, and in the other group, in which the videotape replay teaching method was used, there were 12 boys and 8 girls. Within this group the children were recorded on videotape while swimming, and after that the mistakes in their swimming technique were discussed and showed to them by videotape replay by the instructor.

Both groups have had 20 hours of training.

The instruments used for the implementation of the video technology teaching method were the GoPro Hero camera, Samsung Galaxy Note 9 smartphone and a laptop.

The following studies were carried out within the research:

- measuring the pulse of children after 50m crawl swimming with Beurer Po60 Pulseoxymeter
- measuring the obtained times on 50m crawl swimming
- a swimming trainer's evaluation of the children's swimming technique on a scale from 1 to 10

The comparison was carried out between March 2019 and June 2019 at the "Universitas" Swimming Pool at Babeș-Bolyai University of Cluj-Napoca during controlled training activities.

**Statistical data analysis**

For normality testing the Kolmogorov-Smirnov test was performed.

For testing differences between the mean values the t test for sample pairs was performed. The significance threshold was p=0.05

The statistical calculations were performed in IBM SPSS 20.

**4. Results**

Table 1. Descriptive Statistics

| | N | Mean | Std. Deviation |
|---|---|---|---|
| Puls traditional (bmp) | 20 | 156.25 | 3.307 |
| Time traditional (s) | 20 | 98.80 | 5.095 |
| Evaluation traditional | 20 | 6.50 | .827 |

Table 2. One-Sample Kolmogorov-Smirnov Test

| | Puls traditional (bmp) | Time traditional (s) | Evaluation traditional |
|---|---|---|---|
| Kolmogorov-Smirnov Z | .459 | .841 | 1.016 |
| Asymp. Sig. (2-tailed) | .984 | .479 | .253 |

According to the table above , we can state that our data is normally distributed because p>0.05. Measurements were carried out after the 20h training season was finished .

Table 3. Paired Samples Statistics

| | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| Puls traditional (bmp) | 156.25 | 20 | 3.307 | .739 |
| Puls video (bmp) | 150.70 | 20 | 3.213 | .719 |
| Time traditional (s) | 98.80 | 20 | 5.095 | 1.139 |
| Time video (s) | 92.20 | 20 | 4.584 | 1.025 |
| Evaluation traditional | 6.50 | 20 | .827 | .185 |
| Evaluation video | 8.15 | 20 | 1.040 | .233 |

Comparing the averages of video teaching method group and the averages of traditional teaching method group ,it follows that differences are significant in all three measured parameters

Table 4. Paired Samples Test

| | Mean | Std. Deviation | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|
| Puls traditional (bmp) - Puls video (bmp) | 5.550 | 2.544 | 9.757 | 19 | .000 |
| Time traditional (s) - Time video (s) | 6.600 | 6.692 | 4.411 | 19 | .000 |
| Evaluation traditional - Evaluation video | -1.650 | 1.663 | -4.437 | 19 | .000 |

According to the results presented above, p=0.000, and we can state that these means are statistically significantly different, because $p<0.05$. Comparing the averages of the parameters obtained after conducting the experiment with the two teaching methods , it follows that the differences are significant in all three measured parameters , and that the results obtained with the video teaching method are better than the results obtained with the traditional teaching method

## 5. Conclusions

Nowadays' generation of children have better results with the video technology teaching method than with the traditional teaching method. Each studies which were carried out pointed out the fact that video technology teaching method used in swimming is more effective for children.

## Acknowledgments

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ICU 2019

# THE EVOLUTION OF WORLD RECORDS AT 100 METER DASH AND THE DYNAMICS OF THE FACTORS THAT INFLUENCED THE SPRINTERS PERFORMANCE CAPACITY

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**Abstract**

The first 100 m men's world's unmatched record but published by the IAAF was held by William MacLaren, a British athlete who ran in 1867 at Haslingden (a small town in the Rossendale Valley in Lancashire), 110 yards (100.58m) in 11,0 seconds with manual timing.
The first IAAF official world record was obtained by the American athlete Donald Lippincott, in Stockholm (Sweden), during the 1912 Olympic Games, when he won 100m with 10.6 seconds.
The total number of world records at 100 m recorded by the IAAF since 1867 to date amounts to 206 new records and equal records. Of these, 23 records were set before the IAAF set the conditions for the approval of a world record to be officially registered (1912), and 188 records are official. 150 official world records were manually timed and 33 records were automatically timed.
What are the factors that have determined over time this dynamic of world records, implicitly the performance capacity of sprint athletes? In this study we will try to identify the main factors and how they influenced athletic performance.

*Keywords:* word records, 100m, sprint athletes, factors, performance capacity.

## Introduction

## 1. A brief history of 100m dash

Track and field is a sport that consist of various athletic contests involving running races, and jumping and throwing events. Track and field was known simply as “athletics” in the 19th century, as events like the 100-meter dash, marathon run, long jump, and shot put were regarded as ultimate test of athletics skill.

Track and field’s program of events is largely derived from ancient athletic festivals held by Greece and the British Isles. Both the original Olympiad in ancient Greece and the Celtic Tailteann Games date from around the 9th century BC. These pageants played host to the best athletes throughout the land, who contested running, jumping, and throwing events in addition to wrestling, “feats of strength”, archery, and in the case of the Greeks, swimming (Crego, 2003).

The first Greek Olympics took place in 776 BC. It lasted for one day and featured sacrifices in honor of the Greek gods, especially Zeus. The only athletic event was a sprint from one end of the race course to the other. It was called a “stadion”, or “stade”, and its distance was about 192 meters. From 776 to 724 BC, the stadion was the only event at the Olympic Games; the victor gave his name to the entire four-year Olympiad. The winner of the stadion at the first Olympic Games was Koroibos of Elis, the subsequent four-years was called the Olympiad of Koroibos.

Eventually the Olympics became a five-day event and included other contests, such as boxing and the pentathlon. In the pentathlon, the athlete participated in five events, including a sprint. However, the original stade continued to be the chief event, and its popularity continued until Emperor Theodosius I, who abolished the games in 394 AD.

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The Tailteann Games were funeral games associated with the semi-legendary history of Pre-Christian Ireland. Some historical sources place the beginnings of these games around 1600 BC, others in 632 BC. These were celebrated until the year 1169-1171 AD when they died out after the Norman invasion. Games included the long jump, high jump, running, hurling, spear throwing, boxing, contests in sword fighting, archery, wrestling, swimming, and chariot and horse racing.

Though cultural and religious trends in Europe tended to downplay athletics throughout medieval times, the sport of pedestrianism began to gain popularity in Britain and Western Europe beginning in the late of 17th century. While most pedestrians engaged in long walks runs for distance, some enjoyed short-course competition and sprinting, typically between either two or several competitors and usually linked to gambling.

The French tried to revive the Olympics during the French Revolution. Contests were held three years in a row from 1796 to 1798. The French had recently invented the metric system, so for the first time, Olympic athletes competed on race tracks measured in meters.

Track and field grew out of pedestrianism in 19th century England and took two distinct forms, one professional and one amateur. Professional track and field had no regulation, with many athletes making a living on cunning and skill. There are numerous accounts of sprinters who would travel from town to town in disguise, pretending to have little skill or knowledge of racing until they had convinced several local competitors to run against them and even more spectators to place bets against them.

As so many organized sports in Victorian England , track and field was a product of the public schools and universities. The first intramural competition was held at Eaten College in 1837. In Britain and USA, the 100 yards dash or "century" as it was called, came to be standard by witch men of speed were measured. To run "even time" was to break 10 seconds in the 100 meters yards.

Running races were also included in other attempts to revive the Olympics, such as the Grand Olympic Festival, which took place in Liverpool during the 1860s. Greece also attempted to revive the Olympics at about the same time. This revival, called the Olympia of Zappas, featured a re-enactment of the ancient stade sprint.

In 1864 the initial Oxford versus Cambridge intercollegiate athletics meet was staged – an event generally regarded as the "foundation meeting" of modern athletics. In the latter quarter of the 19th century, track and field gained popularity throughout colleges and clubs in England and along the northeastern seaboard of USA.

When the modern Olympic Games began in 1896, sprinters ran a 100-meter dash and a 400-meter dash. A 200-meter dash was added in the 1900 Olympics, and teams of four sprinters began to run relay races in the 1912 Olympics. Women's sprint events were added in the 1928 Olympics. The format of the races changed. Ropes, which originally separated the sprinting lanes, were eventually discarded.

According to the IAAF, the first unofficial 100-yard dash record for a professional athlete was obtained in London, in 1850 by George Seward (GBI), with a performance of 10.0 seconds, and the first unofficial record of an amateur athlete was obtained at Cambridge by Thomas Bury (GBI), in 1855, with a performance of 10.0 seconds. The last official record of this distance was obtained by Johnny Jones (USA) in 1977 with a performance of 9.21 seconds, at the College Triangular Meeting in Texas, USA.

The first 100 m men's world's unmatched record but published by the IAAF was held by William MacLaren, a British athlete who ran in 1867 at Haslingden (a small town in the Rossendale Valley in Lancashire), 110 yards (100.58m) in 11,0 seconds with manual timing.

The first IAAF official world record was obtained by the American athlete Donald Lippincott, in Stockholm (Sweden), during the 1912 Olympic Games, when he won 100m dash with 10.6 secons.

The first unofficial record of a woman, obtained at a distance of 110 yards dash, was made by Mamie Hubbard (USA) in New York in 1890. The last official record recorded at this distance was obtained by the athlete Chi Cheng (TPE) in the year 1970 with a performance of 10.0 seconds.

The first unofficial record obtained by a woman on the 100 meters dash is held by Aino Rannanpaa (FIN), when in 1902, in Helsinki he traveled this distance with a performance of 17.4 seconds. The first official record in this distance belongs to the athlete Marie Mejzlicova II (TCH), when in a contest in Prague, in 1922, she traveled the distance of 100 meters dash in 13.6 seconds.

Since the beginning of the athletic events, the short distance races have been an attraction for athletes and spectators. On the other hand, speed runs represented one of the most historical races along with the marathon.

**2. Analysis of the evolution of world records at 100 meters dash**

The first 100 m men's world's unmatched record but published by the IAAF was held by William MacLaren, a British athlete who ran in 1867 at Haslingden (a small town in the Rossendale Valley in Lancashire), 110 yards (100.58m) in 11,0 seconds with manual timing (see Fig.1). During this period, the veracity of the times is under many question marks, there being reports that in many situations the times were approximate, there were no specific timing tools, at other times the running surface was not perfectly flat, the wind was not taken into consideration and the situations where the start was stolen was not regulated by regulation. Between 1867 and 1912, Britain awarded 4 world records, the United States 3 records, Belgium one record, Sweden 7 records, Upper Africa one record and Germany 6 world records. As can be seen in the figure below, in 45 years the world record has improved by 0.5 seconds, the longest period in which the world record has not changed was for 14 years (10.80 seconds) between 1892 and 1906.

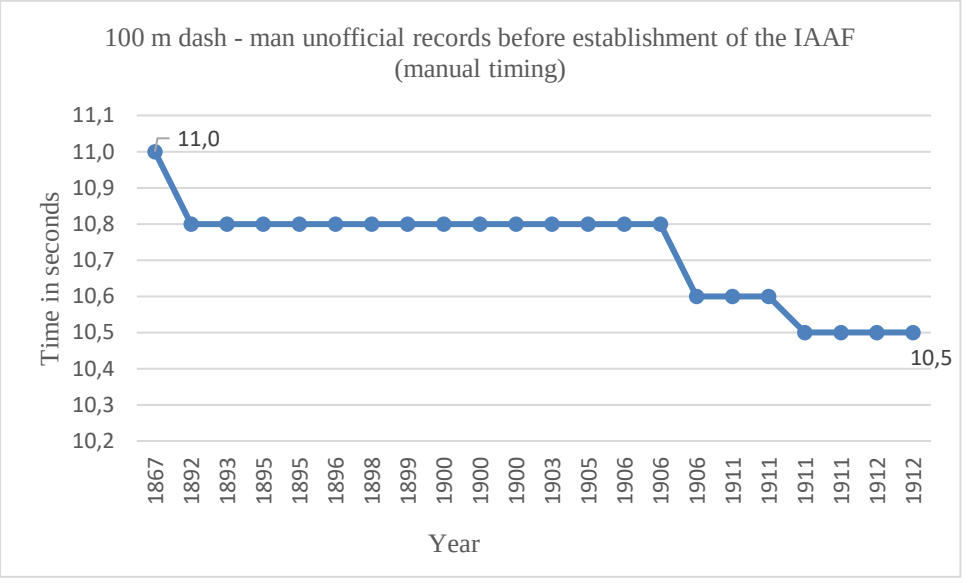


Fig.1

The first official world records were manually recorded and recognized by the IAAF, with the establishment of this international forum. The first IAAF official world record was obtained by the American athlete Donald Lippincott, in Stockholm (Sweden), during the 1912 Olympic Games, when he won 100m with 10.6 seconds. Thus, between 1912 and 1977 there were 108 world records and equal world records, of which 8 world record improvements (see Fig.2). Of these, 7 record enhancements and another 51 matched world records were obtained by US athletes. Another 25 records were matched by athletes from Germany, then the Federal Republic of Germany.
As can be seen in the figure below, in 74 years the world record has improved by 0.8 seconds, the longest period when the world record has not changed was for 20 years (10.20 seconds), between 1936 and 1956.
The last IAAF official world record, manual timing, was obtained by the Nigerian athlete Chidi Imo, in Berlin (Democratic Republic of Germany), in 1986, when he won 100m with 9,80 seconds.

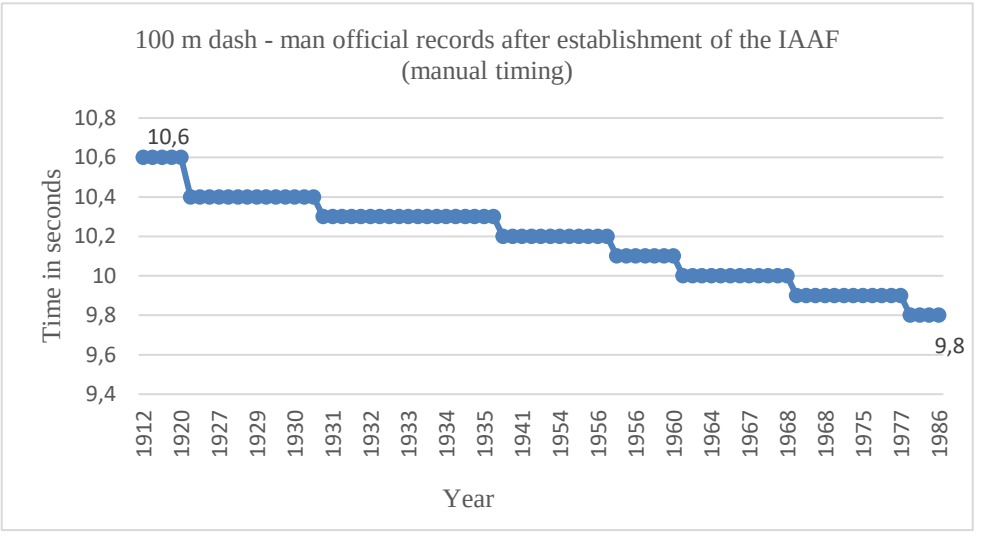


Fig.2

The world records as they are known today are those recorded with automatic timing, and in order to be approved they must comply with the IAAF athletic regulations. Automatic timing started in 1932, since then, the world record being improved or equaled 33 times. The times obtained by the runners being recorded at the level of hundreds of seconds, caused the world record to be improved 27 times and equaled only 6 times. Athletes in the United States have managed to improve or equal the world record 18 times. Their supremacy has been overthrown since 2005 by two Jamaican athletes, Asafa Powell and Usain Bolt, who have achieved 5 world record improvements and two draws. In 87 years of automatic timing, the world record improved by 1.06 seconds, the most spectacular leap in the world record taking place during the Jamaican rule. The current world record is 9.58 seconds, obtained by Jamaican athlete Usain Bolt in 2009, in Berlin (Germany), in the final of the World Championships (see Fig.3). The longest period when the world record has not changed was for 16 years (10.38 seconds), between 1932 and 1948. The second longest period when the world record has not changed was for 15 years (9,95 seconds), between 1968 and 1983.

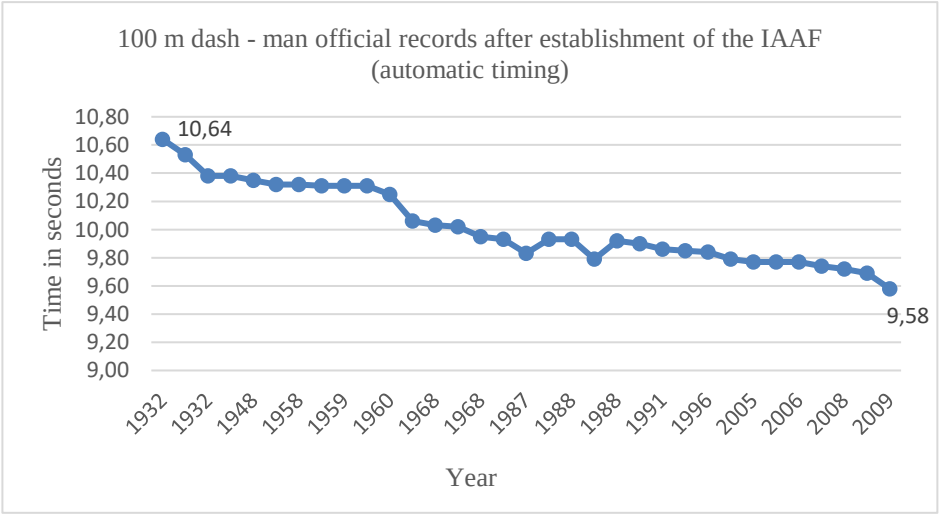


Fig.3

As shown in Table 1, the last 10 records at 100 meters dash have managed to descend below the ten second barrier, the performance achieved since 1968. Of these, seven are athletes from the United States two are from Jamaica and one from Canada. The extraordinary performance of 9.58 seconds per 100 meters dash of Jamaican athlete Usain Bolt, is already 10 years the most valuable result in this distance, announcing a record that many years will not be broken.

Table 1. Top 10 men world record holders at 100 meters dash

| Mark | Wind | Competitor | DOB | Country | Venue | Date |
|---|---|---|---|---|---|---|
| 9.58 | 0.9 | Usain BOLT | 21-Aug-86 | JAM | Olympiastadion, Berlin (GER) | 16-Aug-09 |
| 9.74 | 1.7 | Asafa POWELL | 23-Nov-82 | JAM | Guidobaldi, Rieti (ITA) | 9-Sep-07 |
| 9.79 | 0.1 | Maurice GREENE | 23-Jul-74 | USA | Athina (GRE) | 16-Jun-99 |
| 9.84 | 0.7 | Donovan BAILEY | 16-Dec-67 | CAN | Olympic Stadium, Atlanta, GA (USA) | 27-Jul-96 |
| 9.85 | 1.2 | Leroy BURRELL | 21-Feb-67 | USA | Pontaise, Lausanne (SUI) | 6-Jul-94 |
| 9.86 | 1.2 | Carl LEWIS | 1-Jul-61 | USA | Olympic Stadium, Tokyo (JPN) | 25-Aug-91 |
| 9.93 | 1.4 | Calvin SMITH | 8-Jan-61 | USA | Air Force Academy (USA) | 3-Jul-83 |
| 9.95 | 0.3 | Jim HINES | 10-Sep-46 | USA | Estadio Olímpico, Ciudad de México (MEX) | 14-Oct-68 |
| 9.9h | 0.9 | Charlie GREENE | 21-Mar-45 | USA | Sacramento, CA (USA) | 20-Jun-68 |
| 9.9h | 0.8 | Ronnie Ray SMITH | 28-Mar-49 | USA | Sacramento, CA (USA) | 20-Jun-68 |

The first unofficial record obtained by a woman on the 100 meters dash is held by Aino Rannanpaa (FIN), when in 1902, in Helsinki he traveled this distance with a performance of 17.4 seconds. (see Fig.4). Between 1902 and 1919, the world record has improved by 13 times with a total of 4.60 seconds, the longest period in which the world record has not changed for 6 years (between 1913-1919). The beginning of women sprint obviously was the dominated by Finland who awarded 11 out of 13 world records.

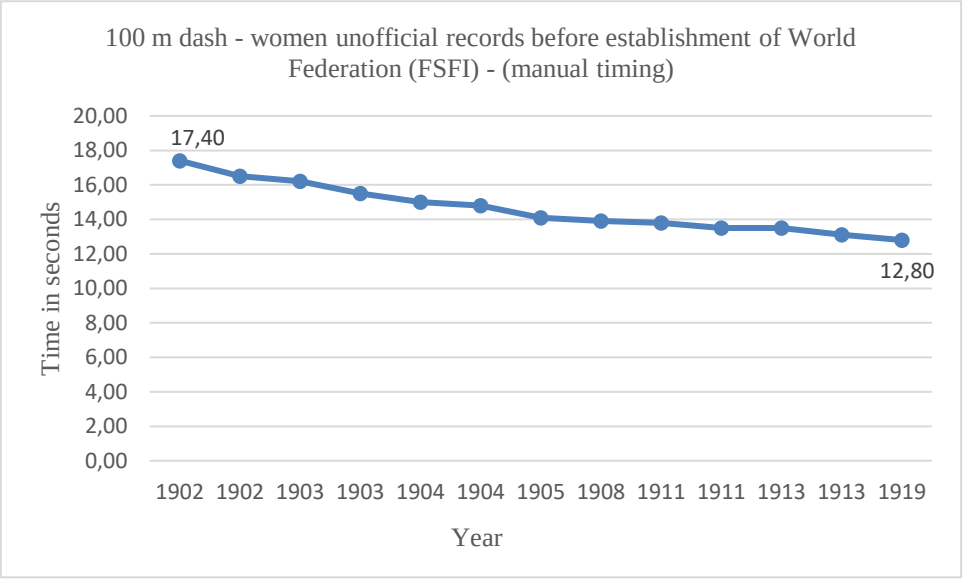


Fig.4

International Women's Sport Federation (FSFI), who was founded in October 1921, to let women compete in sport, particularly in international meetings. The first world record recorded on 100 meters dash for women was hold by Marie Mejzlikova II (TCH), and was obtained in Praha in 1922. This international forum has recorded world record till 1934 when Kathe Krauss (GER) in London broke the world record running 100 meters dash in 11.9 second. In 12 years the world record was improved with 1,70 seconds (see fig.5), the longest period in which the world record has not changed for 6 years (between 1928-1932).

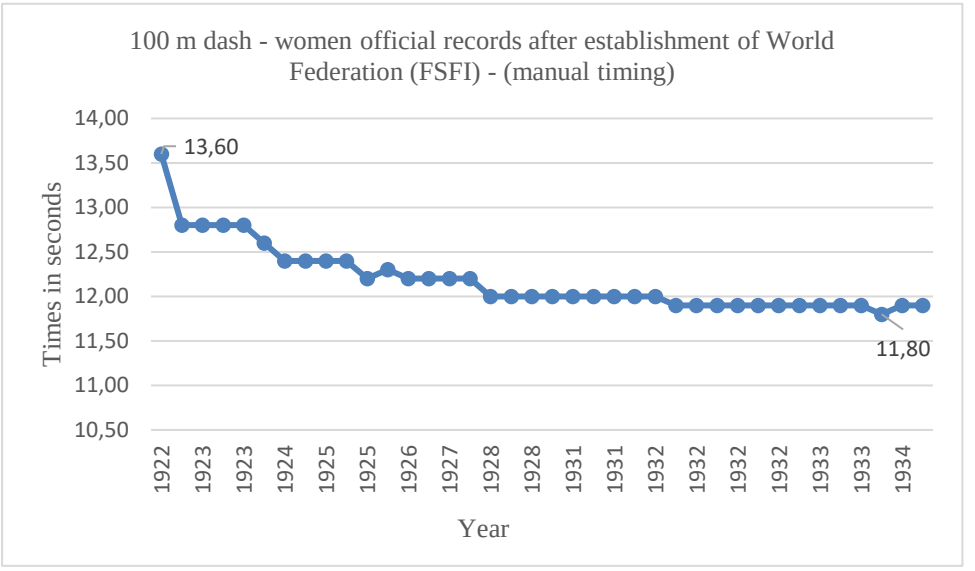


Fig.5

The first woman world record recorded by International Association of Athletics Federations was made in 1934. Stanislawa Walasiewicz (POL) ran 100 meters dash in 11,7 seconds in Warszawa, racing against men. IAAF recorded 49 world records and equal world records with manual timing until 1988, of which 13 world record improvements. In 54 years the 100 meters dash women world record was improved with 1,40 seconds, the longest period in which the world record has not changed for 8 years (between 1943-1952) (see Fig.6). The countries that most often broke the world record were USA, POL and GER.

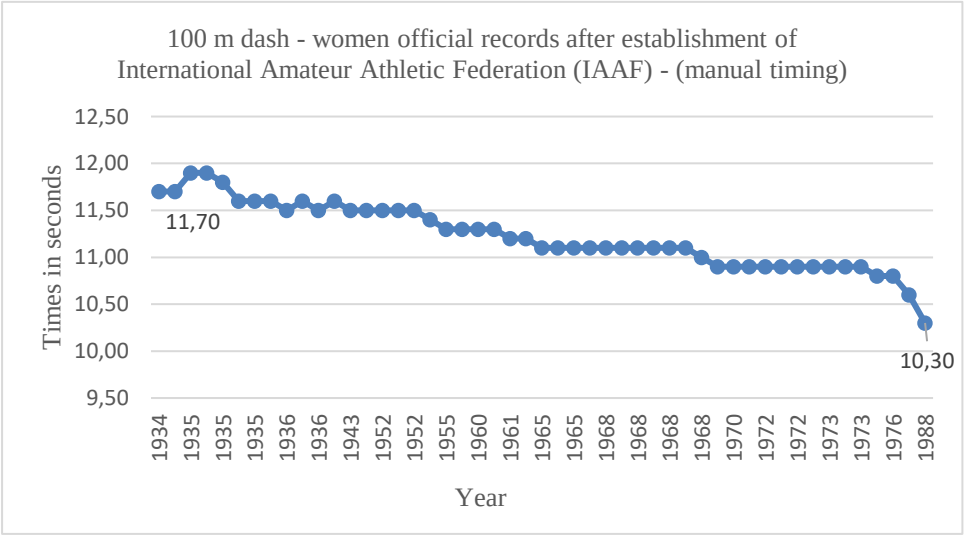


Fig.6

The first woman automatic timing world record recorded by International Association of Athletics Federations was made in 1952. Winsome Cripps (AUS) ran 100 meters dash in 12.8 seconds in Helsinki, at the Olympic Games, Finland. IAAF recorded 22 world records and equal, of which 19 world record improvements. In 36 years the 100 meters dash women world record was improved with 1.69 seconds, the longest period in which the world record has not changed for 31 years (between 1988-2019) (see Fig.7). The countries that most often broke the world record were USA, GDR and AUS.

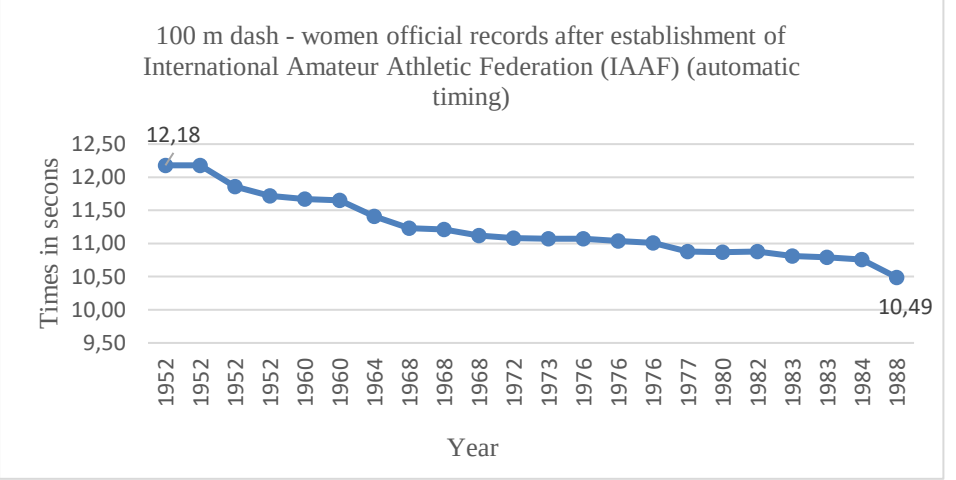


Fig.7

As shown in Table 2, the last 10 records at 100 meters dash have managed to descend below the eleven second barrier, the performance achieved since 1977. Of these, three are athletes from the United States three are from Democratic Republic of Germany, two from Federal Republic of Germany and one from Poland and one from Soviet Union. The extraordinary performance of 10.49 seconds per 100 meters dash of American athlete Florence Griffith-Joyner seems to be an unbeatable record for the women's sprint.

Tabel 2. Top 10 women world record holders at 100 meters dash

| Mark | Wind | Competitor | DOB | Country | Venue | Date |
|---|---|---|---|---|---|---|
| 10.49 | 0 | Florence GRIFFITH-JOYNER | 21-Dec-59 | USA | Indianapolis, IN (USA) | 16-Jul-88 |
| 10.76 | 1.7 | Evelyn ASHFORD | 15-Apr-57 | USA | Zürich (SUI) | 22-Aug-84 |
| 10.81 | 1.7 | Marlies GÖHR | 21-Mar-58 | GDR | Berlin (GER) | 8-Jun-83 |
| 10.88 | 2 | Marlies OELSNER | 21-Mar-58 | GDR | Dresden (GER) | 1-Jul-77 |
| 11.01 | 0.6 | Annegret RICHTER | 13-Oct-50 | FRG | Olympic Stadium, Montreal (CAN) | 25-Jul-76 |
| 11.04 | 0.6 | Ingeborg HELTEN | 31-Dec-50 | FRG | Fürth (GER) | 13-Jun-76 |
| 11.07 | 1.8 | Renate STECHER | 12-May-50 | GDR | Dresden (GER) | 20-Jul-73 |
| 11.08 | 1.2 | Wyomia TYUS | 29-Aug-45 | USA | Estadio Olímpico, Ciudad de México (MEX) | 15-Oct-68 |
| 11.2 | 1.8 | Irena SZEWIŃSKA | 24-May-46 | POL | Estadio Olímpico, Ciudad de México (MEX) | 14-Oct-68 |
| 11.1h | 0 | Lyudmila SAMOTYOSOVA | 26-Oct-39 | URS | Leninakan (URS) | 15-Aug-68 |

**3. Factors that throughout time influenced the sprinters performance capacity**

This last part of the research, concentrates on the analysis of some important key factors that influence sprinters' performance. In general, the main factors that determine the performance of an athlete at the 100m race are the following:

- **Wind**: In track and field, wind assistance is the benefit that an athlete receives during a race or event as registered by a wind gauge. Wind is one of many forms of weather which can affect sport. In these events, the maximum legal wind assistance is 2.0 meters per second. If the runners of a race receive more wind assistance than this, their times will not be eligible as collegiate, national, or world records. On May 31, 2008, Usain Bolt ran a 100m time of 9.72 seconds with a +1.7m/s wind, officially breaking the 100 meter world record. On June 29, 2008, Tyson Gay ran a 100m time of 9.68 seconds with +4.1m/s wind. Despite having a faster absolute time, he does not receive the world record.
- **Altitude**: The physics of high altitude sports performance and the advantages derived by the competitors in such venues are as varied as they are emphatic. Intense research conducted in the wake of the world record onslaught at Mexico City confirmed that the reduced wind resistance and drag upon the competitors' bodies in the thin air permitted the athletes to move with greater efficiency. So long as the event did not involve prolonged duress to the aerobic energy system and its dependency upon maximal amounts of oxygen, an athlete could expect better performances in higher altitude. The 1968 Olympics held in Mexico City were the first games staged at a high altitude 2,300 m, and the number of world records set was indicative of the impact of the thinner air on performance. Records fell in almost every track event from the 100 m dash to the 1.500m.
- **Reaction Time**: In the world of track and field, reaction time is known to be a pivotal aspect of a top-level athlete's technical arsenal, separating the gifted from the elite. Reaction time is defined as the interval of time between the onset of a stimulus, and the initiation of a response. Brain electrophysiological studies have confirmed that cerebral potential amplitude increases during the acquisition of a new skill, specifically premotor potential, which is the "decision-to-act" portion of reaction time; this potential was predictably higher in the expert sprinters (Collet, 1999). This revelation in neuroscience provides proof that reaction time does have an environmental basis, in other words, it is both learned and trainable. The reaction time is the time is takes for the runner to respond to the start signal and begin leaving the starting blocks. IAAF policies consider that there is a limit to how fast a human can react to a start signal. As of 2002, if an athlete left the blocks sooner than 100 mSec after the start signal, he was deemed to have false-started. Some fans think this is wrong and that any reaction after the gun should be allowed. The best athletes reaction times are usually in the range of 120 mSec (0.12 sec) to 160 mSec. Tim Montgomery improved that to a near perfect 104 mSec - and came very very close to being false-started. The only sprinter to get closer to perfection was Surin Bruny - who managed a 101 mSec in the 1999 WC 2nd semi-final.
- **Temperature and Humidity**: At fixed pressure and temperature, the range of realistic humidity variations shows little influence on 100 meter race times, yielding corrections of under 0.01 s for the range considered. Since race times are measured to this precision, the effects would be no doubt negligible. Similarly, if temperature is allowed to vary at a fixed humidity level, the corrections grow in magnitude but are still relatively small 0,023 s.(Mureika J R, 2006)
- **Track Surface**: At the beginning of modern athletics, in the 19th century, the running surfaces were totally different from those of today. The athlets ran on the streets, on the grass, on battered soil. Only at the end of the century the surfaces began to be beaten, and covered with slag. Unlike modern times, in the 19$^{th}$ century were only four to five to six lanes in the stadium of those days. That meant athletes had to run more qualifying races, sometimes on the same day. Starting in the late 1950s, artificial surfaces using a combination of rubber and asphalt began to appear. An artificial warm-up track was constructed for the 1956 Summer Olympics in Melbourne, Australia. During the 1960s many of these tracks were constructed; examples still exist today. In the mid-1960s Tartan tracks were developed, surfaced with a product by 3M. The name Tartan is a trademark, but it is sometimes used as a genericized trademark[citation needed]. This process was the first to commercialize a polyurethane surface for running tracks, though it was originally conceived for horse racing. Since the early 1980s, the manufacturer of the surfaces selected for most championship meets has been the Italian company, Mondo, again the trademarked brand name becoming sused as a genericized trademark. Mondo's track surface is called Mondotrack. This form of

construction gives a more consistent bounce (or energy return) and traction. As an example of Mondo-track, this surface were used even in 2016 Summer Olympics in Rio de Janeiro, Brazil. (https://en.wikipedia.org/wiki/All-weather_running_track)

- **Spikes**: The first track spikes date back to the 1850's. They were made by runners looking to increase traction on dirt tracks. The first 'spikes' consisted of little more than nails driven through the sole of the shoe. Kangaroo leather, touted for its strength and low weight, found its way into the uppers of early spikes. This leather would continue to see widespread use in the uppers of competition shoes until the 1970's. In 1900's. in a rural Bavarian town called Herzogenaurach a cobbler by the name of Adi Dassler begins handcrafting sports shoes, including track spikes. His shoes become known for their build quality, and with the money he earns he goes on to found Adidas, today one of the largest sportswear companies in the world. In 1936, Adi Dassler took note of the Olympic Trials performances of an American by the name of Jesse Owens. Despite the risk of being caught by the Nazi regime, Dassler contacted Owens and convinced him to use his spikes during the upcoming Games in Berlin. Owens won four gold medals. Fast forward to 1960, when American sprinter Wilma Rudolph, heralded as the fastest woman in the world, wore spikes featuring a midfoot shank and a nylon spike plate. Structure was provided by a heel cup and adidas' iconic 3-stripes logo purchased from Finnish brand Karhu Sports. Though removable spikes were first developed around the 1930's, fixed spikes remained in favor due to their strength and weight for several decades. The spikes worn by Alberto Juantorena in the 1976 Olympic Games were among the first to feature a modern removable spike system, allowing for the customization of the spike configuration for track surface and personal preference. Take another leap 20 years and you have Michael Johnson's iconic gold Nikes. These shoes caught the world's collective eye during the 1996 Olympics in Atlanta. Made of Zytel – a lightweight combination of nylon and fiberglass, these spikes tipped the scale at a meager 90g and were designed to last through a single use. (http://blog.runningwarehouse.com)
- **Clothing**: For the first time a mandatory clothing was imposed at a major athletics competition by the organizers, at the 1912 Stockholm Olympic Games. The official 1912 Olympic Report outlined that "each competitor shall wear a jersey with short sleeves and drawers to the knees, and shall also have on back and front during competition a distinctive number corresponding to the number in the programme assigned to him by ballot." Over the years, shoes got lighter and the clothing tighter. In the 1970s, synthetic materials began to make their way into running uniforms and the differences between attire for short- and long-distance runners began to grow. With an eye on aerodynamics, sprinters opted for closer-fitting speed suits while marathoners focused on light material that would not get weighed down by mile after mile of sweat. The 1984 U.S. Olympic uniforms in were designed with the consultation of NASA scientist Lawrence Kuznetz. Applying technology used in space suits for American astronauts, Kuznetz and Kappa Sport created a double-knit, aluminum-coated fabric aimed at deflecting the sun's rays and pulling perspiration from the body. In 1988 Seoul Olympic Games the biggest uniform story of the Summer Games centered around Florence Griffith Joyner. In the Olympic Trials, Flo Jo wore an iconic brightly colored one-legged body suit (right), a get-up that was not allowed in Seoul. By the early '90s, sprinters had opted for tight, synthetic uniforms. By 1996, midriffs clothing were a frequent sight on the Olympic track. By the 2008 Olympics in Beijing, computer modeling had been widely incorporated into athletic uniform design, with aerodynamic tweaks aimed at reducing wind resistance. The idea that technology could—and should—shave time off sprinters' races was becoming standardized.
- **Training, Recovery**: Sprint training were present since the 19th century. The training philosophy has undergone changes due, in particular, to the experiences of athletes and coaches, and later in the 20th century, due to the multidisciplinary approach to training athletes. Broadly speaking, the sprinters' training takes into consideration, depending on the ontogenetic development of the athlete, several methodical aspects that ultimately converge to the improvement of the performance capacity. These consider both the improvement of the starting and running technique and the development of specific physical qualities. Thus the sprinters training follows the development of general and specific endurance, development of speed under all its forms of manifestation, development of general and specific strength of the muscle groups involved in the effort, education and the development of power, improvement of the starting and running technique through specific and aiding exercises, a careful and correct periodization of sports training, a proper use of the effort parameters within each training session and assuming tangible intermediate and final goals and not least mental and mental training. On the other side in today's

competitive sport environment, discovering effective methods of facilitating optimal athletic performance is paramount to success. The recovery period is essential in maintaining athletes physical and psychological well-being and crucial in the pursuit of intense physical training and satisfying performances. General a scientific base of recovery has in consideration the physiology of optimal training how to prevent overtraining, how to peak for optimal performance, recovery at the muscular level, nutrition strategies, electrostimulation, compression, massage, and immersion procedures, among others.

- **Doping in sport**: The use of drugs in sports goes back centuries, about all the way back to the very invention of the concept of sports to help increase performance capacity. According to a study commissioned by the World Anti-Doping Agency (WADA), actually 44% of athletes had used banned substances during their careers. Nevertheless, only 0.5% of those tested were caught. The World Anti-Doping Agency is a foundation created through a collective initiative led by the International Olympic Committee (IOC). It was set up on 10 November 1999 in Lausanne, Switzerland, as a result of what was called the "Declaration of Lausanne",to promote, coordinate and monitor the fight against drugs in sports. (https://en.wikipedia.org/wiki/Doping_in_sport)

## 4. Conclusions

In conclusion, this study aimed to evoke the best world performances of male and female sprint over two centuries, in the context of the factors that influenced the value of these performances.

As you can see, the men's sprint began its journey of world records with a performance of 11.0 seconds in 1867. At 152 years distance the phenomenal record held by Usain Bolt, 9.58 seconds promises to remain long unbeatable. So the male sprint took a century and a half to improve his performance on the 100 meter dash with 1.42 seconds.

As the modal records showed, they were for a long time estimated and approximated, the subjectivity of the human factor being largely present. Once the introduction of automatic timing and rules regarding the approval of world records, these results have become indisputable.

Studying the graphs of the evolution of world records for both men and women, it can be seen that world records have stagnated, especially in the 20th century, during critical historical periods, characterized by instability and changes in political regimes, wars, etc.

On the other hand, in the period after World War II, an unprecedented revival of sport and results in the communist countries is observed.

The male sprint began to be dominated by color athletes starting in the second half of the 20th century, while the female sprint was dominated by Caucasian athletes until the end of the last century when color athletes from United States gained their supremacy.

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