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# EDUCATIO ARTIS GYMNASTICAE

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4/2016

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**EDUCATIO ARTIS GYMNASTICAE**

**4/2016**  
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YEAR  
MONTH  
ISSUE

Volume 61 (LXI) 2016  
DECEMBER  
4

# STUDIA

## UNIVERSITATIS BABEȘ-BOLYAI EDUCATIO ARTIS GYMNASTICAE

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## AN EXAMINATION OF PHILOSOPHICAL PROFILES IN PHYSICAL EDUCATION. A COMPARISON BETWEEN ROMANIA AND ITALY

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EMANUELE ISIDORI<sup>3</sup>, FRANCESCO TADDEI<sup>3</sup>, SABRI KAYA<sup>4</sup>

**ABSTRACT.** Physical education is a discipline in which there are often few possibilities for teachers to develop critical thinking and reflexivity. This is due to prevalence, in the curricula of PE teachers, of technified teaching and learning models that do not help them develop as critical reflective practitioners. Within this consideration, and in order to stress the importance of philosophy as a means capable of developing critical thinking in physical education, we have administered to two groups of Romanian and Italian PE teachers a validated questionnaire aimed to detect their philosophical profiles on the basis of five paradigms. The result of our study has shown that, between the two groups of teachers, there exist differences relating to so-called Idealist and Positivist profile. In conclusion, the results and assumptions to explain them and emerging from the study need to be better explored, verified and analyzed by future researches based on a wider sample and focus group of scholars, teachers and respondent informants.

**Keywords:** physical education, philosophy, profile, teachers.

### Introduction

Philosophy of education plays a fundamental role in helping teachers develop as critical practitioners and educators who transmit values in the school. This is particularly true for physical education teachers, who are used to teach a discipline in which, due to several factors and the utilization of technified teaching and learning models, there exist very few real opportunities to develop and implement critical thinking and reflexivity.

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Both in Romania and Italy, physical education teachers usually do not follow courses in educational philosophy applied to their subject during their training period in departments or specific courses for teachers' education. Their education tends to focus more on practical skills than on theoretical reflection and philosophical attitude towards the comprehension of their actions within the framework of the meanings of the complex subject they teach.

We know that the main aim of the philosophy of education is to teach educational practitioners to reflect upon why they act and do things, and on their behaviours (Reboul, 1971). However, teachers are mainly interested in learning what they do because for many of them the practice of teaching is reduced to actions devoid of a rationale or justification. This concept and false belief gives rise to the well-known dichotomy between theory and practice (Thomas, 2007), and between scholars and practitioners. This dichotomy represents one of the main controversial issues of pedagogy as a human science. Nowadays, there are many training models that are trying to solve the problem concerning this dichotomy in teachers' education helping them develop a "philosophical" attitude towards the world and its problems (Schön, 1983). Philosophy can act as a means capable to illuminate and help teachers deeply understand the main issues of the complex educational and political relationship of the school to the social order.

This is most true for physical education teachers, who, in Italy and Romania, for the reasons mentioned above, continue to be influenced by a mere practical conception of sport and physical activity, and not to be aware of their real role and function as educators who are not mere technicians but intellectuals.

Philosophy represents the efforts of human beings to understand their world, themselves, why they exist and search the truth. It stresses the importance of wisdom as mental activities aimed to search the truth, to know and understand the world. Philosophy helps physical teachers to (Pelton, 1970):

- 1) to examine and explore the meaning of the world, the individual, and the interaction between the two;
- 2) to arrive at and develop a personal philosophy which gives meanings and direction to her/his efforts as teacher and human being;
- 3) to keep in perspective the teacher's role, direct her/his choices, and maintain her/his personal integrity both as human being and practitioner;
- 4) to structure the totality of her/his personal beliefs and thus avoid contradictory actions and unrecognized compromise;
- 5) to analyze the consistency of her/his beliefs and determine if her/his practices conform to her/his beliefs.

Engaging in philosophy helps physical education teachers clarify what they do or intend to do and, as they act or propose to act, to justify or explain why they do what they do in a logical, systematic manner in the classroom, gym or pitch. Thus, the activity of doing philosophy aids physical education teachers in

understanding who they are or intend to be and why they do or propose to do what they do. Furthermore, through the action of clarification and justification of practice, physical education teachers develop specific reflective skills very helpful to their decision making.

Philosophy provides physical education teachers with tools capable to clarify their own notions of existence, knowledge, and values in teaching; that is, as we have said above, capable to clarify their personal philosophy of sport and of teaching sport/physical education.

There exists a specific philosophy capable to provide PE teachers with reflective skills. This philosophy, which positions itself between the two system of so-called “sport sciences” and “educational sciences”, is the “philosophy of sport education”.

This specialized philosophy serves as a theoretical means to develop a conceptual framework for sport pedagogy, developing the critical and reflective perspective of this science (Grupe, Krüger, 1997). Applied to the cultural context of PE, philosophy of sport education can be considered as a tool (that is a critical and reflective way of reasoning) which allows teachers to examine and explore the meanings of this practice in relation to the construction of their identity as human beings and persons (Isidori 2012; Kretchmar, 1994).

We are convinced that physical education teachers have to be helped develop as reflective practitioners who take aware of their role both as educators’ intellectuals. They have to become aware of the values, beliefs, and prejudice that influence physical education both as subject and social practice. This critical exercise is very important for teaching physical education, traditionally focused on acquiring technical skills.

It can often happen that physical education teachers have no clear idea about the philosophical context of their teaching in terms of teaching techniques, values connected to PE and sport they intend to transmit, sense and meaning they give to human life through sport and physical activity. This lack of awareness of the paradigms that guide teaching practice don’t allow PE teachers to develop both a critical thinking and reflective attitudes towards the subject they teach in school, in which sport and PE are often conceived just a mere technical activities and practice for competitions and performance.

### **Physical Education Teachers’ Profiles**

As stressed in our previous theoretical background, due to the need for helping PE Teachers to take aware of their educational views, the Italian research team involved in this research has built and validate a questionnaire to detect the philosophical paradigms and pedagogical profiles of a group of Romanian and Italian PE Teachers. The questionnaire has been utilized to identify the theories of education upon which Romanian and Italian physical education teachers tend to base their teaching (Isidori, Abele, Taddei, Buzi, 2016).

Each philosophical paradigm of PE, which is tied to the overall philosophical and educational conceptions of sport and human life, reflects a combination of guidelines that are the result of different perspectives implied in teachers' educational background and in how they have been trained in schools of education. Since educational paradigms represent both a pre-understanding of the world and the root of human action, they reflect specific trends and they need specific pedagogical models to be implemented by teachers.

After thus defining the concept of paradigm, a research analysis of both sports philosophy and pedagogy scholarly literature (Safania, Ghorbanalizadeh, Tayebi, 2010; Wiles, Bondi, 2010; McFee, 2007; Davis, 1963) has allowed us to identify five basic PE teaching paradigms related to five main philosophical movements, mainly:

- 1) pragmatist paradigm;
- 2) idealist paradigm;
- 3) positivist paradigm;
- 4) existentialist paradigm;
- 5) socio-critical paradigm.

Each paradigm is inspired by a specific philosophy of education that has its basis in the thinking of many influential Western philosophers associated with each movement (Fernandez-Balboa, 1997; Morgan, 2006; Thomas, 2007). After that, we have identified five educational philosophical profiles linked and corresponding to the above-mentioned five specific philosophical paradigms. These profiles can be summed up as follows.

**1) *The Pragmatist Profile.*** This philosophical profile refers to the theories of the American philosopher John Dewey (1859-1952). The starting point of this profile is Dewey's concept of experience, understood as the relationship between the human being and her/his environment. The human being learns from experience through freely and concrete actions: that is through practice and always together with other people. Learning is always the result of a practical interest from the person, who, to learn, has always to be interested and motivated. Every experience can be an educational and enriching experience if the person lives in an environment where people accept pluralism of opinions and recognize the right of individuals to express their creativity in the name of freedom and democracy. The pragmatist profile implies that the PE teacher uses a wide selection of types of sports and physical activities when she or he teaches her/his subject.

A pragmatist PE teacher tends to choose activities such as team sports and sport games that improve cooperation and conflict resolution among pupils. A teacher who belongs to this profile avoids, in the gym, the use of daily formal exercises and any type of routine, and tends to communicate and share experiences

in a non-directive communication environment. The exchange of ideas, collaboration, active participation is seen as a fundamental means to promote active learning styles in her/his pupils.

**2) *The Idealist Profile.*** The starting point of this profile is that the nature of reality and what really matters in our life is something spiritual and ethical. Human beings must always conform their life to the principles of moral duty and ethics. The PE teachers who embrace this educational philosophical worldviews, he/she thinks to know what is better and right for her/his pupils. What she or he teaches in the classroom, gym or pitch does not specifically focus on technical aspect of physical exercise or sport games, but on ideal concepts and values of education and learning. This profile puts emphasis on moral and spiritual values of the experiences related to sport. Sports activities and competitions are not important in themselves but as a means to achieve spiritual or moral ends. This profile implies a vision of teaching-training centred on discussion, analysis and decision-making dealing with, for example, fair play, the ethical choices and moral behaviours that sport, especially in its competitive form, implies. In this profile, values are considered more important than athletic and physical performance, and personality is considered central in the process of individual learning.

**3) *The Positivist Profile.*** Positivism puts great emphasis and trusts in the objectivity of science, in rationality, and in woman/man seen as a “rational animal” capable to develop, through science and its methodology, as a better human being. The PE teacher who follows this profile tends to scientifically select activities that enhance physical strength and technical sports skills. Moreover, she/he tends to use tests and measurements to verify the level of technical skills achieved by her/his pupils, and to test the effectiveness of her/his teaching, rejecting any subjective and personal approach to the teaching of physical education and the sports. Within this profile, the teaching and learning process in physical education is mostly implemented through methods that go from individuality to the whole, through an inductive methodology, and are based on a systematic, sequential, and organized presentation of subject contents.

**4) *The Existentialist Profile.*** This profile is based on the concept of existence as conceived by Existentialism, which look at the world and human life as something precarious but at the same time also contingent and dynamic. This profile enhances the subjective dimension of knowledge, of behaviours and relationships with others, and highlights the character of uncertainty of human life. The existentialist PE teacher is indifferent towards measurable objectives, even if, as a facilitator of learning content, can organize training sessions so that

her/his pupils can autonomously achieve their learning objectives. The teacher who follows this profile does not like a close and direct supervision/control on their students through discipline. Actually, they tend to evaluate pupils as a whole, taking into account both the skills achieved and the values transmitted through sport activities and physical exercises, as well as their effects on pupils' personality.

**5) *The Socio-critical Profile.*** This profile, inspired by the critical theories of the Frankfurt School (Fernández-Balboa, 1997). A socio-critical PE teacher trusts in sport and physical education seen as a means capable to develop critical and transformative abilities, as well as social or people skills. That is, skills that allow the person to be aware of social problems, and to understand the social construction of different voices and identities in physical education and sport, and how these are related to historical and social forces and how they can be used as the basis for change in our society. Values and terms such as "inclusion", "fairness" and "justice" are those which give meaning to physical education and sport and their practice, and are more important than those related to "efficiency", "performance" and "victory" conceived of as an achievement of the final result at any cost and mere aim of the competition.

Moreover, this profile requires by the teacher a permanent use of dialogue and democratic communication with their pupils, and a view of the relationship between teachers and pupils as a complementary relationship between equals, never asymmetrical. Within this context, the teacher plays the role of facilitator whose main aim is to promote free creativity, body movement, the pleasure of playing sport, joining others, and sharing with them the gratification and joy.

### **Main Aims and Scope of the Research**

On the basis of this hermeneutical interpretation aimed at identifying the five main educational philosophical profiles of contemporary PE teachers, we have administered to two samples of Romanian and Italian physical education teachers a questionnaire of 50 items (10 items x 5 profiles). This research tool, based on a Likert scale, centred on a score system from 1 to 5, is aimed to detect the level of agreement or disagreement of PE teachers with reference to the items contained in the questionnaire.

The above-mentioned questionnaire, drafted in Romanian and Italian and validated in both languages, was inspired by a previous research tool, statistically validated, and aimed at detecting the philosophical profiles of youth football coaches (Isidori, 2013; Isidori, Migliorati, Taddei, Abele, Sandor, 2011) and theoretical researches (Jones, 2006).

## Method

**Participants.** As mentioned above, the questionnaire was administered to a group of 50 Romanian PE teachers (mean age=38.3 yr, SD=11.9), and to a sample of other 50 Italian PE teachers (mean age=54.1 yr, SD=4.6). The Italian teachers were significantly older than the Romanian ones ( $F_{(1,96)}=62.4, p<.00001$ ).

This is because teachers' hiring system in Italy has been stopped for many years. This is the actual reason for which very few young physical education teachers are teaching in Italian schools.

The Romanian PE teachers group consisted of 16 females (mean age=42.8 yr, SD=12.1) and 34 males (mean age=36.1 yr, SD=11.4) randomly selected in Cluj Region's schools. Most of the teachers had a major in physical education (98%). 48% had more of 10 years of teaching experience (>10 years 20%, >15 years 6%, >20 years 22%), and 90% had practiced sports at a competitive level (69% team sports, 31% individual sports). Moreover, 80% of the Romanian teachers were also sport coaches.

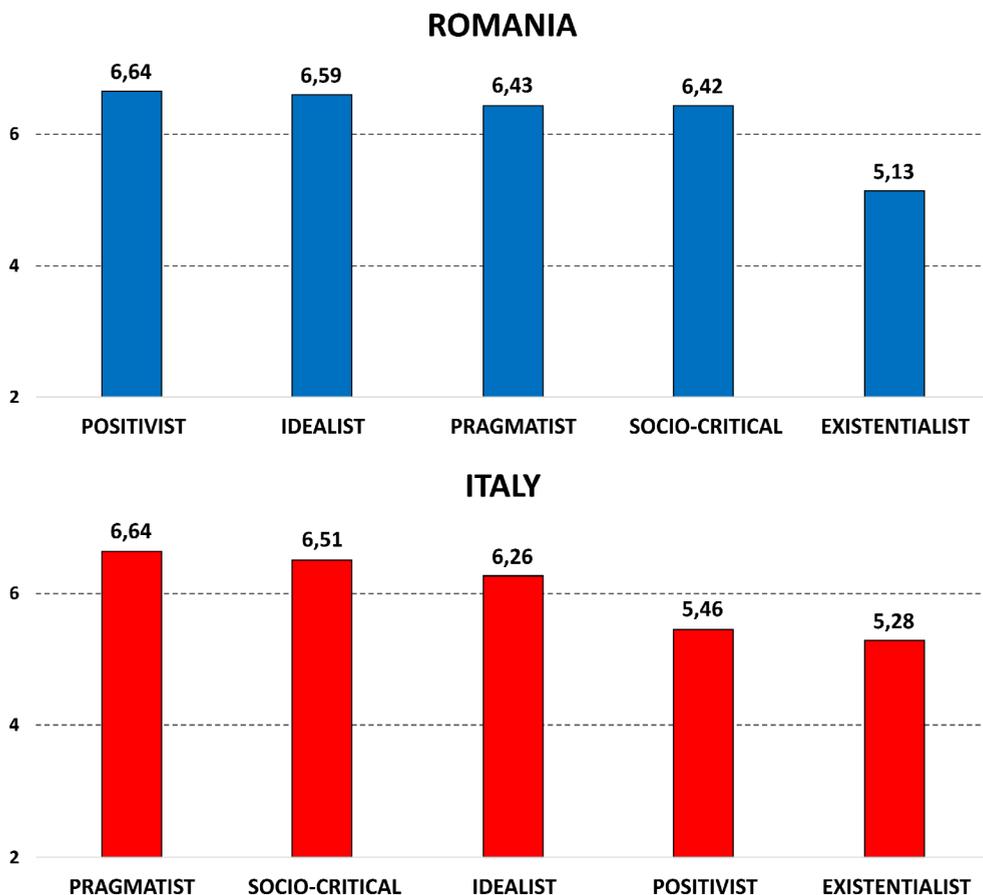
The Italian group consisted of 29 females (mean age=54.4, SD=3.6) and 21 males (mean age=53.8, SD=5.7). The sample of Italian PE teachers was randomly selected from schools in Rome city districts. The Italian PE teachers had majors in sport sciences. The majority of them (82%) had a long teaching experience (>20 years), and had practiced sports at a competitive level (88%), mainly, team sports (39%) and track and field (32%). Moreover, 44% of the teachers were sport coaches.

## Data analysis

Based on the scores obtained in each paradigm, we have found prevailing profiles in each group of PE teachers. In order to evaluate the differences between Romanian and Italian PE teachers, profile scores were subjected to analysis of variance (ANOVA), using the country Group (Romania, Italy) and the Gender (Male, Female) as independent factors. All analysis was performed using Age as a covariate. The alpha level was fixed at 0.05.

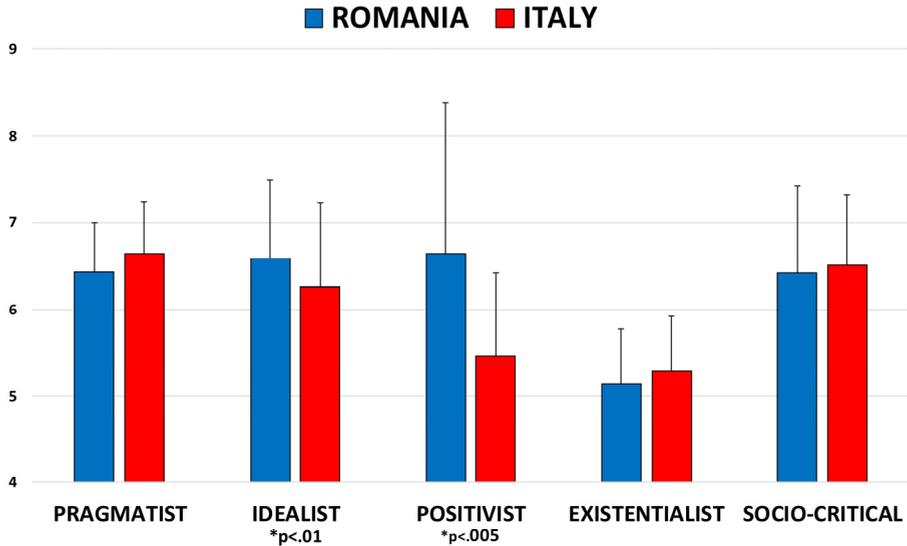
## Results

The data showed a prevalence of the Positivist paradigm (6.64) within the Romanian PE teachers. The other preferences appear distributed as follows: Idealist profile (6.59), Pragmatist (6.43), Socio-critical (6.42), and Existentialist (5.13). As regards the Italian group, the data from the questionnaire shows a prevalence of the Pragmatist profile (6.64). The other preferences are distributed in this way: Socio-critical paradigm (6.51), Idealist (6.26), Positivist (5.46), and Existentialist (5.28) [fig. 1].



**Fig.1.** PE teachers' profiles as they emerge from data.

The ANOVAs on the profile scores has shown a significant effect of the Group factor on both Idealist ( $F_{(1,95)}=7.29, p<.01$ ) and Positivist profile ( $F_{(1,95)}=10.25, p<.005$ ). The Romanian PE teachers group has shown higher scores than the Italian one for what it refers to the Idealist (6.59 vs 6.26) and Positivist profile (6.64 vs 5.46) [fig.2]. Other ANOVAs have not shown significant results.



**Fig. 2.** Differences between Romanian and Italian PE teachers profiles.

### Discussion and conclusion

It is clear from this research that the philosophical profiles of PE Romanian and Italian teachers appear to be rooted in the five philosophical paradigms which are fragmented, and not easy to analyze or define. Our study shows that there exist different educational philosophical profiles between Romanian and Italian PE teachers. Romanian PE teachers show a higher score relating to so-called Idealist and Positivist profile. To better explain this result, we could form the hypothesis that Romanian PE teachers are more devoted to the task and, moreover, are educated through a curriculum focused on a more technified approach to the subject they teach, that doesn't allow them to develop a critical view and perspective on their practice. In any case, this hypothesis needs to be better explored, verified and analyzed by future researches based on a wider sample and focus group of scholars, teachers and respondent informants. The questionnaire we have built and this study want to encourage, via educational support, Romanian and Italian PE teachers, to reflect on their characteristics, orientations and pedagogical models.

In conclusion, this study is an example of how the philosophy of sport education can be applied to practice in a context such as physical education teachers' training, in which there are often very few possibilities to develop critical thinking due to the misconception of sport and physical education as a

merely technical and not critically reflective practice. The philosophy of sport education can help PE teachers analyze the foundations and presuppositions underlying physical education as discipline, investigating its underpinnings as science and form of human education. Moreover, this philosophy can help PE teachers develop a comprehensive conception and apprehension of the world, integrating the interdisciplinary knowledge of the sport and educational sciences with that of ethics to achieve a more critical and coherent view of their profession.

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## **IMPACT OF TEACHING HANDBALL ON THE IMPROVEMENT OF TARGET ACCURACY OF STUDENTS IN CONSIDERATION FOR THE IMPACT ASSESSMENT OF THE PROJECT “HANDBALL AT SCHOOL”**

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MARIA D. MACRA-OȘORHEAN<sup>2</sup>**

**ABSTRACT.** A survey programme was organised by us in the autumn and spring semesters of 2015/ 2016 academic year aiming to prove that project “Handball at School” has positive effect on target accuracy and performance stability results of students, as well as their precision of technical implementation. 183 students were examined (2nd-4th grades) who had two sponge-handball lessons a week out of their 5 physical education lessons. To examine target accuracy two tests were applied. One is “throwing at a target from throwing straddle without previous swing” performed by the students by age-specific sponge-handball from distances corresponding their age. The aim was to hit the small box five times at a time from upper throw. After having a rest, they had another five trials. Shooting surety, performance time and precision of technical implementation were registered. The other test for checking target accuracy was “throwing at a target from throwing straddle with previous swing”, where the difference from the previous one was that they had to run two meters forward, take the ball and run back with it to the sign-line the distance of which was the same as the one in the previous test. At this test, also surety, performance time and precision of technical implementation of upper shot were noted. Four groups were formed from the children in accordance with the time they have spent on training: the first one was that of the children not doing any sport regularly apart from the activity at the PE lessons, so their training past is 0 year, the second group were the children having done sports regularly for one year, their training past is 1 year, the third group was the children with 2 years past, while the fourth group was the ones with 4 years of training past. It was stated that target accuracy results or some other parameter (score, technical implementation, implementation time) improved in all the four groups by the spring check compared to the autumn one indicating the benefit of the programme after half a year.

**Keywords:** handball, every-day physical education, target accuracy, primary school children

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## **Introduction**

A series of important educational changes were implemented in Hungary, in school physical education, when introducing every-day physical education, the necessity and topicality of which is unquestionable. The increase in the number of physical education classes was verified by the worrying health tendencies experienced among children and young people. There are a lot with various deformities, but various diseases also affected children, eg: diabetes, high blood pressure, asthma, allergy, COPD, coronary diseases.

Recently, education has changed a lot, this way contextual and methodological aspects of public education have been altered. It is proven by the continual modification of the curricula (1995–NAT1, 2003–NAT2, 2007–NAT3, 2012–NAT4). The latest National Basic Curriculum was passed by the government on 4th June 2012 based on Government order 110/2012. (VI. 4.), where different aspects of educational objectives were expressed, like physical- and mental health education.

Organising and ensuring every-day physical education, that is having 5 physical education lessons a week in full-time education is imposed mandatory by Act 27.§. Beginning from 2012/2013 academic year every-day physical education is compulsory in 1., 5. and 9. classes, then it will be in all classes in phasing-out system.

Starting with 2015/2016 academic year every-day physical education has become complete. To fulfil the principles and objectives, skills must be acquired in game and sports culture and it is essential to create needs for healthy and health-centred activities. Objectives of school physical education are as follows: knowledge of the sport, developing, enlarging movement skills, participation in free time and sports events, creating values based on regular physical activity and healthy lifestyle.

“Handball at School” project got involved in this favourable education-political environment, enriching the educational content with the target group specific movement material, ball-skills developing exercises of handball on a weekly basis out of the five physical education lessons. The framework curricula made to the project was published in Magyar Közlöny 2016. year 126. issue 5. attachment 22/2016 (VIII.25) EMMI order, supporting the organisational work of teachers.

### ***Description of “Handball at School” Project***

Hungarian Handball Association launched its “Handball at School” project in September 2013 in 50 schools, with 54 PE teachers, 1430 pupils. Thanks to the favourable experience, the programme was enlarged in September 2014 to 91 schools and 98 PE teachers, this way growing the number of the children to 3400. At present, due to further enlargement in 2015, the programme is going on in 117 schools, with 127 PE teachers, with participation of almost 4565 students

(1st-8th grades) in 243 groups. Out of all the participants, 1435 persons are in 2nd-4th grades. The programme and the schools participating in it have become a dominant scene of talent care besides enlarging youth supply base of handball.

The junior section pupils of the schools (2nd-4th grades) participating in the programme learn basic technical and tactical elements, system of rules of handball sport twice a week within every-day physical education, and do various ball exercises (to develop skills and dexterity) with light tool (sponge handball) and playful competitions within the lesson. The PE teachers taking part in the education of the programme are trained by the Hungarian Handball Federation and the schools are supplied with the necessary sports equipment.

The results are controlled by the mentor system and by surveying the lesson plans sent by the teachers. This programme providing professional supervision, continuous training and check-up as well is exceptional in our country. Although a package and retraining of professionals was ensured in the Hungarian programme of kid-athletics as well, the feedback, the continuous control was not fulfilled as thoroughly as in the school programme of handball; therefore, it can be considered unique.

### ***Literature Review***

Checking efficiency of handball sport education can be measured, tested in various aspects: by the teacher's activity and by the efficiency of the students.

When organising our research we were interested in students' output and its efficiency.

Having reviewed the theoretical background of movement preciseness and its measuring (Rigler, 1987; Nádori, 1989; Rigler, & Zsiedeg 1985; Schmidtbleicher et al., 1981; Vas, 1991; Nagy, 1978; Müller et al 1999; Müller, 2000; Müller, 2004) our aim in our test programme was to choose several criteria to evaluate movement. The two aspects we wish to apply in handball sport are:

- accuracy, precision in manifestation, that is in technical implementation
- the biggest, "best" objectively expressed result or efficiency while performing the movement.

Let us have a look what literature says about it:

The Hungarian Thesaurus gives the following definition on **accuracy**: "*Corresponding reality, requirements.*" "*Can be implemented at the designated time.*" "*Working without mistake, reliably.*" (Juhász et al 1980) This way it can be stated that requirement in handball in our case is determined by the description of correct technical implementation. Precise, faultless activity, keeping the set times is also mentioned as important. When measuring movement accuracy time precision, ability to assess time, a crucial factor of coordination abilities are important elements. However, the previous definitions and interpretations do not reflect aiming stability, shooting accuracy characteristic in ball games.

Fetz (In Rigler, 1987) writes about scoring- and target accuracy in his work where he relates this concept not only to ballgames, but considers it more general. He often uses “**scoring accuracy and repetitive preciseness**” concepts in his work. Scoring accuracy shows that the result of the movement, which in case of scoring means hitting the target is a very important moment when evaluating how good the implementation was. Repetitive preciseness means that although a target may be hit once by chance, without any practice, but if one can reproduce it several times after having practised it, motion stability is reproduced as a result of the development of implementation, with little statistical deviation.

Motion preciseness, precise implementation, movement accuracy and result accuracy concepts were defined and determined based on target focus by Meinel (in Rigler, 1987). He writes generally about these concepts, therefore his definition is also general.

According to him *movement accuracy* means target focus and sports movements determined by the target, although the objectives are different in cyclic, point-score sports and in handball. He considers practice crucial, saying that having practised more one can perform the different movements, sports technics, more precisely.

According to Allaway (in Rigler, 1987, 14. p.) **movement accuracy** “*is a feature of movement which includes target accuracy of the implementation of a movement, especially its sameness in a pre-determined movement.*” *This definition is more concrete, it has a sports-specific definition.*

He also mentions **scoring** or **target accuracy** where the objective is to improve the quality of passing the ball. The “target” or target surface may be the goal, the basket of the opponents, a part of their playing area, or even their own teammate creating a moving target surface when passing the ball.

## Questions and Hypothesis

Before starting our research, the following questions were asked. We tried to find the answer for them during our research:

- Which are the tests and procedures to examine the major fitness and coordinating skills that are suitable to help the selection process of junior section pupils in handball sport?
- How will target accuracy of pupils taking part in the survey change due to the project during the year? **Which parameters will mostly have changed** by the autumn and spring check?
- How will target accuracy, performance stability of students not doing sports and students having different training experience change?

- We consider that tests to check and examine fitness and coordination skills, sports-specific tests must be approached in holistic way when finding talents for a sport in junior school age.

- We think that changes in tests between the autumn and spring surveys will mostly occur accordingly with the alternatives of the sport-specific training.

- We presume that students having more hours of training (in any sport) will have better results in the tests in both checks.

- We presume that project “Handball at School” will result in improvements in target accuracy tasks at students not doing sport (training past 0 year) and the ones doing sport after half a year proving favourable benefits of the programme.

### Materials and Methods

Our survey was organised in three schools in autumn and spring, 2015. Primary school children of 2nd and 4th grades having 5 PE lessons a week out of which 2 lessons were spent on acquiring the knowledge of handball sport. They were surveyed in Budapest, Tomori Pál primary school, in Ajka, Fekete-Vörösmarty primary school, and in Gyöngyös, Kálváriaparti primary school. These schools joined the programme on 1st September 2013; the teachers are well-trained professionals, PE teachers having big experience in teaching handball as well.

We aimed at analysing the 10% of the sample. Out of 1430 pupils of the junior section, 183 took part in the survey, that is 12.8% of them. The locations were chosen so that from Western- and Eastern Hungary and a school from the capital city be in the sample, so all the regions of Hungary were represented.

**Table 1.** Sample by location

	Measured children (person)	Measured children (%)
<b>Ajka</b>	63	34.4
<b>Budapest- Tomori</b>	60	32.8
<b>Gyöngyös</b>	60	32.8
<b>Total</b>	183	100.0

It can be seen in Table 1 that there were about the same proportion of children from all the three locations. 94 persons (51.4%) of the measured junior section children were boys, while 89 persons (48.6 %) were girls. The surveyed ones came from 2nd, 3rd and 4th classes, with about the same proportion: 63 persons (34.4%) 2nd class, 57 persons (31.1%) 3rd class, and 63 persons (34.4%) 4th class children. Table 2 shows the sporting habits of the sample:

**Table 2.** Sporting habits of the sample

	Measured children (person)	Measured children (%)
<b>Does not do sport</b>	44	24.0
<b>Handball</b>	44	24.0
<b>Other sport</b>	95	51.9
<b>Total</b>	183	100.0

44 persons (24%) of the surveyed children do not do any sport other than at PE lessons, also 44 persons (24%) were the ones who chose handball sport for their afternoon trainings, while 95 of all the children (51.9%) also do training in the afternoon, however, they do not focus on handball.

66% of the sportsmen have one-two trainings a week, while 33.9% do more than two trainings a week.

44 persons of the children surveyed in the programme (24%) do not do sport either at school or at a club, 88 persons of the children (48%) do sport at an association, while 53 persons (29%) do sports activity at school.

The children surveyed in the sample were grouped by decimal age categories as well. In the autumn survey the dominance of 10-year-old children was noticed, making 34.4% of the surveyed ones, the group of the 9 year olds was just 30.6% of the sample, 8 year olds were 25.7% of the sample, 11year olds were 4.4%, while 6 and 7-year-old children took only 5% of the sample.

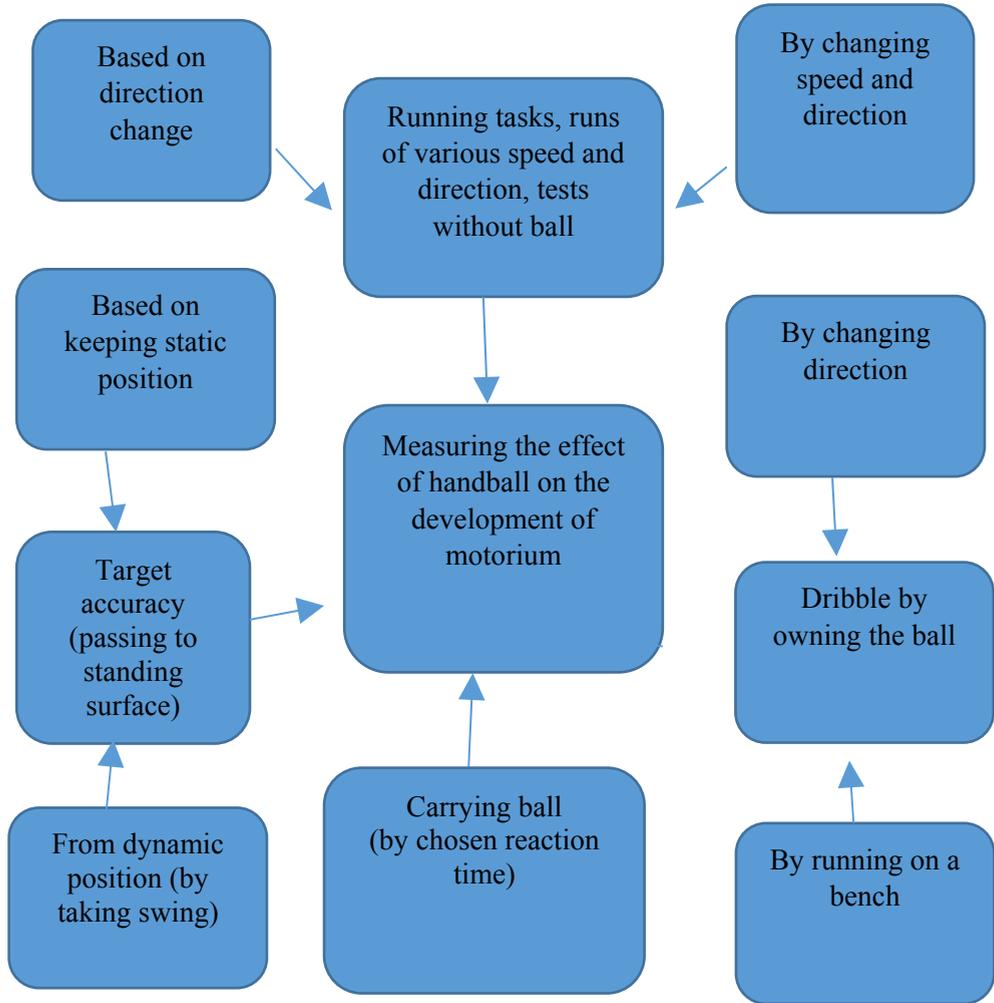
To test the survey material pilot measurements were done in Ózd, Vasvári Street Primary School, to make sure the test material offered for the survey matched the abilities of the age group and to get information about the feasibility of the exercises and general and special technical level, related to the tasks of the students of different age and pre-training. This school was chosen to have a location where underprivileged children could also be tested and the venue is suitable to play sponge handball.

During the pilot research, alterations were made in the previously suggested material, since the 1st and 2nd class pupils could not perform the 2nd task (Alternate hand dribble with ball) even at basic level in alternative way. Therefore, the above-mentioned age group had to perform this task only with one hand (on the dominant side) during the survey. (the evaluation of this task will be published in a future article)

Besides this aspect, as the pilot test was done at the beginning of the school year, the 1st year pupils could not be surveyed, since even understanding the task caused serious problems for them, as, lacking pre-training, they had never faced such kind of movement material.

***The surveyed features and positions***

Movement accuracy is a very complex category in handball; therefore, we tried to examine it through different factors in order to be able to give a complex summary on them later.



**Figure 1.** Structure of tests surveyed

In our present article, the results of our two surveys to test aiming accuracy are described. Therefore, the description of these tests and their evaluation is also shown in details.

**1. Shooting in transversal straddle position without running up** (to survey sport specific coordination skills)

The pupils stood behind the line on the floor, 5 sponge handballs adequate to their age were placed in a turned-up small box on the side of their throwing hand (see test 2) A small box (dimension: 26 cm tall, 62 cm long, 42 cm wide) was placed 5.5 meters away in case of 1st-2nd class children, and 6 meters away in case of 3rd-4th class pupils in the way that the surface covered in leather faced the pupil performing the shot. After having heard the whistle, the pupil had to aim at the surface of the small box with the balls having taken from the small box near him so that the ball hit it with a direct touch. It was performed with upper throw.

**The number of attempts** were 5, at the survey the number of scores, the time of implementation (with digital watch, sec. centi-seconds accuracy) were taken and accuracy index was counted (average/deviation).

**2. Shooting in transversal straddle position with running up** (to survey sport specific coordination skills)

The pupils stood behind the line on the floor, (The distance of the line and the target surface was the same as in test 5). 5 sponge handballs adequate to their age were placed in a turned-up small box on the side of their throwing hand (see test 2). After having heard the whistle, the pupil had to run back to the small box and, taking a ball out of it had to run to the line and similarly to task 5, had to aim at the small box. He had to repeat it as long as he used all the 5 balls. It was performed with upper throw.

**The number of attempts** were 5, at measuring the number of scores, the time of implementation (with digital watch, sec. centi-seconds accuracy) were taken and accuracy index was counted (average/deviation).

**The way of calculation**

The results of the trials applied in the survey were expressed in quantitative way as well. The data were processed with SPSS.22.0 statistical programme. The results were processed and evaluated following mathematical basic statistics survey procedures.

Based on the instructions of handbook "Introduction to the Methodology of Scientific Research" the population was grouped, then average and deviation values, median and modus were counted with basic statistic methods. The correlation survey was done with a two-sample t-test to show the difference between the groups or difference between the autumn and spring values.

**Results**

Shooting in transversal straddle position without running up

**Table 3.** The results of shooting in transversal straddle position without running up related to the years spent with training

	0 year training n=65				1-year training n=74				2-year training n=29				3-year training n=15			
	Autumn result		Spring result		Autumn result		Spring result		Autumn result		Spring result		Autumn result		Spring results	
	mean	deviatio n	mean	deviatio n	mean	deviatio n	mean	deviatio n	mean	deviatio n	mean	deviatio n	mean	deviatio n	mean	deviatio n
First trial Scores	1.11**	1.09**	1.68**	1.30**	1.45**	1.31**	2.09**	1.33**	1.41	1.05	2.28	1.19	1.87	1.41	1.80	1.42
Second trial	1.29**	1.13**	1.46**	1.11**	1.49**	1.16**	2.42**	1.35**	1.59	1.35	2.00	1.00	1.47	1.30	1.73	1.16
First trial Lifted elbow	3.03**	2.02**	3.54**	1.72**	3.30**	1.82**	4.01**	1.49**	3.69**	1.91**	4.17**	1.42**	3.60	1.92	3.20	1.74
Second trial Lifted elbow	3.12**	1.81**	3.68**	1.68**	3.38**	1.85**	3.98**	1.46**	3.59*	2.03*	4.31*	1.31*	3.47	1.73	3.33	1.68
First trial Time (sec)	11.69**	2.58**	10.64**	2.21**	11.61**	1.88**	11.23**	1.94**	11.36**	2.32**	10.33**	1.46**	11.19	1.88	9.96	1.61
Second trial Time (sec)	11.25**	2.31**	10.10**	2.15**	11.52**	2.04**	10.67**	2.08**	10.28**	2.12**	9.87**	1.65**	10.34	1.51	10.00	1.36

(\*significant  $p < 0.05$  \*\* very significant  $p < 0.01$ , showing the change in performance in the surveyed group from autumn to spring)

The test checking target accuracy without running up is not exactly sport-specific. Nonetheless, “Handball at School” project unquestionably had positive effects on the performance of all the four groups.

During the first trial, the students performed 5 throws, which were repeated after some rest (2nd trial). As it can be seen in the table, when focusing on the different training periods, that both in the first and second trial in the non-sporting group and in the case of those doing sport for 1 year the programme of the handball lesson improved the target accuracy (the spring results systematically showed better results compared to the autumn ones, since significant differences could be measured). The target accuracy of those having been going to trainings for two-three years is above the first two groups, shown by the higher score results. The target accuracy of those having been going to trainings for two-three years is merely tendentious, as the values of the Paired Samples t-test do not show significant results.

Concerning the accuracy of technical implementation (the elbow is lifted while throwing) it can be stated that the accuracy of implementation has got better from autumn to spring both at students not doing sports and at the group of the ones having been doing sports for one and two years which can be seen by the improving average figures of scoring and lower deviation figures (stability of performance has got better, proven by the smaller range of variations), the two-trial T-test resulted in significant difference between the autumn and spring measures. In the case of the students having been doing trainings for three years no improvement in technical implementation was experienced.

As for the time results of the implementation it can be declared that it, that the speed component has improved both at students not doing sports and at the group of the ones having been doing sports for one and two years from autumn to spring, proven by the significant values. In the case of the students having been doing trainings for three years, improvement in time can only be seen in its tendency.

Shooting in transversal straddle position with running up

**Table 4.** The results of shooting with running up T-test related to years spent on training

	0 year training n=65				1-year training n=74				2-year training n=29				3-year training n=15			
	Autumn result		Spring result		Autumn result		Spring result		Autumn result		Spring result		Autumn result		Spring result	
	mean	deviation	mean	deviation												
First trial Scores	1.11	1.05	1.57	1.08	1.49**	1.10**	2.38**	1.51**	1.21	1.26	1.72	1.44	1.00	0.93	1.67	0.98
Second trial Scores	1.23	1.17	1.57	1.15	1.46**	1.13**	2.22**	1.36**	1.55	1.09	1.90	1.47	1.33	0.90	1.73	1.03
First trial Lifted elbow	2.95**	1.95**	3.95**	1.59**	3.22**	1.91**	3.69**	1.68**	3.62**	2.11**	3.90**	1.66**	2.47**	2.50**	3.00**	2.07**
Second trial Lifted elbow	3.14**	1.86**	3.80**	1.68**	3.41**	1.90**	3.84**	1.41**	3.66**	1.93**	3.79**	1.80**	2.53*	2.00*	3.27*	1.83*
First trial Time (sec)	18.56**	3.21**	17.84**	3.40**	18.88**	2.86**	17.97**	2.81**	16.90**	2.91**	16.19**	1.89**	16.79*	1.60*	16.48*	1.78*
Second trial Time (sec)	18.43**	3.20**	17.64**	3.64**	18.38**	2.54**	18.19**	2.71**	16.92*	2.33*	16.62*	2.18*	16.19	1.40	16.95	1.48

(\*significant  $p < 0.05$  \*\* very significant  $p < 0.01$ , showing the change in performance in the surveyed group from autumn to spring)

This trial needs sports-specific skills and contains elements characteristic of handball more dominantly.

The score results of shooting with running up trial show lower values in all the four groups. Focusing on the target, scoring combined with running up proved to be more complicated, since this sports specific trial needs higher level of coordination skills, like measuring distance, time speed and sense of direction.

Target accuracy of the first and second trial has shown improvement in all the four groups from autumn to spring, however, significant improvement was seen only in the group having 1-year training experience, while in the other groups, only a slight tendency was experienced.

Evaluating the accuracy of technical implementation (elbow is lifted when throwing) it can be stated that it improved in all the four groups from autumn to spring which can be seen by the improving average figures of scoring and lower deviation figures (stability of performance got better, proven by the smaller range of variations), the two-trial T-test resulted in significant difference between the autumn and spring measures.

Time results show improvement tendency in all the examined groups (exception is the second trial of students having 3 years of sports experience).

The favourable effect of the project is proven by sport-specific tests as well in the case of all the four groups, since the changes between the autumn and spring surveys always showed significant improvement (an exception is the change in scoring accuracy of the non-sporting group and the one having been doing sports for three years).

## **Conclusion**

During our pilot research, we have observed that in small school age tests checking fitness and coordination skills, tests sport-specific to handball must be treated in a complex, holistic way when finding talents for choosing a sport.

“Handball at School” project – involving two sport-specific classes a week, improved shooting accuracy and speed coordination abilities of all the children.

“Handball at School” project showed improvement in all the four examined groups after half a year, since the two sample T-test results of the autumn and spring proved significant improvement in the certain fields. It was stated in our previous article that the best results were achieved by those playing handball, then the ones doing another sport, while target scoring accuracy and performance constancy was lower of those not doing any sport apart from PE lessons.

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## **CASE STUDY ON CARDIAC FREQUENCY DURING THE PHYSICAL EDUCATION CLASS OF THE 5TH GRADE. ASPECTS RELATING TO THE PREPARATION OF THE BODY FOR EFFORT AND SELECTIVE INFLUENCING OF THE LOCOMOTOR APPARATUS**

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**ABSTRACT.** The paper underlines the results of cardiac frequency recordings taken during a physical education class at 5th grade level, aspects relating to the preparation of the body for effort (stage 2) and the selective influencing of the locomotor apparatus (stage 3) throughout the course of ten lessons with various themes and goals, on a number of four 11 years old, male gender subjects. After recording and processing the data with the aid of materials indispensable for such a study, namely Polar M400 watches and H7 belts, we have performed their interpretation on the average cardiac frequency both at the beginning as well as in the end of stages 2 and 3 in order to observe the dynamics of the effort recorded during this part of the lesson and to see whether it is an ascending one towards the fundamental part of the physical and sports education class.

**Keywords:** dynamic of effort, cardiac frequency, physical education class, Polar M400 watch, H7 belt.

**REZUMAT.** *Studiu de caz privind frecvența cardiacă în cadrul lecției de educație fizică și sportivă la clasa a V-a: aspecte cu privire la pregătirea organismului pentru efort și influențarea selectivă a aparatului locomotor.* Lucrarea subliniază rezultatele înregistrării frecvenței cardiace în cadrul lecției de educație fizică și sportivă la nivel de clasa a V-a, aspecte cu privire la pregătirea organismului pentru efort (veriga 2) și influențarea selectivă a aparatului locomotor (veriga 3) pe decursul a zece lecții cu teme și obiective diferite, având un număr de patru subiecți de sex masculin și vârsta de 11 ani. După înregistrarea și prelucrarea datelor cu ajutorul materialelor indispensabile unui astfel de studiu precum ceasuri Polar M400 și centuri H7, am făcut interpretarea acestora pe media frecvenței cardiace atât la începutul cât și la finalul verigilor 2 și 3 pentru a observa dinamica efortului care se înregistrează pe această parte a lecției și dacă este una ascendentă spre partea fundamentală a lecției de educație fizică și sportivă.

**Cuvinte-cheie:** dinamica efortului, frecvența cardiacă, lecția de educație fizică și sportivă, ceas Polar M400, centură H7

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## Introduction

The authors of this paper believe that an interpretation of the values for cardiac frequency for stages 2 (preparation of the body for effort) and 3 (selective influencing of the locomotor apparatus) is very useful for all those involved in the education system in order to verify the hypothesis stating that “the dynamics of effort in the physical education class records an ascending curve throughout the first three stages” (Rață & Rață, 2008, p. 51). Participation at 10 lessons with various themes and goals for the physical education class of the 5th grade at the “Ion Creangă” Middle School from Cluj-Napoca, has allowed for the gathering of a series of data regarding cardiac frequency throughout the entire duration of a lesson for the four male gender subjects, with the aid of four Polar M400 watches and four H7 belts. After data processing, we were interested in cardiac frequency at the beginning and conclusion of stages 2 and 3, and had the possibility to analyse the evolution of such cardiac frequency on these stages.

## Objectives

The objective of the study was the monitoring of the average cardiac frequency in 5th graders during the physical and sports education class for stage 2: preparation of the body for effort, and stage 3: selective influencing of the locomotor apparatus, with an aim at analysing the effort's diagrams on these two stages.

## Materials and Methods

The place of development of this study was the „Ion Creangă” Middle School from Cluj-Napoca, 5th grade, and the duration of the study was ten classes starting with the first recording on November 5 2015 and ending on April 12 2016. Throughout the study, the subjects were 4 males with the following particularities (table 1):

**Table 1.** Particular characteristics of the subjects

Subject	Name	Age	Gender	Height/weight	Level of preparation
S1	P.A.	11 years	M	165cm/65kg	Good
S2	S.G.	11 years	M	160cm/53kg	Good
S3	G.D.	11 years	M	160cm/50kg	Average
S4	F.I.	11 years	M	158cm/51kg	Average

The indispensable materials used for the development of such a study are: Polar M400 watches (Figure 1) and H7 belts (Figure 2) for recording of the cardiac beat:



**Figure 1.** Polar M400 watch (Time 2 Sport, n.d.)



**Figure 2.** H7 Belt (Polar, n.d.)

With the aid of such materials we have recorded cardiac frequency during each second of the physical and sports education class and, at the end of the lesson, the watch offers us the recording about the average cardiac frequency throughout the class as well as the diagram for effort during the activity, by means of the Polar Flow web service (Figure 3).



**Figure 3.** Cardiac frequency recording model for Polar watch and H7 belt

The interpretation of results was achieved based on the recordings of each subject in part throughout the ten lessons with different themes, the emphasis being placed on the average cardiac frequency at the onset and conclusion of stages 2 and 3.

Lesson 1 - Date: 05.11.2015, Theme: Strength: development of strength in the muscles of the abdomen and back;

Lesson 2 - Date: 12.11.2015, Theme: Basketball: consolidation of dribbling and shooting hoops;

Lesson 3 - Date: 19.11.2015, Theme: Football: consolidation, in match conditions, of ball hitting with the inner side of the foot.

Lesson 4 - Date: 28.01.2016, Theme: Speed: development of speed in the form of relay race; Basketball: Consolidation of dribbling in the basketball game; Endurance: development of endurance in an aerobic regime;

Lesson 5 - Date: 08.03.2016, Theme: Basketball: Consolidation of hoops' shooting; Strength: development of general strength;

Lesson 6 - Date: 15.03.2016, Theme: Gymnastics: evaluation of buck jumps when the buck is placed transversally;

Lesson 7 - Date: 22.03.2016, Theme: Gymnastics: evaluation of buck leaps; Endurance: development of endurance in an aerobic regime;

Lesson 8 - Date: 05.04.2016, Theme: Basketball: consolidation of dribbling and hoop shooting; Endurance: development of endurance in an aerobic regime;

Lesson 9 - Date: 08.04.2016, Theme: Evaluation: standing jump; Endurance: development of endurance in an aerobic regime;

Lesson 10 - Date: 12.04.2016, Theme: Speed: development of reaction speed with take-off from different positions; Basketball: consolidation of dribbling and basketball passes using two hands and starting from the chest area;

Actuating systems during the ten physical education classes recorded for stage 2 - preparation of the body for effort, with duration of approximately 8 minutes, have had the same succession of exercise, namely:

- walking and variants of walking (toe walking with arms raised, heel waling with hand behind the head, walking while raising one knee up-forward, thrust walking).
- running and variants of running (light running, running with ankle play, running while raising the knees up-forward, running while swinging the calves forward, springing while raising arms alternatively, jumping while raising arms alternatively, running with added pace, running with stepped pace, backward running, accelerated running).

With regard to stage 3 - selective influencing of the locomotor apparatus, the actuation systems are based, in all lessons, on the same analytical exercises for segments and parts of the body, with an average duration of 7 minutes.

## Results

**Subject 1** in addition to the physical education class, also practices sporting activities within an organized frame, respectively rugby and basketball. The analysis of the cardiac frequency will be performed based on the initial cardiac frequency ( $FC\hat{I}$ ) and final cardiac frequency (FCF) for all ten lessons, for stages 2 and 3 (Figure 4).

Lesson	V1		V2		V3	
	$FC\hat{I}$	FCF	$FC\hat{I}$	FCF	$FC\hat{I}$	FCF
1	92	116	117	135	120	122
2	111	127	126	147	132	110
3	83	113	137	141	116	141
4	107	121	122	168	141	140
5	89	108	110	120	111	127
6	101	103	107	127	120	130
7	108	125	124	139	129	126
8	109	110	112	168	130	152
9	113	110	120	175	160	153
10	100	105	112	149	134	164
Average	101	114	119	147	129	137

**Figure 4.** Recordings of cardiac frequency for subject 1

For stage 2, subject 1 has an average of the initial cardiac frequency (FCÎ) for all ten classes, of 119 beats/minute while at the end of the body's preparation for effort; the average is above 147 beats/minute, the highest among all subjects. Up until starting stage 3, C.F (Cardiac frequency) has gone down by a few beats reaching an average of 129 beats/minute, while at the conclusion of this stage recordings indicate, an average of just 8 additional beats, namely 137 beats/minute, the highest values recorded for the average of all ten classes for all 4 subjects.

**Subject 2** is a member of the school basketball team, with a good physical training, with the following readings (Figure 5):

Lesson	V1		V2		V3	
	FCÎ	FCF	FCÎ	FCF	FCÎ	FCF
1	92	135	121	156	117	121
2	95	107	106	126	115	105
3	105	135	135	154	108	146
4	96	105	107	132	120	143
5	95	109	113	130	115	150
6	98	101	106	126	123	131
7	100	117	120	138	128	123
8	99	104	110	157	120	148
9	112	117	133	162	150	136
10	95	100	105	149	130	150
Average	99	113	116	143	123	135

**Figure 5.** Recordings of cardiac frequency for subject 2

For stage 2, subject 2 has an average of the initial cardiac frequency (FCÎ) for all ten classes, of 116 beats/minute while at the end of the body's preparation for effort the average 143 beats/minute.

For the start of stage 3, C.F (cardiac frequency) has gone down to an average 123 beats/minute, measuring the lowest value among all subjects, while at the end of the stage, an average of 12 additional beats, namely 135 beats/minute was recorded, lower than that of subject 1 by two steps.

**Subject 3** does not practice any other physical activities and, throughout the ten classes had the following readings (Figure 6):

Lesson	V1		V2		V3	
	FCÎ	FCF	FCÎ	FCF	FCÎ	FCF
1	88	120	112	140	121	126
2	97	125	124	148	130	111
3	90	110	135	140	109	140
4	100	109	120	163	140	145
5	93	107	112	129	115	129
6	100	102	103	119	122	129
7	93	111	119	136	127	123
8	101	103	108	155	125	145
9	113	115	127	160	146	132
10	99	101	103	147	129	149
<b>Average</b>	<b>97</b>	<b>110</b>	<b>116</b>	<b>144</b>	<b>126</b>	<b>133</b>

**Figure 6.** Recordings of cardiac frequency for subject 3

For stage 2, subject 3 has an average of the initial cardiac frequency (FCÎ) of 116 beats/minute, just like subjects 1 and 2 while, at the end of the body's preparation for effort, the average is 144 beats/minute, measuring the second value after subject 1, with the remark that, during such phase, the subjects were the first to perform their exercise and were the models for the others. For the beginning of stage 3, the average C.F (cardiac frequency) is of 126 beats /minute, while at the end of the stage, the average recorded was 133 beats/minute.

**Subject 4** does not practice any other physical activities and had the following readings throughout the ten classes (Figure 7):

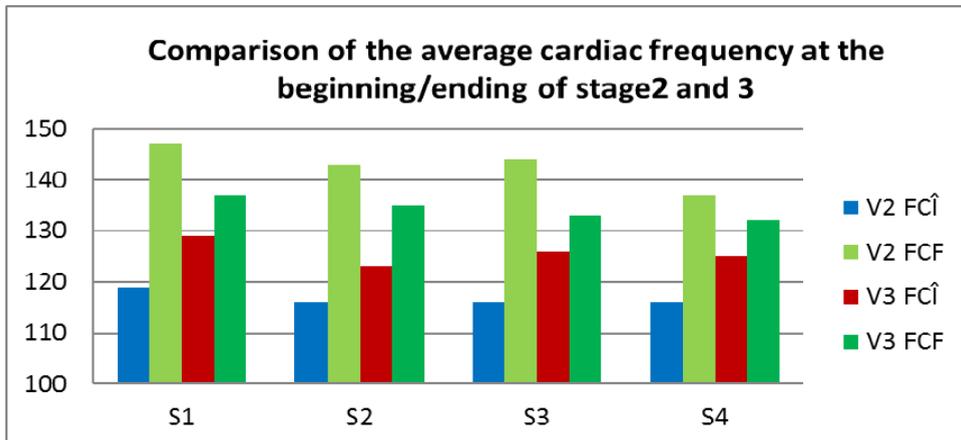
Lesson	V1		V2		V3	
	FCÎ	FCF	FCÎ	FCF	FCÎ	FCF
1	90	117	120	136	120	123
2	93	109	108	128	118	108
3	90	110	135	140	109	140
4	108	110	122	132	140	144
5	100	108	111	121	117	131
6	103	105	106	121	123	130
7	95	113	121	137	125	122
8	100	102	109	154	124	144
9	112	113	126	159	144	132
10	96	100	101	146	129	150
<b>Average</b>	<b>99</b>	<b>109</b>	<b>116</b>	<b>137</b>	<b>125</b>	<b>132</b>

**Figure 7.** Recordings of cardiac frequency for subject 4

For stage 2, subject 4 has an average of the initial cardiac frequency (FCÎ) for all ten classes of 116 beats/minute while at the end of the body's preparation for effort, the average is 137 beats/minute, the lowest reading of the four subjects. For the beginning of stage 3, the average C.F (cardiac frequency) is 125 beats/minute, while at the end of stages, an average of 132 beats/minute was measured, the best average among the subjects.

At the end of stage 1 (set-up of the pupil group), during lessons 3 and 9, all four subjects were punished for indiscipline being assigned to perform 15 squats thus the values taken of the high cardiac frequency of such subjects upon the initiation of the subsequent stage.

From the comparison made among the four subjects, we ensued the conclusion of the study with the aid of the value for average cardiac frequency for stages 2 and 3 for initial cardiac frequency (FCÎ) and for final cardiac frequency (FCF) analysed here in diagram 2 (Figure 8).



**Figure 8.** Comparison of the average cardiac frequency at the beginning/ending of stages 2 and 3

The overall comparison of these two stages indispensable for a class of physical education, indicates that cardiac frequency at the beginning of stage 2 is situated around the values of 110-155 beats/minute because the pupils came to class already having high values of cardiac frequency due to the fact that, during the break they performed various activities (running, jumping). The value recorded for stage 3 decreases after the conclusion of stage 2 down to values situated between 123-129 beats/minute due to the time span between the ending of stage 2 and the beginning of stage 3 which was approximately 40-50 seconds during all

ten lessons on record. At the conclusion of stage 2, the average cardiac frequency is higher than the average cardiac frequency at the conclusion of stage 3 which shows that, throughout the lesson, the dynamics of effort does not indicate an ascending curve towards the initiation of the lesson's fundamental phase.

### **Conclusion**

After having analysed the results pertaining to cardiac frequency during the physical education class of the 5th grade, we ascertained that the average cardiac frequency for all 4 subjects during stage 2 (preparation of the body for effort), at its ending, was 143 beats/minute while the average cardiac frequency at the conclusion of stage 3 (selective influencing of the locomotor apparatus) was 135 beats/minute which means that an ascending curve was not recorded throughout these stages. To conclude, a reversal of these stages during the physical education class would offer pupils a better preparation for the initiation of the lesson's fundamental part.

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## HOW MUCH DOES A WATER POLO PLAYER SWIM DURING A GAME?

ISTVÁN BALOGA<sup>1</sup>

**ABSTRACT.** It has always been a curiosity about how much athletes run, skate or swim in various team sports. Beside many variables, the different environment of the field of play will determine the speed and distance on how fast and how far an athlete moves during a game. The purpose of this study is to ascertain the distance a water polo player swims during one game. We have used two distinctive methods in our research according to whether the game was played in an indoor or an outdoor pool. Recognizing more accurately the distances swum by players during a water polo game it could be useful to improve planning of training and to evaluate the players' performances in different competitions.

**Keywords:** *swimming, water polo, tracking distance, team sport, performance.*

**REZUMAT.** *Cât de mult înoată un jucător de polo în timpul unui meci?* Întotdeauna a existat o curiozitate cu privire la ce distanță aleargă, patinează sau înoată sportivii în diferite sporturi de echipă. Pe lângă multe variabile, mediul diferit al terenurilor de joc va determina viteza și distanța la cât de repede și cât de departe se deplasează un jucător în timpul unui meci. Scopul acestui studiu este de a constata distanța care un jucător de polo pe apă înoată în timpul unui meci. În cercetarea noastră am folosit două metode distincte în funcție de locul în care s-a desfășurat jocul, bazin de înot acoperit sau în aer liber. Cunoașterea mai precisă a distanțelor înotate de jucători în timpul unui meci de polo pe apă ar putea fi utilă pentru îmbunătățirea planificării proceselor de antrenament și de a evalua performanțele jucătorilor în diferite competiții.

**Cuvinte-cheie:** *înot, polo pe apă, trasare distanță, sport de echipă, performanță.*

### Introduction

It has been always a curiosity about how much athletes run, skate or swim in different team sports. Beside many variables, the different environment of the field of play will determine the speed and distance on how fast and how far an athlete moves during a game. On how far on the field, it is limited by the rules of the game, but what we are interested here is the total distance athletes cover

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during one game. According to Fox (2016), in NBA basketball a player runs 2.0 to 4.3 km per game, a football (soccer) player runs 11km per game in average while rugby players run about 7 km in a game. In the study “Covered distances of handball players obtained by an automatic tracking method” by Russomanno et al. (2007), concluded that a team handball player runs 4.4 to 5 km per game.

An ice hockey player over the course of a game skates approximately 8 km, according to Fit for Hockey (2016) retrieved from ([http://www.cybexintl.com/solutions/sports/nhl\\_fit.aspx](http://www.cybexintl.com/solutions/sports/nhl_fit.aspx)).

In a different environment, in water polo “film analyses of a complete game show that the total linear distance traveled by an active player who plays most of the game, in a 30-meter course and 8-minute quarters, ranges from a distance of 1500 meters and up to a maximum of 1800 meters (Dettamanti, 2010)”. Right now, players have only 30 seconds to swim down the pool, set up the offense and score. They will spend approximately 15-20 seconds getting down to the other end of the pool depending on the age and level of play and then they are left with 10-15 seconds to organize the offense. In basketball, players run the similar distance (compared to the water polo court) which leaves them with 25 seconds to set up the offense (Ivovic, 2012).

## **Objective**

The purpose of this study is to ascertain the distance a water polo player swims during a game. In our research we are monitoring players’ horizontal movements in the water that are identic to the four known swimming strokes and derivatives of these, the specific horizontal movements used in the game of water polo. Consequently, by realizing more accurately the distances swum during a water polo game it is beneficial for the players training process and game evaluation.

## **Materials and Methods**

We have used two different methods in our research according to whether the game was played in an indoor or outdoor pool. Furthermore, positions of players were taking in consideration according to Water Polo Positions (2016), retrieved from (<http://waterpolo.isport.com/water-polo-guides/water-polo-positions>). Detecting player’s movement in games that were played in an indoor pool we have used a video observation tracking system, while tracking on games in an outdoor pool we have utilized a Garmin 920 XT GPS system. During our research we tried to cover the distances swum by players on each position, including all substitutions occurred. Also, we registered games played only on 30 meter fields and concluded with no overtime. Warm up swimming and movements between quarters weren’t logged.

HOW MUCH DOES A WATER POLO PLAYER SWIM DURING A GAME?

Preceding our measurements we estimated a hypothetical distance covered only by swimming by field players during a game on each position as following:

- Left Wing: from 2 m defense to 3 m offense or from 2 m defense to 6m offense;
- Left Flat: from 5 m defense to 6m offense or from 5 m defense to 3 m offense;
- Hole Set: from 7 m defense to 3 m offense;
- Point: from 2 m defense to 8 m offense;
- Right Wing: from 2m defense to 3 m offense or from 2m defense to 6m offense;
- Right Flat: from 5 m defense to 6 m offense or from 5m defense to 3m offense.

On both wing players and flat (driver) players we considered movements effectuated not only from wing to wing or flat to flat position on same side of the field but also swimming from wing to flat or flat to wing position on defense and offense. Except occasional drives from wing to hole set position or point to wing positions in general points and hole sets movements were estimated between 2m defense to 8m offense and 7m defense to 3m offense. Therefore, during a one transition period offense to defense or defense to offense we estimated an average distance of swimming of 23.5 meters for the left/right wing, 20.5 meters for the left/right flat, 20 meters for the point, 20 meters for the hole set. In a 4 period 8 minutes game on 30 seconds offensive actual play time we computed a total of swimming of 1504 meters for left/right wings, 1312 meters for flats, 1280 meters for hole sets and points (Table 1). Referring in general we can estimate a total of 1344 meters swimming by a player during a water polo game.

**Table 1.** Hypothetical measurements of distance swum during one game by water polo players on different positions

<b>Position of Player</b>	<b>Distance swum during one transition (meters)</b>	<b>Distance swum during one quarter (meters)</b>	<b>Distance swum during one game (meters)</b>
Left/Right Wing	23.5	376	1504
Left/Right Flat	20.5	328	1312
Hole Set	20	320	1280
Point	20	320	1280

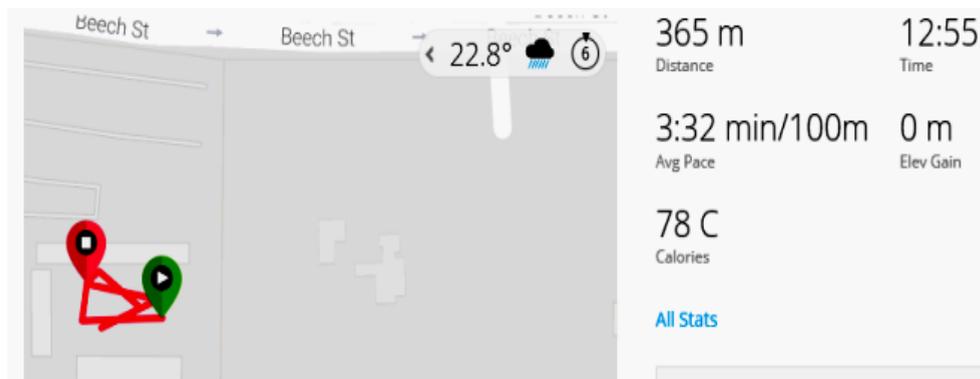
However, work-rest ratios in a vertical position are higher for points and hole sets and swimming distances are shorter in these positions compared to wings and flats, it is important to mention how much a player stays in a vertical

or horizontal position during a water polo game. “Calculations from time and motion analyses indicate that field players spend only 45% to 55% of actual game time in a horizontal body position. The remainder of the time is spent performing activities in predominantly vertical body positions, with and without contact with an opponent, and at low to moderate intensity” (Dettamanti, 2010). The International Swimming Federation (FINA) already started testing new rules by reducing the field of play from 30 meters to 25 meters in order to make the game more dynamic, less physical and with less swimming in transition.

In our research we have covered swimming distances in 18 indoor and 12 outdoor water polo games played on 30 meter fields with the duration of four times eight minute quarters.

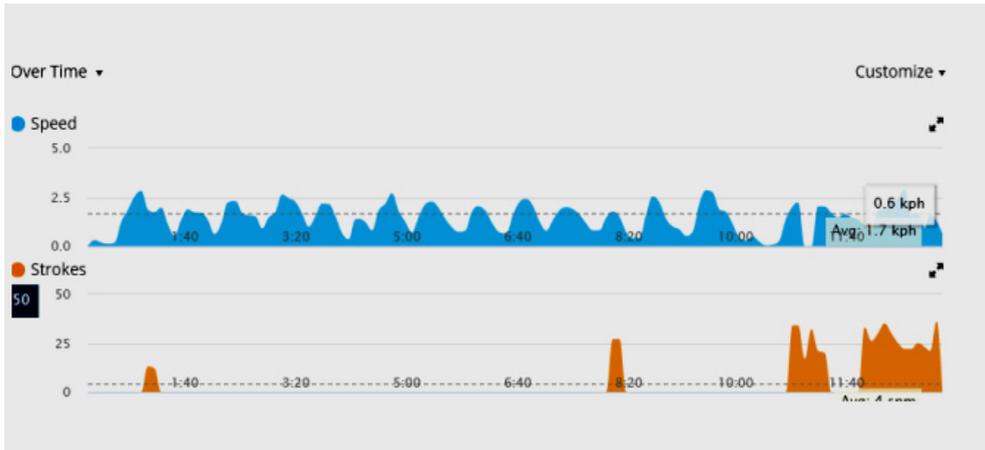
## Results

Tracking on games in an outdoor pool we have utilized a Garmin 920 XT GPS system. During game, each time the tracking device goes under the water it loses GPS signal. For a better accuracy we asked players to place the device under a swim cap then cover with the water polo cap to measure distance, stroke and speed during a game. Therefore, in average a left/right wing swum 1472 meters (Figures 1 and 2), a left/right flat swum 1287 meters, a point covered 988 meters, a hole set accumulated 933 meters of swimming.



**Figure 1.** Distance covered in swimming by Left Wing during one quarter of an outdoor water polo game

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**Figure 2.** Speed and strokes covered by Left Wing during one quarter of an outdoor water polo game

Detecting distances swum in games that were played in an indoor pool we have used a video observation tracking system. The coding and video editing enabled us to deliver customized analysis and streamlined performance feedback. As a result, during one game the average swimming part on different positions were, 1491 meters on left/right wing, 1315 meters on left/right flat, 1011 meters on point and 949 meters on hole set position. The total average horizontal movements during one indoor water polo game resulted in 1191 meters of swimming (Table 2).

**Table 2.** Distances a water polo player swims during a game according to different tracking systems

	Left/Right Wing distance swum (meters)	Left/Right Flat distance swum (meters)	Point distance swum (meters)	Hole Set distance swum (meters)	Average a player swum (meters)
GPS tracking outdoor games	1472	1287	988	933	1170
Video tracking indoor games	1491	1315	1011	949	1191
Average	1481	1301	999	941	1180
Estimated distances	1504	1312	1280	1280	1344

## Conclusions

Observing more accurately the distance covered by water polo players during a game can be used to improve planning in athletes training process. Our research concluded that the distance swum during a water polo game is shorter than swimming distance coaches consider players are covering during a game (Table 2.). Therefore, instead of large volume swimming practices based mostly on freestyle, it is indicated to focus more on water polo specific horizontal body position swimming as well as vertical body position drills during training processes.

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## POWER OUTPUT OF JUDO ATHLETES AND HIGH-SPEED NEUROMUSCULAR CONTROL

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ALMOS ANDRAS<sup>1</sup>, DAN MONEA<sup>1</sup>, GHEORGHE MONEA<sup>1</sup>

**ABSTRACT. Introduction:** Muscles are the main driving force in the locomotive system. Moreover, their activity is crucial for athletic performance. The power they generate allows for higher performance. Increasing the power output is essential for constant performance. Energetic consistency is vital for a consistent neuromuscular control of technique. **Hypothesis:** A specific physical training period influences the evolution of power output and high-speed technique control. **Methods and Materials:** Seventeen female subjects from Romania's Junior Olympic Judo Team took part in our study with the age between 14 and 20 years old. The MGM-15 Jump Carpet was used for the power output and energetic consistency tests. **Results:** There was no significant statistical difference between the initial and final power output measurement but there was a strong correlation between them. **Conclusions:** The physical training period the subjects undergone may have had an impact over the way the power output increases or decreases regarding to the initial value due to their correlation. The high-speed technique control does not seem to be affected by a high-intensity workout period, though we have listed a series of possible causes for this result.

**Keywords:** judo, power, speed, neuromuscular control, technique

**REZUMAT. Puterea dezvoltată de sportivii de judo și controlul neuromuscular la viteze mari de execuție. Introducere:** Mușchii sunt principalul motor în cadrul sistemului locomotor. Activitatea lor este crucială pentru performanța sportivă. Puterea generată de aceștia permite atingerea unei performanțe ridicate. Creșterea puterii generată este esențială pentru performanță constantă în timp. Consistența energetică este vitală pentru un control neuromuscular consistent al tehnicii. **Ipoteză:** O perioadă de antrenament fizic specific influențează puterea generată și controlul tehnicii la viteze mari de execuție. **Metode și Materiale:** 17 subiecți de gen feminin din cadrul Lotului Olimpic al României de Judo categoria Juniori cu vârsta cuprinsă între 14 și 20 de ani au participat la studiul nostru. Covorul de sărituri MGM-15 a fost folosit pentru testele de putere generată și pentru măsurarea variabilității energetice. **Rezultate:** Nu a fost identificată o diferență semnificativ statistică între valoarea inițială și finală a puterii dezvoltate.

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S-a identificat o corelație semnificativ statistică între valorile puterii dezvoltate înainte și după perioada de antrenament. **Concluzii:** Perioada de antrenament fizic în care au fost integrați subiecții a avut un impact asupra modului în care puterea dezvoltată crește sau scade comparativ cu valoarea inițială datorită corelației dintre aceste momente. Controlul tehnicii la viteze mari de execuție pare să nu fi fost influențată de perioada de pregătire fizică, cu toate acestea am identificat câteva posibile cauze pentru acest rezultat.

**Cuvinte cheie:** judo, putere, viteză, control neurmuscular, tehnică

## Introduction

The power developed by the muscles is different from the traction force of the muscle contraction. Power measures the muscle labor in a given period of time. The power is dependent not only to the force of contraction of the muscle, but also to the length and the number of contractions in a minute. In general, muscle power is measured in kg-m/min (kilogram-force meter/minute). Thus, a muscle that can lift a weight of 1 kg at a height of 1 m in one minute or can move sideways against a resistant object of 1 kg in a minute has a power of 1 kg-m/min. The maximum power that can be produced by all muscles of a trained athlete, with all the muscles working together, has the following values:

For the first 8-10 sec., Maximum power is 7000 kg-m/min;

For the first minute, maximum power is 4000 kg-m/min;

For the first 30 minutes, maximum power is kg-m/min 1700;

Johnson and Bahamonde (1996) tested the power output of students while trying to find a reliable power measurement.

"Cognitive control" is a construct from contemporary cognitive neuroscience that refers to processes that allow information processing and behavior to vary adaptively from moment to moment depending on current goals, rather than remaining rigid and inflexible. Cognitive control processes include a broad class of mental operations including goal or context representation and maintenance, and strategic processes such as attention allocation and stimulus-response mapping. Cognitive control is associated with a wide range of processes and is not restricted to a particular cognitive domain. For example, the presence of impairments in cognitive control functions may be associated with specific deficits in attention, memory, language comprehension and emotional processing. Given its pervasive influence, impaired cognitive control could account for many of the widespread impairments exhibited by people with schizophrenia and other neurodevelopmental disorders (Carter & Cho 2004).

## **Objective**

A period of intense physical training affects the power output and high speed neuromuscular control of judo practising athletes.

## **Materials and Methods**

Seventeen female subjects took part in our study with the age between 14 and 20 years old. All the subjects were athletes that compete in national and international judo competitions and are part of the Romania's Junior Olympic Judo Team. During the specific physical training period, all subjects underwent the same routine at the same location. The test's protocol was explained to the participants and written informed consent was obtained from them.

All the subjects were briefed beforehand regarding what the experiment consisted of and what they were required to do. The subjects were assured that any personal information would not be made public and their personal data recorded will be analysed under the cover of anonymity. Moreover the subjects were instructed how to control social and routine aspects of their lives so that those variables would not interfere with the experiment's results. Also, after the briefing, the subjects were asked to confirm their understanding of what was required on a premade consent form.

For the measurements we've used the MGM-15 jumping carpet that offers data regarding the force-speed asymmetry and also the structural consistency of a subject's movement control. The carpet is used in the Miron Georgescu Modified Test that requires the subject to perform 1 set of 15 consecutive jumps on both legs, on left and on the right leg each. The data recorded is then analysed by the instrument's software and final coefficients are offered.

We've conducted 2 measurements for the whole research. One was done before and one was after the physical training period. This schedule allowed us to identify as accurately as possible the effects of the training over the force-speed asymmetry.

The protocol for each measurement was as follows:

- The subjects were accommodated with the instrument;
- The subjects were informed with regards to the test's requirements;
- The subjects had 10-15 minutes for warm-up;
- The subjects could dry-test a few jumps;
- The subject started the test with 3 sets of 15 jumps (both legs, right leg, left leg) with 15 seconds pause between the sets.

The analysis of the data was done using the SPSS v.17 software. For the statistical analysis we've used the paired sample t-test to determine the influence of the training period over the chosen coefficients.

We've focused our attention on 2 coefficients offered by the software: general power output and EVC (energetic variability coefficient). The general power output refers to the energy measured in Watts that the subject uses to complete a task and is measured globally. This coefficient only reflects the intrinsic power output of a person that doesn't take into account special angles or techniques for isolated movements. The EVC (Energetic variability coefficient) refers to the ability to control the technique at high execution speeds. The average value for the test on both legs is between 3 and 3.5. High values mean that the subject can't control the execution of a technique at high repetition or execution speeds. Besides these, high-end values for a subject mean that the movement necessary for that technique isn't automated or that the technique has been learned in a deficient way that requires more active cognitive control.

## Results

A paired-samples t-test was conducted to compare the value of the initial power output (Power\_Ini) and the value of the final power output (Power\_End) for the judo athletes. There was no significant difference in the scores of the initial test (M= 3.5465, SD= 0.45673) and of the final test (M= 3.5535, SD= 0.53040) conditions;  $t(16) = -.076$ ,  $p = 0.940$ . These results suggest that the training programme the subjects undergone did not affect either positive or negative the power output (Table 3). There was a very strong positive correlation between initial power output and final power output (Table 2).

A paired-samples t-test was conducted to compare the value of the initial EVC (EVC\_Ini) and the value of the final EVC (EVC\_End) for the judo athletes. There was no significant difference in the scores of the initial test (M= 6.2500, SD= 2.05307) and of the final test (M= 6.9241, SD= 2.42039) conditions;  $t(16) = -.771$ ,  $p = 0.452$ . These results suggest that the training programme the subjects undergone had no influence on the control of the technique at high speeds. (Table 3)

**Table 1.** Main statistics of the paired sample t-test

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Power_Ini	3.5465	17	.45673	.11077
	Power_End	3.5535	17	.53040	.12864
Pair 2	EVC_Ini	6.2500	17	2.05307	.49794
	EVC_End	6.9241	17	2.42039	.58703

**Table 2.** The correlation values for the two coefficients

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	Power_Ini & Power_End	17	.712	.001
Pair 2	EVC_Ini & EVC_End	17	-.294	.251

**Table 3.** Paired sample t-test results

Paired Samples Test				
		t	df	Sig. (2-tailed)
Pair 1	Power_Ini - Power_End	-.076	16	.940
Pair 2	EVC_Ini - EVC_End	-.771	16	.452

## Discussion

The results of this study have not confirmed an existing relation between the EVC's values before and after a period of intense physical training. All things considered this was expected to happen but the high value of uncorrelated data suggested there might be an underlining set of causes that maybe have influenced the results. One cause for the lack of correlation of the data might be due to high intensity of the workout. This is to be expected after a period of intensive physical training due to the fact that the overall performance of the motor system decreases shortly after such a stress.

A second possibility for the results regarding the EVC might be due to the fact that muscle tiredness may affect the neuromuscular control of the movements. Besides this aspect overall fatigue also decreases the cognitive awareness that may be the reason for slower and weaker muscular control of technique at high speeds. One more cause that might have influenced the EVC, during our study, might be the quantity of pure neuromuscular control exercises that might have improved the movement control. Even though some exercises were included in the training program their role was not the center or focus of the workout.

There was a strong correlation between the before and after data regarding the power output. This may suggest, considering that the correlation is strongly positive, there is a directly proportionate relation between the data. In other words when one increase the other will increase also and vice-versa. This is an interesting result due to the fact that it implies that if a group of athletes have a high power output before a training period the output at the end of it will be high also. Considering this aspect we can concur that, for our subjects, a series of these types of training periods one after another may have a positive influence

over the power output from one period to another. Our subjects were athletes that were involved in judo competitions that are not as regular as a football championship for example. In general their completion season is a series of week-long competitions that are spread throughout the year. Between these the athletes have intense training periods. This may be the reason why our group reacted so well to the training workout regarding power output. This is not a generalization of the results, but an observation that there is a strong correlation for our group regarding the power output before and after a training period.

## Conclusions

After the analysis of the data we were able to conclude the followings:

- There was no statistical difference between the data of EVC and power output before and after the training period, meaning that we can't be sure that the workout had an effect over the variables recorded;
- There was a strong and positive correlation between the before and after data of power output;
- We've offered some possible causes for the statistical results;
- The correlation of the power output data before and after may be due to the specific way of training used by our group.

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## **A STUDY ON THE REAL MADRID FOOTBALL TEAM'S FULL-BACKS' INVOLVEMENT IN THE ATTACK**

**PÉTER GUCSI VÉGH<sup>1</sup>, JÁNOS TÓTH JR.<sup>1\*</sup>, JÁNOS TÓTH<sup>1</sup>**

**ABSTRACT.** Real Madrid is one of the best teams in the world. This study examines the team's game system and the full-backs' involvement in the attack based on a video analysis. How effectively they enter the attack, what passes they complete in the different parts of the pitch (attacking, middle, defensive third) and how they help the team's attacks. I analyzed in the flat back four game scheme the importance of the full-backs and their participation in the attack. I examined the matches of the first ten round in the 2015/2016 season, with special emphasis on the efficiency of the full-backs' entry into the attack. In each match the team's line-up was characterized by the flat back four game scheme. I prepared a graph for each match which shows what passes were completed by the full-backs and how successful they were. The results of the analyzed matches (n = 10) reveal that out of the total number of passes (1239) 597, that is 48%, were forward passes which aimed at helping the attack. 587 times the passes were completed by the full-backs and 461 times they were successful which equals to a pass accuracy of 77%. 32% of the passes took place in the attacking third, whereas in the middle third 52% and in the defensive third only 16% of the passes occurred. This study also addresses in details the passing efficiency. Another method that I used in the study is the heatmap. It is a special chart pointing out that throughout the whole match up to what degree took the full-back part in the game in the different parts of the pitch and where he was the most active. The graph shows only the two full-backs' play which makes it very easy to analyze which parts of the football pitch were they the most active. The figures reveal the number of the ball contacts in the examined matches and based on this it is obvious that the left full-back was much more active during the matches. Without doubt it can be said that in Real Madrid team the left full-back helps the attacks in an almost midfielder manner. The arrows located on the heatmap indicate the direction of the team's attack, helping the analysis of the graph.

**Keywords:** *game scheme, full-back, pass, top team*

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## **Introduction**

I chose this football team on the basis of personal sympathy and my own affection to football. Real Madrid playing in La Liga was in 2015 the organization with the biggest income in the world (nemzetisport.hu, 2016). My study is based on the first ten matches of the 2015/2016 autumn season. The team was supervised by a Spanish professional, Rafael Benítez. The game scheme changed twice during the matches. First, the team had a 4-2-3-1 line-up, then they switched to the flat back four game scheme, so the 4-3-3 option, which is very popular among other teams as well (Bangsbo J. & Peitersen B., 2003). The game scheme is placing the players, the forces on the pitch in harmony with the defensive and attacking tasks that characterize the team (Toth J. & Jr. Tóth J., 2011). This had no effect on the result of the study, because the full-backs had a significant role in the attack in both systems.

Football today is very fast and is characterized by a lot of passes and attacks and for this reason the role of the full-backs in the attack is of great importance. While analyzing the matches I was focusing on how they help the attack. The attack involves all the eleven players but not in an equal measure and same way. I was focusing on the efficiency of passing during the match. A good attack requires an accurate, fast, forward pass. Without this, it is almost impossible to get over to the opponent's half. In my analysis I prepared a chart which shows the passes that the full-backs completed in the attacking third, in the middle third and in the defensive third. The conscious control of the ball, its transfer to a teammate is called a pass. Based on this it is obvious how important it is that the full-backs enter the attack. In a modern attack not only the strikers and the midfielders but also the full-backs have a very important role (Csanádi, 1978).

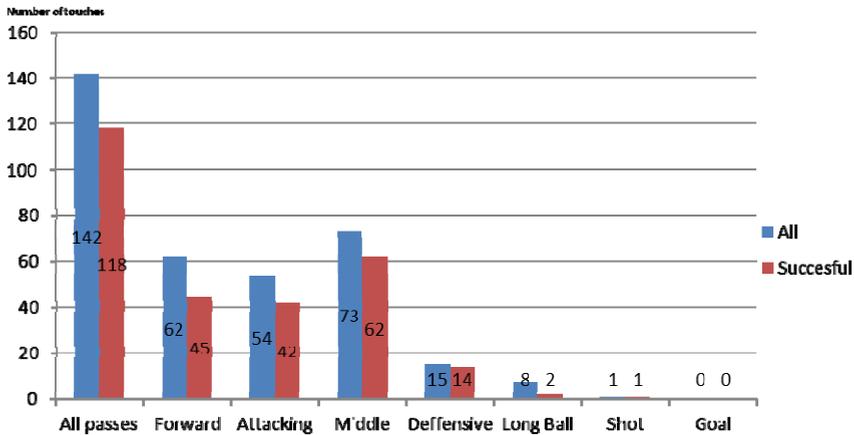
## **Objective**

The scope of the full-backs' roles has changed since he is more actively involved in the attack (Jones, 2012). This is exactly what motivated me when choosing the aim of this study which is to demonstrate the effectiveness of the full-backs of the Real Madrid team. During my research I introduce a new technical tool, the heatmap which is used in stadiums equipped with the latest technology. It monitors each player's moves separately. However, it can only be seen in the most advanced stadiums. The heatmap shows the moves of each player in the different parts of the pitch. (Bíró, 2011).

## Results

### 1. match

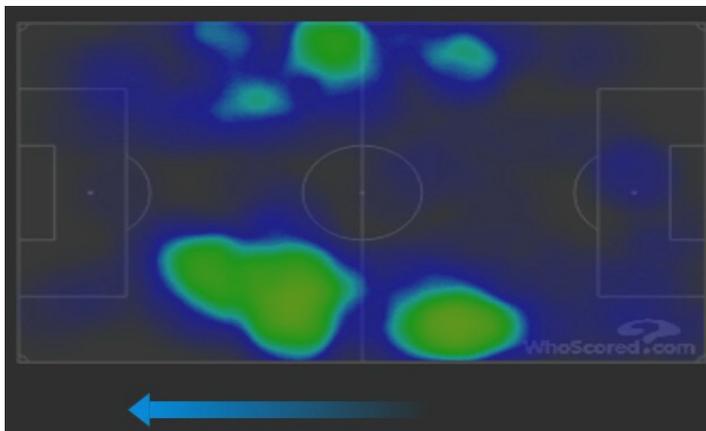
Sporting Gijon: Real Madrid 2015. 08. 23. Score: 0:0



**Graph 1.** Real Madrid wingback all passes

In the match there were 140 passes completed by the full-backs, of which 62 were forward passes. As far as forward passes are concerned 45 of them were successful which means an accuracy of 72%. 54 passes took place in the attacking third and 15 in the defensive third. The match was completed with a pass accuracy of 84%.

### Heatmap



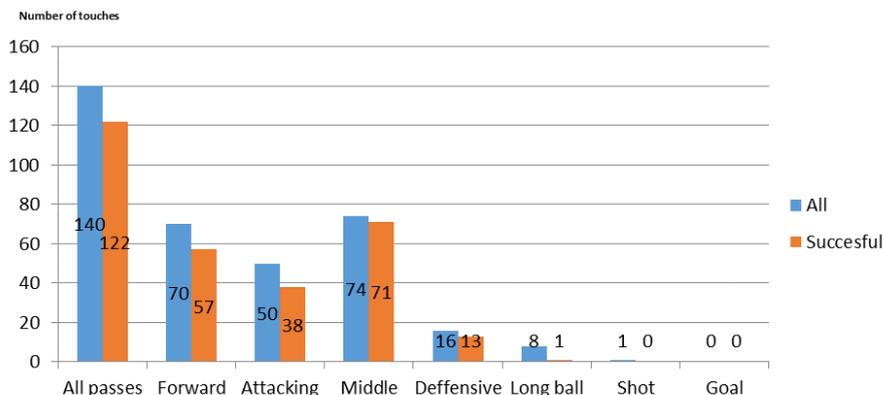
**Figure 1.** Real Madrid wingback heatmap

Reference: Heatmap (2016.april 2.).whoscored.com. retrieved from: <https://www.whoscored.com/Matches/985459/Live>

As shown in the graph, the left full-back was more actively involved in the attacks, particularly in the middle third. In the match they had 183 ball contacts, the left full-back 107 and the right full-back 76. The heatmap points out the parts of the pitch where the ball contacts took place.

## 2. match

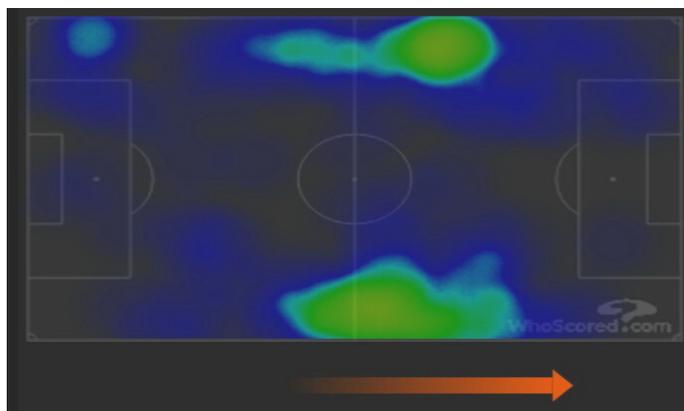
Real Madrid: Betis 2015.08.29. Score: 5:0



**Graph 2.** Real Madrid wingback all passes

In the match the players completed 140 passes, of which 122 were successful resulting in an outstanding pass accuracy of 87%. The number of the forward passes was 70, of which 57 were successful which means a pass accuracy of 81%. 50 passes took place in the attacking third and 16 in the defensive third.

Heatmap



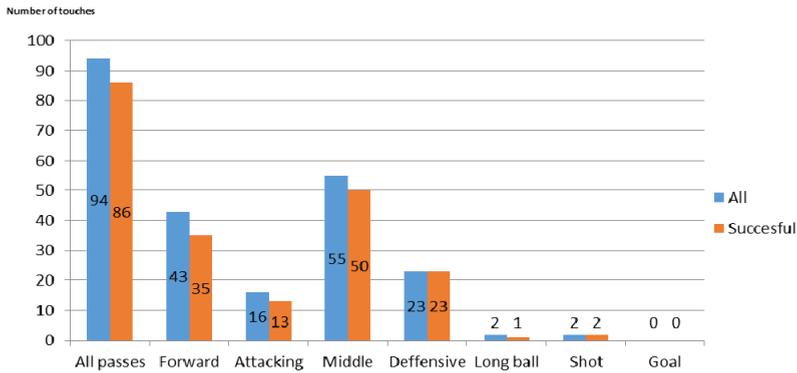
**Figure 2.** Real Madrid wingback heatmap

Reference: Heatmap (2016.april 2.).whoscored.com. Retrieved from: <https://www.whoscored.com/Matches/985469/Live>

The graph shows how actively were the two defenders involved in the attacks. They were moving almost exclusively in the attacking third. In the match they had 172 ball contacts, the left full-back 87 and the right 85. The heatmap illustrates the places where the contacts took place. They had hardly any contacts in the defensive third.

### 3. match

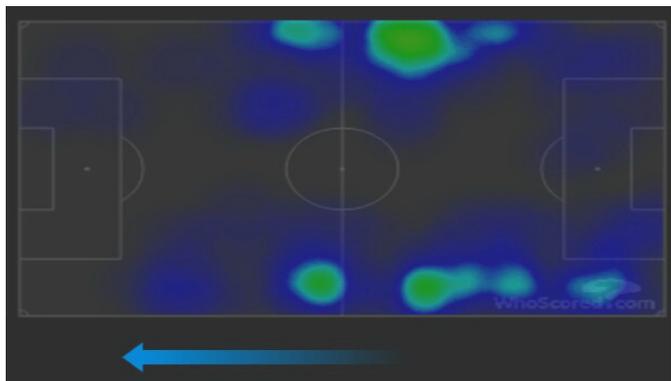
Espanyol: Real Madrid 2015.09.12. Score: 0:6



**Graph 3.** Real Madrid wingback all passes

In comparison to the previous matches there was a lower number of passes. Out of the total 93 passes 86 were successful which equals to a pass accuracy of 92%. There were 43 forward passes, of which 35 were successful resulting in a pass accuracy of 81%. The number of the passes taking place in the defensive third was 23.

Heatmap



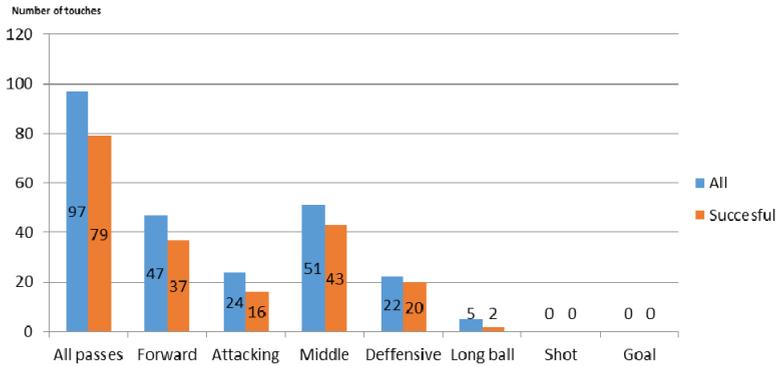
**Figure 3.** Real Madrid wingback heatmap

Reference: Heatmap (2016.april 2.).whoscored.com. retrieved from: <https://www.whoscored.com/Matches/985478/Live>

As shown on the map this match did not require such an active involvement in the attacks as the other ones. The number of the ball contacts that the full-backs had was 126, 66 completed by the left and 60 by the right full-back. The map shows the places where the contacts took place.

#### 4. match

Real Madrid: Granada 2015.09.19. Score: 1:0



**Graph 4.** Real Madrid wingback all passes

In this match there were 97 passes, of which 47 were forward passes. In percentage it is 48%. Out of the 47 forward passes 37 were successful which means a pass accuracy of 79%. In the attacking third there were 24 passes, in the defensive third 22 which is relatively a lot. The match was completed with a pass accuracy of 81%.

#### Heatmap



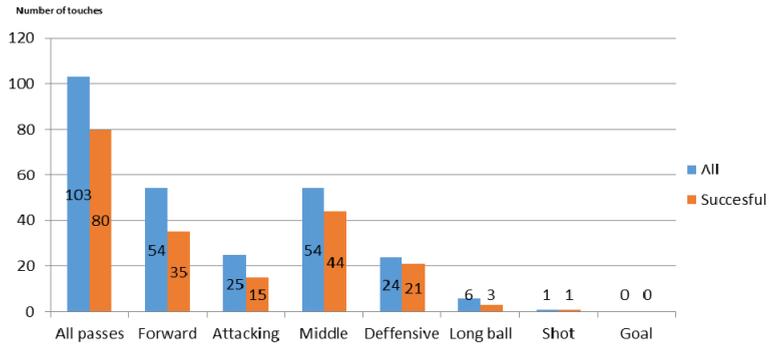
**Figure 4.** Real Madrid wingback heatmap

Reference: Heatmap (2016.april 2.).whoscored.com. retrieved from: <https://www.whoscored.com/Matches/985518/Live>

As shown on the map the right full-back was more actively involved in the attacks than the left, who spent more time in the middle third. The left full-back had 78 ball contacts, the right one 60, so the total number is 138. Their moves can be seen on the map.

## 5. match

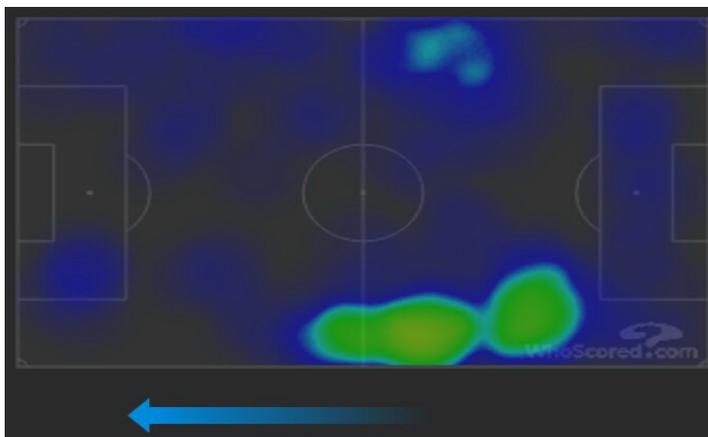
Athletic Bilbao: Real Madrid 2015.09.23. Score: 1:2



**Graph 5.** Real Madrid wingback all passes

The match was completed with 103 passes. The number of the forward passes was 54, which is 52%. 35 forward passes were successful which resulted in a pass accuracy of 65%. As shown on the graph most passes, 54 to be precise, took place in the middle third. There was an unsuccessful goal-shooting as well.

Heatmap



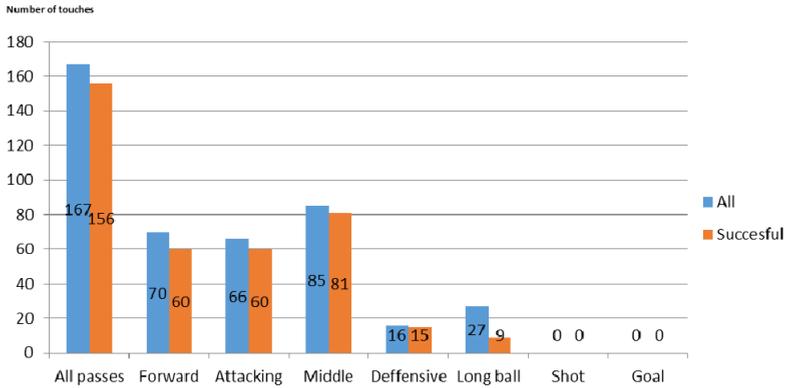
**Figure 5.** Real Madrid wingback heatmap

Reference: Heatmap (2016.april 2.).whoscored.com. retrieved from:  
<https://www.whoscored.com/Matches/985495/Live>

As shown on the map the left full-back was more active than the right one. He had his most active performance in the middle third, however, his moves can be seen in the attacking third too. The full-backs had 142 ball contacts in the match. As the heat map shows, the left full-back had 80 and the right full-back 62 ball contacts.

## 6. match

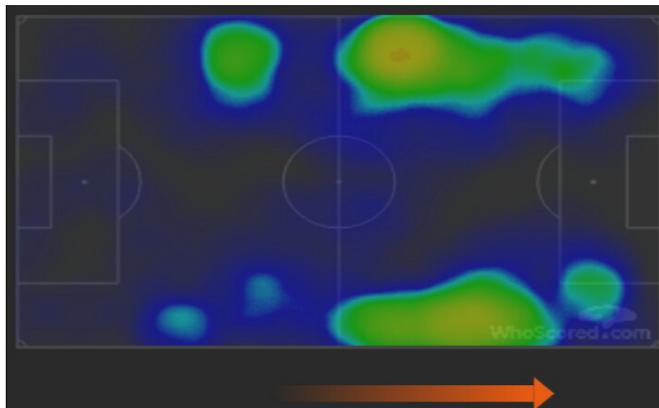
Real Madrid: Malaga 2015.09.26 Score: 0:0



**Graph 6.** Real Madrid wingback all passes

This match can boast with the highest number of passes, 167 to be precise. It is an outstanding number. There were 70 forward passes, of which 60 were successful bringing a pass accuracy of 86%. 66 passes occurred in the attacking third. The graph shows that the passes completed by the full-backs significantly helped the attacks.

Heatmap



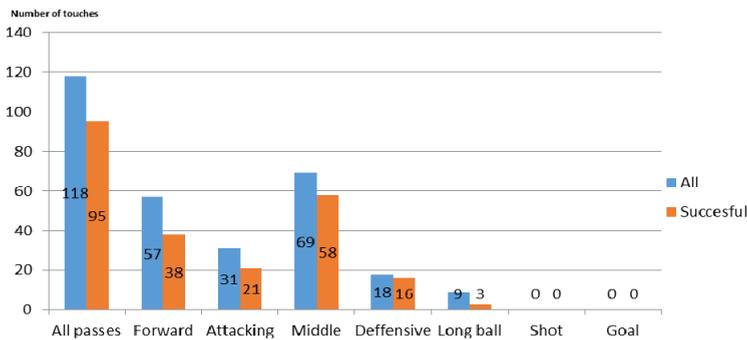
**Figure 6.** Real Madrid wingback heatmap

Reference: Heatmap (2016.april 2.).whoscored.com. retrieved from: <https://www.whoscored.com/Matches/985482/Live>

Based on the map everybody can see the full-backs' significant contribution to the attack. Their defending role can only be seen in the middle third and attacking third of the pitch. This proves the important role that the full-back performs in the attacks. The full-backs had 220 ball contacts. The left full-back can boast with 112 and the right full-back with 108 contacts. The heatmap points out the parts of the pitch where the ball contacts took place. Taking into consideration that the total number of ball contacts was 818 in this match, the 220 contacts completed by the full-backs is a distinguished result.

### 7. match

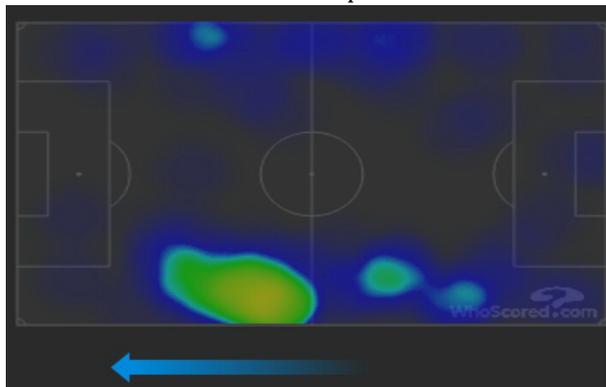
Atletico Madrid: Real Madrid 2015.10.04. Score: 1:1



**Graph 7.** Real Madrid wingback all passes

Out of the total 118, 57 were forward passes which is 48%. 38 out of the 57 forward passes were successful which is a 67% pass accuracy. There were 31 passes in the attacking third, 69 in the middle third and 18 in the defensive third. Based on this it can be stated that the full-backs were concentrating on the forward game.

Heatmap



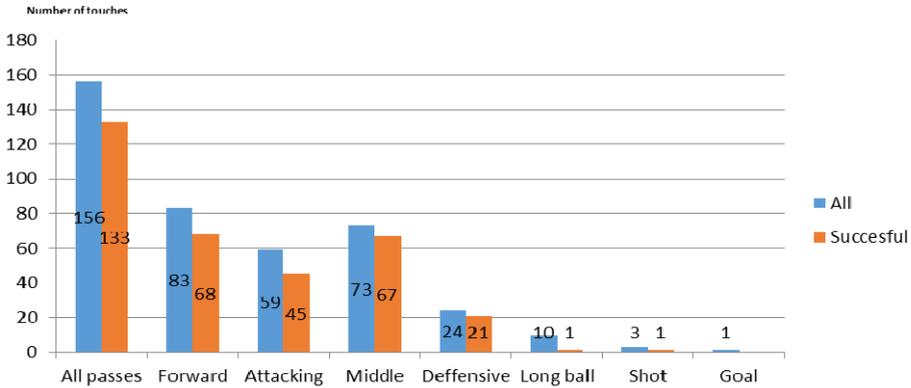
**Figure 7.** Real Madrid wingback heatmap

Reference: Heatmap (2016.april 2.).whoscored.com. retrieved from: <https://www.whoscored.com/Matches/985501/Live>

As shown on the map the role of the left full-back is almost the same as that of the midfielder since he is so actively involved in preparing the attacks. The left full-back had 78, the right 66 ball contacts which is in total 144. This can be seen on the heatmap, too.

### 8. match

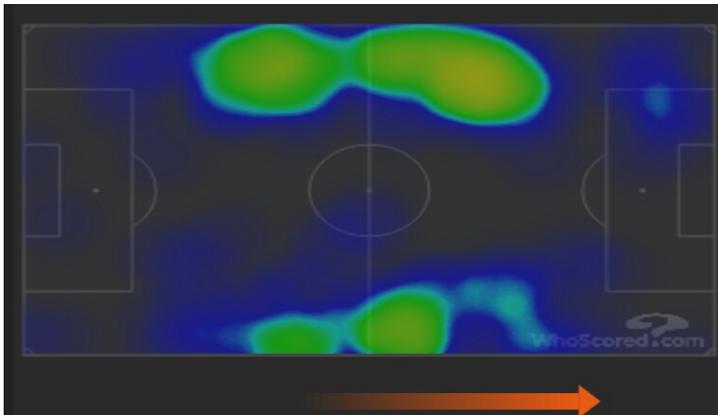
Real Madrid: Levante 2015.10.17 Score: 3:0



**Graph 8.** Real Madrid wingback all passes

The match was completed with 156 passes, of which 83, in percentage 52% were forward passes. The 68 successful passes equal to a pass accuracy of 82%. In the attacking third there were 59 passes, in the defensive third 24. It can also be seen on the map that the passes completed by the full-backs helped the attacks.

Heatmap



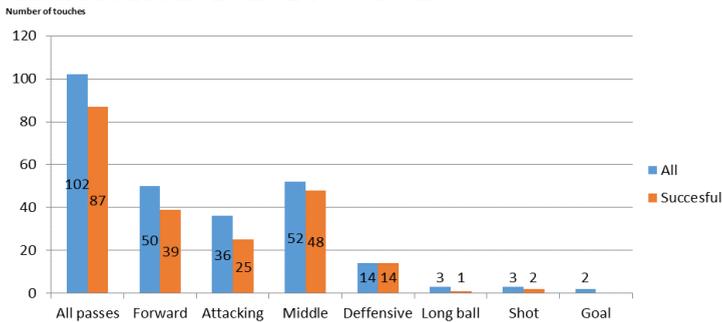
**Figure 8.** Real Madrid wingback heatmap

Reference: Heatmap (2016.april 2.).whoscored.com. retrieved from: <https://www.whoscored.com/Matches/985535/Live>

As shown on the map the left full-back helped the attacks up to a great degree. His most active performance took place in the middle third. The right full-back was a little more passive, however, his most active performance took place in the middle third too. The full-backs had 197 ball contacts, of which the left full-back had 116 and the right full-back 81. The heatmap shows the parts of the pitch where they took place.

### 9. match

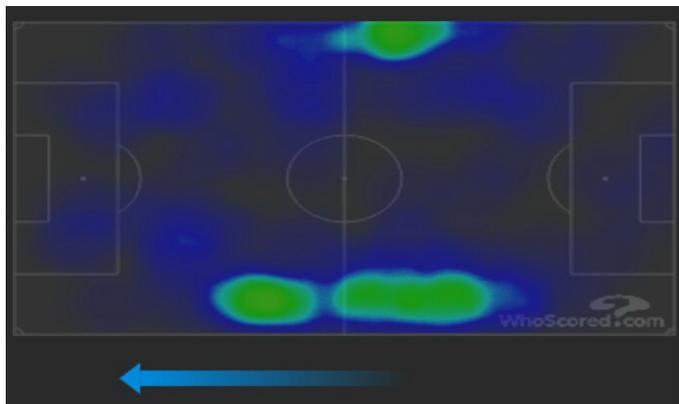
Celta Vigo: Real Madrid 2015.10.24. Score: 1:3



**Graph 9.** Real Madrid wingback all passes

There were 102 passes in the match, of which 50 - 49% - were forward passes. 39 forward passes were successful, that is a pass accuracy of 78%. 36 passes took place in the attacking third. There were 3 goal-shooting attempts, of which 2 resulted in a goal. As for the full-backs they had an excellent performance in this match with a 3:1 final score.

Heatmap



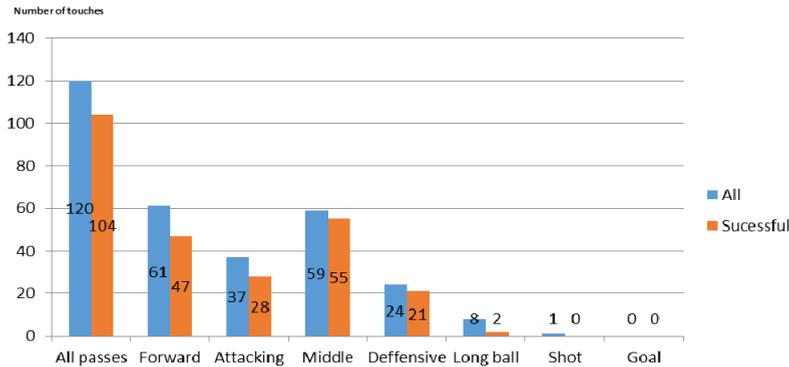
**Figure 9.** Real Madrid wingback heatmap

Reference: Heatmap (2016.april 2.).whoscored.com. retrieved from: <https://www.whoscored.com/Matches/985553/Live>

We can see from the map that the players had their most active performance in the middle third. However, they were also involved in the game in the attacking third which resulted in two goals. The full-backs had 196 ball contacts, of which the left full-back can boast with 135 and the right full-back with 61 contacts. The left full-back played a significant role in this match both in terms of the number of passes and ball contacts. His important contribution to the attack goes without saying.

### 10. match

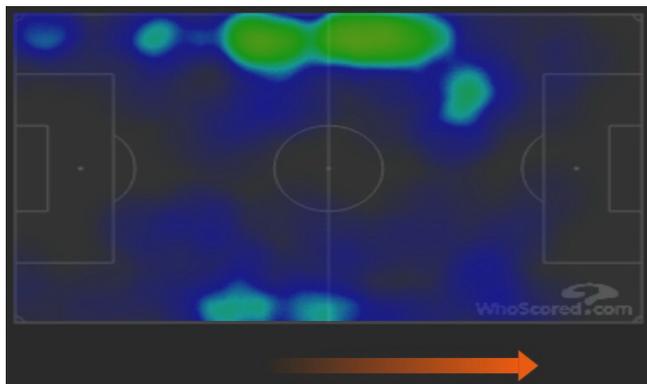
Real Madrid: Las Palmas 2015.10.31. Score: 3:1



**Graph 10.** Real Madrid wingback all passes

The match was completed with 120 passes, of which 51%, so 61 were forward passes. 47 forward passes were successful which equals to a pass accuracy of 77%. There were 37 passes in the attacking third, 59 in the middle third and 24 in the defensive third. This was the only match where the full-backs completed a goal pass.

Heatmap



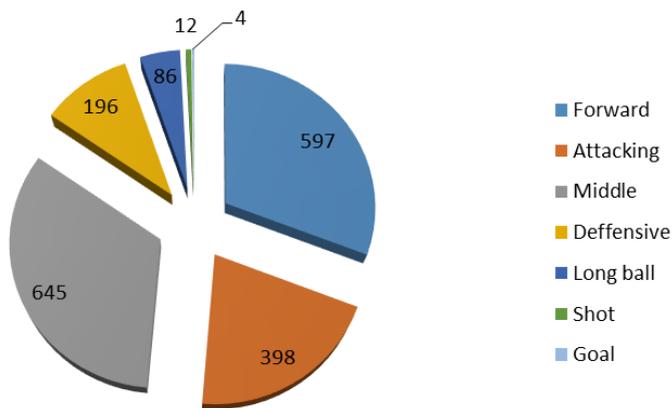
**Figure 10.** Real Madrid wingback heatmap

Reference: Heatmap (2016.april 2.).whoscored.com. retrieved from: <https://www.whoscored.com/Matches/985526/Live>

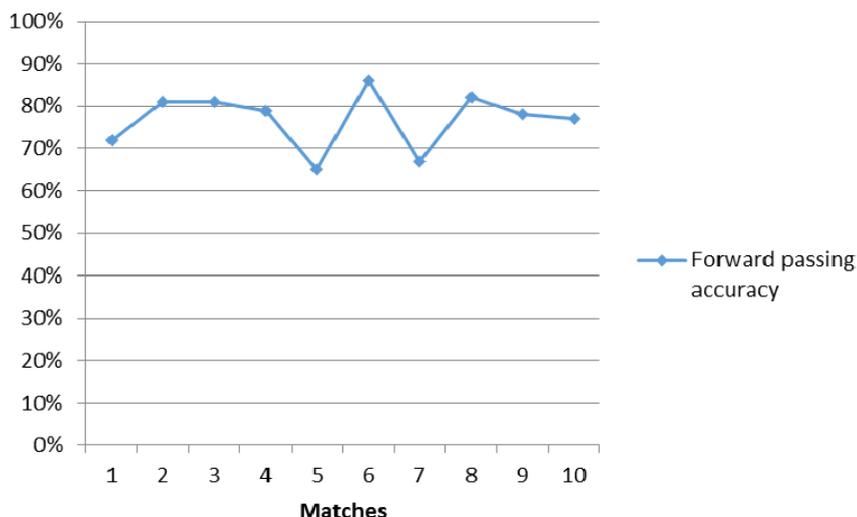
As well as in the other matches the left full-back was more active and it can also be seen on the map. He had 92 ball contacts whereas the right full-back 65, so the total number is 92. The full-backs had 196 ball contacts.

### Conclusion

The aim of my study was to illustrate the important role that the full-backs play in the attacks. I did so on the basis of the number of passes and heatmaps. I analysed the passes completed by the full-backs and their direction. I also described the moves of the full-backs separately in each match. I used a graph and a heatmap for every match. 48.6% of all the passes were forward passes. It is an outstanding performance from the full-backs. The graph (graph 11) shows us the passes that took place in the matches. Based on this it can be said that most of them were forward passes. It is followed by the passes completed in the middle third and the least passes took place in the attacking third. There were 597 forward passes, of which 461 were successful resulting in a pass accuracy of 77%. This is an excellent result from the full-backs because it means that their passes were mostly accurate. Their forward passes had an accuracy of 65% which helped the team a lot when it came to attacking (graph 12). As shown on the maps the left full-back helped the attacks in most cases and was very active on the left side of the pitch. Altogether there were 1675 ball contacts, of which 957 were completed by the left full-back and 724 by the right full-back. The former had 57% of the ball contacts and the latter 43%. Based on this there is no doubt that the left full-back was more actively involved in the matches than the right full-back. The heatmaps also pointed out that most of the ball contacts occurred in the attacking third and middle third, thus helping the attacks.



**Graph 11.** Passing over the evolution of the test matches



**Graph 12.** Passing forward accuracy during the matches

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## PREDICTORS OF ACADEMIC PERFORMANCE

BLANCA GRAMA<sup>1</sup>

**ABSTRACT.** Developing capacities and skills necessary for the integration into the labour market and for the achievement of a professional career is a foreground target of the educational system. Within this frame, personality traits and career interests of students who shall pursue a career in education are directly connected to the choices they make, to their plans and achievements equally. This study presents an analysis of the dominant personality traits of the students studying physical education, based on the Big-Five model, based on the results of a quantity-quality descriptive study conducted on 118 students attending the physical and athletic education faculty, as well as the identification of the occupational cluster corresponding to the teaching activity. For the studying of the personality factors we used the NEOPI-R personality inventory, career interests were measured with the JVIS, Jackson Vocational Interest Survey, and the results were correlated with academic performance. As a result of the analysis, we may conclude that the physical education student is both an agreeable and a hard-working person, with a high sense of responsibility, constantly preoccupied for his personal performance.

**Keywords:** conscientiousness, agreeableness, academic performance

**REZUMAT. *Predictori ai performanței academice.*** Un obiectiv prioritar ale sistemului educațional îl constituie formarea competențelor și aptitudinilor necesare pentru integrarea pe piața forței de muncă și realizarea carierei profesionale. În acest context, trăsăturile de personalitate și interesele vocaționale ale studenților care vor urma o carieră didactică sunt implicate direct în alegerile pe care aceștia le fac, în ceea ce-și propun și realizează deopotrivă. Studiul de față prezintă o analiză a trăsăturilor dominante ale personalității studenților de la domeniul educație fizică și sport, având la bază modelul Big-Five, pe baza rezultatelor dintr-un studiu descriptiv mixt cantitativ-calitativ realizat pe un număr de 118 studenți de la specializarea educație fizică și sportivă, domeniul de licență, precum și identificarea clusterului ocupațional corespunzător activității de predare. Pentru investigarea factorilor de personalitate am utilizat Inventarul de personalitate NEOPI-R, interesele vocaționale au fost măsurate cu Inventarul de Interese Vocaționale Jackson, JVIS, iar rezultatele obținute au fost corelate cu performanța academică, calculată ca medie a anilor de studii corespunzători. Ca rezultat al analizei putem conchide că studentul de

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la acest profil este deopotrivă agreabil și conștiincios, cu un simț al responsabilității ridicat în activitatea profesională, preocupat în permanență pentru performanța personală în relațiile cu sine și performanța profesională în relațiile cu ceilalți.

**Cuvinte-cheie:** conștiinciozitate, agreabilitate, performanțe academice

## Introduction

In the current context the quality of the educational process does not depend only on the selection of courses, on the good presence of the professors and the assessment method, but also on the way they, the beneficiaries, the students, are guided, advised, directed towards entering the labour market. The university becomes a bridge between students and the labour market, and at the same time a permanent dialogue area with the graduates. What are the skills and personality traits which make graduates as capable and flexible in “scanning” the labour market opportunities as possible, in order to be apt to success?

Personality traits and career interests represent a main bridge over knowledge and evolution, involved directly into the choices that we make, into our plans and achievements at the same time.

The analysis of the relation between personality and career choices represented a research basis 50 years ago as well (Barrick, & Mount, 1991; Costa, McRae, 1992; DeNeve, & Cooper, 1998; Gomez, Gomez, Cooper, 2002; Heller, Watson, Ilies, 2004; Judge, Heller, Mount, 2002).

Personality factors differentiate career groups from one another playing the role of predictors in choosing one’s career. A study conducted on Canadian students showed a significant influence relation between personality factors (agreeableness, conscientiousness, neuroticism) and emotions (anxiety, anger, boredom, pride) over the academic environment adjustment using *MetaTutor learning environment* (Harley, Carter, Papaionnou, Bouchet, Landis, Azevedo, Karabachian, 2016). According to the results, in order to achieve a high academic performance students must develop a high level of conscientiousness and agreeableness at the same time with an emotional display from their teachers based on adaptive emotions (joy, trust, pride) and avoid non-adaptive emotions (boredom, anger). In a study conducted by Bozanoglu & Sapanci (2015) results indicated a relationship between personality factors and academic motivation. While conscientiousness indicated a strong significant correlation to academic motivation, neuroticism indicated a strong negative correlation.

Trapmann, Hell, Hirn, Schulern (2015) investigated the impact of the big five personality factors on academic success at university. Results show that the influence of personality traits on academic achievement depends on the success criterion. Neuroticism is related to academic satisfaction ( $r = -.369, k = 8$ ), conscientiousness correlates with grades ( $r = .269, k = 41$ ), extraversion, openness to experience, and agreeableness have no significant impact on academic success. Moderator analysis suggests effects of culture for the validity of extraversion.

Personality factors together with daily mood may significantly influence professional performance, and implicitly academic performance (Nai Wen Chi, Huo Tsan Chang, Hsien-Lier Huang, 2015). In this study results indicated that a daily positive mood plays an important role in achieving professional performance together with conscientiousness and agreeableness.

The idea that personality factors can differentiate one occupational group from another has been empirically evaluated through the use of personality assessment. As a result, personality factors have been shown to significantly relate to and predict career choice. For example, Hojat and Zuckerman (2008) also examined the effects of personality on specialty interest for the big five personality factors. They hypothesized that those who choose a hospital-based specialty would score lower on sociability when compared to the primary care/people oriented specialties. Results supported the aforementioned hypothesis. Conclusions of the studies mentioned above suggest that personality does have an effect on a medical student's choice of specialty, and the exploration and use of these findings can enhance the ability of educators to counsel their students in decision making for their future careers.

Tross, Harper, Osher, et al. (2000) analyzed the ability of the personality characteristics, achievement, conscientiousness, and resiliency to predict college student performance and retention. Results show that conscientiousness was more predictive of college GPA than was high school GPA. Conscientiousness was associated with retention both directly and indirectly, whereas high school GPA, total SAT score, achievement, and resiliency showed no predictive value for college retention. It is concluded that personality variables are useful predictors of college performance and retention.

Lounsbury, Saudargas, Gipson, et al. (2005), based on a sample of 532 undergraduates at a South-Eastern U.S. university, Big Five and narrow personality traits, were examined in relation to a measure of satisfaction with specific domains of college experience and a measure of General Life Satisfaction. Four of the Big Five traits, agreeableness, conscientiousness, emotional stability and extraversion - as well as the narrow traits of aggression, career decidedness, optimism, self-directed learning, sense of identity, and work drive were positively, significantly related to both satisfaction measures.

In a study conducted on 254 medical students (Grama, Botone, Raulea, 2016) researchers found that basic personality traits as “agreeability” and “conscientiousness” represent significant predictors for academic performance materialized in attendance, grades and, subsequently, for professional performance after graduation.

A study conducted by Scepanisky & Bjornsen (2003) proves that people who want to get a job after graduating have a far higher level of course attendance during school period, are more motivated for studying, fact which correlates with conscientiousness.

Schaeffer and co. (2003) identified the following qualities as being typical of the efficient teachers, according to students’ perception: accessible, creative and interesting, caring, enthusiastic, flexible and receptive, well-informed, having realistic, fair expectations, but respectful as well. Delli (2010) developed “Teacher Perceiver Interview”, an instrument used in the process of selecting teachers, process which includes among other characteristics the assessment of the teacher’s empathy, his/her capacity to create positive relationships with the students, objectiveness, and innovation.

From the analysis of studies based on this subject, we can assert that each personality factor bears an important and well-defined role in achieving academic success and in their future integration into the labor market, so we are more interested in fact in the way these factors combine and less in the influence they have separately on physical and athletic education students.

## **Objectives**

This study is meant to analyze the relation between personality dimensions (the big five model) and the academic performance of physical and athletic education students, as well as to identify possible predictors of academic performance.

At the same time the need to improve the profession of teaching caused the development of this study which analyzes the personality structure of future teachers but also the identification of the factors which influence the performance of these future teachers with the purpose of achieving educational objectives.

## **Hypothesis**

1. We assume that there are significant differences between male subjects and female subjects from the point of view of the level of conscientiousness and agreeableness expressed by the assessed students;

2. We assume that conscientiousness is a predictor significant for the academic performance.

## **Methods**

For the assessment of personality traits we used: the Revised NEO Personality Inventory, NEO PI-R (2009) - one of the most used personality questionnaires of the modern applied psychology, containing five areas: Neuroticism (N), Extraversion (E), Openness (O), Agreeableness (A), Conscientiousness (C). The five areas (mentioned before) and 30 faces of the NEO PI-R allow a comprehensive evaluation of the normal adult personality. By using NEO PI-R in the educational assessment and the career orientation researchers tend to focus mainly on the conscientiousness factor. Studies on conscientiousness indicate a substantial number of correlations (Costa, 2009, 169). De Raad & Perugini (2002), Shiner (2000) underline the predictive role of conscientiousness in the academic achievements.

JVIS (Jackson Vocational Interest Survey, 2007) is a measuring instrument for career interests with the purpose of evaluating career interests along a common set of dimensions, its structure containing 34 scales. Academic performance was rendered operational by calculating the average score of each student throughout the entire period of study in the university.

The group study (who expressed their written consent to participate in this research) contains 118 students attending the physical and athletic education faculty courses (43 females and 75 males) assessed with NEO PI-R; 99 of these students (38 females and 61 males) signed up for the psycho-pedagogy program and were evaluated with JVIS.

For the testing of the research hypothesis we have used several statistical methods applied through SPSS 23; we have used the variance analysis method, the correlation method and the Pearson bi-variant correlation coefficient.

## **Results**

After analyzing and processing the data through NEO PI-R, we obtained the following results. Table 1 and 2 present the descriptive statistics for the investigated variables.

**Table 1.** Descriptive Statistics

	<b>N</b>	<b>Mean</b>	<b>Std. deviation</b>
Study year	118	1.91	.716
Gender	118	1.64	.483
Age	118	23.80	6.223
Conscientiousness	118	123.64	18.315
Extraversion	118	112.98	15.658
Agreeableness	118	112.87	16.782
Openness	118	106.20	13.408
Neuroticism	118	85.92	17.288

**Table 2.** Descriptive statistics of the variables studied according to gender

<b>Gender</b>		<b>N</b>	<b>Mean</b>	<b>Std. deviation</b>	<b>Std. error mean</b>
Female	Agreeableness	43	119.51	15.686	2.392
	Conscientiousness	43	130.88	16.403	2.501
	Extraversion	43	116.74	15.601	2.379
Male	Agreeableness	75	109.07	16.290	1.881
	Conscientiousness	75	119.49	18.159	2.097
	Extraversion	75	110.83	15.381	1.776

The Levene test of equality of error variance came up insignificant, which allows us to analyze the data under quasi-experimental conditions. From the data analysis of the investigated group we can assert that there are significant differences between female and male subjects from the point of view of the expressed level of conscientiousness ( $F = 11.521$ ; sig 0.001; eta 0.090), as well as from the point of view of the expressed agreeableness level ( $F = 11.540$ ; sig 0.001; eta 0.090) although the relation is significant, the effect size expressed through the eta coefficient is small. Hypothesis 1 is confirmed. Female subjects scored a higher at the conscientiousness level; consequently within the group of subjects the level of conscientiousness of the group tends to grow together with the number of female subjects participant in the survey. High scores of the extraversion dimension indicate the fact that physical education students have frequent interactions with other people, aspect corresponding to the nature of their future job.

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**Table 3.** ANOVA<sup>a</sup>

Model	Sum of squares	Df	Mean Square	F	Sig.
Regression	6.759	1	6.759	8.192	.005 <sup>b</sup>
Residual	94.882	115	.825		
Total	101.641	116			

a. Dependent Variable: Average score for the previous year

b. Predictors: (Constant), NEOPIR\_ Conscientiousness

**Table 4.** Regression coefficients

Model	Unstandardized coefficients		Standardized Coefficients	t	Sig.
	B	Std. error	Beta		
(Constant)	6.605	.577		11.452	.000
NEOPIR_ Conscientiousness	.013	.005	.258	2.862	.005

a. Dependent Variable: Average score for the previous year

Tables 3 and 4 present the statistics for Hypothesis no. 2. Results indicate conscientiousness as a significant predictor for academic performance. Hypothesis 2 is confirmed. Analyzing the data for the studied group, agreeableness correlates positively with conscientiousness ( $r = 0.467^{**}$ ; sig. 0.00); the more agreeable the students feel like being to the others, the higher the level of their conscientiousness tends to be. At the same time the study indicates significant high correlations between conscientiousness ( $r = 0.520^{**}$ ; sig. 0.00) and extraversion.

The analysis of the data indicates significant positive correlations between straightforwardness and the dutifulness ( $r = 0.476^{**}$ ; sig. 0.00), self-discipline and the dutifulness ( $r = 0.680$ ; sig. 0.00), the capacity to plan, organize and implement. The particularity of this field, the athletic activity that some of the students are practicing, create a dutifulness and self-discipline, educating motivated individuals who carry out the tasks they initiated, who stick to their ethical principles and rigorously fulfill their moral duties. Straightforwardness is a face of agreeableness, and the subjects who scored high in this dimension are open and sincere, with a positive attitude towards the others. At the same

time the statistical analysis indicated significant positive correlations between altruism ( $m = 22.37$ ) and the dutifulness ( $m = 22.67$ ) and a correlation coefficient value of  $r = 0.602^{**}$ ; sig. 0.00.

The significant positive correlations between these facets as well as the high scores obtained by the subjects allow us to appreciate the future graduates as individuals with a sense of duty, honest, unselfish, conscientiousness and agreeableness, considerate with people around them, showing generosity and desire to help.

**Table 5.** Descriptive statistics for JVIS factors

	N	Minimum	Maximum	Mean	Std. deviation
Elementary Education	99	4	97	59.42	27.289
Teaching	99	1	99	56.46	30.844
Social Service	99	1	98	55.14	30.562
Human Relations Management	99	0	99	49.37	29.032

In order to identify the occupational profile I used JVIS. Table 5 presents several descriptive statistics for JVIS scales, significant for graduates who will become teachers or sports coaches. The career interest corresponding to the teaching activity for adults (Jackson, 2007, 204) contains the scales measured in Table 5. The average score for the respondent students is high for the teaching and elementary education scale, fact which indicates the pleasure of teaching other people and the willingness to participate in the educational activity, characteristics that are necessary for defining the future teachers. Also the average scores for the female subjects are higher (teaching 60.53, social services 64.87) compared to the average scores for male (teaching 53.93, social services 49.08), thus female proving to be more interested in teaching than male.

## Conclusions

Conscientiousness represents a performance predictor in almost any field, and especially in the academic area, especially when demands are standardized and less encouraging for independent thinking and creativity; these are conditions typical for the Romanian educational system. Students are well-organized, determined and perseverant, features which in time lead to

better academic results. It is considered that conscientiousness individuals are perceived by the others as being intelligent and the scores for this area can complete the scores obtained in the assessment of abilities, as an academic success predictor (Costa, & McCrae, 1992).

The recorded significant positive correlations determine us to emphasize the dimension of conscientiousness as a predictor for academic performance for students attending the specialization studied here. The significant positive correlations between the facets of the big five personality model corresponding to Table 5 allow us to consider these individuals as having a strong sense of duty, honest, unselfish, conscientiousness, and agreeable people, considerate with the people around them, showing generosity and desire to help.

The students participating in this survey are attending the psycho-pedagogy program for teaching competency. While using JVIS our intention was to identify the occupational cluster for teaching corresponding to students from this specialization (Table 5.). Thus, the group containing teachers, trainers, coaches showed high interests (according to the scores shown in Table 5.) in teaching, elementary education, social services, and human relations management scales; which grants them potential for developing these qualifications in order to be able to manage the teaching activity.

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## **SPORT, GENDER DIFFERENCES AND SEXUALITY BETWEEN SOCIAL STEREOTYPES AND EDUCATIONAL NEEDS FOR RECOGNITION OF SUBJECTIVITIES**

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**ABSTRACT.** Sport symbolizes a powerful instrument to propagate social stereotypes that feed and exacerbate also gender differences. The discrimination messages about gender are very frequent in sport and most of the time they have not direct and clear appearances, but the signals are implicit, hidden and nonverbal, not for this less effective. The educational instance that emerges strongly is which that consists in supporting individual paths of self-research, which could mean a suffered journey that requires difficult integrations. In light of this, what can be the educability dimension which should be supported by a sport that focuses on the individual's subjectivity, thus also his sexuality? Intending sport in a broader sense, and then considering all forms of organized activity related to movement, it might be appropriate to induce several aspects that may confer to sport an intentional educational value. It is at this point that the pedagogy is called upon to reflect critically on sports situations, to direct actions towards the construction of the learning *setting* that can promote wellness and well-being of involved persons. On a pedagogical perspective, is worthwhile reflect on how sport can becomes a context able to allow subjects to test themselves freely, even developing abilities and behaviors useful to feed life skills to a harmonious growth with themselves and in their own living environments. A sport supporter of universal ideals must undoubtable accept the category of difference in order to support and promote values of subjectivities.

**Keywords:** gender differences, sexuality, education, sport pedagogy

### **1. Body, Gender and Sport between Nature and Culture**

Individual identity is also built in connection with the acknowledgement and internalization of values and models of the culture where the person lives, that culture influences the way of thinking and behave, than, also the way to live and feel. The individual is considered, than, as a real "system" integrates into an environment made both of natural disposition and, therefore biological, both of

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cultural conditioning, than educational (Bateson, 1979), where the mind-body-environment connection is attributed to an ecological and systemic prospective of processes and system involved (Fischer et al., 2007). This triple connection emphasizes, therefore, the importance of education in the processes of influence and growth of subjects, where the role of the body, his actions and languages are central (Lowen, 1958); in this sense, human body becomes a real “educational area” on which are played the line forms of historical, social and political negotiation that influence it and from which in their turn are influenced (La Cecla, 2009). The ideas that individuals build over time in connection with own and another’s body, as well as, the quality of actions that they express, are literally “shaped” by culture where they are immersed: “These perceptions are driven by external forces that shape our culture and set norms where capitalist world views are strongly developed and promoted. To argue that we all have different opinions of what we look like is essential to the cultural meaning of the body and manifested in the relationship that each of us has regarding our own body. There is no doubt, then, that the image that we wish to portray to the rest of the world about what we are, as a person, is often viewed through the eyes of others, and how we feel about the image that we portray is the most important aspect of the way in which we live in our body” (Gilbert, 1998, p. 69).

Despite acculturation and socialization processes pass through both formal education places both those non formal ones and informal, however, in literature is observed an unbalanced attention that does not attribute to the latter the importance they deserve; consider, for example , the role that peer group has in the processes of construction and consolidation of identity in adolescence (Santrock, 2008) and how in general backgrounds such as family, sports group, associations and all other places of social gathering exercise, on the ground of social learning processes, very important forms of influence. Priority pedagogical instance is that to accompany the growth processes of individuals supporting them in building their own point of view, connects to the emotional and action dimension. What happens when these contexts that should be in self-emancipation sense of growth and experimentation, instead of supporting personal constructions they wind up to be predetermined interpretations that often correspond with stereotypical visions of social relationship and between genders? The question raised is relevant because it is common to notice the tendency to ignore, in the matter in question where sport education take place, individual peculiarity and his instances and, obstruct his behavioral tendencies and his inclinations.

For this reason, it is necessary to reflect on that educational work that is carried also in the places which are not specifically educational or didactics, such as sports, health and personal care (Tramma, 2015). The recognition of subjectivity, the way of a person to be different from another, to be himself, in the other words, passes through body and his behavior first of all (Husserl, 1950; Merleau-Ponty, 1945).

The way in which persons conceptualize the body and the movement is considerably marked by gender culture that expresses every day itself in the different context of life (Ulivieri, 2014). The interest on gender argument refers to, therefore, theme of identity; this means having to do with the social expectations related to being male or being female within certain boundaries. From birth, boys and girls are raised differently in various cultures, sometimes even at the same, precisely in relation to a several educational conditioning pertinent to the idea that parents and the social context have about male or female.

Many research contributions that have analyzed the ways in which the gender is internalized since early childhood; more specifically, learning theory emphasizes the reinforcing component in the process of sexual typing (Schaffer, 1996); essentially, it tends to reward, encourage and incentivize the right behavior to one sex rather than to another. In the family context, than, precisely father and mother educate sons and daughters in distinction of gender through specific behavior, intentional or not. Also as Carol Gilligan (1987) has highlighted, masculine or feminine education gives more space to male autonomy and independence and encourage more social dependence for women; this causes a difference of social expectations in connection with gender and, so, unequal opportunities to one and to others, for example, approving formative opportunities and resources that effectively channel the experience according to gender criteria.

The ways with which subjects live the gender symbolize the start point for identity construction (Connell, 2002), that influences gender social relationships that will be established; identity, socialization environment and concerning enactments cause a systematic conditioning on the quality of situations of which individuals will do experience.

In regard to the sport education, it is interesting to show the matter of bonds and possibilities (Ceruti, 1986) in connection with gender discussions; in this sense, it refers to many missed opportunities, many inconveniences experienced by those persons whose native culture precludes them even to take on particular physical activity or sport. Debate sport theme with that of gender means to ask that socio-cultural imaginary that always influences our existences.

Sport symbolizes a cultural product that in turn produce culture (Dunning & Coakley, 2000). If sport is the society mirror which has produced it, than it can be addressed on an educational plan to come to light the relationship property between body, gender, identity in the current historical climate; the sport, also like media, fashion and popular cultures in a broad sense, in fact, convey ideas that play a decisive role in the body views, gender appearances and body identity, since from the early childhood (Gilbert, 1998). As widely acknowledged from supranational sport organizations (IOC, 2016), health is considered a continuous bio- psycho-social balance process among subject and life context and not simply a state of absence of disease, the sport has an exact social value. In fact, it produces positive effects on state of health and individuals' wellness and, for

this reason, it carries values such as equality and respect for diversity, intercultural and social inclusion (Isidori & Fraile, 2008). In view of this huge potential, which very often is the content of media campaign, in every day sport continuous to support many forms of inequality; among them stand out, those concerning gender differences. In women instance, for example, the sports world still goes on to give few opportunities of job placement and less tax provisions, as well as lowest salary, result of a sport culture which relegates them to subordinate positions than men (Pfister, 2010). The stereotypes in connection with gender, therefore, do not save sport world, giving rich field to build wrong legends. In this sense it is usual to think that women, compared to men, are less inclined to do sports; in the same way, from childhood, there are movement games for boys and others for girls, sports for boys and sports for girls.

All of this has considerable consequences also on selection criteria; choice a sport activity rather than another one, is guided not always by self-interests, his wishes, but, instead, by standards that are socially accepted and recognized. If it is possible to think that the attribution of specific characteristics of being male or female find in the sport a sort of social recognition, in light of the immediacy with which the body expresses the subjectivities, at the same time it can be supposed that the power of the sport to exercise influence is above all to refer to the development of sexual identity and, therefore, to all of those behavioral aspects that can be associated with being male or female as also to all of those forms of feeling that then translate in attitudes. It is absolutely evident, in this sense, as some sports are associated with male or female characteristics.

Also, concerning sport performance, the fact that women performances do not compare with those of men for well-known physiological and biological differences do not exclude the possibility for a person to choose any activity, with the aim of feeling good with himself and give wide possibility to express their subjectivity. These ways of thinking, obviously, had a crucial impact also on the diffusion of some sports linked with sex, even high level: "In many disciplines, women started competing chronologically later than their male counterparts did (hammer throw, pole vault, and 3000-m steeplechase were the last women's events introduced in Olympics; women still not compete in the 50-km race-walk). Even in 2012, the 1500-m freestyle, the longest pool event in Olympic swimming for men, is still not a competitive distance for women (who race only up to 800m)" (Capranica et al., 2013, p. 100).

Unfortunately most of sport remains a field prerogative of one sex: men are the majority to practice it, they are almost all men who represent the institutional leaders, and languages used are mainly male (McKay, Messner & Sabo, 2000). For this reason, even European Union takes an interest in gender issues in sport and, the Conference took place in Vilnius in 2013 had the main scope to create a set of actions, organized into a different level, run to realization

of environment without gender discriminations. The Conference has thus issued the “Strategy Engagement for Gender Equality 2016-2019” in which are some related data concerning the diffusion of violence against women in sport; as it has reported in document “[...] Gender-based violence and negative stereotypes in sport, for instance, are widespread. It harms victims not only in terms of their health and well-being, but also their working lives, thereby damaging their financial independence and the economy in general. It is estimated that 500.000 women and girls in the EU are at risk of female genital mutilation (FGM). In addition, women and girls make up the majority of human trafficking victims (68% women, 17% men, 12% girls and 3% boys” (EC, 2015, p. 8).

Sport symbolizes a powerful instrument to propagate social stereotypes that feed and exacerbate gender differences. Consider, for example, how female athletes can raise doubts about their femininity and heterosexuality due to their aggressive attitudes in the discipline practiced and how male athletes, showing themselves aggressive, can, instead, keep away from homosexuality spectre. To the men are required to appear muscular, strong and vigorous, orientated so hard to win at all costs, while women have to appear light, sinuous and graceful, besides to counterbalance the sports participation emphasizing their femininity (Salvini, 1982).

## **2. Sport and Sexuality: Which Condition of Educability?**

On a pedagogical perspective, is worthwhile reflect on how sport can becomes a context able to allow subjects to test themselves freely, even developing abilities and behaviors useful to feed life skills to a harmonious growth with themselves and in their own living environments (Bellantonio, 2014).

In order to build body identity, sport is a particularly important place, not only because it focuses on body and physicality, but also because it is an opportunity for self-knowledge, own resources and limits. The discrimination messages are very frequent and most of the time they have not direct and clear appearances, but the signals are implicit, hidden and nonverbal, not for this less effective. Body dimension encloses a direct communication mode, without mediations and, therefore, it is not coincidence that, sport is a place where predominant cultures find a preferential vehicle to diffusion, an environment where, according to someone, homophobia is regulatory and structural (Rizzo, 2006). This point of view can only marginalize homosexual because it does correspond the physical shape ways of being, doing and interacting already determined and where it is expected that each individual, male or female, it is recognized.

The presence of homosexual person in sports contexts is not accepted willingly where it refers to a certain collective imagination to behaviors and attitudes that contrast with some plots that characterize the sport, quite clearly distinct, often distinguished in its deepest meanings, between male and female.

The lack of cohesion to certain gender stereotypes which see male athletics stand out, among others things, for strength, competitive spirit and female athletics more focused on recognition and social acknowledgment and on the research of a completeness of female athletic image represent in some way a potential threat; call into question of predominant values on which even a certain socio-cultural system is based does not put only sport at risk, in the sense of consent from a public opinion that doesn't find anymore some civil cohabitation mainstays, but indirectly that male and female self-identity which identify in several sport champions their own favorites and reference models, often to imitate. (Gross, 2001). Around the most important athletes turn a lot of economic and advertising interests, since many companies hire them as their testimonial. Sometimes is necessary to take heterosexual behaviors to preserve group relations and also to guarantee the sponsorship and financial support continuity; for this reason, not by chance, most of homosexual professional athletes decide to *coming out* at the end of their career; for this reason/speaking on which, it must be remembered that the tennis player Martina Navrátilová, after announced her homosexuality, lost as many as 12 billion dollars of advertising contracts in the Eighties.

In consequence of all of this many homosexual athletes therefore, do not reveal their identity to avoid imaginable effect on their personal lives. If the individual identity is built with the interaction with the others, for homosexual athletes this interaction can be reason of pain and exclusion; from sexual membership point of view and what ensues from attitudes plan, predominant social message is that it cannot be anything else, it is required be alike, the same, accept and propose again a quality of being and socializing that is recognized, punishment is to be marginalized, mock, or even reject explicitly. Existential events of athletes or aspiring prove that sport seems to be a redemption experience, a possibility to recreate the community judgment; sport is proposed, in this sense, as a unique opportunity to conquer a physicality that might suggest self-confidence, influencing self-esteem and self-image positively. it is obvious that working only on the appearance strengthen , instead, values focused on appearance and does not stimulate the research of coherence forms between how you feel, how you would like to be and what you feel like other people's judgment.

The educational instance that emerges strongly is which that consists in supporting individual paths of self-research, which could mean a suffered journey that requires difficult integrations. In light of this, what can be the educability dimension which should be supported by a sport that focuses on the individual's subjectivity, thus also his sexuality? If sport is a context where methodological and relational choices conduct the act, orienting the action to

educational sense, then it can reveal itself as an advertising instrument of subjects' independence and emancipation (Cunti, 2015). Intending sport in a broader sense, and then considering all forms of organized activity related to movement, it might be appropriate to induce several aspects that may confer to sport that educational value, as previously said, too often remains only in intent and that it is not practiced. It is at this point that the pedagogy is called upon to reflect critically on sports situations, to direct actions towards the construction of the learning *setting* that can promote the wellness of involved persons; in that meaning, a pedagogical perspective calls into question of *comparison* and *diversity*. The development of the comparison, in the etymological sense to put in correlation one thing with another to know the similarities and differences, enriches the sport of educational value, stimulating self-knowledge through the understanding of the other and the use of empathic abilities. The comparison theme, therefore, is closely linked to that of *diversity*, because it is precisely the comparison to stimulate the recognition of similarities and differences by the parties implicated. It becomes necessary, at this point, a *meeting space* with the other (Callari Galli, 1996), in order to tear down a multiplicity of antinomies which finish up reduce the complexity smoothing over the differences and producing gender stereotypes; in this regard, the meeting becomes an ethical space, advocate social and educational of cultural relativism and not of hegemony absolutism. A sport supporter of universal ideals must undoubtable accept many *voices of diversity* (Callari Galli, Ceruti & Pievani, 1998), preferring that educational purpose able to support values of subjectivities.

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## ECONOMIC IMPACTS OF SPORTS EVENTS

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**ABSTRACT.** A number of researches and economic analyses deal with the economic effects of the various sports events. These researches try to find out if it is profitable to organise a sports event or why it is worth, when and how the invested capital returns for the host country. Mainly for hosting mayor international sports events like the Olympic Games or the World Championships and continental competitions (e.g. EC) do the countries rival guessing the chances and analyzing the expected economic impacts and the return on investment. However, it is difficult to forecast the recovery effects or to quantify them considering the various locations. The Olympics will result in economic benefits for the host country. In the preparatory phase, the economy-stimulating effect, the additional demand for tourism and the multiple effects of tourism are the most extensive. Hosting such an event will structure the economy even after the event by increasing the effect of image thus attracting foreign capital.

**Keywords:** economic effects, Olympics, economic impact, multiple effect, demand, supply

### Introduction

A number of Hungarian and international researches and economic analyses deal with the economic effects of the various sports events. Mainly for organising the mayor international sports events like the Olympic Games or the World Championships and continental competitions (e.g. EC) do the countries rival guessing the chances and analyzing the expected economic impacts and the return on investments. Basically, two factors influence the extent of the economic impact relating these sports events (Felföldi, 2012):

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- 1) The quantity of the autonomous liquid assets flowing into the town;
- 2) The measure of the multiple effects which depends on the quantity of autonomous expenditure staying in town/region which produce income that is spent repeatedly. The re-spent part of the income is dependent on the excise margin inclination, while the measure of liquid assets flowing out of region is determined by the import and the taxes.

## **Objectives, Materials and Methods**

Our aim was to analyse the economical effect of the Olympic Games with seconder research date.

We examined: touristic impact, employment generating effect, extra incomes, and image forming impact.

When and how did the director's return on invested capital of the country?

## **Results**

Infrastructure development and investment are the leading economic impacts of major sports events, such as the Olympic Games. A spectacular example is the Sydney Olympic Games in 2000, when in the 6 years either prior to or following the Olympic Games the GDP in Australia rose 6.3 billion pounds, primarily thanks to investments. The two basically important organisational institutions were Sydney Olympic Organising Committee for the Olympic Games and the Olympic Coordinating Authority. OCA was responsible for the physical preparation and coordination of government-wide activities related to the Olympics.

Sydney Olympic Organising Committee for the Olympic Games owned full responsibility for the organisation and the marketing of the Olympic Games. All costs were covered by the Organising Committee (2071.5 million USD), the private sector (832.5 million USD), the New-South-Wales Government (997.2 million USD), the Commonwealth Government (186 million USD) and others. Officially, the Olympic Games were completed with some loss (45 million USD).

However, it has to be taken into account that the Australian Olympic Foundation and the New-South-Wales Government were given a share from the income titled as heritage contributions (Felföldi, 2012). Greece also had to produce significant improvements before hosting the 2004 Athens Olympics. The Olympics were the device to restore the host town and to solve major

transport problems alike in Barcelona. During the design and organisation, the aim of the organising committee in Athens was, on one hand, to decrease the negative environmental impacts applying innovative technology. Secondly, through infrastructure development the local environment was to be transformed. Preparation cost nearly 9 billion EUR for Greece (2012). 40 % of infrastructure development was national (the network of road and rail developments, marine service improvements in Piraeus, pre-port of Athens). It resulted in improvement in country towns. Backward areas' catching up was ensured with the new motorway system stretching the whole country thus it contributed to decreasing regional inequalities. Greek investments increased GDP by 0.1-0.2%, GNP by 3.8 %, which was the highest rate in 2004 in EU member countries. Almost one third of the increase was due to preparatory work (investment, constructions) for the Olympics.

Analyses describing the economic return of the Beijing Olympics are not so clear. The Chinese Government and Beijing Municipality undertook a financial guarantee to produce infrastructural and contractual developments needed for the Olympics. China was extremely generous with the expenditure. They spent 44 billion USD on hosting (this amount is half of Hungary's yearly budget). The Beijing Olympic Games cost four times more than the Athens in 2004, which means they spent 0.3 % of their GDP yearly on hosting. 2 billion USD of the investments were spent on sports infrastructure (stadiums, other establishments). The majority of investments in connection with the Olympics in Beijing were national alike in Athens. [14] Other economic analyses claim that the Olympics in China have contributed to the increase of GDP by 2.5 % since 2002 (Ráthonyi – Odor, 2015). Nearly 40 percent of total expenditure was spent on environment protecting developments, as the most important problem of Beijing was air pollution which had been getting worse and worse since 1980. (16 Chinese towns are on the top 20 international list of most polluted towns. The rate of fine dust concentration in the air is 6 times higher in Beijing than in New York.)

The hosting costs of the 2012 London Olympics were much smaller with their 15 billion USD compared to the 2008 Beijing Games. The costs were underestimated. Originally, they were only 4 billion USD or 2.5 billion GBP. Already after 2005, an extensive infrastructural development and spatial planning started in London. Revitalisation in practice meant the physical and social revitalisation of the underdeveloped and bleak East-London areas – this is why the Olympic Stadium and several buildings with the 2.5 km<sup>2</sup> Olympic Park were built in one of the poorest quarters of the country. Prior to the constructions, the organisers had to face a very serious problem: chemical plantations, landfills, fertilizer factories and a lot more industrial activities left their trace in the soil. In most cases, the dangerous waste was just dug in the soil not having handled properly.

Thus in twelve hours a day, every single day of the week, the soil which contained arsenic, lead, copper and a lot of carbon-hydrogen had to be cleaned. 85 % of the poisoned soil (that is 2 000 000 tons) was detoxified with various soil cleaning devices (Ráthonyi – Odor, 2015). On the land of the Olympic Park, eventually 9 new stadiums were built including the Olympic Stadium which can seat 80 000 ps. Similarly to the previous locations of the Olympics, significant improvements were done in modernising public transport, developing road network system, but they also built hospitals and thousands of apartments. Furthermore, the Stratford railway station, which is situated near the Olympic Park) was completely restored.

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

## **World Championships**

Until 1974, the potential economic impact of nine football world championships were examined by the German Commerzbank. In the host countries, foreign construction industry investments decreased by 1% one year prior to the championship, 0.4 % in the year of the championship and increased by 1.5 % one year after the championship. However, the analysts had not expected that. They had thought that the investments would increase before the championship as the majority of the preparation work had been launched then. Data showing GDP increase / person suit the forecast tendency better: in average, the GDP per capita increased by 2.1 % one year prior to the championship, 0.9 % in the year of the championship and 1.7 % one year after the championship in the host countries.

The macro-economic data of the countries that won these championships are a bit different, though. Before the championship the GDP per capita increase was smaller (0.9 % in average). In the year of the world cup it was 1.6 %, and 1.8 % the next year (Bíró, Müller, & Szalay, 2015).

We should not ignore the fact, though, that 4 of the 9 world championships were organised in the periods of economic slowdown, which strongly affected the above mentioned macro-economic data. Economists also claim, that the stronger the economy, the smaller is structuring, booming effect of these championships or Olympics, as the rate of investments related to the sports events is relatively small compared to the overall GDP of the whole country.

### **European Championships**

In 2004 in Portugal hosting the European Football Championship, an 800-million-euro stadium investment and a 330-million-euro airport investment were actualised. A Portuguese commercial bank calculated the following result: the GDP increased by 0.2 % between 2000 and 2003, while 0.25 % in 2004.

The 2008 European Football Championship was hosted by Austria and Switzerland together. The investments were almost exclusively related with sports infrastructure (4 stadiums were built / country) as Austria and Switzerland belong to the best-prepared receiving countries in Europe. The basic infrastructure is well-developed; the 4-5 star hotels were able to satisfy the additional demand. The sports infrastructure investments increased the GDP of Austria by 0.15 %. The same date for Switzerland was 0.2 %. Switzerland spent a sum of 1.3 million Swiss francs (200 billion HUF) on various infrastructure investments, a little higher than one third of which was spent on stadium restorations. In Austria, 190 million EUR (50 billion HUF) was spent on stadium constructions. All these mean 321 million EUR extra incomes for Austria, while 527 million EUR went to Switzerland.

In Poland and in the Ukraine, the investments also boomed in 2012 thanks to the European Football Championship hosted by them. 30.2 billion EUR was invested on developments of infrastructure and sports establishments, so the volume of investments extensively increased by 9 % in the Ukraine and 8.5 % in Poland. At the same time, the impacts of the economic crisis blunted. One million tourists arrived at the events; they spent an average of 3-4 nights generating 800 million EUR incomes for both countries. EURO 2012 can increase the Polish GDP by 2 % between 2008 and 2020 according to the forecasts (Dóra, 2012).

### **Touristic Impact**

More and more people take part in sports events as viewers, supporters, since the experience they gain at the events is an important incentive in sports tourists' motivation when choosing a destination. According to *András* (2003),

when visiting a sports event, the subject of the exchange is a form of spending leisure time, when making a claim on a service matches an experience or entertainment form. Beyond all these, the value of the product is defined with facilities available in the sports establishment, in the stadium, while the consumption through the media is defined with the media, which is a transforming factor.

A number of literature deals with the demand-supply elements, the economic factors and the target group motivation of sports tourism (Bácsné-Baba, 2014, Bánhidi, 2007, Bánhidi, Dobay, Starhon, & Edvy, 2006, Borbély, & Müller, 2015, Dénes, 2012, Dobay, 2007). Several international analyses and researches claim that the demand stimulating effect of the sports events prevails in the given country's tourism before, during and after the event. In most cases, this effect results in increasing guest nights, tourists, performance. However, the Olympics might have a guest number decreasing, tourism depressing impact. In the 2004 Athens Olympics the number of tourist arrivals decreased by 4% compared to the previous year date, but this was compensated by the extra income from the accommodation prices which were risen for the event (10.3 million EUR). It is true, that fewer tourists arrived, but they owned higher discretionary income and they were willing to spend more.

In 1992, before the Barcelona Olympics, it was one of the main goals to strengthen the prestige of a non-capital hosting town, to attract not only the investors but also the tourists. A lot of tourists for the Olympics travel not exclusively for the event but they connect it with exploring the host country.

In 1996, 61% of the German tourists arriving to Atlanta for the Olympics connected their stay with visiting the USA. Further research findings show that although tourist sites are important for the supporters, the main motif is still the event itself (Felföldi, 2012).

After the Olympics, an obvious increase was shown in tourism in Sydney. The increase in touristic sales did not stop with the end of the event series. In the last 3 months in 2000, further 189 000 visitors arrived in Australia, which was 15% more compared to the same period of the previous year. Income surplus from tourism was 398 million USD. This tendency continued in 2001 (4.7%), which was only halted by the terror activities in September. In the 1990s 4.5 million visitors arrived in Australia before the Olympics, while after the Olympics this number was 5-5.5 million, which is a significant increase (Borbély, & Müller, 2015).

As the result of the media campaign sponsored by VisitBritain and the Government of Great Britain the Olympics will improve the tourism in the country and vivify the touristic demand within the 4 years following the Olympics. Forecasts prognosticate additional 4.6 million visitors to London

which means 2.3 billion GBP redundancy incomes for British tourism. However, there are not any certain guaranties as the tourism industry sector depends on several external factors as well (economic crisis, safety etc.) (Dóra, 2012).

In many cases, before the sports event a significant demand increase was perceptible in the organising country's tourism market. In 1984 people invited by the Los Angeles Organising Committee spent 29 000 day, 19 200 guest-nights in the city, which resulted in approximately 7.5 million USD extra autonomous expenses (ERA, 1984). From data about the Atlanta Olympics it is clearly apparent that in 1996 they counted 18 000 guests and 69 760 guest-days, which would mean approximately 17.8 million USD extra autonomous expenses. In the case of Sydney Games the trainings of the 127 teams from 39 countries prior to the Olympics meant 43.2 million USD extra incomes from autonomous sources to the state of New-South-Wales. The number of visitors on the Games in 2004 was estimated about 25 000 people (Borbély, & Müller, 2015).

In connection with the different sports events related to the EC or the WC they recorded different average stay. In 2008 in connection with the UEFA European Championship the EC-tourists spent an average of 3.6 nights in Austria, while in Switzerland they spent an average of 3.4 days. In the Sydney Olympics tourists spent approximately 27 days, in 2006 for the FIFA World Cup in Germany 2 million tourists arrived. At the FIFA World Championship in South Africa 373 000 tourists were recorded for an average of 18 days (Szücs, 2007).

### **Employment Generating Effect**

Employment needed for hosting and organising the Olympics has a temporary character. Its permanency depends on the pace of the preparation and the actualisation. The application phase (the first phase) comes with a lot of additional tasks, the quantity of which grows in the preparation phase (the second phase). During the actualisation phase (the third phase) the quantity of tasks is the largest, while shortly after the Olympics (the fourth phase) it descends. Job contracts at the Organising committee are for an average of 4 years, while certain jobs are needed during the Olympics only for a few days. In Los Angeles, there was an amount of 16 250 people employed only for 30 days at the organising committee. In Soul, 300 people worked for 90 days, 700 people for 60 days, 12 100 people for 30 days, 3350 people for 20 days and 33 500 people for 10 days. Permanent employment is generated in industries which are in development due to the Olympics (construction industry, tourism, leisure time- and entertainment industry) or which are induced by the Olympics

(service and commerce industries, property protection, etc.) (Felföldi, 2012). After the Sydney Olympics hundreds of people were provided with employment in the Olympic village which functioned as a suburban area with shops, offices, entertainment facilities, fitness centres. This was the first suburbs in the world which was operated with solar power and after the Olympics as many as 5000 people were provided with homes here. The buildings having functioned as hospitals during the Olympics were reused as schools, kindergartens, leisure centres (unknow author, 2012). The 2008 Football European Championship contributed to generating employment of nearly 6000 people in Austria, 75,00 people in Switzerland, 13,400 people altogether. The Football World Championship in South-Africa and its preparations between 2005 and 2010 created 415,000 workplaces in the country which struggles with a 24.3 % unemployment rate. In 2010, 280 000 people found employment, even if temporarily, thank to the WC.

The advantage of the 2012 Football European Championship hosted by Poland and the Ukraine is that several workplaces were created, many of which remained even after the continental games. Furthermore, the developments will be useful for the whole country because they will ease the transport, making everyday life better, more comfortable with a higher standard (Unknow Author, 2012).

### **Extra Incomes**

The Austrian-Swiss European Championship generated a 1.4 billion EUR extra income for Europe. The reason for this is that during the events the Europeans spent more on travelling, catering services, food and transport.

Not only in Europe did the impact of the 2008 FEC appear. For instance, companies producing electronic devices as far as Thailand could market an additional 20-30 % of their products (mainly TV sets, LCD TV sets). The South-African World Championship resulted in a 15 billion USD extra income.

Through their image forming impact, sports events can contribute to vivifying certain areas of economy and to attracting foreign investments. The year after the 2004 Athens Olympics, the performance of Greek naval trading, boasting of the world's largest commercial fleet, grew significantly, reaching almost 41%, exceeding the 13.3 billion EUR incomes from tourism. The 2008 football continental games' added value exceeded a sum of 640 million EUR. The largest beneficiary was the tourism and trade sector. The Chairman of the Austrian Economic Chamber estimated the value of the image forming and the added advertising value for 300 million EUR.

In connection with the London Olympic Games, several calculations were done, stating that the event contributed to forming the image, and through this to the attraction of foreign investments, thus to the better performance of the economy.

The CEBR economists assume that the yearly growing rate of the London economy – calculated on the basis of the gross added value - might be increased with 0.6 % by the long-run effects of the Olympics. In further years, these effects will be perceptible in full extent, but at present prices, according to the estimations, in the long-run the additional impacts of the games will contribute to the output value of London economy in 2015-2016 with 1.8 billion GBP (MTI, 2013).

As another impact of the London Olympics, optimistic forecasts prognosticate the attracting of several-ten billion-GBP value investments. On the basis of the data collected by the United Kingdom Trade and Investment agency (UKTI), the government and the London Town Hall in a common study stated that in the year following the games, indirectly 9.9 billion GBP (4300 Billion HUF) economic profit originated from the Olympics. From this amount, 2.5 billion GBP have arrived to the British economy as the value of the additional indirect foreign investments since the Olympics.

These investments created 31 000 workplaces. British companies have won foreign investment commissions related to the Olympics – sports investments in Sochi and Rio, at the locations of the following winter and summer games. Besides, the foreign promotional activities in connection with the London Olympics resulted in additional export worth 5.9 billion GBP, says the analysis. According to the estimations in the analysis, until 2020, the sum of 28-41 billion GBP gross added value will appear in the British economy as a heritage of the London Olympic Games (Ráthonyi – Odor, 2015).

## **Discussion and Conclusion**

The Olympic Games result in economic advantages for the host country. In preparation phase the most expressive impacts are the economy vivifying effects, the extra tourism demand or the multiple effects of tourism. Hosting generate the economy through its image forming effect, by attracting foreign capital or orders in the years following the games.

Nowadays, commercialisation of sport relates to individual sports branches as well, as regulation changes tend to make the event faster, more dynamic, so it can be sold by TV broadcast as it adds to its entertainment character. It is a must that the event should be unique, spectacular and

entertaining. In case of the Olympics, we can see, that the entertainment function has become more and more dominating; let us mention the opening and the closing ceremony. Although the National Olympic Committees are trying to preserve the original Coubertin disciplines, it can be just more or less carried out. The National Olympic Committees forbid advertising during the event at the location of the event, in the Olympic village, even in the airspace (with the exception of advertisements of sports equipment producers, but the size of their logo is also limited). However, in many times we can see that sports branches with fewer viewer numbers get out of the programmes, while popular, exciting, new sports branches attracting crowds can get into.

The Olympics and the morals of them with the sports idols have a significant impact on the younger generations and the society's life style and physical activity. The Olympic morals like peace and the symbolic body of nations living together, being the medium of positive messages are all excellent formal and non-formal educational means.

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## OBESITY – THE CHRONIC DISEASE OF THE 21<sup>ST</sup> CENTURY

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**ABSTRACT.** Obesity is the scourge of humanity. Even if we aspire to a standard of living increasingly higher and more comfortable, this implies a risk to humanity, risking that through ignorance, to lead the human race from destruction. More than half the world's population is overweight and the rate increases from year to year. The number of deaths in one year amounts to 3.4 million people. Those who remain with disabilities rises to 3.9%. Recovery costs are huge. The work aims to present how danger is the obesity and ways to prevent it. Attaining those objectives is a close collaboration between medical sciences, sport sciences, sociology, chemistry sciences. Even if exercise cannot always solve stopping and controlling obesity, it is still the least expensive of known treatments.

**Keywords:** obesity, disease control, genetic factors, sport, children, health.

**REZUMAT. *Obezitatea – boala cronică a secolului XXI.*** Obezitatea reprezintă flagelul omenirii. Chiar dacă tindem spre un nivel de viață din ce în ce mai ridicat și mai confortabil, aceasta presupune un risc pentru umanitate, riscând ca prin ignoranță, să ducem rasa umană la distrugere. Mai bine de jumătate din populația lumii este supraponderală, iar rata crește de la an la an. Numărul deceselor într-un singur an se ridică la 3,4 milioane de oameni. Cei care rămân cu handicap se ridică la 3,9%. Costurile recuperării sunt uriașe. Lucrarea dorește să prezinte pericol ce îl reprezintă obezitatea și mijloacele de prevenire a acesteia. Atingerea obiectivelor este o colaborare strânsă între științele medicinei, științele sportului, ale sociologiei, ale științelor chimiei. Chiar dacă nu întotdeauna exercițiul fizic poate rezolva stoparea și ținerea sub control a obezității, este, totuși, cea mai puțin costisitoare dintre tratamentele cunoscute.

**Cuvinte-cheie:** obezitate, controlul bolii, factori genetici, sport, copii, sănătate.

### Introduction

The presence of obesity is not necessarily a scourge of our century. It always exists at all levels of society. Even our ancestors, from the primitive period were faced with the worst disease of mankind, obesity.

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The presence of obese people is known since the Neolithic Period (beginning about 10,200 BC and ended 2,000 BC.) In the cave paintings, but also in the statuettes and figurines discovered in many regions of the world, shows us that obesity was present even in those times. The women are presented with large breasts, wide basin, in apple or pear-shaped, with faces fatty, all demonstrating the presence of obesity.

The archaeologists named these statuette "Venus", named after the goddess of love, beauty, sexuality in the ancient Romans. Many of these statuettes presented the image of a woman who suffered from obesity by varying degrees, but even *morbidly obese*, one of the most dangerous forms of obesity (Osterdahl M, Kocturk T, Koochek A, Wandell PE: p. 682-685).

The best known of these is called the "*Venus from Willendorf*", discovered in 1908, which presented all the elements of morbid obesity, although we talk about dating for over 25,000 years (Antle-Weiser, Walpurga, 2012).

Discovered in 1908, the statuettes, which shows all the elements of morbid obesity, although we talk about dating for over 25.000 years (Antle-Weiser, Walpurga, 2012).

Besides this famous statue, across Europe were discovered and other female statuettes, which had the same forms: Venus from Schelkingen discovered in Germany, dating from 40.000 BCE, Venus from Lespugue with 26.000-24.000 years old or Venus from Moravani with an age of 80.000 years (Fagan, Beck, 1996).

The ancient period continue to gather data demonstrating that obesity is present in society. The philosopher Galen (born 130- died 210) is one of the first ancient philosophers who showing obesity as a form of illness (Potter, Mattingly, 1999). Hippocrates from Cos, the father of medicine (c. 460 BC- d. 370 BC) says about overweight: "Obesity is not only a disease itself, but is a risk factor for other diseases" (Hippocrate, Grimm, Prausnitz, Glogau, 1837)

Despite the fact that life in ancient Rome was at a high level and in some regions outside the Empire, food was varied, there were numerous cases of obesity. Neither India is safe. Indian *physician Sushruta* (ca. 600 BCE) tells us about those who are overweight, and recommends practical exercise that can help slimming (Dwivedi, Girish, Dwivedi, Shridhar, 2007).

The medieval period, despite numerous food crises, presence in the very rich societies, obesity is a form of pride and virtue. The great historical figures have suffered from this terrible disease: Henry VIII<sup>th</sup> (1491-1547) dies from complications of diabetes of the second degree. Obesity was so advanced that it was his move was made with a special crane (Erickson, 2004).

The industrialization period has seen a decrease in the rate of obesity, but food revolution from the 90s of the XXth century makes the worldwide to increase more alarming among all social classes. While in the past only a certain social category was reached, obesity now has no preference. Children, youth and adults, all can be affected by this scourge.

**The definition of obesity**

*Obesity* is derived from the Latin term "obesus" which means "fat robus, fattening" (Lewis Charlton Thomas, 1915, p. 7)

There is not a modern term, it exists from time immemorial. The term "*diet*" is used as a means of counteracting obesity. It has been used since Roman antiquity as a form of therapy and later become synonymous with "dietary" (Garland, 2009).

If you were to define obesity, we could say that is an excess of body fat, stored in different sections or levels of the body, which can have serious consequences for the health of the individual (Revista "Whoo 2000", p. 6).

The obesity can be defined as: a Body Mass Index (BMI / BMI) with a value over 30 / m<sup>2</sup>. Calculation of BMI is made by by dividing weight by height squared (kg / m<sup>2</sup>). The values can be tracked into table 1.

**Table 1.** BMI classification

<b>BMI</b>	<b>Classification</b>
< 18.5	underweight
18.5–24.9	normal weight
25.0–29.9	overweight
30.0–34.9	obesity class I (severe)
35.0–39.9	class II obesity (morbid)
≥ 40.0	class III obesity (superobezitate)

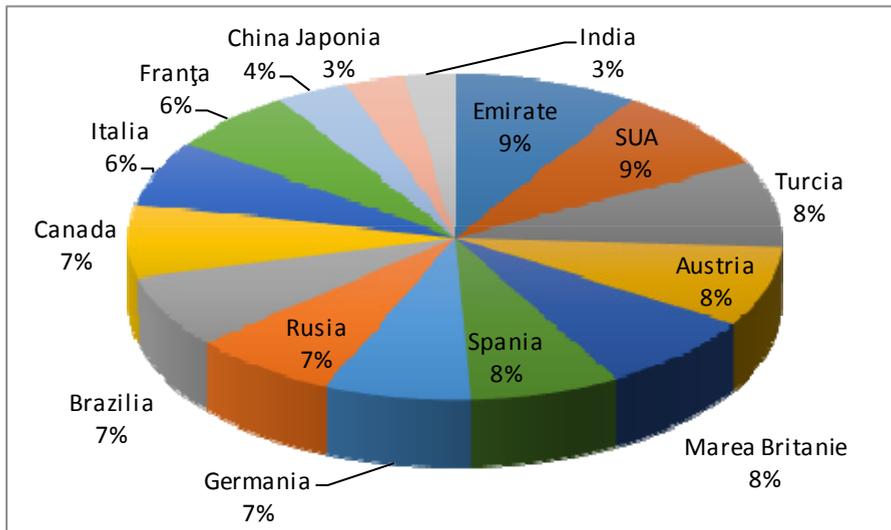
Garabed, 2008, pg. 47-51.

**The rate of obesity worldwide**

In June 2014 the first report appears really worrying about the health of the world’s population. The report, drafted by the Organisation for Economic Co-operation and Development (OECD), signals the fact that worldwide obesity rate is rising to the entire population (male / female) with a very high percentage of the young adult population. According to Table in Appendix 2, USA (the country

with the highest number of obese in 2014) 35% of the adult population over the age of 20 years suffer from obesity. Over 39.9% are adults of both sexes aged over 60 years According to the report presented by the Center for Disease Control and Prevention, NCHS Data Brief no. shown in 141, January 2014). (Tala H.I. Fakhouri, Ph.D., M.P.H.; and co, January 2014. *Physical Activity in U.S. Youth Aged 12–15 Years, 2012.*)

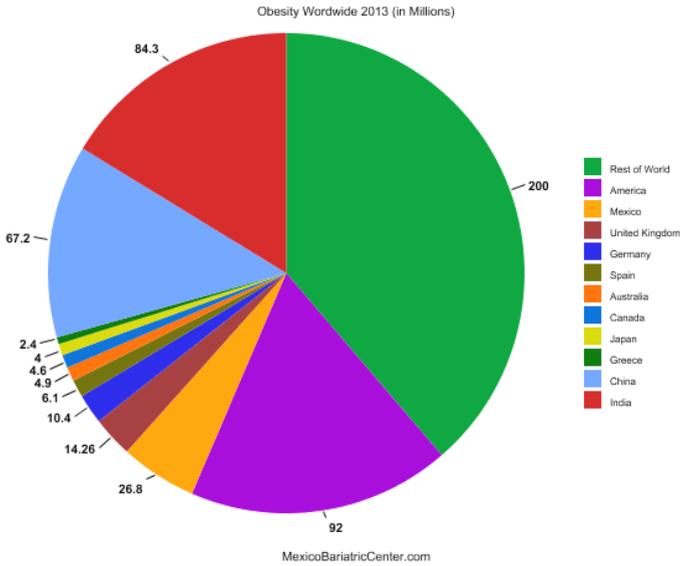
In December 2015, the Medical Center "Mexico Bariatric Center" presents a report showing that obesity rates report 2013, respectively 2014, increased. If USA occupied in 2014 the first place to obesity, this time the report is as follows: Saudi Arabia 71%, USA 66%, Turkey 65%, Australia 62%, UK 62%, Spain 58%, Germany 57%, Russia 57%, Brazil 56%, Canada 56%, Italy 50%, France 49%, China 28%, Japan 23%, India 20% (Figure 1.)



**Figure 1.** Obesity rates in the world in 2013-2014  
[www.mexicobariatriccenter.com](http://www.mexicobariatriccenter.com)

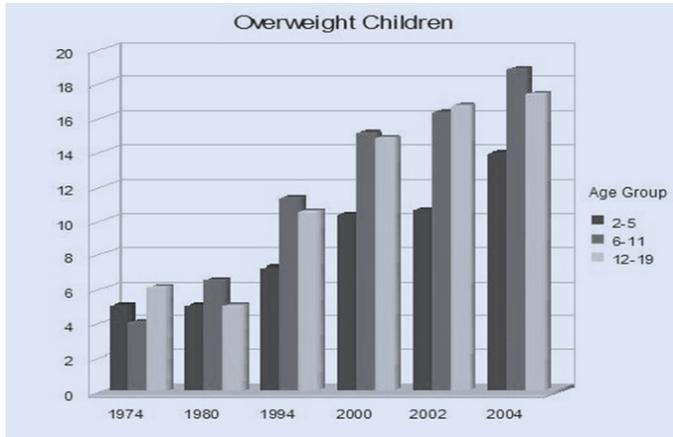
The situation is really alarming that 1 from 3 people in the world is obese. Half of the world's obese population (50%) lives in the USA, India, Pakistan, Mexico, Brazil, Egypt, Russia, Germany and Indonesia ([www.healthdata.org](http://www.healthdata.org)). In 2010, the death rate caused by obesity had risen in the world to 3.4 million people and 3.9% of the world was left with a disability of varying degrees (Marie, Fleming, 2014).

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**Figure 2.** Obesity Worldwide 2013  
[www.MexicoBariatricCenter.com](http://www.MexicoBariatricCenter.com)

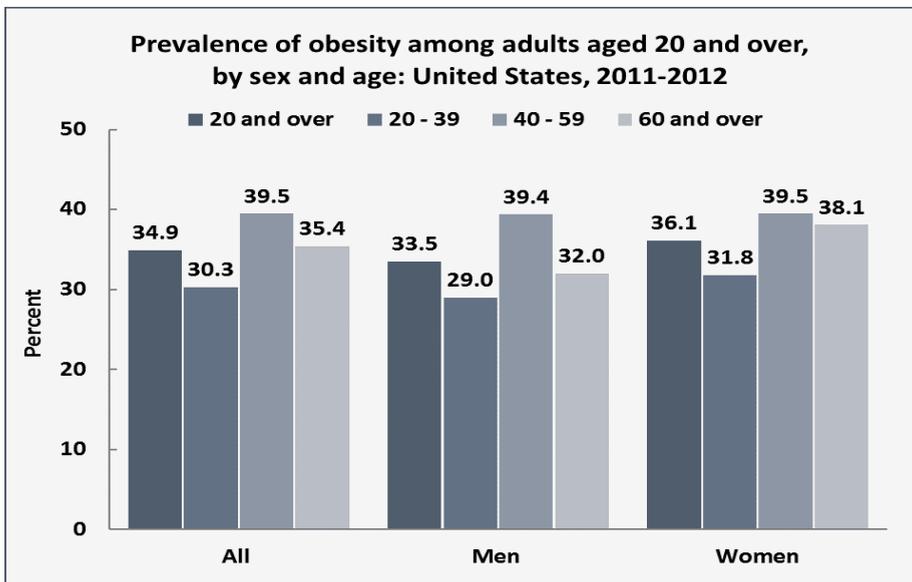
According to data presented by the World Health Organization, Obesity increases the level of children dizzying pace. Studies show that only at European Union level, obesity affects about 30% of children. Research has shown that in 18 years, obesity rates in children increased by 60% during 1990-2008) (Figures 3 and 4).



**Figure 3.** National Health Examination Surveys II (ages 6-11) and III (ages 12-17), National Health and Nutrition Examination Surveys I, II, III and 1999-2004, NCHS, CDC.

The obesity rate in Romania is alarming. More than half of the population is obese (58.1%). Of whom 62.1% are men and 54.5% are women. 21.3% of the population, over 18 suffer from some form of obesity ([www.vizhub.healthdata.org](http://www.vizhub.healthdata.org)).

Epidemiological Study (ORC) shows that 9.9% of adults up to 39 years are a form of obesity. And values are worrying if we see that those between 40 and 50 years old, the rate is almost 30 times higher, 30.1%. While at over 60 years old, the rate is 41.6%. In as allocations under by region, Moldova ranks first both in the obesity degree both in the obesity degree, and in patients with Grade II obesity. So 23.8% are affected by obesity grade I, while 33.4% are affected by obesity grade II. Transylvania and Banat, respectively Crisana, obesity rate is 18%. (WHO Global Health Observatory Data Geneva, World Health Organization, 2013)



**Figure 5.** Prevalence of obesity among adults aged 20 and over, by sex and age: US 2011-2012 (Cynthia L. Ogden, and co., 2014)

### Causes

The causes of this disease may be different. We cannot say that only wrong nutrition leads to deposition of fat mass. Among the major causes of obesity include:

1. *Sedentary activity*. A life without the presence of physical exercise, movement generally lead to accumulation of fat in the body. Among the diseases that can cause lack of movement include: anxiety, cardiovascular disease, diabetes, osteoporosis, herniated disc, and even colon cancer (Lopez, Mathers, Ezzati, Jamison, Murray, 2006).

2. *Genetic factors*. Although there are many cases, however, some genes can produce obesity, independent of a person's will. This fact is based genetic disorder of the central nervous system. (Willer, Speliotes, Loos, et al., 2009). Among serious genetic diseases include: Prader-Willi Syndrome, affecting chromosome 15; Cohen syndrome, a consequence of a mutation (chromosome 8); Momo syndrome (caused by a genetic mutation).

3. *Hypothyroidism*, thyroid hormone deficiencies.

4. *Social factors* – the obesity today are affected by all classes, but no matter which of these we speak, we see that where food is abundant and chaotic consumption, appear different forms of obesity.

5. *Infectious agents* - especially those from the intestinal flora. Some micro-specific pathogens, bacteria found in the intestines can cause different forms of obesity.

6. *Physiopathology* - leptin and grelina are one of the factors responsible that regulates appetite in relation to the nervous system.

7. *Geographic factors* - nutrition varies from one region to another and from one community to another. Religious education has an important role in terms of weight control. Communities are that prohibit dairy mixture with the meat, while others neglects this aspect.

8. *Eating habits* - more than three meals a day, all rich in quantity.

### **Complications of obesity**

Ignorance and delaying the treatment of obesity can cause devastating effects in the human body. The treatment later being of tens and hundreds of times more expensive. The occurrence of serious diseases begin with very simple symptoms: loss of endurance, low immunity, fatigue, and especially increased weight.

Absence of any movement, moving more and more by vehicles, the avoidance of minimal effort, bring the body to the brink of collapse.

Among the diseases that appear we include (Ministry of Health, World Health Organization, 2010):

- High blood pressure;
- Breathing disorders, including sleep apnea, a potentially serious sleep disorder in which breathing repeatedly stops and starts;
- High triglycerides and low high-density lipoprotein (HDL) cholesterol;

- Metabolic syndrome — a combination of high blood sugar, high blood pressure, high triglycerides and low HDL cholesterol;
- Stroke - with many complications if survival.
- Gallbladder disease;
- Osteoarthritis;
- Gynaecological problems, such as infertility and irregular periods;
- Cancer, including cancer of the pancreas, kidney, uterus, ovaries, breast, colon, rectum, oesophagus, liver and other.
- Depression;
- Disability.

### **Means of combating**

Over time many recipes were offered to fight body fat excess. Before moving on to a series of effective measures, it is necessary to determine the exact cause of obesity. An endocrine disorder or a genetic problem makes it difficult to tackle a number of exercise effective and long term.

Once the detected cause treatment can begin. Where permitted to intervene exercise we will introduce a series of exercises adapted to each subject separately. We do not recommend a general program what should be work since the response effort differs from individual to individual, especially those who are not accustomed to exercise.

It will categorically avoid starvation diets, which can lead to serious health problems. Also cure of herbal teas and medications herbal teas and medications directed to weight loss, can cause severe dehydration of the body, endangering life. For results to be truly effective, especially long term, we recommend an individual program adapted the subject and only in close connection with the endocrinologist or the one who recommended medical treatment.

As forms of obesity prevention recommend:

1. Stretching exercises in the morning and/or during breaks from work (5-10 minutes).
2. The practice of the mass sports (tennis, volleyball, athletics, football, swimming, etc.) at least 50 minutes with medium effort.
3. Consumption of natural foods, dairy products, fruits, oils, etc.
4. An active life in an environment as natural (walking to work, trips, etc.)
5. Assuring a good nutrition, for adult's no more than four meals a day and no consumption of sweets or snack between meals.

The World Health Organization confirmed in 2010 that the practice of physical exercise reduces the risk of ischemic heart disease and approximately 30% and diabetes by 27%. Also the risk of colon cancer and breast cancer, a cause of obesity, is reduced by 21-25%, if practiced regularly exercise (European Commission, Directorate General Health and Consumers, Directorate C “Health and Risk Assessment”, 2010).

## Conclusion

The obesity can be considered one of the worst diseases of humankind. The danger is all the greater as anyone can be touched by it. The ignorance, postpone and inaction against physical exercise, can lead to loss of life or disability. Disability caused by the effects of body fat leads to extremely high financial costs, most often unbearable for the families of those affected.

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