



STUDIA UNIVERSITATIS  
BABEŞ-BOLYAI



# EDUCATIO ARTIS GYMNASTICAE

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2/2018

**STUDIA**  
**UNIVERSITATIS BABEŞ-BOLYAI**  
**EDUCATIO ARTIS GYMNASTICAE**

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## PELVIC-FLOOR MUSCLE EXERCISES FOR THE IMPROVEMENT OF MALE SEXUAL FUNCTIONS

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**ABSTRACT. Introduction.** Premature ejaculation (PE) and erectile dysfunction (ED) are the most common sexual disorders among men regardless of ethnicity. The literature estimates the prevalence of PE between 16,3-32,5 and the prevalence of ED between 10-66% depending on age and secondary diseases. **Objectives.** We aim to assess the efficacy of the 8-week-long program of pelvic floor muscle (PFM) rehabilitation in the therapy of premature ejaculation and erectile dysfunctions. **Materials and methods.** The volunteer in our case-study was a 24-year-old, non-smoking, athletic university student living in a heterosexual, sexually active relationship for 5 months. At the beginning of the investigation, the subject had to complete numerous questionnaires. The trial used complex physiotherapy as treatment. The first part of the physiotherapy consisted of exercises to raise consciousness of the function of pelvic floor muscles (PFM). The patient had to learn how to isolate the contractions of PFM from its synergic muscles. The basic exercises consisted of isotonic, isometric and relaxation practices that lasted for 6 weeks. After that, "lifting exercises" supplemented the basic practices for another 2 weeks. **Results.** At the termination of the 8-week-long program all previously measured qualities showed improvement to a certain extent. **Conclusion.** At the end of the 8-week-long program, we measured significant change in various qualities regarding sexual life that proves the efficiency and the reason of existence of PFM rehabilitation in the therapy of premature ejaculation and erectile dysfunctions.

**Keywords:** *pelvic-floor muscle exercises, premature ejaculation, perineal muscles, IELT, PEDT*

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## **Background**

Premature ejaculation (PE) and erectile dysfunction (ED) are the most common sexual disorders among men regardless of ethnicity. The literature estimates the prevalence of PE between 16,3-32,5 (Rowland, 2004) and the prevalence of ED between 10-66% (Feldman, 1994; Wagner, 1996) depending on age and secondary diseases. PE and ED could develop simultaneously as symptoms of a possible pelvic-floor dysfunction. The above-mentioned sexual dysfunctions are often approached by medical therapies that could have various side-effects. Treating pelvic floor muscles (PFM)-related PE and ED with physiotherapy has low risks, no side-effects and can be easily learned and executed by the patient in his home.

The role of the pelvic floor in male sexual dysfunction and the importance of pelvic floor physical therapy are only beginning to be appreciated by the sexual medicine community. Treatment of the pelvic floor has been shown to result in significant functional improvement of sexual health in selected men with concomitant pelvic floor and sexual dysfunction, especially in the presence of chronic prostatitis/chronic pelvic pain syndrome (Cohen, 2016).

## **Objectives**

We aim to assess the efficacy of the 8-week-long program of pelvic floor muscle (PFM) rehabilitation in the therapy of premature ejaculation and erectile dysfunctions.

## **Materials and methods**

Through internet advertisement, we recruited men, who reported premature ejaculation. The volunteer in our case-study was a 24-year-old, non-smoking, athletic university student living in a heterosexual, sexually active relationship for 5 months. He had neither incontinence nor any urological symptoms apart from self-reported PE. At the beginning of the investigation, the subject had to complete numerous questionnaires. We used the Premature Ejaculation Diagnostic Tool (PEDT) to assess the possibility and degree of the volunteer's PE (Symonds, 2007, a,b). 9 or higher values of PEDT was sufficient to take part in the study. Furthermore, the Beck

Depression Inventory (BDI) intended to discover any sign of depression (Beck, 1996). The Sexual Activity and Satisfaction Scale (SAS) measured the volunteer's contentment and activity in his sexual life with his partner (Kreuter, 1996). We applied the 5-item version of the International Index of Erectile Function (IIEF-5) to identify any possible dysfunction in the man's erection (Rosen, 1999). The subject was asked to estimate his Intravaginal Ejaculatory Latency Time (IELT), the time from vaginal penetration to intravaginal ejaculation during sexual intercourse (Lee, 2015).

The trial used complex physiotherapy as treatment (Lavoisier, 2014; Van Kampen, 2003). The first part of the physiotherapy consisted of exercises to raise consciousness of the function of pelvic floor muscles (PFM). The patient had to learn how to isolate the contractions of PFM from its synergic muscles. The basic exercises consisted of isotonic, isometric and relaxation practices that lasted for 6 weeks. After that, "lifting exercises" supplemented the basic practices for another 2 weeks. In these techniques, the subject had to learn how to distinguish at least five different degrees of PFM contractions and be able to change between the various levels without resting. Thus, these practices contained isometric-isotonic combinations of muscle-activity. "Lifting exercises" were only introduced if the patient reached a certain level in the physiotherapy thus his PFM showed improvement in strength and control. All these exercises aimed the strengthening of PFM.

Moreover, the volunteer had to execute masturbation techniques for 8 weeks as well. These exercises served as a sort of biofeedback during the program, therefore the patient could experience the functioning of the PFM and raise consciousness of them during erection. In addition, masturbation techniques can teach the male patient "when" and "how" to contract or relax his PFM during the pre-orgasm sensation. Mainly, ischiocavernosus and bulbospongiosus muscles are responsible for the maintenance of erection and ejaculation. These muscles function in synergism with the rest of the PFM. The acquirement of the ability to relax the PFM was crucial for the patient in order to delay the ejaculation. In these practices, the male subject had to maintain his erection for at least 30 minutes by tactile stimuli (without and with lubrication) and then ejaculate. Conditioning the man to uphold a sustained erection before ejaculation was also a key factor in treating PE.

The patient had to record a workout-log about his activities. All sessions took place at the university's educational room where only the patient and the therapist were present. The meetings' regularity was customised according to the development and needs of the volunteer.



## Results

At the termination of the 8-week-long program all previously measured qualities showed improvement to a certain extent. After the complex physiotherapy, the patient filled out the same questionnaires again: PEDT values decreased (9 to 2) thus the patient shifted to the category of PEDT that indicates no rapid ejaculation. IIEF-5 (19 to 23) and SAS (15 to 16) values increased, BDI values were constant (zero). The estimated Intravaginal Ejaculatory Latency Time (IELT) of the male subject increased from 5 to 13-15 minutes during coitus which corresponds to the time length of a “normal” sexual intercourse (7-14 minutes) (Montorsi, 2005). IIEF-5 identified a mild erectile dysfunction at the beginning of treatment. After the physiotherapy, the patient regained the physiological rigidity of his penile erection according to IIEF-5.

## Conclusion

At the end of the 8-week-long program, we measured significant change in various qualities regarding sexual life that proves the efficiency and the reason of existence of PFM rehabilitation in the therapy of premature ejaculation and erectile dysfunctions. Pelvic-floor related male sexual problems should be treated by complex physiotherapy and other alternative therapies before considering medications. PFM-exercises have no side-effects and it is relatively easy learn by the help of a physiotherapist. Furthermore, it is cost-effective and can be executed anywhere even during other activities. However, further research and observation needed in order to gather sufficient evidence and experience about pelvic-floor muscle rehabilitation. Up to this point, the results are promising.

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## SITTING TIME AND SPORT PARTICIPATION OF THE EMPLOYED POPULATION IN HUNGARY AND EUROPE

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**ABSTRACT. Introduction.** The aim of our study was to examine the participation, motivation and locations of sport activity of adult employed population in Hungary and Europe, highlighting the differences in sport participation among different occupation groups. **Methods.** The Eurobarometer (EB) is a set of international surveys conducted on behalf of the European Commission. The survey consisted of two modules, the 'Standard EB' which contains the core set of questions which are similar in every survey, and the 'Special EB' which included physical activity (PA) and sitting time (ST). In our research we used the Eurobarometer 2013 database. **Results.** According to ST we found significant differences between the European and Hungarian employed adults. Hungarian respondents spent less time with sitting. The proportion of respondents not doing any sports is the highest among Hungarian women (67,44%, CI: 64,24 - 70,64), and those who's occupation is "supervisor", "unskilled or skilled manual worker", or whose job is an "employed position - travelling" or "employed position at desk"(62,64% (CI: 55.58 - 69.70) - 72,41% (CI: 64,11-80,71). **Conclusion.** Our results show that more than one-third of Hungarian employees do not do regular sports, but overall spend less time sitting than the EU average. The amount of sitting and the proportion of inactive respondents is higher among women. Based on our analysis of job types we highlight office administrators' work - with higher rate of females -which includes very little PA. Thus, the increase of PA among women and among administrative workers is the key focus of our further research.

**Keywords:** *physical activity, sport participation, employees, Eurobarometer*

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## Introduction

Sedentary lifestyle is an emerging health risk that is associated with more than three million deaths annually worldwide (Gerovasili et al., 2015, Bennie et al., 2013). Several researches proved that physically active adults are healthier and face significantly lower risk of various chronic diseases compared to those with sedentary lifestyle (Ács et al., 2011; Ács et al., 2014; Jirathananuwat et al., 2017; Szalai et al., 2014; Bergier et al., 2014; Járomi et al., 2012). Furthermore, leisure-time physical activity (LTPA) and sport participation is positively associated with self-rated health and inversely with obesity (Abu-Omar et al., 2008). LTPA is closely correlated with healthy habits taken from home or socioeconomic situation, and a childhood led by healthy lifestyle means a more active adult life (Zeńczak-Praga et al., 2017).

Health status is also influenced by the daily average sitting time (ST). In the research of Lakerveld et al., 18.5% of the respondents reported sitting >7.5h/day, especially higher educated participants and those with white collar jobs (Lakerveld et al., 2017).

In the majority of European countries (25 countries, N=23909) sport participation (SP) among adults is less than 40% (Tuyckom et al., 2010). Demographic data shows that more men engage in physical activity than women. This is confirmed by the research of Velde et al., claiming that men are more engaged in physical activity (PA) during free-time than women (Velde et al., 2010). Research by Gerovasili aptly summarizes the socio-demographic factors in play, arguing that males, younger persons, and those living in rural areas, possessing higher education degrees or having at least moderate financial circumstances were independently associated with higher physical activity, especially LTPA (Gerovasili et al., 2015).

Sport participation is determined by different psychological motivation factors. Among other aspects, the Eurobarometer PA survey examined European respondents' motivation for sport. It revealed that the most motivated respondents lived in Sweden, Denmark and Finland, while Hungary – as most Central- and Eastern-European states – belonged to the countries with lower level of motivation. However, the least motivated county in the research proved to be the Netherlands. The results revealed two main motivational factors: physical appearance (including weight management) and social reasons (social activity and the need to be with friends) (Rios et al., 2013).

However, the frequency of sports participation of males and females appear to be affected by different factors. Women are affected more by a need to improve self-esteem, while men are more keen to produce social integration (Downward et al., 2014).

Yet, when we examine PA participation, it is important to evaluate environmental factors as well, such as the availability of sport facilities or the climatic features of the given country (Watanabe et al., 2017).

Lavery (2018) et al found association between higher mean annual temperatures and levels of physical activity: an increase in the mean annual temperature by 1°C was associated with 0.94 fewer minutes of vigorous-intensity activity per week (Lavery et al., 2018). Furthermore, the perception of opportunities for physical activity locally was associated with increased levels of all types of PA (Filippidis et al., 2016).

Jirathananuwat et al (2017) summarized in their review the five factors which together can be used as the basis of a well-established intervention to increase PA. The five factors are: predisposing factor (information, self-motivation, program training), enabling (instrument resource and enabled health service), reinforcing (campaign, competition, prizes, money/financial incentive, and rewards for participants), social support (family support, group meeting, group support), policy regulatory domain (protocols), and the environmental development domain (for example lunchtime walking or cycling groups, promoting stairway signs, etc).

Another 12-week worksite physical activity intervention's aim was to target a goal of 10,000 steps per day on reducing anthropometric indices, blood pressure indices, and plasma biomarkers of cardiovascular disease (CVD) risk among the employees who participated in the 12-week physical activity intervention (3x60 min/week). On average, 28% of participants adhered to the goal of 10,000 steps per day and according to the study's results there was no benefit for compliance to the goal of 10,000 steps per day (Corbett et al., 2018).

Skogstad's (2018) research focused on facilities and leisure time PA-initiatives. The study described a 15-month follow-up after an 8-week PA-initiative delivered at the workplace, investigating if improvements in cardiovascular risk status are sustainable. Participants reported an increase in LTPA during the 8-week follow-up, but the PA was back to baseline levels at the final, 15-month follow-up.

A workplace intervention was conducted over 40 days targeting insufficiently active and/or obese adults; separated in two groups in the after-work (n = 25) or in-work group (n = 23) with a goal as 60 min PA/day, or a control group (n = 23). The after-work group undertook more vigorous PA and had greater weight loss and lasting blood glucose improvement, relative to the in-work participants and controls (Burn et al., 2017).

A number of research programs examined PA of adult employees and several interventions aimed to maintain employees' health and increase their PA. However, the above references prove that a short-term PA intervention is not sufficient – it is not enough to encourage employees to sit less or walk more during work. The results show that long-term results can only be achieved by systematic, weekly sport participation after working hours, as part of the overall lifestyle.

## **Objectives**

The aim of our study was to examine the sport participation, sitting time, sport motivation and sport location of adult employed population in Hungary and Europe (EU) and to explore the differences in various occupational groups to form a well-aimed intervention promoting increased PA among the target group.

## **Methods**

The Eurobarometer (EB) is a set of international surveys conducted on behalf of the European Commission. The survey consists of two modules: the 'Standard EB' which contains the core set of questions that are similar in every survey, and the 'Special EB' which includes physical activity and sitting time. For each survey independent samples were drawn from each EU member state using a multi-stage, random sampling design with probability proportional to population size and population density. The research included 27 countries in 2013 with 27,919 respondents altogether. Data was collected in November-December 2013. All interviews were conducted face-to-face in the respondent's home and in the respective national language. Computer-assisted personal interview (CAPI) technique was used in countries where it was available and, where unavailable, paper and pencil questionnaires were conducted (Eurobarometer, 2013). Our research based on Eurobarometer 2013 database and we examined the sport participation, sport motivation - barriers and sport location, and demographic questions such as gender, age, marital status, place of living, and occupation. To compare PA and demographic variables we applied chi-square tests using SPSS 22.0 software.

## Results

Demographic data reflected by Table 1 revealed that both genders were equally represented in the study. More than half of the respondents were married. Our results proved similar to the European average in terms of age and residence as well. One-third of the participants lived in villages or towns, another third of them lived in medium- or major cities of Hungary. Majority of the respondents were middle-aged. In light of all the above we claim that our sample sufficiently represents the population in focus (Table 1).

**Table 1.** Demographic parameters of the Hungarian (HU) and European (EU) sample

	HU		EU	
N	474 N/%		11514 N/%	
<b>Gender</b>				
Male	259	54.65	5475	47.55
Female	215	45.35	6039	52.45
<b>Marital status</b>				
Married	253	53.43	6390	55.50
Single living with partner	99	20.95	1728	15.01
Single	72	15.24	1967	17.08
Divorced	43	9.09	1023	8.88
Widow	6	1.29	264	2.29
Other/not responded	-	0.00	142	1.23
<b>Place of living</b>				
Village	163	34.33	3650	31.70
Small or middle town	130	27.38	4364	37.90
Big cities	181	38.29	3494	30.35
<b>Age groups</b>				
15 - 24	50	10.55	721	6.26
25 - 34	114	24.10	2571	22.33
35 - 44	156	33.01	3064	26.61
45 - 54	106	22.34	3121	27.11
55 - 64	46	9.62	1762	15.30
65 years or more	2	0.38	275	2.39



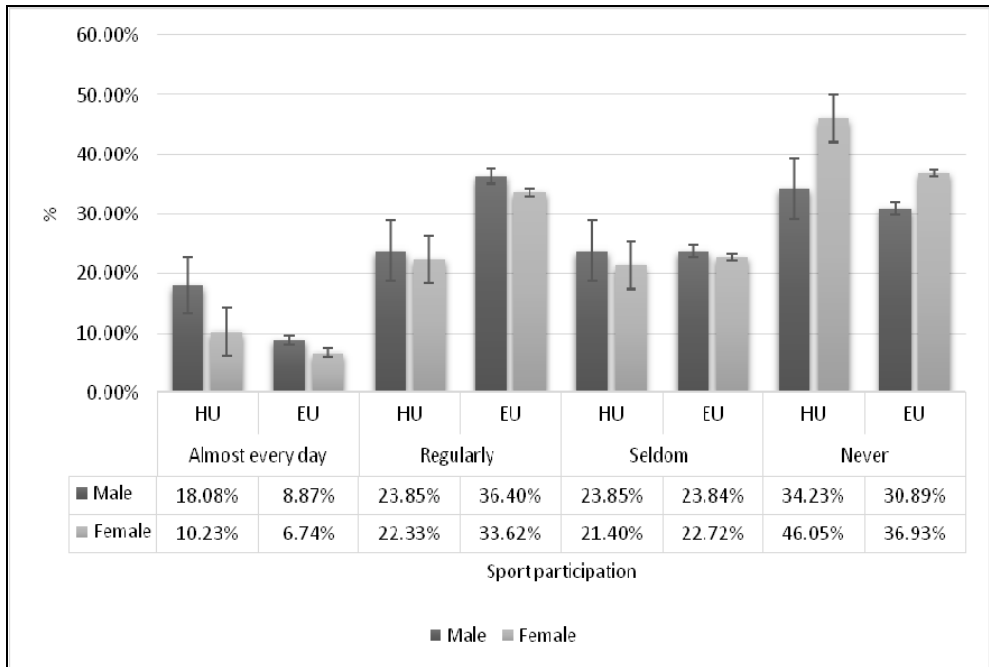
Time spent sitting is lower among Hungarian respondents compared to the EU average. We found significant difference between genders among both the Hungarian and the EU respondents, men spending less time sitting. Twice as many Hungarian male respondents reported to sit 2h 30 minutes (min) or less per day on average than in the EU, and there are about 10 percentage points less Hungarian respondents who belong to the 5h 31 min – 8h 30 min and the 8h 31 min or more categories compared to the EU sample. In terms of female respondents, Hungarian women reported less time sitting than women in the EU, but the differences are smaller than those in case of men (Table 2).

**Table 2.** Average daily sitting time among HU and EU respondents by gender

	HU		EU	
	Male	Female	Male	Female
	p=0.049	$\chi^2=7.82$	p<0.001	$\chi^2=20.56$
<b>2h 30min or less</b>	33.99%	29.11%	18.34%	19.53%
<b>2h 31min to 5h 30min</b>	46.25%	39.91%	42.92%	38.80%
<b>5h 31min to 8h30min</b>	15.02%	23.94%	25.57%	28.02%
<b>8h31min or more</b>	4.74%	7.04%	13.17%	13.65%

We found differences in sport participation in terms of gender in both groups. Generally, sport participation is higher among men. There is no significant difference between sport participation in Hungary and the EU, although the proportion of those who never or seldom do sports is higher among Hungarian employees (58.08% confidence interval (CI): 55.01 – 61.15; 67.44% CI: 64.24 – 70.64) (Figure 1).

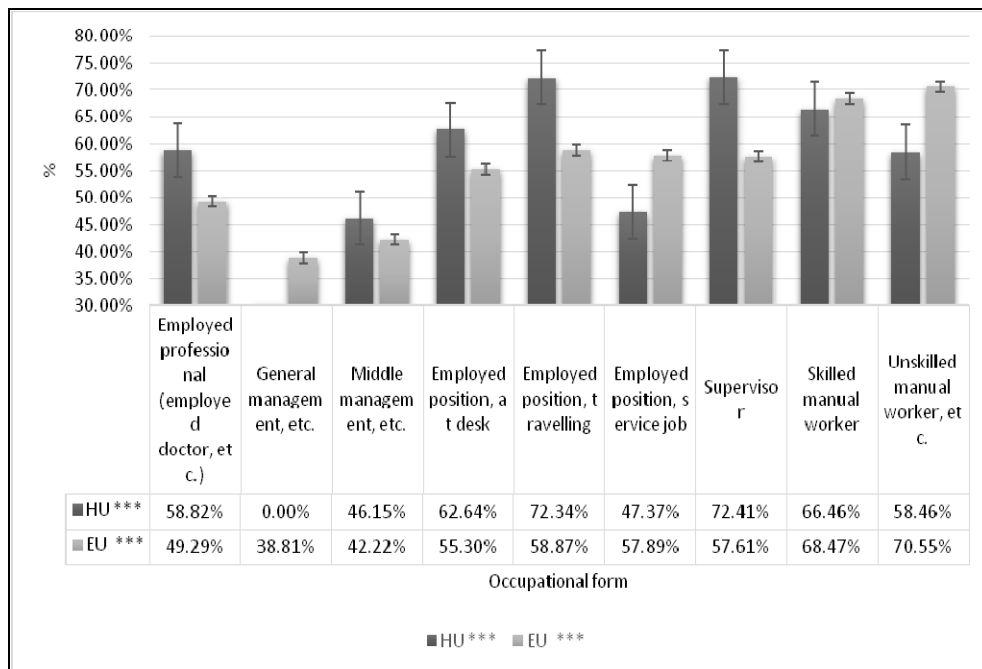
Although Hungarian respondents spend less time sitting compared to the EU average, respondents from the EU spend more time doing PA compared to Hungarians.



**Fig. 1.** Frequency of the sport participation among EU and HU employees by gender

In the following section we explore the connection between sport habits with occupational forms. The Eurobarometer survey distinguished between 9 occupational groups. One of these – the general managers – did not appear in the Hungarian sample. Figure 2 shows the Hungarian and European respondents who never or seldom play sports, grouped by various types of occupation. Our results show that the proportion of respondents not doing any sports is the lowest among top-level and general managers, and highest among supervisors, skilled and unskilled workers, employed with travelling and “at desk” position.

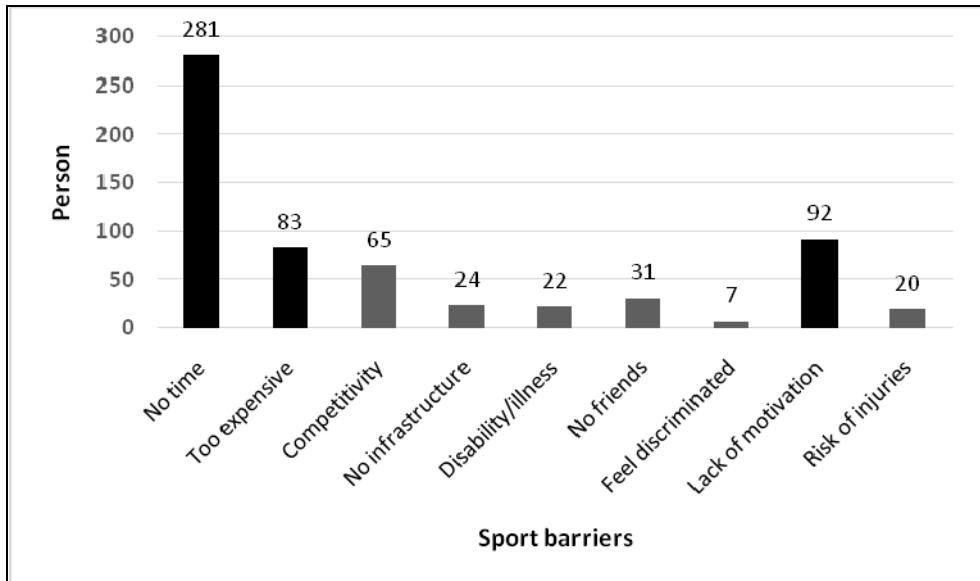
In the EU respondent group, the lowest level of sport participation was reported by unskilled manual workers, skilled manual workers, workers in service jobs, supervisors and employees who travel during work (Figure 2).



**Fig. 2.** Frequency of the employees who never or seldom do sports, by location and occupational form (% , \* $p > 0.05$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ )

Furthermore, in this research we examined which motivational factors are considered the most important regarding sport participation. Hungarian and European respondents alike claimed that fitness, relaxation and health are the most important factors of motivation during sport.

We also examined the reasons behind the behavior of those opting out of sports. For Hungarian respondents, it was the lack of time, money and motivation (Figure 3). The first three most frequent sport barriers found in the European study are similar to the Hungarian results, and we found no differences between the two samples in terms of gender or the type of occupation.



**Fig. 3.** Sport barriers among the Hungarian employees who not do any sport activities ( $p < 0.01$ )

Finally, we mention our results on the location where Hungarian respondents play sports. This reflects that more than half of both the male and female respondents claimed that the access to local sport facilities was satisfactory.

## Discussion

This research revealed that 58.05% of Hungarian male employees and 67.44% of Hungarian female employees do not play sports at all or do it once a month at most. In comparison, the Eurobarometer 2013 study claims that 62% of the Hungarian population never or seldom play any sport. Tuyckom et al. (2010) research revealed that in the majority of European countries ( $N=23909$  in 25 European countries) sport participation is less than 40%. We suggest that in countries with lower sport participation, policy makers should engage more in increasing PA to maintain a healthy society. Increasing PA of women should be of primary importance.

Hungarian employees spend less time sitting than the European average. Research ( $N=27637$ , 15-98 years old population) of Bennie et al revealed that mean reported weekday sitting time was 309 min/day (SD 184

min/day). There was a broad geographical pattern and some of the lowest amounts of daily sitting were reported in Southern- (Malta and Portugal, means 194-236 min/day) and Eastern- (Romania and Hungary, means 191-276 min/day) European countries; and some of the highest amounts of daily sitting were reported in Northern countries (Bennie et al., 2013).

However, research by Milton et al supports the claim that the proportion of those who spend more than 7h 30 min daily with sitting is decreasing among the European population, from 27.7% to 19.0%.

Proportion of respondents who do not do any sports is lowest among employed professionals and general managers, and highest among middle managers, supervisors, skilled manual workers, employees working at desk or those traveling during their work (Milton et al., 2011).

The aim of Mullane et al's 2017 research's was to identify socio-ecological correlations of objectively measured sedentary behavior at the workplace in academic, industrial, and government sectors, with an active PAL-micro accelerometer. According to their results walking at lunch was positively associated while face-to-face interaction was negatively associated with prolonged sitting. Individuals in private offices sat more than those in public offices.

Our research and the results of Mullane also underline that increasing sport participation is key for the population conducting sedentary work.

Furthermore, our research revealed lower sport participation engagement among women, thus our results support the claim that it is important to motivate female workers to participate in intervention programs aiming to increase PA (Bergier et al., 2014, Salonna et al., 2015).

Our results showed that the biggest difference to average European and Hungarian sport participation scores were found among women and employees doing sedentary work or having to travel during work. Thus, additional attention should be paid to the inclusion of these target groups during preparation of intervention aimed at adult employees. We shall note however, that it is not satisfactory to simply include these groups to sport activities – long-term increase of PA requires the initiation of complex programs.

Shift in the work environment caused effective changes in the PA increase. Short activities during working hours proved to be less effective than after-work sports conducted three times a week. Peer support and motivation is highly important in reaching long-term goals (Jirathananuwat et al., 2017).

Supportive workplaces may reach important milestones in terms of increasing PA and engagement in sports. Effectiveness of healthy and active employees comes to surface during their daily job performance as well (WHO, 2010).

## Conclusion

Physical activity of the adult employed population strongly influences a country's wellbeing. Physically active lifestyle supports the increase of quality-adjusted life years. In our research, sport participation of manual and sedentary workers showed the lowest rate – PA rate of manual workers is potentially higher due to occupational features. Strengthening the engagement of sedentary workers in playing sports is a potentially key goal for intervention programs aiming to increase health at the workplace.

## Acknowledgement

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## SUBJECTIVE WELL-BEING AND ENGAGEMENT IN COMMUNITY SPORTS ACTIVITIES

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**ABSTRACT.** Physical activity and sports participation have significant benefits for physical and mental well-being, an emerging literature examines the impact of sports participation on subjective well-being. Identifying the existing literature gap regarding sport attending's relationship with subjective well-being, this study will examine whether sport attending also have significant and positive effects on individuals' life satisfaction. This study seeks to establish a relationship between sports participation and subjective well-being by distinguishing active and non-active participation. Subjective well-being was measured through life satisfaction in a sample of 1,017 active and non-active participants in a local Marathon event. Individuals who actively participated in the Marathon event reported higher life satisfaction compared to non-active participants. Education and frequency of participation were found to be significant mediation factors of the sports participation - subjective well-being relationship, with more educated and more frequent participants reporting higher life satisfaction. Engagement in community sports activities upgrades subjective well-being, and the power of this relationship is affected by specific demographic variables.

**Keywords:** *Subjective well-being, Sport participation, Sport attending, Local sport events, Leisure, Community sports*

### Introduction

Subjective well-being is an umbrella term of different life evaluations that individuals make. It comprises people's long-term levels of pleasant affect, lack of unpleasant affect, and life satisfaction, displaying relatively high levels of situational and temporal consistency (Diener, 1994). According to Diener et al.

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(1999), subjective well-being is a global measure of people's well-being that takes into account mood and emotions, as well as life satisfaction in selected life domains, including work, family, leisure/health, finances, self and social relationships. Of course, significant differences exist among different persons, as individuals place different emphasis on these domains (De Neve & Cooper, 1998). Subjective measures of well-being have become an area of interest as they are frequently used complementary to traditional economic measures in order to assess societal progress. Based on existing literature, significant steps forward have been made so as to understand both its ascendants and consequences.

## Literature Review

Broad terms, all possible influences of subjective well-being include income, personal characteristics, socially developed features, types of spending time, attitudes towards life, self and others, relationships, and the wider economic, social and political environment (Dolan et al., 2008). For example, it has been documented that subjective well-being is higher at the younger and older age points, representing a U-shaped relationship (Blanchflower & Oswald, 2008), as well as in married individuals (Verbakel, 2012). In accordance, it has been suggested that increasing income is related to increased life satisfaction up to a certain level, and then this positive impact diminishes (Sacks et al., 2010), as well as than being unemployed significantly decreases subjective well-being (Lelkes, 2006). Besides demographic characteristics, several other correlates of subjective well-being have been highlighted by the empirical literature, such as physical and mental health (Steptoe et al., 2015), leisure and engagement in social activities (Newman et al., 2014), social cohesion (Dehley & Dragolov, 2016), and environmental quality (Eiffe et al., 2016).

Among these factors, physical activity and sports have been suggested to contribute significantly to subjective well-being. In general terms, there is abundant evidence that engaging in sports and exercise has a positive impact on both physical and mental health. Physical activity has the potential of upgrading mental well-being and life quality through enhanced self-esteem, improved mood and reduced anxiety (Fox, 1999). Empirical evidence suggests that sports and exercise have a preventive and therapeutic impact on mental well-being, reducing the risk of depression and anxiety (Walsh, 2011). Accordingly, there is robust scientific evidence regarding the positive relationship between physical activity and physical health, as exercise and sports decrease the risk of illness (Meyers, 2008). Moreover, it has been documented that physical activity influences all dimensions of subjective well-

being, contributing to mental health through maintenance of an active life, mental alertness, stress reduction, positive attitudes towards life and development of social relationships (Stathi et al., 2002). In older adults, Ku et al. (2007) found that physical activity is essential for the physical, psychological, developmental and other elements of subjective well-being. Especially for health issues, there is a large number of researches highlighting all the possible benefits that someone can gain by actively participating in any kind of physical activity. Coenders et al. (2017) argue that the direct connection between sport participation and personal health (subjective health in particular) as stated on the majority of existing literature stands as it is. They also believe that possible health benefits of sport-participation are rather persistent, and are not explained by alternative factors in their research.

Although the positive impact of physical activity on the social, emotional and other dimensions of well-being has been well-established, a limited number of studies have highlighted the relationship between taking part in a sport activity as a member of a sport community and subjective well-being. Becchetti et al. (2008) found that relational goods, including sports participation individually and collectively, have a significant and positive effect on self-reported life satisfaction, while gender, age and education of participants play an important role, as the impact of sociability on happiness is stronger for women, older and less educated individuals. Wheatley & Bickerton (2017), who found that engagement in arts, culture and sports has a positive effect on subjective well-being, adopted a similar approach. Moreover, frequency of engagement is important only for sports as regular participation in sports activities only was found to have a positive impact on well-being. This assumption is also suggested by Kavetsos (2011), who showed that self-reported happiness increases with frequency of participation in sports activities.

The positive effects of sports activities on subjective well-being have also been verified by Lechner (2009), particularly for men, and by Rasciute & Downward (2010), who proved that physical activity, including sports participation and active travel through walking and cycling, has a positive impact on self-reported health and well-being. Moreover, it has been suggested that greater levels of subjective well-being are accomplished if one allows for the social interaction nature of sports. In particular, Downward & Rasciute (2011) examined 67 sports activities and found that sports participation increases subjective well-being of individuals in greater extent in the case of sports that require social interactions, such as team sports and sports undertaken with a partner (eg. racquet sports). In a sample of disabled individuals, Lee & Park (2010) established a positive relationship between sports participation and life satisfaction, despite the level of disability.

In the general population, Pawlowski et al. (2011) explored the age-specific effects of physical activity and sports participation on subjective well-being in 19 European countries, confirming that engagement in physical activity generally contributes positively to the subjective well-being of individuals on a European level, although significant age-specific differences exist, as with increasing age, people seem to be on average less happy and less active. Pawlowski et al. (2011) suggested that proximity to sports facilities is important for establishing a relationship between sports participation and subjective well-being, an assumption also confirmed by Huang & Humphreys (2012), who investigated the relationship between sports participation and self-reported happiness in the US, indicating that individuals living in a county with greater access to sports facilities are more likely to participate in a physical activity and report higher life satisfaction, with men appearing to benefit more than women from participation.

For example, Kavetsos & Szymanski (2008), based on a multinational survey, concluded that hosting a sport event leads to a short-term “feel-good” effect, and recently, Kawakami et al. (2017) found that subjective happiness of elders without a specific team to support significantly increased after watching a professional baseball game. This study adds to this literature by providing further evidence on the relationship between active and passive sports engagement and subjective well-being, using data of participants in a Marathon event. Researchers have broadly used running events when it comes to sport participation and well-being issues as they offer a big variety of participants as well as engagement in many different levels. In one of these researches, Zhou and Kaplanidou (2017), explored the social capital building among participants, finding strong evidences that bonding capital as well as bridging and linking capital is well developed in events of this type.

## **Materials and Methods**

### ***Aim of the study***

The present study aims to identify the relationship between subjective well-being and the frequency of engagement in sport events on individuals that are passively or actively engaged in sport events. Additionally, the demographic profile of participants on subjective well-being is investigated.

### ***Research tool***

The questionnaire was based on two widespread methods to measure life satisfaction. Positive and negative affect schedule (PANAS method), as well as the Life Satisfaction Approach. The final result was a combination of these

two methods, adjusted on the specific running event. Firstly, the questionnaire included 4 questions aimed at clarifying the socio-demographic characteristics of the study sample. More specifically, gender, age, marital status and educational status of participants were identified. Participants' level of engagement in sports events was identified by a 5-point Likert (1: Very rarely to 5: Very frequently). Also, the level of subjective well-being of the participants was determined through a 10-point numeric scale (1-Not at all satisfied to 10-Absolutely satisfied), referring to the level of life satisfaction.

### ***Study sample***

Convenience sampling method was employed in order to collect the research sample. The total sample consists two sub-samples of individuals that run (actively engaged individuals) the 10th International Marathon "MEGAS ALEXANDROS" in Thessaloniki and more specifically the 5,000m Course of Health and Dynamic Walking and individuals that attended the specific sport event as spectators (non-actively engaged individuals). The total sample of the survey reaches the 1017 individuals, while the two subsamples of the actively and passively engaged respondents consist of 514 and 503 individuals respectively.

### ***Statistical tools***

The results of the survey are presented by combining the use of both descriptive and inductive statistics. More specifically, with regard to the descriptive statistics tools used, they include the presentation of the frequencies and the relative frequencies of the respondents' answers, while for the presentation of the results of the answers identified by the Likert scales mean and standard deviation were used. In addition, the Pearson linear correlation coefficient was used in order to identify the relationship between subjective well-being and the frequency of engagement in sport events, while independent samples t-test and One-Way ANOVA test were used in order to conduct comparisons on the mean scores of subjective well-being based on the type of engagement and socio-demographic characteristics.

## **Results and Discussion**

Percentages of men and women who run in the half-marathon were 53.1% and 46.9%, respectively, while in the non-active sample, respective percentages were 45.9% and 54.1%. Active participants were mostly between 18 and 45 years old (74.1% of the total sub-sample), 10.6% were from 45 to

55, 10.4% up to 18 years, 4.3% between 56 and 65 and 0.8% over 65 years. In addition, in the non-active sub-sample, 71.3% were aged between 18 and 45, 11.6% between 45 and 55, 10.6% up to 18, 5.6% from 56 to 65, and only 1.0% was aged over 65. 60.4% of non-active and 49.6% of active participants were single, while the corresponding percentages of married individuals for the two sub-samples were 25.8% and 33.9%, respectively. The percentages of separated, divorced, widowed or cohabiting individuals were significant lower. Furthermore, 31.7% and 28.6% of passively and actively engaged individuals were secondary education graduates, 12.8% and 10.3%, respectively, were technical school graduates, while 32.9% of the sports event spectators hold a university degree, with the corresponding percentage of the runners in the half marathon being 34.7%. Moreover, the percentage of the runners who hold a Master or Phd is relatively higher in comparison to spectators (22.3% and 14.8% respectively).

**Table 1.** Demographic characteristics and degree of engagement in sport activities

		Passive engagement		Active engagement	
		N	%	N	%
Sex	Male	231	45.9%	272	53.1%
	Female	272	54.1%	240	46.9%
Age	<18	53	10.6%	53	10.4%
	18-25	174	34.7%	133	26.0%
	26-35	109	21.7%	135	26.4%
	36-45	75	14.9%	110	21.5%
	45-55	58	11.6%	54	10.6%
	56-65	28	5.6%	22	4.3%
	>65	5	1.0%	4	0.8%
Marital status	Single	302	60.4%	255	49.6%
	Married	129	25.8%	174	33.9%
	Separated	22	4.4%	21	4.1%
	Divorced	16	3.2%	15	2.9%
	Widowed	10	2.0%	10	1.9%
	Cohabiting	21	4.2%	39	7.6%
Educational level	Secondary education	158	31.7%	144	28.6%
	Technical school	64	12.8%	52	10.3%
	University degree	164	32.9%	175	34.7%
	Master	61	12.2%	92	18.3%
	Phd	13	2.6%	20	4.0%
	Other	39	7.8%	21	4.2%
		<b>M</b>	<b>SD</b>	<b>M</b>	<b>SD</b>
Degree of engagement		3.24	1.19	3.26	1.25

Finally, regarding the level of engagement in sport activities for active and non-active participants, this was identified as quite high, with the corresponding mean scores being equal to 3.26 and 3.24, respectively (SD = 1.25 and 1.19).

Considering the impact of the basic socio-demographic characteristics of the two sub-samples on the life satisfaction level, statistically significant differences in the mean scores were identified only in reference to the educational status of the individuals that were actively engaged in the sports event ( $p < 0.001$ ). Specifically, individuals of higher education, and especially Master and Phd graduates, reported higher subjective well-being score compared with university, technical school and secondary education graduates.

**Table 2.** Differences of subjective well-being score based on demographic characteristics

		Passive engagement		p	Active engagement		p
		M	SD		M	SD	
Sex	Male	7.26	1.49	0.778	7.32	1.37	0.081
	Female	7.22	1.36		7.52	1.21	
Age	<18	7.11	1.76	0.417	7.23	1.44	0.534
	18-25	7.26	1.44		7.35	1.46	
	26-35	7.01	1.49		7.59	1.08	
	36-45	7.41	1.13		7.41	1.23	
	45-55	7.31	1.44		7.43	1.22	
	56-65	7.57	0.88		7.14	1.64	
	>65	7.20	1.64		7.25	0.96	
Marital status	Single	7.15	1.48	0.254	7.35	1.33	0.295
	Married	7.50	1.11		7.52	1.23	
	Separated	7.18	2.13		7.10	1.87	
	Divorced	6.94	1.48		7.67	0.72	
	Widowed	7.10	1.37		6.80	1.69	
	Cohabiting	7.29	1.27		7.53	1.06	
Educational level	Secondary education	7.05	1.53	0.178	7.12	1.47	<0.001
	Technical school	7.25	1.55		7.08	1.40	
	University degree	7.33	1.32		7.51	1.21	
	Master	7.38	1.08		7.72	0.99	
	Phd	7.92	1.04		8.20	0.89	
	Other	7.08	1.66		7.29	1.45	

## **Recommendations**

Physical activity and engagement in sports have been identified as significant factors contributing to mental and physical well-being, but yet, participation in community sports activities in reference to subjective well-being is understudied. This paper adds new empirical evidence to this matter and contributes to our understanding of the possible positive sports experience. In particular, by measuring subjective well-being through self-reported satisfaction with life, this study revealed significant differences between active and non-active sports engagement's impact on subjective well-being, taking also into account different demographic characteristics. By examining the life satisfaction levels of a sample of both active and non-active participants in a Marathon event, three important suggestions can be made.

## **Conclusion**

First, the study revealed that life satisfaction levels are quite high among both active and non-active participants, indicating that sports engagement and collective physical activity positively contributes to subjective well-being. Indeed, there is empirical evidence suggesting that although physical activity improves mental and physical health (Stathi et al., 2002; Meyers, 2008; Walsh, 2011), allowing for the social interaction nature of sports through collective participation leads to greater levels of life satisfaction (Downward & Rasciute, 2011). Moreover, this study found that life satisfaction is greater for active participants in comparison to non-active ones, suggesting that being more actively engaged in sports activities has greater influence on well-being, as more engagement means greater social interaction as well as greater levels of physical activity. Besides, attending once a sports event has a short-term orientation, in contrast to the long-term nature of subjective well-being (Kawakami et al., 2017).

Second, present findings suggest that the relationship between engagement in sports activities in the community and subjective well-being is not affected by the demographic profile of the active and non-active participants. No statistically significant differences were found in terms of gender, age and family status, although there is empirical evidence that men may benefit more than women by participating in sports activities as regards their well-being (Lechner, 2009; Huang & Humphreys, 2012; Ruseski et al., 2014), as well as that age is a contributing factor in self-reported life satisfaction levels when sports engagement is taken into account (Pawlowski et al., 2011; Ruseski et al., 2014).

The only demographic factor that was found to have a positive relationship with subjective well-being for active participants in this study was education, with individuals of higher educational levels reporting higher life satisfaction, in contrast to Becchetti et al. (2008) findings, who documented the impact of sociability stemming from sports participation on well-being, is stronger for less educated individuals. Education may be a mediating factor in this case due to the possibility that more educated individuals place more importance to extensive social networks and value more the benefits of togetherness stemming from sports activities in the community. Further investigation is required to address the impact of demographic characteristics and access to sports facilities on life satisfaction and subjective well-being.

The above-mentioned findings might have a significant value for future managerial implications among governmental institutes or local policy offices. The outcomes of this study show a clear and positive relationship between sport participation/sport attending and subjective well-being and this relationship is yet to be explored in the future. Taking under mind that service environment and event quality are highly connected with event loyalty, a strong bridge between local individuals and consistent participating can be build. (Alexandris et al., 2017)

### **Disclosure statement**

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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## MULTI BALL TRAINING METHOD

APOSTU PAULA<sup>1\*</sup>, NUȚ RAMONA ANCUȚA<sup>1</sup>, BACIU ALIN MARIUS<sup>1</sup>

**ABSTRACT.** *Multi ball training method.* The multi ball method was first introduced by the Chinese. It can be successfully applied in one-to-one situations (such as private coaching), where the coach is working with just one player, but it can also be used successfully with a 1:2 ratio of coach to players. Multi ball training implies hitting the ball at different spins, power, speed and the placement in different combinations. Continuous hitting the ball removes the time wasted picking up the ball, increasing thus the intensity of training and helps to improve drills execution by strengthening difficult moves. **Material and methods:** sixteen table tennis junior II level players of the Politehnica Sports Club of Cluj-Napoca were involved in this study. The participants were divided into two groups: the Experimental group (n=8) and the Control group (n=8). For two years, the players attending experimental group have performed trainings by alternating the multi ball method with regular methods. **Results:** Differences were noticed between the Experimental and Control group results. The Witness group results were improved comparing with the previous testing however the lack of improvement and of higher play consistency impeded further progress. Players of experimental group achieved better results on contests, being highly trained both from technical and tactical point of view as well as physical and psychological perspective. **Conclusions:** The players' training requires the improvement of technical procedures by acquiring them as correctly and effectively as possible, using methods and means suitable to their skills.

**Keywords:** *multi ball, table tennis, technical procedures*

**REZUMAT.** *Antrenamentul cu multe mingi - cutia cu mingi.* Metoda de antrenament – cutia cu mingi este o metodă, care a fost introdusă pentru prima dată de către chinezi. Aceasta poate fi aplicată în situații de unu la unu (cum ar fi coaching-ul privat), în cazul în care antrenorul lucrează doar cu un singur jucător, dar poate fi, de asemenea, utilizată cu succes și în raport de 1:2, antrenor și doi jucători. Antrenamentul cu multe mingi presupune lovirea mingii cu diferite

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rotații, forță, viteză, plasare în combinații diferite. Lovirea mingii în continuu înlătură timpii morți provocați de culegerea mingilor măbind astfel intensitatea antrenamentului și contribuie la îmbunătățirea executării exercițiilor prin consolidarea mișcărilor dificile. **Material și metode:** la acest studiu au participat șaisprezece jucători de tenis de masă, juniori II din cadrul Clubului Sportiv Politehnica Cluj-Napoca. Participanții au fost împărțiți în două grupe: Experimentală (n=8) și de Control (n=8). Timp de doi ani, sportivii din grupa experimentală au efectuat antrenamente în care s-a mizat pe alternarea cutiei cu mingi cu metodele obișnuite. **Rezultate:** S-au observat diferențe între rezultatele grupelor Experimentală și, respectiv Control. Grupa martor a crescut și ea față de testările trecute, dar faptul că nu a beneficiat de acumulare, de o siguranță mai mare la masă a împiedicat-o să progreseze mai mult. Sportivii grupei experimentale au obținut rezultate mult mai bune la competițiile la care au participat, având o pregătire foarte bună, atât din punct de vedere tehnico-tactic, cât și fizic și psihologic. **Concluzii:** În instruirea sportivilor se impune îmbunătățirea procedeele tehnice printr-o însușire cât mai corectă și economică a acestora, folosind metode și mijloace adecvate nivelului de cunoștințe ale sportivilor.

**Cuvinte cheie:** *cutia cu mingi, tenis de masă, procedee tehnice*

## Introduction

Table tennis being a duel game, the effectiveness of training is proportional to the strengths of the challenger. The availability of suitable level sparring partner is a big challenge for organizing any training sessions. Coaches of advance and high level players face more of this challenge, to find a right partner for training. One of the means to overcome this challenge and have a very effective training session for technical and tactical aspect is by using multi-ball training (Master Thesis, China Papers, 2012).

Multi-ball training in table tennis is an effective training method. Multi-ball training with different means of rotation, strength, speed, placement, arcs, combinations of different technologies and continuous ball hitting can compensate for the fewer to-and-fro times, more space and other weaknesses, in order to improve the exercise efficiency and make athletes grasp and strengthen a variety of difficult movements. Secondly, continuous hitting in multi-ball training can effectively increase the density and strength of the training, which not only strengthens the improvement of techniques and tactics, but also plays a role in training athletes' quality and will (Wei Zheng, Keyi Jin, 2016).

## Research Subjects and Methods

### *Research Subjects*

The experiment was conducted at the Politehnica Sports Club of Cluj - Napoca during the years 2016-2018. They were included 16 athletes, juniors II, divided into experimental group (8 athletes) and control group (8 athletes).

### *Research Methods*

Documentation: search and collect literature on multi-ball training in table tennis in domestic sports journals by hand or computer to provide a theoretical basis of this thesis.

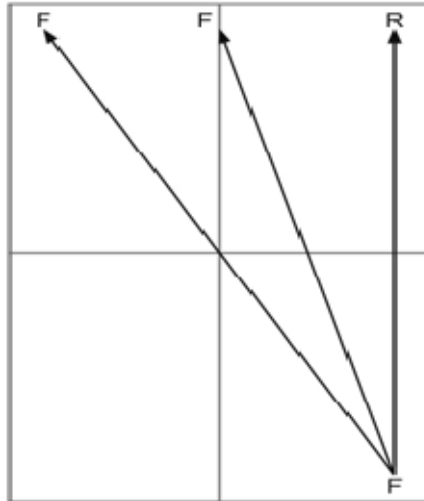
### *Experimental Methods*

Both the experimental and the control group are mixed groups containing 8 players each. The experiment has been performed on groups training in the same conditions on initial, intermediary and final testing. The experiment lasted for two years, and consisted in the use of regular methods (drills performed with partners) for the witness group and the alternative use of multi ball and regular methods for the experimental group.

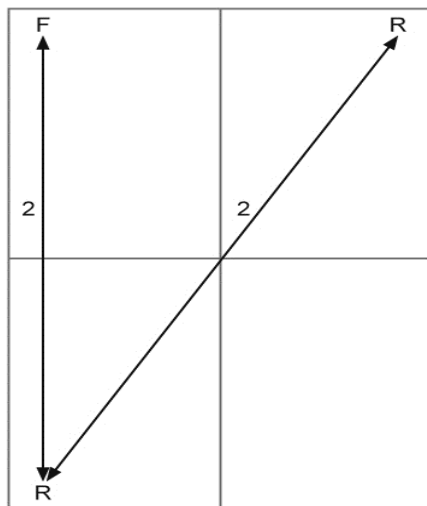
At the beginning of the experiment, both groups were put to the initial tests consisting of three combined drills of table tennis in order to observe the number of correct strokes. These initial testing was identically made, both groups having the same type of training and preparation methods.

These three **combined drills**, that will be resumed during the final and intermediary tests are:

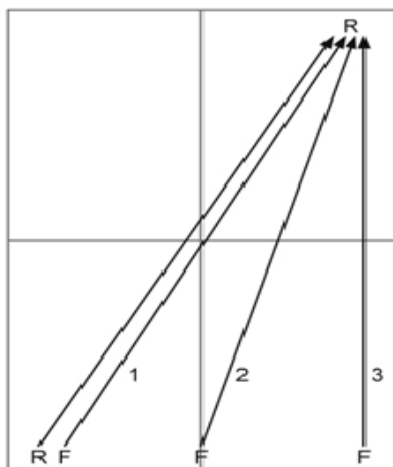
1. Forehand counter – forehand counter – backhand counter to the opponent's backhand (F-F-R→F); **Fig.1**
2. Forehand 2 counter – 2 backhand counter to the opponent's backhand (2F-2R→R); **Fig.2**
3. Cross backhand counter optionally followed by forehand from the backhand side, followed by forehand counter from the middle, followed by forehand counter down the line from the forehand side (R-F-F-F→R). **Fig.3**



**Fig. 1.** Forehand counter - forehand - backhand counter to the opponent's forehand (F-F-R→F)



**Fig. 2.** Forehand counter 2 forehand-2 backhand to the opponent's backhand (2F-2R→R)



**Fig. 3.** Cross backhand counter optionally followed by forehand from the backhand side, followed by forehand counter from the middle, followed by forehand counter down the line.  
(R-F-F-F→R)

## Results and Discussion

The results obtained by the two groups on the 3 drills at the **initial and final testing**:

**Table 1.** Experimental group results

Nr.	Name	Initial testing			Finale tests		
		Theme 1 F-F-R→F	Theme 2 2F-2R→R	Theme 3 R-F-F-F→R	Theme 1 F-F-R→F	Theme 2 2F-2R→R	Theme 3 R-F-F-F→R
1	L.G.	10	14	12	15	19	18
2	S.D.	12	10	13	16	16	19
3	Ş.A.	13	12	11	18	19	16
4	A.K.	14	9	12	19	17	15
5	C.A.	10	10	10	15	15	18
6	O.M.	11	14	14	16	21	20
7	R.T.	12	10	12	18	17	19
8	T.M.	14	13	12	20	17	18
<b>Sum</b>		<b>94</b>	<b>92</b>	<b>96</b>	<b>137</b>	<b>141</b>	<b>143</b>



**Table 2.** Witness group results

Nr.	Name	Initial testing			Finale tests		
		Theme 1 F-F-R→F	Theme 2 2F-2R→R	Theme 3 R-F-F-F→R	Theme 1 F-F-R→F	Theme 2 2F-2R→R	Theme 3 R-F-F-F→R
1	L.G.	10	14	12	15	19	18
2	S.D.	12	10	13	16	16	19
3	Ș.A.	13	12	11	18	19	16
4	A.K.	14	9	12	19	17	15
5	C.A.	10	10	10	15	15	18
6	O.M.	11	14	14	16	21	20
7	R.T.	12	10	12	18	17	19
8	T.M.	14	13	12	20	17	18
<b>Total</b>		<b>94</b>	<b>92</b>	<b>96</b>	<b>137</b>	<b>141</b>	<b>143</b>

On **initial testing**, based on the individual results of the players on each of the three combined drills and from the total of each group on the same drills, it outcomes that the players of the two groups are approximately equals from the technical perspective of mastering the technical and tactical procedures of table tennis. In addition, we mention that until initial testing, the players performed the same type of training (drills with partners, general and specific physical training). It's worth mentioning that, the players participated in both official and amicable contests, where the players of the two groups obtained approximately the same value results, both in individual and team contests.

The experimental group trained using the multi ball three times a week, while the control group continued to practice only with partners. Trainings of the experimental group were more complex, being conducted in two ways:

- accumulation (multi ball) and drills with partners during the offseason competition period;
- drills with partners and emphasis on the game, before contests;

The results on intermediary testing reveals a progress of the experimental group, comparing with the control group, which is due to the multi ball training made by the players of experimental group, who had more control during play. The results obtained in official contests were also different, the experimental group achieving notable results.

**Final tests** revealed an increased performance of the experimental group comparing with the control group, the differences increased both in individual and overall contests. The control group had improved results comparing with the previous testing, but the lack of accumulation and control impeded its further progress. The players of experimental group achieved significantly better results in official competitions, being very well trained from technical and tactical perspective as well as from physical and psychological viewpoint.

### **The Application of Tactical Combination in Multi Ball Training**

When do tactical training for athletes, multi-ball training is a good choice. In the technical combination training in table tennis, the quality of training and the results in some technical training content with single ball training methods and means are not ideal. It is susceptible to opponents' ball quality and cannot reach the continuously, if you use the single ball training method, the ladder player cannot master well and it is easy to clean the ball. In addition, the ball is not high quality which will affect the continuity and exercise difficulty. However, these problems do not exist in multi ball training, which ensures the quality and intensity of training. In a tactical combination, we should accelerate the speed as much as possible in accordance with the tactical set and acceptable range for athletes, in order to improve athletes' response threshold to adapt to fast ball speed in actual games (Wei Zheng, Keyi Jin, 2016).

### **Conclusion**

Multi ball is great and can really help to increase the speed of your development. It's extremely versatile and can be used for players at all levels. Multi-ball training method has an obvious effect on improving players' technical and tactical levels, special qualities and will.  
(<http://www.experttabletennis.com/use-multiball-training-to-speed-up-your-table-tennis-development/>).

One is the formation of movements and correction of the techniques. The density and intensity of multi ball training is stronger than the single ball training. Second is to strengthen the footwork exercises. Due to the good continuity in multi ball training, trainees can run continuously. For example: when practice the above in the full court, the trainee may run continuously for about 30 balls. This is difficult to achieve in the single ball training. In addition,

multi-ball training can practice a variety of footwork, including front and rear footwork, left and right footwork, and some combination footwork. Based on each player's weaknesses, we can also make targeted exercise. Third, it could improve the combination ball techniques. Using the Multi ball training method to practice combination techniques may increase plate times, which is fewer in the single ball training. It can also improve athletes' response ability. Use different placements and different speeds of the ball to improve the combination ball techniques. Fourth, the develop athletes' good will to never give up in the face of adversity. Moreover, they will do not relax at the lead and do not hesitate in the face of pressure. In the face of fatigue they can withstand it. All these are necessary qualities for modern table tennis athletes (Wei Zheng, Keyi Jin, 2016). After the implementation of 11 Points Competition System, it requires the athletes to have stronger mental qualities. In the multi ball training with high-intensity, high-density and highly complexity, it requires athletes to insist on that, struggle it and never give up easily. It is effective to exercise athletes' willpower.

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## RESISTANCE, PULSEOXIMETRY AND SPECIFIC MEANS OF ATHLETICS AND FOOTBALL

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**ABSTRACT.** *Purpose:* Predictive and summative knowledge of the level of arterial oxygenation and of cardiac frequency, after two semesters of training in physical education classes with specific means of athletics versus football. *Objective:* To optimize the development of the body's resistance in lessons with specific means of athletics or football, which have greater efficiency. *Hypothesis:* The systematic training of students in lessons with football means and methods ultimately leads to changes in heart rate and oxygen saturation, which measured after the exercises offer better values compared to using the specific athletics means and methods. *Material and Method:* The experiment was applied on two experimental and control groups, which were randomized containing 28 pupils from the 9<sup>th</sup> to 12<sup>th</sup> grade. The development of resistance in lessons was carried out by the method of inter-effort and variable efforts, the experimental sample with specific means of football, and the control sample with specific means of athletics. Subjects of both groups were sampled with the device called pulseoximeter. The first evaluation with the pulseoximeter was predictive and took place at the beginning of the school year, and the second was applied summarily after two semesters with diversified means for the two samples. *Results:* Working with football-specific means produced greater progress in the subjects of the experimental sample compared to those of the control sample subjects who were trained with specific means of athletics over the same period of time. *Conclusion:* The statistical and mathematical calculations carried out as a result of the experiment confirm the assumptions of the hypothesis, so the results of the experiment confirm the hypothesis of the research.

**Keywords:** *resistance, pulsometry, means, athletics, football.*

**REZUMAT.** *Rezistența, pulsoximetria și mijloacele specifice atletismului și fotbalului.* *Scop:* Cunoașterea nivelului oxigenării arteriale și a frecvenței cardiace, predictiv și sumativ după două semestre de instruire în orele de educație fizică cu mijloace specifice atletismului vs fotbalului. *Obiectiv:* Optimizarea

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dezvoltării rezistenței organismului elevilor în lecții prin mijloace specifice din atletism sau fotbal, care au eficiență mai mare. **Ipoteza:** Instruirea sistematică a elevilor în lecții cu mijloace și metode specifice fotbalului, determină în final modificări ale frecvenței cardiace și a saturației arteriale cu oxigen, care măsurate post efort dau valori mai bune comparativ cu folosirea mijloacelor și metodelor specifice atletismului. **Material și metodă:** Experimentul s-a aplicat pe două eșantioane, experimental și de control, formate randomizat cu câte 28 elevi din clasele IX-XII. Dezvoltarea rezistenței în lecții s-a efectuat prin metoda eforturilor pe intervale și a eforturilor variabile, la eșantionul experimental cu mijloace specifice fotbalului, iar la eșantionul de control cu mijloace specifice atletismului. Subiecții ambelor eșantioane au fost supuși probei cu aparatul numit pulsoximetru. Prima evaluare cu pulsoximetrul a avut loc predictiv la început de an școlar, iar a doua s-a aplicat sumativ după două semestre de lucru cu mijloace diversificate pentru cele două eșantioane. **Rezultate:** Lucrul cu mijloace specifice fotbalului a produs progres mai mare la subiecții eșantionului experimental, comparativ cu cel înregistrat la subiecții eșantionului de control, care au fost instruiți cu mijloace specifice atletismului pe aceeași perioadă de timp. **Concluzii:** Calculele statistico-matematice efectuate ca urmare a aplicării experimentului au confirmat presupunerea ipotezei, deci rezultatele experimentului confirmă ipoteza cercetării.

**Cuvinte cheie:** rezistență, pulsoximetrie, mijloace, atletism, fotbal.

## Introduction

Knowing from the time before the teaching the mobilization and the great physical commitment to the students` effort when approaching the means and methodology specific to football for the development of resistance, compared to the physical commitment to the effort when working with specific means of athletics, we decided that by formulating the theme, to scientifically research if it is confirmed that the specific means of football, applied systematically during a school year, can further develop the resistance, the capacity of the students' body. According to Popescu-Neveanu's considerations, the effort is a "mobilization, concentration, accelerating of the physical and psychic forces within a system with self-conscious and unconscious self-regulation [...] The effort implies a certain finality and therefore characterized by focusing, obstacle, tension and unification of physical, mental, intellectual resources " (Bota, 2000). Considering these, we used the elements, processes and the game of football as a means of physical school education, knowing that they are loved by pupils and that they mobilize them and concentrate on depositing all physical and mental capacity for the success of more accurate and effective executions, to bring their success to execution and into the game.

By studying football in the preliminary research and observing the students' involvement in the sustained effort, compared with those of athletics, we deduced that these are the means they like and which mobilize the students. The exercises that are specific to the football game have become the means of exercising which assures the students the general resistance of the body, the positive attitude towards the repeated effort, the long-lasting work that produces fatigue, a basic condition for the development of resistance. "Modern competitive football requires general resistance (as a basis of physical condition) and special" (Buiac, 1985). Football has become a social phenomenon, generating emotions and joy when goals are scored or matches are won, and sadness when games are lost. By using the means of football play that are so accessible to high school students, the teacher can make the most of pupils' potential during extra-curricular classes and sporting activities, while at the same time providing them with specific skills, developing their motor, psychic, moral and willpower, rapid decision-making capacities: "Being appreciated and practiced with pleasure by the great mass of students, playing football forms skills and capabilities of maximum utility: moral and psychic qualities; skills in behavior in the community and in its interest; specific motor skills; ability to orient and decide, imagination and spontaneity" (Neța & Popovici, 2000).

The resistance development in the physical and sports education lessons are in close correlation with the physiological and psychological mechanisms of the high school student. "Ensuring the satisfaction through movement of a permanent and richer emotional sphere, the perspective of the realization of certain aspirations and skills is the basic bond of attracting and retaining young people in systematic sporting activity" (Alexe, 1972). Using in the lessons the football games, enthusiastically expected by the students, we have assured their positive attitude towards the repeated and variable effort, compared to a large work volume that produces the fatigue necessary for the resistance development. Until a few years ago, I have prioritized the formation and consolidation of specific motor skill and other sports than football (volleyball, basketball, hand ball). At the end of the school year, we found their contribution to the development of resistance harder. This was due to the nonparticipating attitude of all students to a high level of effort (at the planned schedule by the teacher) as a result of the pretentious technique that did not allow fluency in practice and play. We also added to it the popularity of these branches in our county, compared to football. As a result of this finding, I decided to address the development of pupils' resistance by means that are more accessible and enjoyable to them, belonging to the football field - more popular, more accessible, loved by students and practiced in free time. Sports performance is also determined by the pleasure of tackling the activity in lessons.

Football is so popular, precisely because of its high degree of accessibility, and it is approached with high potential by the students, while at the same time removing the attention from the high level of the effort made, resulting in fatigue which then allows the teacher to resume adapting their body to an immediate higher level of effort, through proper dosing, which ultimately develops resistance. This sporting branch can be practiced not only by boys, but also by girls, without being stigmatized. It also has an advantage, that it can be approached on any unmarked vacant surface within the school without major danger of injury.

By making a system of means belonging to football, and applying it to the preliminary research, we rationalized and standardized it to meet the goal, to develop the resistance of the students' body, their ability to exercise, more than the means specific to athletics. Knowing that the effort is a "systematic repetition of motor actions, aimed at improving performance without obvious morphological changes" (Hollmann and Hettinger, cited by Bota, 2000), we relied on building the specific means of football, choosing the methods of resistance development and their systematic implementation throughout the school year, both in physical education classes and in sports teams. From a physiological perspective, the effort "causes a series of disturbances in the body that affect major functions, adapting the devices and the systems being dependent on its nature" (Demeter, cited by Bota, 2000). For a positive adaptation of the devices and systems of the students' body, in the sense of optimizing the effort capacity, we have worked in lessons with the means and methods specific to football, rationalized and dosed accordingly from the preliminary research period.

The predictive and summative pulseoximeter testing aimed to know the level of arterial oxygenation and heart rate, after two semesters of training in physical education classes with specific means of football vs athletics.

## **Objectives**

Optimizing the development of the body resistance in lessons by specific means of football or athletics, and deciding has greater efficiency.

## **Methods**

In order to verify the hypothesis in practice, we decided to carry out the scientific research by experimenting, thus objectivizing its aspects and moments ("Scientific analysis aims at the objectification of all its aspects and moments. The objectivizing is accomplished by measuring objects, phenomena

and other variables subject to research" - Epuran & Marolicaru, 1998). The experiment was applied on two experimental and control groups, which were randomised containing 28 pupils from the 9<sup>th</sup> to 12<sup>th</sup> grade. The development of resistance in lessons was carried out by the method of intervals and variable efforts, in the experimental sample with specific means of football, and in the control sample with means specific to athletics. Subjects of both groups were sampled with the device called pulseoximeter. The first evaluation with the pulseoximeter was predictive at the beginning of the school year, and the second was applied summarily after two semesters of work with diversified means. For the students' instruction in the two school semesters were used the calendar schedules that included the specific means of football to the experimental sample and the specific means of athletics for the control sample. The exercises of both sports disciplines have been rationalized and dosed specifically to the development of the resistance of the students' body. The workload in the lessons was similar for both samples throughout the school year.

## Results

Working with the specific means of football used in the experiment in physical and sports education lessons for the development of resistance was a pleasure for the students ("Experimental Knowledge uses observation as an essential condition, as a source of hypothesis and as a source of information from deliberate provocation of the facts - Epuran & Marolicaru, 1998). They have produced motivation and emulation, positive factors for engaging students at great effort. In this context, we noticed a much better participation in their sustained effort and an increase in time of the body resistance index, which confirms Massimo Giacomini's statements: "The development of resistance is limited by other factors, the first being the psychological factor: children are slowly adapting to slow-moving activities, which stretch over a longer period of time. In recent years, intermittent methods of resistance training have developed a lot, especially in team sports, so long and slow exercises for the development of aerobic resistance have been almost completely abandoned. "[...]" To train the resistance there should be used specific ball exercises, exercise cycles or mixed exercises (with and without a ball), matches and other activities designed to maintain a high level of motivation. The goal-oriented game that needs to be attained is the teaching environment that should be at the core of physical training programs." (Romanian Football Federation, 2014). The systematic training of pupils during a school year with specific means of football has led to biological and psychological increases of the experimental sample subjects, that have led to greater progress in summative assessment



compared to the progress achieved by subjects of the control sample that have worked systematically on the same time, but with specific means of athletics. By statistical and mathematical calculations based on the data recorded on the pulseoximeter functional sample, to determine the oxygen concentration in the blood (Sp O<sub>2</sub>), before effort and post-exercise (after 6 minutes of aerobic run) the values of the statistical parameters indicators for the control sample and the experimental sample are presented in the following table:

**Table 1.** The values of the statistical parameters indicators for the control sample and the experimental sample

SpO <sub>2</sub> (%)	CONTROL SAMPLE						EXPERIMENTAL SAMPLE					
	Predictive Assessment		Summative Assessment		Progress		Predictive Assessment		Summative Assessment		Progress	
	Before effort (TP1)	Post effort (TP2)	Before effort (TS1)	Post effort (TS2)	Before effort (TS1-TP1)	Post effort (TS2-TP2)	Before effort (TP1)	Post effort (TP2)	Before effort (TS1)	Post effort (TS2)	Before effort (TS1-TP1)	Post effort (TS2-TP2)
sum	2759.0	2700.00	2761.00	2719.00	2.00	19.00	2753.00	2616.00	2766.00	2714.00	13.00	98.00
minimum	97.00	94.00	98.00	96.00	-1.00	-1.00	97.00	90.00	98.00	95.00	0.00	2.00
maximum	99.00	98.00	99.00	98.00	1.00	2.00	99.00	96.00	99.00	98.00	1.00	6.00
number	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
half	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00
<b>Arithmetic mean</b>	<b>98.54</b>	<b>96.43</b>	<b>98.61</b>	<b>97.11</b>	<b>0.07</b>	<b>0.68</b>	<b>98.32</b>	<b>93.43</b>	<b>98.79</b>	<b>96.93</b>	<b>0.46</b>	<b>3.50</b>
median	99.00	96.00	99.00	97.00	0.00	1.00	98.00	94.00	99.00	97.00	0.00	3.00
<b>Standard irregularity</b>	<b>0.68</b>	<b>1.02</b>	<b>0.49</b>	<b>0.67</b>	<b>0.46</b>	<b>0.76</b>	<b>0.71</b>	<b>1.61</b>	<b>0.41</b>	<b>0.80</b>	<b>0.50</b>	<b>1.05</b>
amplitude	2.00	4.00	1.00	2.00	2.00	3.00	2.00	6.00	1.00	3.00	1.00	4.00
variation factor	0.69	1.05	0.50	0.69	640.31	111.77	0.72	1.73	0.42	0.82	107.42	30.06
The STUDENT test	766.26	502.62	1068.38	763.61	0.83	4.73	732.97	306.48	1273.93	642.25	4.93	17.60
average error of arithmetic mean	0.13	0.19	0.09	0.13	0.09	0.14	0.13	0.30	0.08	0.15	0.09	0.20
Homogeneity	High	high	high	high	low	low	high	high	high	high	low	low

In predictive and summative testing, the pulseoximeter shows that in the pre-exercise measurement the oxygen concentration in the blood is higher than in the post-exercise measurement, where it decreases due to 6 minute aerobic run (desaturation occurs). In the summative evaluation SpO<sub>2</sub> values were mitigated in both samples, but more in the experimental sample where the subjects worked with different means and methods than those of the control sample.

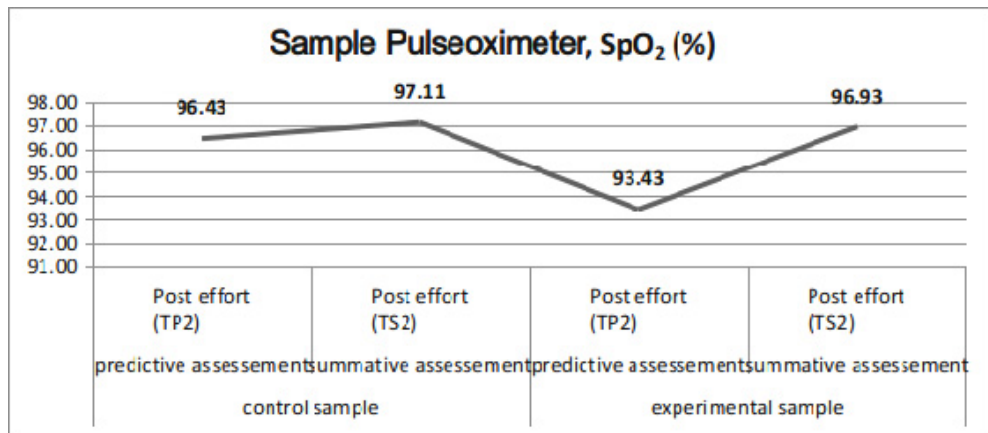
From the above table, we find an improvement in the arterial values of oxygen saturation (SpO<sub>2</sub>) obtained at TS2 vs. TP2, increased in the experimental sample versus the control sample (96.93 vs. 93.43 and 97.11 respectively compared to 96.43). The coefficient of variation at TS2 and TP2 shows high homogeneity in the summative assessment in the experimental sample (0.82) and in the control sample (0.69), and the standard deviation (0.80 and 0.67,

respectively) indicates a group near the average, so it is a small scattering. The value of the student test being greater than 2.58 (the critical value tabulated) at the threshold  $p < 0.01$  has the significance with a probability of 99%.

The progress of the experimental sample of 3.04% of oxygen saturation (SpO<sub>2</sub>) versus 0.61% of the control sample is due to the work of the subjects with means and methods specific to the football game, which proved to be more effective compared to the means and the specific athletic methods that the subjects of the control sample worked on. This conclusion highlights our hypothesis. Consequently, the null hypothesis (the random difference between environments) is invalidated and the hypothesis formulated is accepted.

**Table 2.** Table of values of the average values of the control sample and the experimental sample, in the predictive and summative post-exercise evaluation at the sample with the Spo<sub>2</sub>-Pulseoximeter. (oxygen concentration in the blood)

Control sample		Experimental sample	
Predictive assessment	Summative assessment	Predictive assessment	Summative assessment
Post effort (TP2)	Post effort (TS2)	Post effort (TP2)	Post effort (TS2)
96.43 %	97.11 %	93.43 %	96.93 %



**Fig. 1.** The progress and values of the arithmetic mean of the control sample and the experimental sample, in the predictive and summative post-exercise evaluation at the Pulse Oximeter-SpO<sub>2</sub> sample.

From the previous table with the arithmetic mean values and the associated graph we find an increase in the final value of the mean oxygen

saturation (SpO<sub>2</sub>) obtained at TS2 vs. TP2, increased in the experimental sample versus the control sample (in the control sample increased with 0.68%, and 3.50% in the experimental sample). This higher increase in the subjects in the experimental sample represents the greater efficiency of the means and methods of football specific to the means and methods specific to athletics. In the experimental sample, the mean of the progress of oxygen saturation (SpO<sub>2</sub>) was 3.04% and in the control sample only 0.61%.

**Table 3.** Table of the values of the statistical parameter indicators of the control sample and of the experimental sample in the predictive and summative evaluation at the Pulse Oximeter Functional Pulse Oximeter (PR)

PR (bpm)	Control sample						Experimental sample					
	Predictive assessment		Summative assessment		Progress		Predictive assessment		Summative assessment		Progress	
	Before effort (TP1)	Post effort (TP2)	Before effort (TS1)	Post effort (TS2)	Before effort (TS1-TP1)	Post effort (TS2-TP2)	Before effort (TP1)	Post effort (TP2)	Before effort (TS1)	Post effort (TS2)	Before effort (TS1-TP1)	Post effort (TS2-TP2)
sum	2214.00	4815.00	2215.00	4410.00	1.00	-405.00	2217.00	4767.00	2143.00	4067.00	-74.00	-700.00
Minimum	68.00	160.00	70.00	138.00	-8.00	-22.00	69.00	157.00	66.00	138.00	-10.00	-38.00
Maximum	90.00	182.00	86.00	170.00	8.00	-1.00	89.00	186.00	85.00	164.00	6.00	-19.00
Number	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
Half	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00
<b>Arithmetic mean</b>	<b>79.07</b>	<b>171.96</b>	<b>79.11</b>	<b>157.50</b>	<b>0.04</b>	<b>-14.46</b>	<b>79.18</b>	<b>170.25</b>	<b>76.54</b>	<b>145.25</b>	<b>-2.64</b>	<b>-25.00</b>
Median	78.00	170.00	80.00	158.00	-2.00	-16.00	80.00	168.00	77.00	143.00	-4.00	-25.00
<b>Standard irregularity</b>	<b>5.83</b>	<b>5.99</b>	<b>4.74</b>	<b>8.19</b>	<b>4.06</b>	<b>4.96</b>	<b>4.54</b>	<b>7.88</b>	<b>4.23</b>	<b>6.68</b>	<b>3.47</b>	<b>4.15</b>
Amplitude	22.00	22.00	16.00	32.00	16.00	21.00	20.00	29.00	19.00	26.00	16.00	19.00
Variation factor	7.37	3.48	5.99	5.20	11360.90	-34.29	5.73	4.63	5.53	4.60	-131.16	-16.60
The STUDENT test	71.76	151.89	88.34	101.74	0.05	-15.43	92.37	114.30	95.75	114.97	-4.03	-31.88
Average error of arithmetic mean	1.10	1.13	0.90	1.55	0.77	0.94	0.86	1.49	0.80	1.26	0.66	0.78
Homogeneity	high	high	high	high	low	high	high	high	high	high	high	high

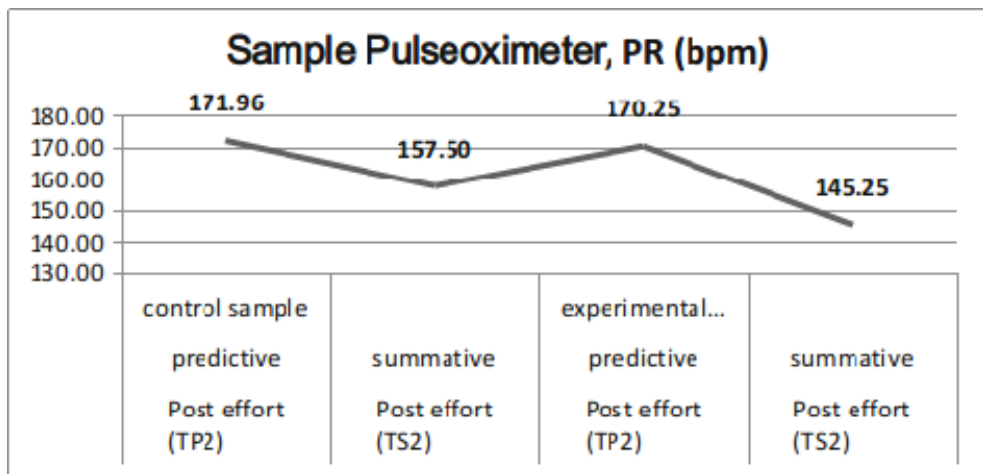
Initially, after the effort, the predictive pulse (PR) testing was higher. It decreased in the summative testing of both samples, but the decrease was more pronounced in the subjects of the experimental sample than those of the control sample. So the values diminished in the summative evaluation more in the subjects of the experimental sample who worked with the means and methods specific to football. From the above table, we find a decrease of the arithmetic mean values of the pulse (PR) obtained at TS2 vs. TP2, increased in the experimental sample compared to the control sample (145.25 vs. 170.25 and 157.50, respectively 171.96). The coefficient of variation at TS2 and TP2 shows high homogeneity in the summative assessment of the experimental sample (4.60) and the control sample (5.20), and the standard deviation (6.68 and 8.19) indicates a group near arithmetic mean, better performance of the subjects from the experimental sample. The value of the Student test is greater

than the critical table (2.58), so it is significant at the threshold  $p < 0.01$  and has a high probability of 99%.

The progress of the experimental sample was manifested by the decrease of the heart rate at the effort by 25 beats per minute (bpm), and in the control sample the adaptation to effort specific to the specific means and methods of athletics decreased the pulse by only 14.46 bpm, from which it follows that the means the specific methods of playing football used to train the subjects in the experimental sample gave better performance, developed greater student effort. According to the aforementioned, one can say that in the case of pulse (PR) the null hypothesis is rejected and the hypothesis formulated is accepted.

**Table 4.** Table of values of the arithmetic mean values of the control and the experimental sample, in the predictive and summative post-exercise evaluation at the Pulseoximeter – PR

Control sample		Experimental sample	
Predictive assessment	Summative assessment	Predictive assessment	Summative assessment
Post effort (TP2)	Post effort (TS2)	Post effort (TP2)	Post effort (TS2)
171.96 bpm	157.50 bpm	170.25 bpm	145.25 bpm



**Fig. 2.** Graph with the progress and values of the arithmetic mean of the control sample and the experimental sample, the predictive and summative post-exercise evaluation at the Pulseoximeter PR

From the previous table and the associated chart we find a decrease in the final value of the mean heart rate (PR) obtained at TS2 compared to TP2,

increased in the experimental sample compared to the control sample (in the control sample decreased by 14.46 bpm, and at the experimental sample with 25 bpm). This higher pulse decrease in subjects in the experimental sample represents the increased efficiency of football's means and methods versus athletic means and methods. In the experimental sample, mean pulse rate (PR) was -25 bpm, and in the control sample only -14.46 bpm. Predictive measurement with the pulseoximeter before the experimental experiment showed normal values of oxygen saturation (99% - 97%) and heart rate (76 bpm - 89 bpm). After the 6-minute aerobic run physiological changes occurred at the vital pulseoximeter parameters: high heart rate (PR) (180 bpm - 162 bpm) and normal oxygen saturation (SpO<sub>2</sub>) (96% - 94%), but also with values ranging from 93% to 90%, being installed in small hypoxic subjects.

After two semesters of systematic training with the means and methods specific to football, the post-effort summative measure, the subjects of the experimental sample improved their SpO<sub>2</sub> values (99% - 98%), there was not any low hypoxia at any pupil and it decreased in cardiac frequency (155 bpm - 139 bpm). In the pre-exercise control sample, predictive pulseoximetry showed values close to those of the experimental sample at oxygen saturation (99% - 97%) and pulse (70 bpm - 87 bpm). After effort, the measurements showed a heart rate ranging from 180 bpm to 160 bpm and normal oxygen saturation (99% - 94%), but also subjects with low hypoxia (93% - 90%). And here physiological changes occurred after a school year of systematic training with means and methods specific to athletics, but at a lower level than the experimental sample that worked with football means and methods: pulse between 165 bpm - 138 bpm and saturation oxygen with oxygen between 99% and 97%.

In post-exercise summative assessments, the measurements showed both pulsation decreases and an increase in oxygen saturation, more prominent in the experimental sample versus control, and in their predictive post-exercise assessment, for example the exercise capacity increased resistance of the students' body to the effort. By carrying out the 6 minute aerobic effort of the subjects, changes in the physiological indices occurred: the increase of the pulse during the effort and the decrease of the blood oxygen saturation with lower values than the predictive evaluation (the pulse values being inversely proportional to the saturation values of the oxygen). The exercise capacity of the subjects who performed the 6-minute aerobic run at summative assessment was assessed by correlating it with post-exercise physiological indexes: PR and SpO<sub>2</sub> in predictive assessment. The lower the subject's pulse value and the oxygen saturation value was higher after the effort, the more they were rated as having improved exercise capacity.

## Conclusions

The statistical and mathematical calculations carried out as a result of the experiment have confirmed the assumption of the hypothesis, the superiority of the efficiency of the specific means of football, compared to the use in the lessons of the specific means of athletics, when working to optimize the development of the resistance of the high school students. From the values obtained by measurement with the pulseoximeter we can see the positive differentiation in favor of the experimental sample that we assign to the systematic work with means and methods specific to the football game in the physical and sports education classes throughout the school year which have maintained a high level of motivation of students. So the systematic use of football-specific means and methods in physical and sport education lessons optimizes the development of resistance, they are more effective than using the specific athletics. So, by confirming the hypothesis of our research, the null hypothesis is rejected and the working hypothesis is accepted. The development of high school students' resistance must be considered a priority task of school physical education, as it has a direct influence on the development of their motor skills, which is also an objective to be achieved.

The football game itself, and the football-specific exercises used for the development of resistance contribute to a great extent also to the formation of certain volitional qualities such as the psychic ability to withstand, the self-mastery and the desire for progress. Practicing students in physical education and sports classes, the football game contributes substantially to achieving the tasks of physical education: "The playing conditions, the complexity of the movements and the specific character of the players' actions, attribute to football itself the role of the middle of physical and sports education, because it contributes to the accomplishment of its tasks" (Neța & Popovici, 2000); "The practice of the game influences the restructuring of the functions of different organs and systems that favor the mechanism of adapting to the effort of the entire organism by increasing its functional capacity" (Neța & Popovici, 2000); "The football game develops at a higher level the general and specific motricity, as well as the physical qualities that are also an important objective of physical education" (Neța & Popovici, 2000); "Learning and practicing the football game in the school environment, in the form of mini-football, in small spaces (specific to the conditions offered by most schools), contributes to solving the important tasks of the training and education process through its multiple formative valences" (Neța & Popovici, 2000).

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## THE EFFECT OF A SELF-SUPERVISION MODEL BASED ON AUTHENTIC MOVEMENT AND EPIMOTORICS' ON EMOTION-RELATED PHYSIOLOGICAL PARAMETERS AMONG DANCE MOVEMENT THERAPISTS

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**ABSTRACT. Introduction:** This is part of a larger study examining the effects of an original self-supervision model (SSM), based on Authentic Movement and Epimotorics', on novice dance movement therapists. The larger study examines movement parameters, psychological parameters, and physiological measures, while the present study focuses on the emotion-related physiological parameters of pulse and oxygen saturation. Used regularly in medical settings, these have also been found to reliably reflect a person's emotional state (Appelhans & Luecken, 2006; Porges, 2007; Picard, 1997). **Objective:** To see whether the SSM training affects participants' pulse and oxygen saturation. The hypothesis is that there will be a decrease in pulse variables and increase in oxygen saturation after the SSM training, which would reflect lower emotional arousal and stress. **Methods and Materials:** Pulse oximetry was used to measure pulse and oxygen saturation. These were recorded before and after a simulation at the start of the SSM training, and before and after a simulation at the end of the training. To detect changes in pulse variables according to the time of measurement (before and after each simulation), a series of paired-samples t-tests was performed: The first series compared the 'after' measurements of both simulations. The second series compared the 'before' measurement of Simulation 1 to the 'after' measurement of Simulation 2. **Results:** The training affected all measures, showing a significant decrease in pulse variables in Simulation 2 (after) compared to the beginning of Simulation 1 (before). **Conclusion:** The results suggest that the SSM decreases stress, as reflected in decreased pulse variables.

**Key words:** *Emotion-related physiological parameter, heart rate, oxygen saturation, Pulse oximeter*

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## Introduction

The supervision model examined in this study is a model for self-supervision, a framework that therapists can use to guide themselves and approach challenging issues that arise in their work. The self-supervision model (SSM) is intended to offer therapists a basis for self-development, including professional development in such areas as regulation of emotional response, decreased stress, and increase sense of self-worth as a professional. These skills would help the therapists provide beneficial therapy to their clients in the therapy setting (Watkins, 1997). The specific self-supervision model, developed by the researcher and tested in the study, is based on two modalities of work used in the field of dance movement therapy: Authentic Movement and Epimotorics'. In this study, the participants' pulse and oxygen saturation were measured, as a way to potentially detect changes in stress levels and emotional/psychological/mental state. Studies indicate that there is a direct connection between these physiological parameters and a person's emotional state (Porges, 2007). Decreased stress levels and the ability to regulate levels of emotional arousal could improve therapists' psychological state and increase their sense of self-efficacy in their work.

Studies including Calderón (2016) and Tiwari et al. (2015) examined the relationship between emotional state and physiological measures. Research in the fields of medicine, sports, and psychology have demonstrated that there is a reliable connection between them; heart rate and oxygen saturation, and the changes occurring in them, are two physiological measures that have been demonstrated to provide a reliable reflection of a person's state of emotional arousal, in the absence of existing medical conditions (Davila, Lewis, & Porges, 2017).

The two physiological measures used here, pulse and oxygen saturation, can be defined as follows: Pulse refers to the contraction and expansion of the arteries as blood is pumped by the heart. Pulse is measured in terms of the number of beats per minute (BPM). Because the pulsing of the arteries occurs as a direct result of the heart beating, the pulse rate is equal to the heart rate. Measuring pulse, which can be done using a range of spots on the body, thus makes it easy to measure heart rate. Blood oxygen saturation (SpO<sub>2</sub>) refers to the percentage of oxygenated hemoglobin present in the blood, out of all the hemoglobin in the blood. Optimal SpO<sub>2</sub> is between 94% and 100% (Tusman, Bohm, & Suarez-Sipmann, 2017). Pulse and oxygen saturation are physiological measures that can offer information about a person's physical fitness, however in this study they provide information

about the person's emotional state. They are used here to examine the emotional/psychological effects of the SSM on the novice dance movement therapists who participated in the study.

## Research Design and Methodology

The present article presents a study that is part of a larger research study exploring the effects of a unique self-supervision model on novice dance movement therapists.

**The study population** consisted of six participants in their first few years of practicing therapy, from the Jerusalem region in Israel. The participants did not suffer from any medical limitations. 50% of the group was male and 50% was female, ranging in age from 29 to 38 ( $M=32.75$ ,  $SD=3.08$ ). All of the participants hold a Master's degree (M.A).

**Research methods:** The group of participants underwent training in the self-supervision model. At the beginning of the training, participants were prompted to simulate a situation from their therapy work for which they required supervision ("Simulation 1"). Their pulse and oxygen saturation were measured before this simulation and after it. At the end of the training in the SSM, the participants were again asked to simulate a situation requiring supervision ("Simulation 2"). Their pulse and oxygen saturation were again measured before and after the simulation. Thus participants' pulse and heart rate of participants were recorded at four points in time.

All measurements of pulse and oxygen saturation were performed using a **pulse oximeter**. Although various tools are available for measuring heart rate and oxygen saturation, the pulse oximeter was chosen for this study because it has been widely and extensively researched and is convenient, non-invasive, and provides reliable and immediate results (Mengelkoch, Martin, & Lawler, 1994).

The pulse oximeter is a small device that measures pulse and oxygen saturation when it is placed on a part of the body, often a finger. The device takes its measurements by sending one red and one infrared wavelength of light from one side of the device, through the body part, and to the opposite side of the device, where there is a light detector. The two types of light are thus passed through the body part. Since oxygenated hemoglobin and deoxygenated hemoglobin absorb these wavelengths differently, the pulse oximeter is able to determine the percentage of blood that is oxygenated. The

device measures pulse by measuring the slight changes in blood volume that take place as the arteries expand and contract in conjunction with the heart pumping blood. The results of these two measurements are recorded in the device (Brand, Brand, & Jay, 2002).

Pulse oximeters are regularly used to provide important information about a person's physical state, but they have also been used in various studies to measure physiological indicators of emotion (Calderón, 2016; Aweto, Owoeye, Akinbo, & Onabajo, 2012). Because emotional arousal is reflected in physiological changes such as increased heart rate, one may gain information from physiological measures about a person's emotional state. Pulse oximeters are increasingly used to gain information on physiological parameters that reflect emotional arousal (Harrison, Gray, Gianaros, & Critchley, 2010; Calderón, 2016). In the present study, pulse oximetry is likewise used to record levels of emotional arousal among the participants in order to see whether their ability to regulate their emotional state improves over the course of the training in the SSM. In this study, the pulse oximeter recorded measures before and after Simulation 1 and before and after Simulation 2. Results from different points in time were compared using paired t-tests, standard mean comparisons. Paired t-tests have been found to be appropriate for studies involving a small sample size (De Winter, 2013; Cahill & Egan, 2017; Brown, 2017).

The pulse oximeter also recorded "events," significant increases or decreases in pulse rate, as well as the duration of such events, meaning the amount of time it took for the pulse to return to normal. A decrease in the frequency and duration of such events would reflect increased emotional regulation.

## Results

The research hypothesis was that participants' heart rates would decrease and oxygen saturation levels would increase after the training in and practicing of the self-supervision model (SSM) based on Authentic Movement and Epimotomics'. Such a result would reflect decreased levels of emotional arousal among the participants.

Table 1 shows an example of the measurements recorded for one participant (a 34-year-old male), with the left panel showing the data from the 'before' stage of Simulation 1 and the right panel showing those from the 'after' stage of Simulation 2. The results for this participant show a decrease in heart rate and an increase in oxygen saturation at Simulation 2 as compared with Simulation 1.

**Table 1.** Pulse oximeter results for male participant, age 34, comparing Simulation 1 ('before') and Simulation 2 ('after')

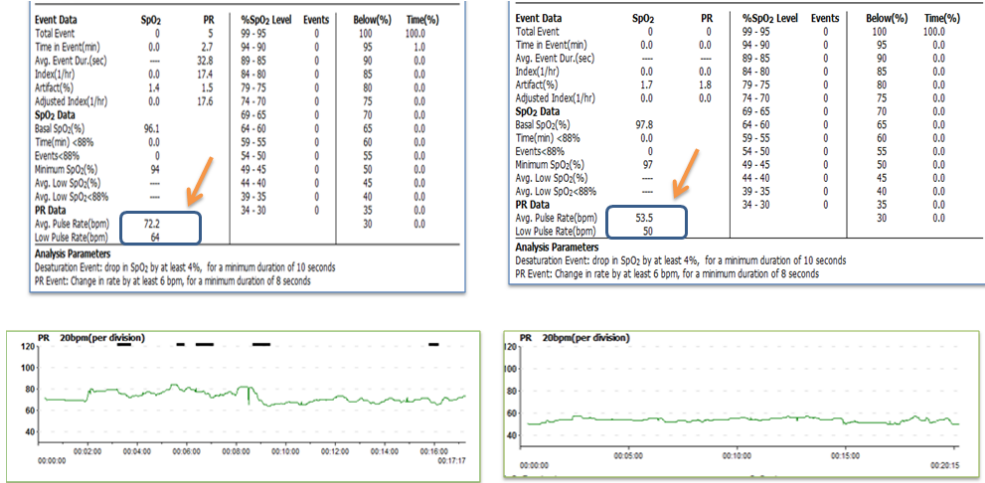


Table 2 presents the baseline descriptive statistics for pulse and saturation variables.

**Table 2.** Baseline descriptive statistics for pulse and saturation variables (N=6)

	M	SD	Min	Max
<b>Pulse</b>				
Total events	11.00	5.18	5.00	17.00
Time in event (minutes)	5.12	1.26	3.40	7.00
Index	33.55	16.31	13.90	49.79
<b>Saturation</b>				
Basal SpO <sub>2</sub> %	96.80	3.02	90.7	98.7

In order to detect changes in the pulse and saturation variables according to the time of measurement (before and after), a series of paired-samples t tests were performed. The first series compared the 'after' measurements of both simulations. Table 3 presents significant differences in pulse 'time in event (minutes)' from after Simulation 1 ( $t_{(5)} = 3.41, p = .02$ ) and after Simulation 2, showing that there was a decrease in the time in event compared to after the first simulation. No significant differences were found for the rest of the variables.

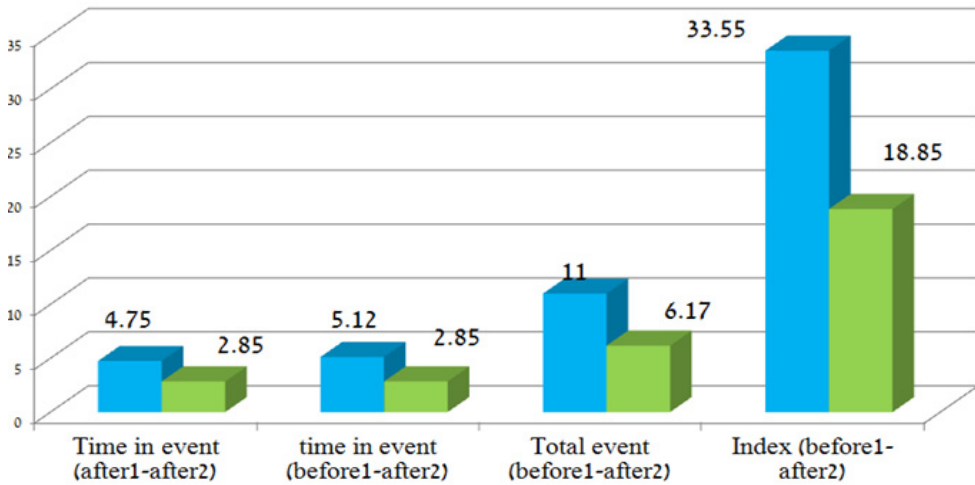
**Table 3.** Means and standard deviations for physiological parameters, after the first and second simulation, within the study group (N=6)

	After Simulation 1		After Simulation 2		$t_{(5)}$	$p$
	$M$	$SD$	$M$	$SD$		
<b>Pulse</b>						
Total events	9.17	4.12	6.17	5.35	1.75	.14
Time in event (minutes)	4.75	1.25	2.85	2.00	3.41	.02
Index	27.47	11.81	18.85	15.83	1.28	.26
<b>Saturation</b>						
Basal SpO2%	97.38	1.38	97.47	1.07	-0.22	.84

The second series compared the 'before' measurement of Simulation 1 to the 'after' measurement of Simulation 2. Table 4 presents significant and marginally significant differences in pulse 'total events' ( $t_{(5)} = 4.25$ ,  $p = .008$ ), in 'time in event' ( $t_{(5)} = 2.25$ ,  $p = .074$ ), and in the 'index' calculation ( $t_{(5)} = 2.66$ ,  $p = .052$ ): After Simulation 2 there was a pulse decrease when compared with before Simulation 1. No significant differences were found for the saturation basal SpO2%. Figure 1 presents the significant and marginally significant differences in pulse parameters between the simulations.

**Table 4.** Means and standard deviations for physiological parameters, before Simulation 1 and after the Simulation 2, within the study group (N=6)

	Before Simulation 1		After Simulation 2		$t_{(5)}$	$p$
	$M$	$SD$	$M$	$SD$		
<b>Pulse</b>						
Total events	11.00	5.18	6.17	5.35	4.25	.008
Time in event (minutes)	5.12	1.26	2.85	2.00	2.25	.074
Index	33.55	16.31	18.85	15.83	2.66	.052
<b>Saturation</b>						
Basal SpO2%	96.80	3.02	97.47	1.07	-0.51	.63



**Fig. 1.** Differences in time in event, total event, and index parameters, comparing Simulation 1 (blue) and Simulation 2 (green)

Comparing the ‘after’ measurements of the first and second simulations showed significant differences in accordance with the hypothesis – after Simulation 1 there was a decrease in the time in event. Comparing the baseline measurement of Simulation 1 to the ‘after’ measurement of Simulation 2 showed significant and marginally significant differences in pulse total events, time in event, and in the ‘index’ calculation in accordance with the hypothesis – after the second simulation there was a pulse decrease compared to before the first simulation. Nonetheless, no significant differences were found in total events and the index parameter while comparing the ‘after’ measurements.

## Discussion

As discussed above, changes in physiological parameters can reliably reflect changes in emotional arousal and thus emotional/psychological state. The following combination was found in the present study: A decrease in the number and duration of events of pulse changes. There were significant differences in pulse ‘time in event (minutes)’ ( $t_{(5)} = 3.41, p = .02$ ) – after Simulation 2 there was a decrease in the time in event compared to after Simulation 1. A significant reduction in Total Events can indicate a decrease in stress and better coping with states of emotional arousal and anxiety.

In light of the fact that the participants are healthy adults with no medical issues and based on the connection between changes in emotional state and changes in physiological parameters, the decrease in pulse variables can be understood as a decrease in stress levels and an increased ability for emotional regulation (Picard, 1997). Although oxygen saturation levels did not increase in statistically significant numbers, as hypothesized, there was an increase in this measure among all the participants. Perhaps the increase was not statistically significant because the baseline levels of oxygen saturation were already high (SpO<sub>2</sub> 96.8%).

## Conclusion

This study produced findings regarding the effects of a unique self-supervision model (SSM) on novice dance movement therapists. The findings show a clear impact of the training in the self-supervision model on the participants in the area of emotion-related physiological parameters, namely pulse and oxygen saturation.

The fact that in all the measurements there was a decrease in Simulation 2 (after) when compared to the beginning of Simulation 1 (before) demonstrates that the SSM had the effect of decreasing stress levels and emotional arousal. This may point to the ability of the supervision model to enhance therapists' skills in the area of emotional self-regulation, a crucial skill in offering successful therapy.

The results of this study support the hypothesis that practicing the self-supervision model based on Authentic Movement and Epimotorics' can improve emotion-related physiological parameters of novice dance movement therapists.

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# THE TRENDS AND REASONS OF BEST RESULTS OF THROWING EVENTS OF TRACK AND FIELD WORLD CHAMPIONSHIPS FROM 1983 TO 2017

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**ABSTRACT.** The purpose of this study is to present the best results of the Athletics World Championships from the first competition in 1983 to the latest event held in 2017 in London. Besides highlighting the summarization and trends, we presented the results and its background of the London World Championships. In our study, we provide a comprehensive picture by interviewing the leading top throwing coaches and the most successful athletes (n = 12). With our questions, we were wondering what are their opinions, about the results of London World Championship and what the background of the Hungarian throwing results are. Looking for the reasons, with the answers of our deep interviews, we have found the following conclusions: the finding of talent is becoming more and more difficult today in Hungary, the disappearance of the special throwing workshops is typical, the decline of the technical (throwing movement) quality is very significant in the domestic throwing discipline, other sports have very strong extraction power, the lack of proper medical background in domestic athletics, concerning the sector.

**Keywords:** *Track and field, world championship, throwing events, performance prediction*

## Introduction

The 16th World Athletics Championship was held between the 4th and 13th of August 2017 in London. There were 16 Hungarian competitors who were given the right to compete, and 6 of them were throwers.

We would like to mention in the first row, Anita Márton, our Olympic bronze medallist who despite unfavourable weather – reached the best result of the Hungarian athletics team – she received the silver medal.

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We have 3 hammer throwers Krisztián Pars, Bence Halász and Réka Gyurácz. Krisztián Pars did not succeed getting into the finals, but Bence Halász did, with a convincing competition, where he came in 11<sup>th</sup>. Réka Gyurácz also did not get into the women final either.

In javelin throwing Norbert Rivasz-Tóth represented our country but he did not absolved well in the qualification round just as Zoltán Kővágó in discus throwing.

## **Methods**

We collected all the data of all Athletics World Championship from the beginning to the last Championship of London. These data were the winner results, all the 8th results of the finals, and the best non qualifiers result in throwing events. This data shows us an overall situation about the world's best athletes' actual form – and with it the leading performance characteristics of the picked event.

All the trend lines have to be handled with a strong consideration. We tried to find the most suitable polynomial trend line with the best approach what the data let us, but in a few cases (for example in the world records) some data was far beyond the average trend. Therefore to find the “smoothing” method with choosing the correct polysomic equitation was not easy. We aspire to find the simplest equation for the given event, given data group. The more uniform were the data, the more equitable were the equation.

After the data collection and analysing of it, we interviewed the top throwing coaches and the most successful athletes (n = 12). With our questions, we were wondering what are their opinions about the results of London World Championship, and what the background of the Hungarian throwing results are.

## **Results of the four throwing final**

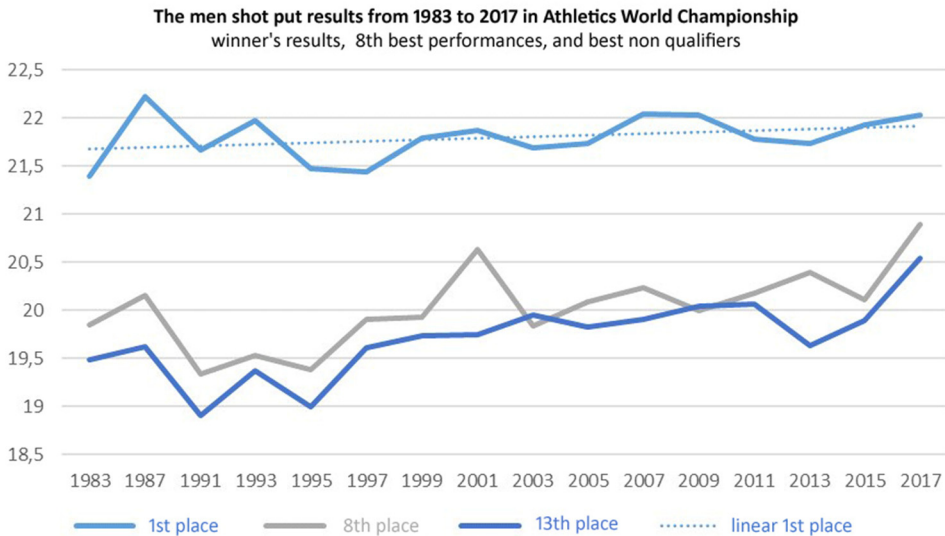
### ***Men shot-putt***

The former Olympic bronze medallist, Walsh won the 16th Athletics World Championship (pic. 1.) 22.03m. Kovacs from the USA came in second, and the Croatian Zunic, third. Since 2009 a result this high has not been needed to win.



**Pic.1.** Thomas Walsh (New Zealand) 22.03 m

So far there were only two occasions where it was thrown better, in 1987 22.23 m and in 2007 22.04 m. The 8<sup>th</sup> best result was in 2017.



**Fig. 1.** The men shot put results from 1983 to 2017 in Athletics World Championship - winner's results, 8<sup>th</sup> best performances, and best non qualifiers.

We investigated all the results of World Championship qualifications to find what the score of the 13th place was, which did not reach the finals.

It can be said that in the men's shot put qualifications such a long result has never been needed for the 12 finals. The 20.54m result was not enough though.

### ***Women shot put***

The women shot put won by Gong (pic. 2) with 19.94 m and the silver medal went to Anita Márton, before Carter from the USA. From 2011 a decline can be observed when investigating the results of first places.

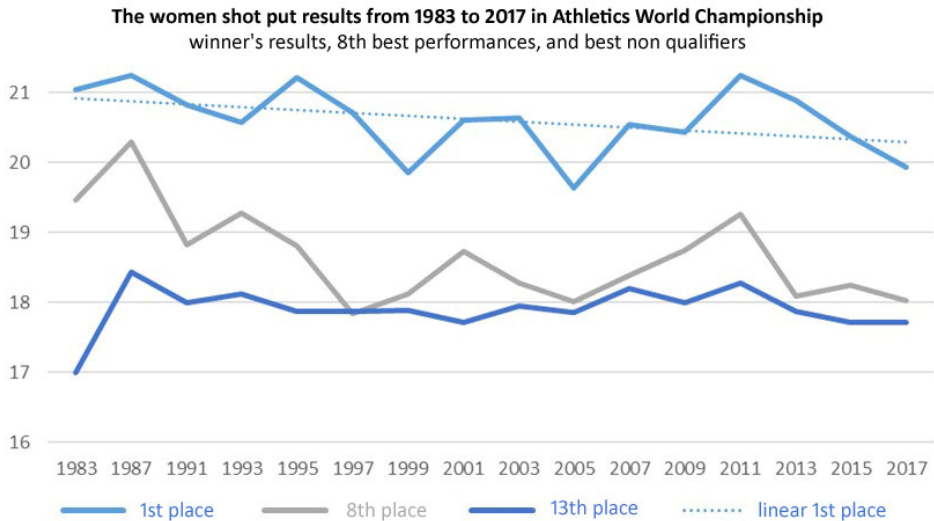
There were only 2 occasions when under 20m results were enough to win (1999- 19.85 m, and 2005 19.64 m)

On the other hand so far at 16 World Championship there were 4 occasions when results over 21 m. Two times the same result 21.24 m (1987 and 2011).



**Pic.2.** Gong Li-Csiao (China) 19.94 m

Investigating the final and the qualifier round (Fig. 2) we can state that there were weaker results achieved. There has not been such weak results in the final and the qualifiers since the first World Championship (1983 – 16.99 m and 2017 – 17.71).



**Fig.2.** The women shot put results from 1983 to 2017 in Athletics World Championship - winner's results, 8<sup>th</sup> best performances, and best non qualifiers.

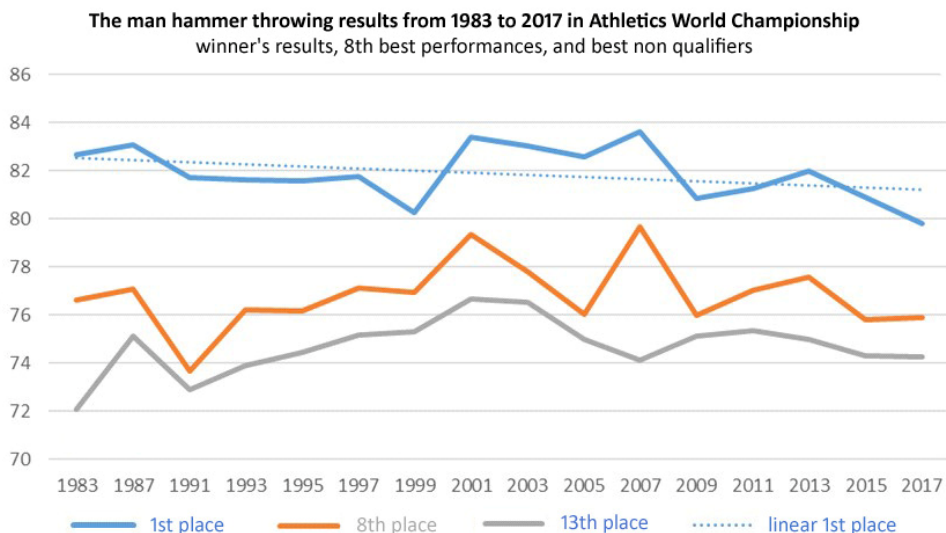
### ***Men hammer throw***

In men hammer throw two Polish athletes could stand on the podium. The winner was Fajdek with his 3<sup>rd</sup> gold (Pic 3) before Pronkin and Nowicki.



**Pic. 3.** Pawel Fajdek (Poland) 79.81 m

In the history of Athletics World Championships this was the first time that results under 80m were enough to win the gold. Also in the qualifying results there is a downturn. There were only 4 times, when the results - not enough for final - were weaker so far on the Athletics World Championships (Fig. 3)



**Fig. 3.** The man hammer throwing results from 1983 to 2017 in Athletics World Championship - winner's results, 8<sup>th</sup> best performances, and best non qualifiers.

The best results were set in 2007, because the winner result was 83.63 m and the 8<sup>th</sup> best result was 79.66 m. From the qualifying rounds we have to highlight the year 2001, in this year 76.66 m was not enough to get in to the finals.

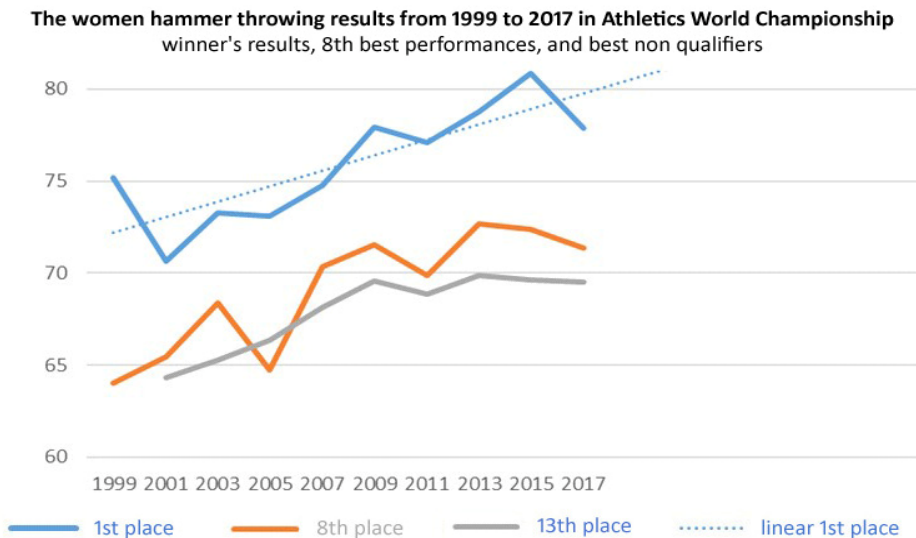
### ***Women hammer throw***

In the competition of women hammer throwing there were two Polish competitors who could stand on the podium. The winner was the world record holder Włodarczyk (Pic 4), the second was the Chinese Wang, and the third was Kporon, the other athlete from Poland.



**Pic. 4.** Anita Włodarczyk (Poland) 77.9 m

There was a relapse in the results of finals and qualifications during the two World Championships. So far there is only one time where a result over 80m was born in the finals in 2015 – 80.85 m. It can also be found that the best 8<sup>th</sup> result was 72.38 m. We must take into account that the female hammer throwing got into the program of Athletics World Championship only in 1999.



**Fig. 4.** The women hammer throwing results from 1999 to 2017 in Athletics World Championship - winner's results, 8<sup>th</sup> best performances, and best non qualifiers.

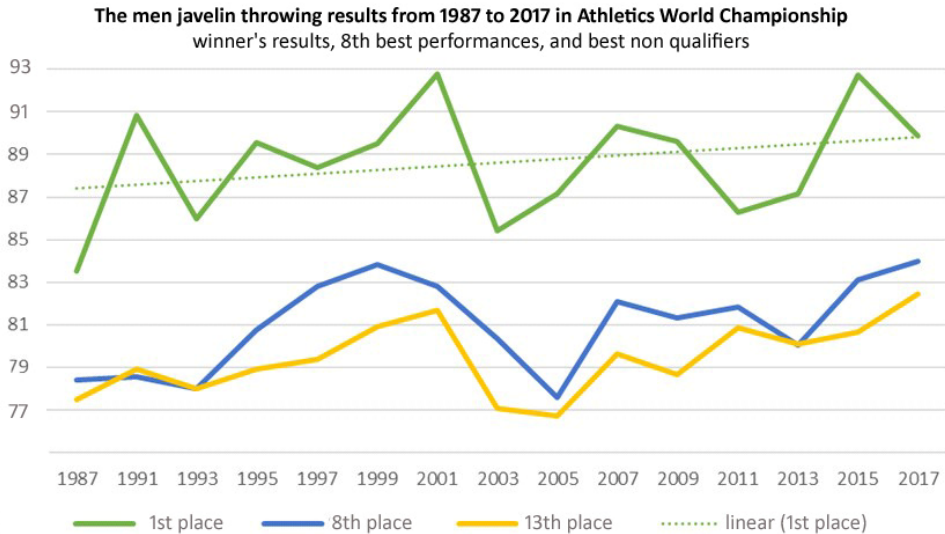


### Men javelin throwing

In men, the German Vetter (Pic. 5) defeated the two Czech competitors. The silver medallist Vadlejch and the bronze medallist Frydrych got on the podium with a personal best. Both throwers coach was the world record holder Zelezny.



**Pic. 5.** Johannes Vetter ( Germany) 89.89vm



**Fig. 5.** The men javelin throwing results from 1987 to 2017 in Athletics World Championship - winner's results, 8<sup>th</sup> best performances, and best non qualifiers.

During the final, it was enough to win with a result below 90 m (89.89 m).

Although we can say this result is very good, in sight of the recent gold medallists, since they only won four times with better results, which were all above 90 meters. The best result was in 2001 where the throw was 92.80 meters.

In the qualifications there were very good results. The 13<sup>th</sup> place was 82.46 m, which is could have been enough for the final 12. It can be seen that the 8th result has never been so far (pic 5).

### ***Women javelin throwing***

The women javelin throwing was won by world record holder, Olympic champion Sportacova (pic 6) before the Chinese Lí and Lyu.

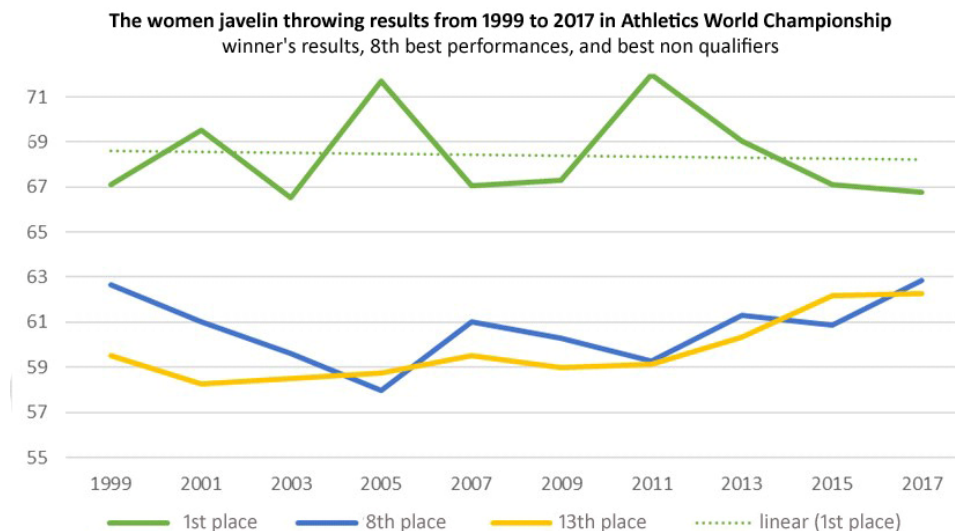


**Pic. 6.** Barbara Spotáková (Czech Republic) 66.76 m

There was a recession in the first places from 2011 (Fig. 6). There was only one time when the winner results was shorter than the 2017 result, in 2003 when the gold medal winner threw 66.52 m.

From 1999 women have thrown with the new javelin, but before this date there were better performances. After that there were only two occasions (two winner results) when they have thrown over 70m. The first was in 2005 with 71.70 m, and the second was in 2011 with 71.99 m.

It should be emphasized that a score such high has never been needed to get in the final round. A throw of 62.26 m was not long enough to receive even a 13<sup>th</sup> place which is still a non-qualifying result.



**Fig. 6.** The women javelin throwing results from 1999 to 2017 in Athletics World Championship - winner's results, 8<sup>th</sup> best performances, and best non qualifiers.

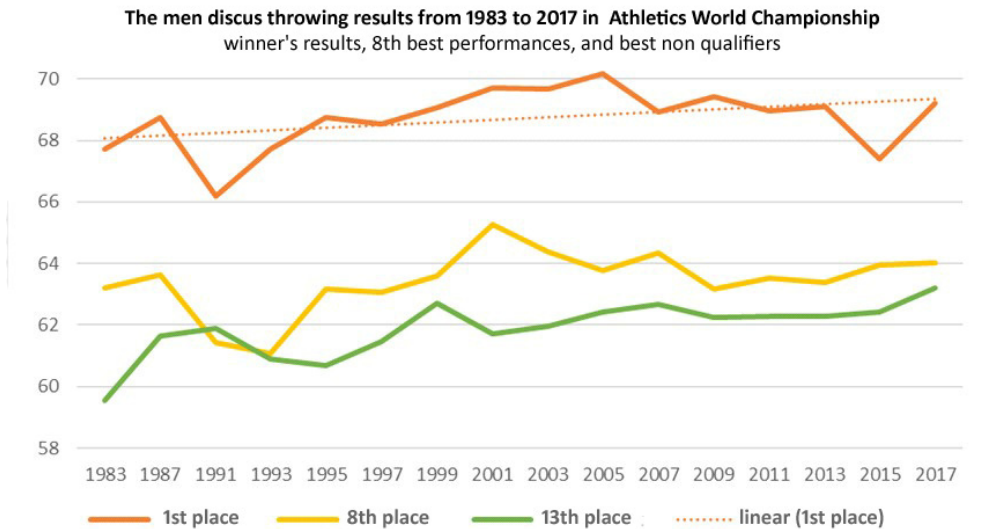
### ***Men discus throwing***

The men's discus throwing competition was won by Lithuanian Gudzius (Pic.7) before the Swedish Ståhl and the American Finley. From 2009 this has been the best gold winner throwing (69.21 m) and it can be seen fluent improvement at the results of 8<sup>th</sup> places. From the 16 Athletics World Championship there were only four occasions when the winner results were better (Fig. 7). The longest throw was thrown in 2005, 70.17m. Of the 8 athletes who placed, his was the 4<sup>th</sup> best.

From the men's competition it has never happened in the Athletics World Championship that the result 63.21 m received 13<sup>th</sup> place and didn't meet the finals. We can say that the qualifications of discus throwing shows an improving tendency.



**Pic. 7.** Andrius Gudzius (Lithuania) 69.21m



**Fig. 7.** The men discus throwing results from 1983 to 2017 in Athletics World Championship - winner's results, 8<sup>th</sup> best performances, and best non qualifiers.

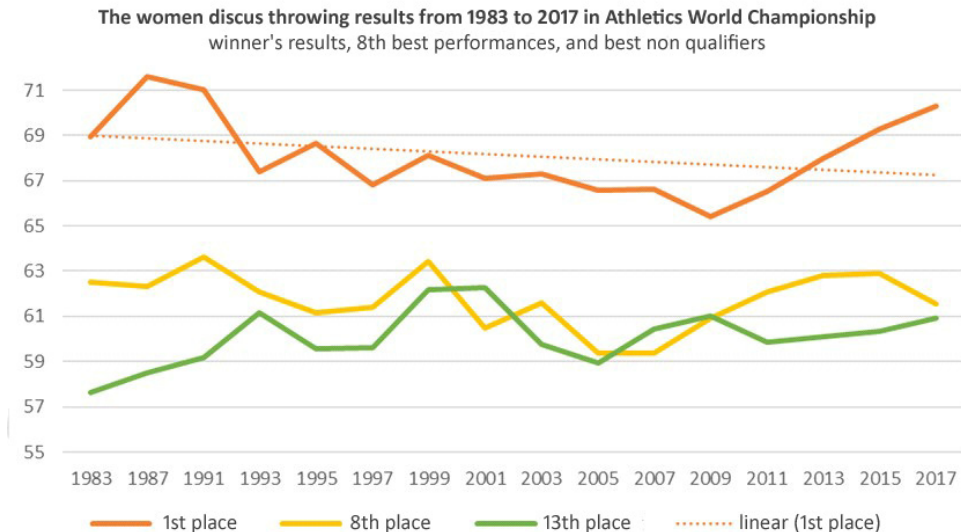
### ***Women discus throwing***

The Olympic champion Perkovics (Pic. 8) won the competition with a throw over 70m. The second was the Australian Stevens and the third was the French Robert – Michon.



**Pic. 8.** Sandra Perkovic (Croatia) 70.31 m

Investigating the gold medallist throwing (Fig.8) we can state, that the results are getting better continuously from 2009. 1991 was the first year when the women throwers succeeded to win with an over 70 m throw. Before that it was succeeded only in 1987 (71.62 m) and 1991 (71.02 m). We should emphasize that the silver medallist almost reached the 70 m border (69.64 m) which was a National Record as well.



**Fig.8.** The women discus throwing results from 1983 to 2017 in Athletics World Championship - winner's results, 8<sup>th</sup> best performances, and best non qualifiers.

The qualification rounds were also strong just as the men's rounds. In the past 8 years a throw this long has not been needed to get in the final rounds. Taking in to count all the World Championships there were only 4 occasions when longer throws were needed.

## Deep interviews and results

We can say by investigating the results that there are no outstanding results between gold medallists. The grouping of the results are typical. We can also state that except in the hammer throwing (in 2017) in all the throwing events qualification rounds have never needed such good results to qualify.

We should emphasize the fact, that there were five medallist places which were won by personal best.

The clustering of the field is shown well by the results of the medallists, in mens discus throwing there was only a 2 cm difference, in javelin throwing there was a 26 cm difference between the silver and gold medalists, and in hammer throwing there was a 13 cm difference between the silver and bronze medal winners. (átírtam) The women javelin throwing was only won by 51 cm by Spotáková.

We wanted to know better what the hypothetical reasons of the results were, therefore we asked Hungarian world elite level athlete coaches and throwers as well (n =12).

We did not find any literature or analysis about the Hungarian and foreigner throwing results. In domestic relations - based on the answers - the root of the Hungarian results are the day by day discontinued track and field associations and sections, and the newly built malls on thrower fields. Coaches have come up with an unequivocal opinion that there is less and less space to operate a throwing athletics, but in Budapest it is almost impossible.

The most influencing in the case of country kids are the attitude of the school, the personal and material conditions which determine the successes of the throwing events. As our responders state the main problem is the new politics of funds distributions of Hungarian sport, because the "interest" is getting bigger and bigger about the team and "money" sports. The coaches formulated in a complete agreement on the extraction power of other sports.

A lot of the thrower athletes opinions are that there is no value of their 3<sup>rd</sup>-4<sup>th</sup> place on the national rank no one remembers that but just as much money can be earned with a 100<sup>th</sup> place on the football rank list. There was a thrower who explained his thrower carrier breaking decision with - "if he cannot be first on the rank list, there is no sense to straggle.

Many of the asked refer today - mainly girls - to the doping, because "the only way to get international level is by using performance enhancing drugs", and they do not undertake this procedure (Benczenleitner, 2014).

Searching the reasons about the interviews we can make the following states:

- Finding talent is getting harder;
- The disappearance of the throwing workshops are getting more common;
- The backsliding of the technique level of throwing;
- The extraction power of other sports;
- The medical background deficiency.

## Conclusions

The results of finalist showing grouping which is meaning that the group of the leaders got closer to each other's, mainly because falling back of the top-first results.

After 1988 it can be seen a falling back tendencies in performances. This phenomena can be seen not only at men's hammer throwing but also at every throwing event except the men and women javelin throwing. There was a significant fall-back to the deterioration of development, mainly because of the Ben Johnson doping scandal in 1988 which resulted a very strict doping control.

According to the collected data the performances show – mainly in hammer throwing – in the second half of the 90's a slight development, moreover the years after the turn of the century a new, well detected performance rising, although this tendency not reach the height of the 1988 top.

Regrettable that the mentioned trend in the second half of the decade again shows a significant decline, crushed down to the performance averages of beginning of the 80's (Benczenleitner et. al., 2012).

Our conclusions are that the most important tasks are the following - the selection, high level of education and the competing of our young athletes.

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## A STUDY ON THE MANAGEMENT OF AN EDUCATIONAL CRISIS IN A ROMANIAN MIDDLE SCHOOL

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**ABSTRACT.** The paper highlights the results of the record based on a questionnaire on how 5<sup>th</sup> grade pupils react to an educational crisis situation, whether conflicts or various forms of violence or aggression, and of course how often they engage in conflicts that do not concern them directly. The research was carried out at Middle School no. 1 of Gherla, county of Cluj, the questionnaire being applied to 55 5<sup>th</sup> grade pupils (24 pupils in 5<sup>th</sup> grade A and 31 pupils in 5<sup>th</sup> grade B) in May 2017. After recording and processing the data, the interpretation of the results was made by looking at the comparison between the answers of the 5<sup>th</sup> grade A and 5<sup>th</sup> grade B grade pupils, since even if they are of the same age, they come from different backgrounds, the argument for this is that in the 5<sup>th</sup> grade A 85% pupils come from rural areas and only 15% from urban areas, while in 5<sup>th</sup> grade B 70% of pupils are urban and only 30% are rural.

**Keywords:** *educational crisis, conflicts, violence, aggression.*

**REZUMAT.** *Studiu privind gestionarea situațiilor de criză Educațională în învățământul gimnazial din România.* Lucrarea subliniează rezultatele înregistrării pe baza unui chestionar a modului în care elevii claselor a V-a reacționează în fața unor situații de criză educațională, fie ele conflicte, fie diferite forme de violență sau agresivitate și desigur cât de des se implică aceștia în conflicte care nu îi privesc în mod direct. Cercetarea s-a desfășurat la Școala Gimnazială Nr. 1 din localitatea Gherla, Județul Cluj, chestionarul fiind aplicat unui număr de 55 de elevi (24 de elevi din clasa a V-a A și 31 elevi din clasa a V-a B), în luna mai a anului 2017. După înregistrarea și prelucrarea datelor, interpretarea rezultatelor s-a făcut urmărind comparația răspunsurilor elevilor din clasa a V-a A și a celor din

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clasa a V-a B, deoarece chiar dacă sunt de aceeași vârstă provin din medii diferite, ca și argument la acest lucru e faptul că în clasa a V-a A 85% dintre elevi provin din mediul rural și doar 15% din mediul urban, pe când în clasa a V-a B aproximativ 70% dintre elevi sunt din mediul urban și doar un procent de 30% fac parte din mediul rural.

**Cuvinte cheie:** *criză educațională, conflicte, violență, agresivitate.*

## Introduction

"The educational crisis is an event or a complex of unexpected but also unplanned events, generating danger to the climate, health, or safety of the organization (the classroom of students) and its members" (Iucu, 2006, p. 191). The unexpected event that occurs in a classroom of pupils is like any other inevitable conflict, but to solve it as quickly as possible or to solve it as efficiently as possible depends largely on the "classroom manager" didactic that leads the pupils and, of course, its preparation in terms of conflict management.

Brock, Sandoval and Lewis (1996), offering a definition applicable to schools, suggest that crises are sudden, unexpected events that have an "emergency quality" and have the potential to impact on the entire school community.

Van de Vliert's opinion (1997) is that individuals are in conflict when they are obstructed or irritated by another individual or group and inevitably react to it in a beneficial or costly way. From early school, pupils begin to irritate each other through words, gestures, comments, facts that can hurt their image in front of others, and then it is very difficult not to come into conflict with each other.

## Objectives

The objectives of this paper are:

- Assessing the pupil's level of involvement in conflict situations that do not directly concern them;
- Analyzing pupils' views on crisis situations in the school where they are studying;
- Study regarding the management of educational crisis situations.

## Materials and Methods

The research was conducted at the Middle School No. 1 of Gherla, county of Cluj, the questionnaire being applied to 55 pupils (24 pupils in the 5<sup>th</sup> grade A and 31 pupils in the 5<sup>th</sup> grade B) at the beginning of May of 2017.

In the research itself, the sociological survey method was used, given that through it it can be clearly seen the subjects' view on some aspects related to the management of educational crisis situations and of course the level of their involvement in conflict situations which do not directly concern them. At the basis of the sociological survey was a questionnaire made up by the authors of the paper, with a total of 10 questions, with which I tried to confirm the hypothesis of starting the research, and 3 socio-demographic questions regarding the age, the type of the pupils questioned and the classroom they are part of.

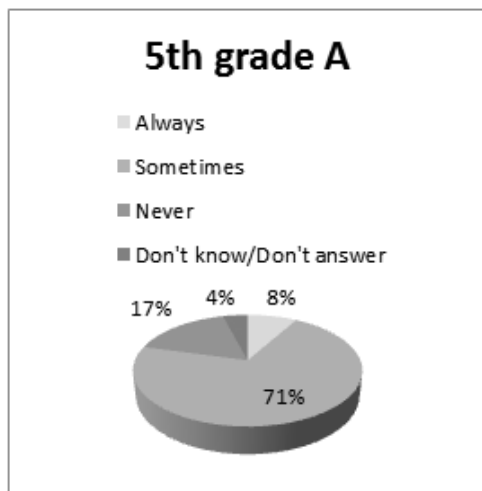
## Results

Following the conduct of the questionnaire, a comparison was made between the answers of the 5<sup>th</sup> grade A pupils and 5<sup>th</sup> grade B pupils, since even if they are of the same age, they come from different backgrounds; the argument in this case is that in 5<sup>th</sup> grade A 85% of students come from rural areas and only 15% from urban areas, while in 5<sup>th</sup> grade B about 70% of students come from urban areas and only 30% come from rural areas.

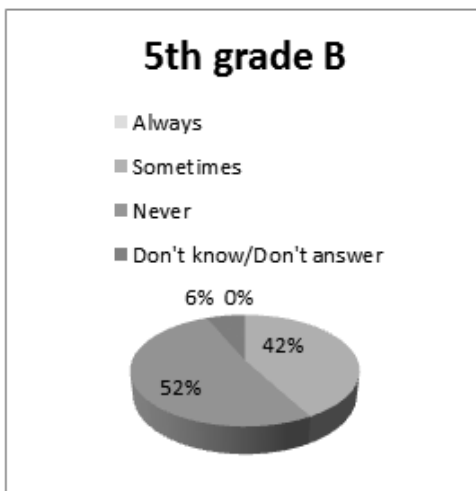
Following the answers received regarding the gender distribution in each classroom, it emerged that the pupils of 5<sup>th</sup> grade A are 58% female and only 42% male, and those in the 5<sup>th</sup> grade B are 55% male and 45% female. Thus, the first difference between the two classes is highlighted, namely that in 5<sup>th</sup> grade A the girls predominate and the boys are minor, and in 5<sup>th</sup> grade B we find exactly the opposite.

The first similarity of the questionnaire is found in terms of the subjects' age, over 60% in both classes being 12, over 30% of them being 11 years old, and only a small percentage about 3% are 13 years old, following the repetition of a school year.

For the first question, according to Figure 1, we can observe that a percentage of 8% of the pupils of 5<sup>th</sup> grade A are always involved in conflicts that do not concern them directly, whilst none in 5<sup>th</sup> grade B are always involved. Those in the first grade mentioned above say that they are sometimes involved in a number of 71%, and those in 5<sup>th</sup> grade B in a number of 42% which means that they are more daring and also more curious by what can follow up their involvement in conflicts. Therefore we can note that those in 5<sup>th</sup> grade A have a sanguineous spirit by getting involved into conflicts that do not concern them directly.

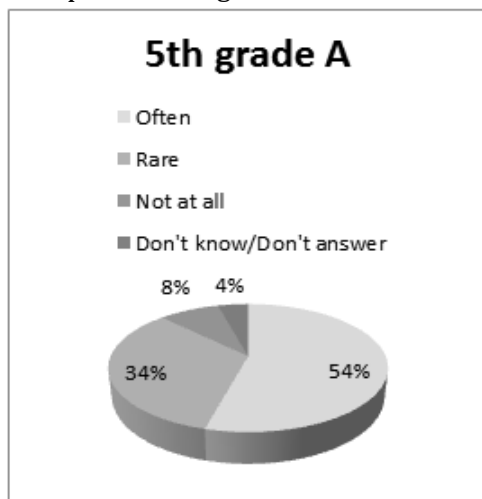


**Fig. 1.** Intervention in the conflict of 5<sup>th</sup> grade A

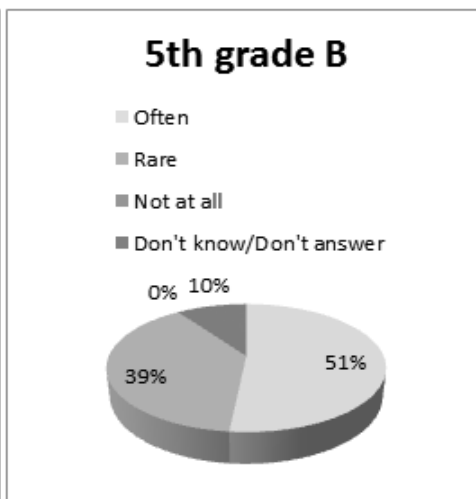


**Fig. 2.** Intervention in the conflict of 5<sup>th</sup> grade B

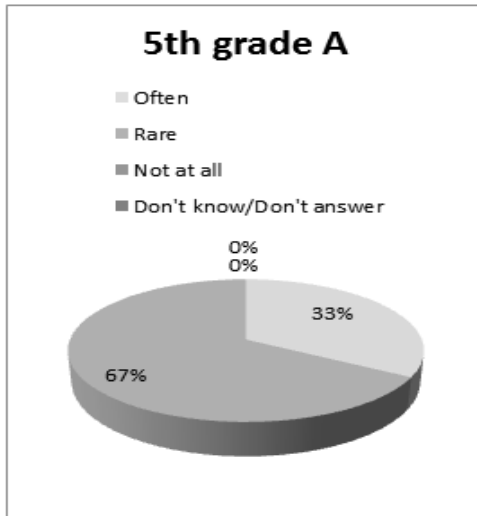
In accordance with question No. 2 (see Figure 3 and Figure 4) more than 50% of the percentage of each grade consider that there are frequent educational crisis situations by conflicts that occur inside the classroom, which represents the continuous will of affirmation of those involved in such conflicts and probably the attempt to be recognized as leaders of their classroom.



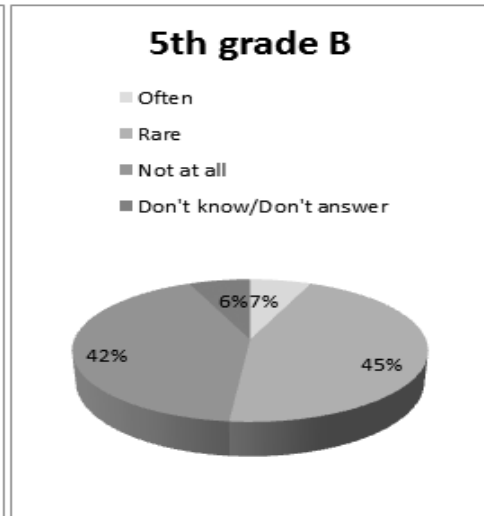
**Fig.3.** Existence of conflicts in 5th grade A



**Fig.4.** Existence of conflicts in 5th grade B



**Fig. 5.** The pupil's involvement in conflicts in 5<sup>th</sup> grade A



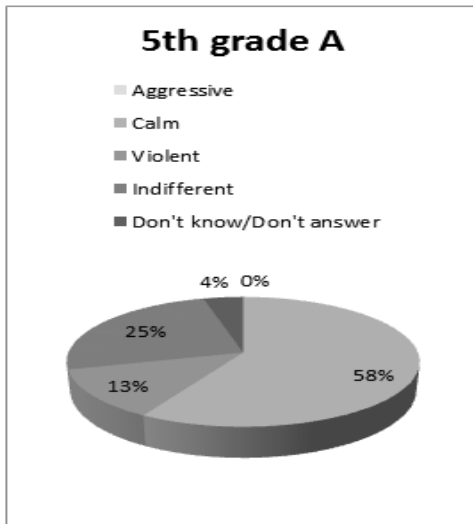
**Fig. 6.** The pupil's involvement in the conflicts in 5<sup>th</sup> grade B

For question No. 3 regarding the pupil's involvement in conflicts (see Figure 5 and Figure 6), the important differentiation to notice is the fact that the pupils in 5<sup>th</sup> grade A find themselves in a high percentage 33% involved in the conflicts that take place in their classroom, while those in 5<sup>th</sup> grade B only 7% do it. It is interesting that none of the pupils in 5<sup>th</sup> grade A said that he/she would not get involved at all in conflicts inside the classroom, whilst 42% of those in 5<sup>th</sup> grade B are not involved at all in the classroom conflicts.

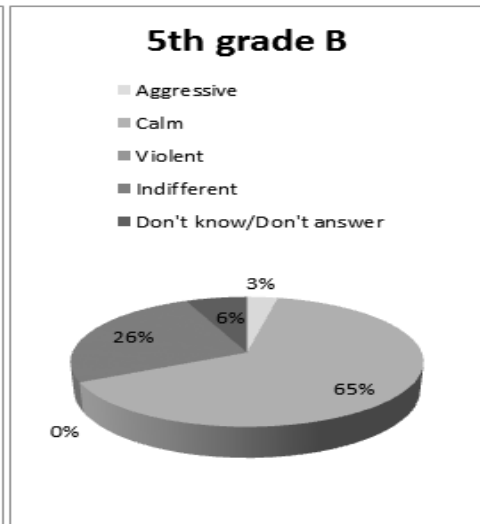
At the fourth question (see Figure 7 and Figure 8), what kind of person do you consider yourself, both the response of the pupils in 5<sup>th</sup> grade A, and in 5<sup>th</sup> grade B were surprising, considering themselves calm persons to a percentage of about 60%. However, about 25% of both grades considered themselves indifferent and yet a percentage of 13% of the pupils in 5<sup>th</sup> grade A believe they are violent persons, which confirms the high percentages above, that we mentioned.

For question No. 5: aggression among pupils is the same with violence among them?, we must consider that they are 5<sup>th</sup> grade children, perhaps they do not understand the difference between aggression and violence, therefore we consider it would be useful that the tutor, at the tutorship hour, teach them what they mean and how each one is shown. A percentage of 44% of the

respondents affirmed they knew the difference between the two terms, 36% recognized they did not know what they mean, and 20% didn't know or didn't want to answer this question. Considering that both terms have negative connotations, and they know it, there is no excuse to use one of them by the pupils, even if they do not know the difference between them. Even if the opinions on the two terms are divided, ultimately it matters that the pupils understand their true meanings and not use any of them in the relations with their peers.



**Fig. 7.** Type of person of the pupils in 5<sup>th</sup> grade A

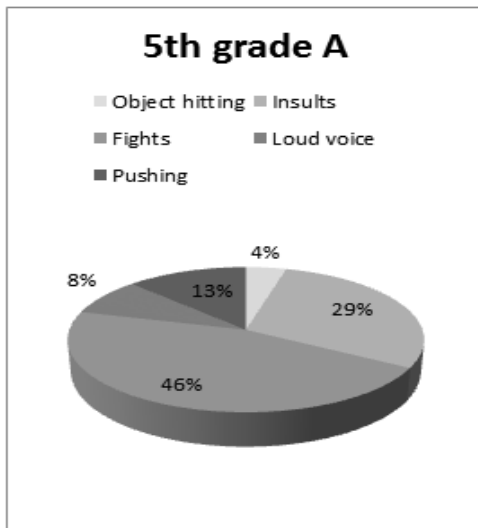


**Fig. 8.** Type of person of the pupils in 5<sup>th</sup> grade B

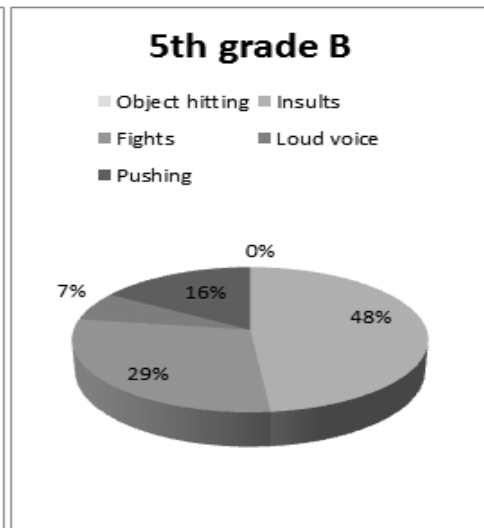
For question No. 6 (see Figure 9 and Figure 10) opinions are divided in terms of the forms of aggression met in school, however fight is considered by a number of 46% by the pupils in 5<sup>th</sup> grade A and 29% by the pupils in 5<sup>th</sup> grade B, which shows once again that there are conflicts at the whole school level, and fight, hitting and other forms of aggression are frequent. 5<sup>th</sup> grade B consider that the most frequent form of aggression is insulting, in a percentage of 48%, while in 5<sup>th</sup> grade A only 29% consider this form of aggression.

For question No. 7: to what extent do you consider yourself a victim of violence in your classroom or school?, pupils in 5<sup>th</sup> grade A, respectively pupils in 5<sup>th</sup> grade B do not consider themselves victims of violence in the classroom or in school, as it results from the responses by a number of 67% and 71%.

About a quarter in each classroom consider that to a certain extent they are victims of violence in school, the question pupils in 5<sup>th</sup> grade A are in a number of 25%, respectively 29% in 5<sup>th</sup> grade B. there is no respondent, in any classroom who would have answered that he/she feels to a large extent a victim of violence in the school or the classroom he/she is part of, however there is, an extent of 8%, pupils in 5<sup>th</sup> grade A, who asserted that to a great extent they consider themselves victims.



**Fig.9. Form of aggression**  
5<sup>th</sup> grade A



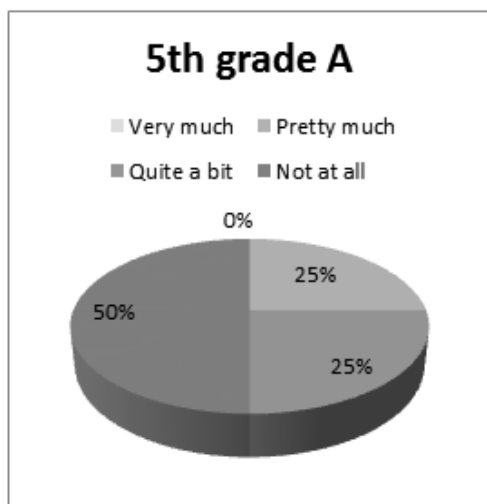
**Fig.10. Form of aggression**  
5<sup>th</sup> grade B

For question No. 8: who are the most frequent parts in conflicts in your school?, pupils in 5<sup>th</sup> grade A consider that they most often occur between two pupils, by a number of 88%, and pupils in 5<sup>th</sup> grade B by a number of 84%, consider the same. In both classrooms, both in 5<sup>th</sup> grade A, and in 5<sup>th</sup> grade B, by a number of 8% and 6%, there are conflicts between parents and the teaching staff, however there is also an open conflict between pupils and teachers, in both classrooms, which are confirmed by the pupils by a number of 4% and 7%. In 5<sup>th</sup> grade B there are pupils who asserted that there are also conflicts between a group of pupils and the classroom, as compared to 5<sup>th</sup> grade A.

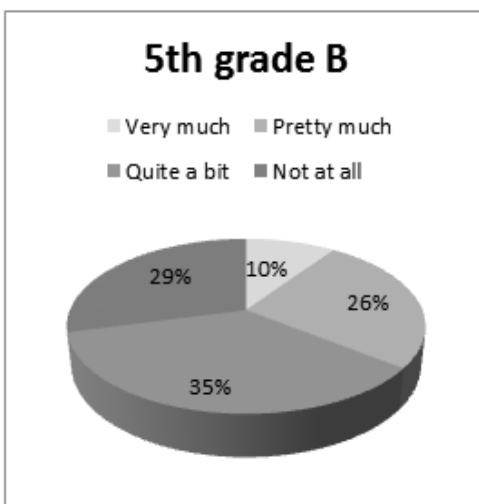
For question No. 9: do conflicts occurring in your school affect you?, it seems the respondents in 5<sup>th</sup> grade A are not affected, 50% responding that they are not affected at all (see Figure 11), and respondents in 5<sup>th</sup> grade B (see Figure 12), responded that they are not affected at all by a number of 29%. 25%

in 5<sup>th</sup> grade A responded that it affects them to a little extent, the pupils in 5<sup>th</sup> grade B who responded that it affects them to a little extent, number 35%.

Only 25% in 5<sup>th</sup> grade A, respectively 26% in 5<sup>th</sup> grade B said that they are affected by the conflicts occurring in the school pretty much, and 10% in 5<sup>th</sup> grade B responded that they are very much affected by conflicts.



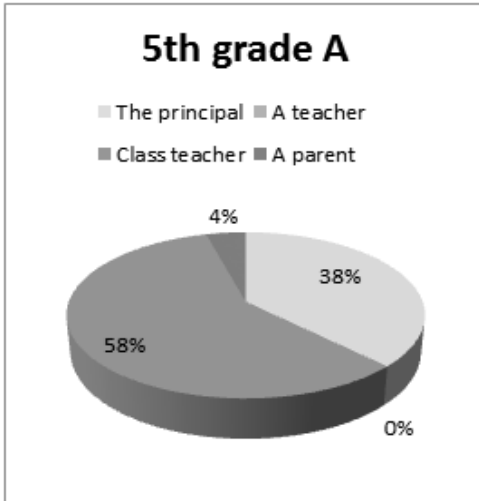
**Fig. 11. Importance of conflicts**  
in 5<sup>th</sup> grade A



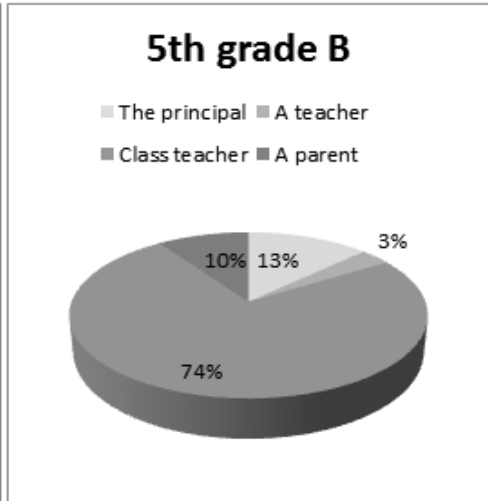
**Fig. 12. Importance of conflicts**  
in 5<sup>th</sup> grade B

As we can see in the figures above, pupils who are not affected by school conflicts are more than those who are affected, which means that there are no conflicts that can harm the image of their school and their own, and of course the fact that if there are such conflicts they do not involve a large number of people in the school but take place between a group of pupils.

According to the answers to question 10 (see Figure 13 and Figure 14): in your classroom who do you think would manage to solve a much better conflict?, 5<sup>th</sup> grade A, consider that the right person for conflict settlements is the class tutor, by a number of 58%, and 5<sup>th</sup> grade B consider the appropriate person to settle the conflicts by the class tutor, but in a higher proportion, that is 74%. The schoolmaster has a high percentage in 5<sup>th</sup> grade A, 38% when it comes to problem solving, and in 5<sup>th</sup> grade B, only 13% think the schoolmaster would settle them. In 5<sup>th</sup> grade B, pupils consider that another teacher could help in conflict settlements in a number of 3%, and 10% consider that a parent would succeed in settling conflicts, while in 5<sup>th</sup> grade B, 4% of the respondents responded that parents could get involved.



**Fig. 13. Conflicts settlement**  
5<sup>th</sup> grade A



**Fig. 14. Conflicts settlement**  
5<sup>th</sup> grade B

## Conclusions

Following the application of the questionnaire to the pupils of the two classes, it was observed that based on the results obtained, in the school in which they carry out their daily activity there are, as in many other conflicts between different individuals or persons.

The fairly high percentages show that educational crises often happen to pupils in school and even in their classes. The authors consider that all such crisis situations have happened because they have known each other for a short period, being the first year together in this configuration and of course coming from different areas, some from the rural area and others from urban area. Literature (Decker, 1997; Brock et al, 2001) suggests that planning should involve the creation of a team of individuals who would coordinate the educational crises often happen to pupils in school.

Then, if we look closely at their involvement in conflicts that do not concern them directly, the percentages are again rather high, which is why the hypothesis that "pupils are involved in conflicting situations that do not concern them directly" the number of pupils in 5<sup>th</sup> grade A is somewhat high, and they are sometimes involved in conflicts that do not concern them directly



and about 42% of those in 5<sup>th</sup> grade B. This high percentage is due to the fact that they either want to help their colleagues or have a more choleric temper.

Crisis drills not only keep the response system well-tuned, but provide a wake-up call about the ever-present possibility of crisis (Lichtenstein et al, 1994, p. 6).

However, one positive thing that could be taken from their answers is that pupils of both classrooms have great confidence in their supervisor's decisions and think that he/she is the one who can cope with unforeseen crisis situations and manage them as efficiently as possible and with the involvement of all those who have taken part in the conflict.

### **Questionnaire regarding the “Pupil’s involvement in conflicts”**

School:

Gender: Male/Female

Age:

Classroom:

1. Do you get involved in conflicts that do not concern you directly?
  - a. always
  - b. sometimes
  - c. never
  - d. Don’t know/Don’t answer
2. How frequent are conflicts in your classroom?
  - a. often
  - b. rare
  - c. never
  - d. Don’t know/Don’t answer
3. How often were you involved in the conflicts in your classroom?
  - a. often
  - b. rarely
  - c. never
  - d. Don’t know/Don’t answer
4. What kind of person do you consider yourself?
  - a. aggressive
  - b. calm
  - c. violent
  - d. indifferent
  - e. Don’t know/Don’t answer
5. Is aggression among pupils the same with violence?
  - a. yes
  - b. no
  - c. Don’t know/Don’t answer
6. In your school or classroom, what is the most frequent form of aggression?
  - a. hitting with objects
  - b. insult
  - c. fight
  - d. loud voice
  - e. pushing
7. To what extent do you consider yourself a victim of violence in your classroom or school?
  - a. to a greatest extent
  - b. to a great extent
  - c. to a certain extent
  - d. not at all

8. Who are the most frequent parts of the conflicts in your school?
- a. between a pupil and the classroom
  - b. between a pupil and a teacher
  - c. between a group of pupils and the classroom
  - d. between two pupils
  - e. between pupils and parents
9. Do the conflicts in your school affect you?
- a. very much
  - b. pretty much
  - c. quite a bit
  - d. not at all
10. Who do you consider to resolve a conflict much better?
- a. the schoolmaster
  - b. the teacher
  - c. the classroom tutor
  - d. the parents

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## COMPARATIVE STUDY ON EFFICIENCY AND OBTAINING POINTS IN HIGH PERFORMANCE COMPETITIONS OF THE WING SPIKER VOLLEYBALL PLAYER

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**ABSTRACT.** Today sports performance is not a chance. In top performances, a volleyball team must have control over all technical and tactical elements to avoid interrupting a game sequence through mistakes amended by the rules, but by trying to play the game by making the opponent mistaken. The attack is the most influential ability of a volleyball game that can predict the team's success. The offensive action performance is dependent on the height at which it is executed in relation to the height of the net and is determined by the player's ability to have its high vertical center of gravity. In the case of volleyball, the execution of a vertical jump is associated with the athlete's performance, being a decision-making factor in the effectiveness of the attack. The purpose of the study is to evaluate the effectiveness of the world-class players who participated in the Rio 2016 Olympic Games and the World Volleyball League 2017. The measurable values for the study were: player height, vertical jump, reaching the maximum point with a hand-attack with takeoff, jumping and reaching as high as possible with the extended arm, jumping vertically, on the spot, reaching the maximum point with two hands, the number of attacks made in each match, the number of points earned from offensive actions

**Keywords:** *volleyball, outside hitter, strike, hitting efficiency*

**REZUMAT.** *Studiu comparativ privind eficiența jucătorilor extremă din jocul de volei în competițiile de înaltă performanță.* În ziua de azi performanțele sportive nu sunt o întâmplare. În performanțele de vârf, o echipă de volei trebuie să aibă control asupra tuturor elementelor tehnice și tactice, pentru a evita întreruperea unei secvențe de joc, prin greșeli amendate de regulament, dar încercând prin mijloace specifice jocului să îl facă pe adversar să greșească. Atacul este cea mai influentă abilitate specifică jocul de volei cu ajutorul căreia se poate prezice succesul echipei. Performanța acțiunilor ofensive,

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sunt dependente de înălțimea la care se execută în raport cu înălțimea fileului și sunt determinate de capacitatea jucătorului de a-și înălța centrul de greutate pe verticală. În cazul voleiului executarea unei sărituri cu desprindere pe verticală este asociată cu performanța sportivului, fiind un factor decizional în eficiența realizării atacului. Scopul studiului este de a evalua eficiența jucătorilor de clasă mondială care au participat la Jocurile Olimpice de la Rio 2016 și în Liga Mondială de Volei 2017. Valorile măsurabile în vederea realizării studiului au fost: înălțimea jucătorilor, săritura pe verticală, cu elan, și atingerea punctului maxim, cu o mână - elan de atac, săritura și atingerea cât mai sus cu brațul întins, săritură pe verticală, de pe loc, cu atingerea punctului maxim, cu două mâini - elan de brațe, numărul de atacuri realizate în fiecare meci, numărul de puncte câștigate în urma acțiunilor ofensive.

**Cuvinte cheie:** *volei, jucător extremă, eficiența loviturii*

## Introduction

Ball games require extensive skills including technical, tactical and mental skills. Athletes must therefore have the necessary psychological requirements to respond to match requests. Volleyball is one of the most popular ball games in the world and is considered one of the most explosive and fast-running sports. It all started with YMCA Springfield's younger teacher of physical and sports education, Morgan, and will remain in history as the inventor of the volleyball game, at that time being called "Mintonette."

The volleyball game is a game with a high dynamics that requires a combination of aerobic and anaerobic physical characteristics involved in solving defensive or offensive game actions. In the case of volleyball, the execution of a vertical jump is associated with the performance of the athlete, being a decision-making factor in the efficiency of the attack, the blocking of the service, as well as in the defensive actions.

A higher reach point of attack gives the player a better attack angle to make a decisive attack and get the point for his team. A feature of the volleyball game is that each team can have a maximum of three touches, receiving the ball and attack. The volleyball game has a cyclical and sequential structure through which the previous game phase will influence the next one (Reeberg, Luiz Claudio et.al. 2008)

Two types of actions can be distinguished from the three touches, according to (José M. Palao, Manzanares, Valadés, 2014), the solid or terminal actions that attempt to score, actions that challenge the opposing team and continuous actions aiming at neutralizing, eliminating the possibilities of action for the opposing team.

These actions aimed at neutralizing or eliminating the opponents possibilities may consist in sending the opponent a ball that makes it difficult for him to continue the action or in sending a ball to his teammate to increase the chances or facilitates the obtaining of the next point.

The evolution of volleyball world-wide has led players to specialize in positions with different roles. The specialization of positions in volleyball leads to the classification of players in different types. The player considered the first option to be the opposite or spiker, followed by the outside hitter or the second player. Traditionally the opposite or spiker is the player who is the most involved in the attack phases with the highest possibility of completing an attack (make a kill) either from the front row or back row lineup (Rui, José, José Cicero Isabel, 2014). Side players must have very good orientation skills and advanced physical abilities to meet the ball transmitted by the setter to the highest possible point in order to initiate the attack.

The effectiveness of attack, block and service actions depend on the height at which they are executed in relation to the height of the net and are determined by the player's ability to raise vertically his center of gravity - improve his jump height (González-Silva et. al. , 2016) In volleyball the rally is the decisive part of a match. The results accomplished by a team show the effectiveness of the attack, which depends on the characteristics of each team, and the position of the players who have the possibility to attack.

Winning a rally is particular to one player and involves his full participation, using all his physical, technical, tactical and mental capacity as a whole.

## **Sampling**

The selection of the subjects to analyze for comparison was based on their participation in the two events, namely the Rio 2016 Olympic Games and the Volleyball World League 2017. The teams taking part in the Olympics in Rio, twelve in number, were the same teams who got selected for participation in the World Volleyball Championship 2017 .

## **Materials and methods used**

Data for this study was collected in 2016 during the Olympic Games and in 2017 during the World Cup matches at indoor volleyball. The lot being studied represents a small number of players who participated in both events playing either as outside hitters or opposites. The indicators we examined were: the height of the players, the height of the strike, the height of the block,

the effectiveness of the attack, the progress made since the Olympic Games until the World League in the World League (2017). All the attack actions executed by the side players have been recorded as percentage of the success rate in relation to the personal attempts and total attempts of the team.

## Results and discussions

There were a total of 74 matches played in both events, 36 held in the Olympic Games and 36 matches taking place at the World League 2017. The statistical analysis tracked the actions of 8 players from different countries that added up 517 attempts at both events, with 176 attempts at Rio 2016 and 341 at the World League 2017. The players' analysis took into account the number of attempted and completed offensive actions that led to obtaining a point. The percentage of personal successes and successes within the team of the analyzed players showed the following results:

**Table 1.** PERRIN John Gordon (P1)

Height	Strike height	Block height	Event	Attempts	Won attempts	Percentage of team success rate	Percentage of personal success rate
201	353	329	RIO16	18.04	7.06	35.33%	18.81%
			WL17	26	11.02	27.03%	40.33%

Average action per game

**Table 2.** H. Milad (P2)

Height	Strike height	Block height	Event	Attempts	Won attempts	Percentage of team success rate	Percentage of personal success rate
196	350	310	RIO16	19.3	7.3	16.24%	34.22%
			WL17	26.6	12.6	23.27%	45.03%

Average action per game

**Table 3.** H. Milad (P2)

Height	Strike height	Block height	Event	Attempts	Won attempts	Percentage of team success rate	Percentage of personal success rate
196	348	326	RIO16	23.66	11.16	21.32%	49.06%
			WL17	28.05	13.33	23.33%	46.45%

Average action per game

**Table 4. N. Earvin (P4)**

Height	Strike height	Block height	Event	Attempts	Won attempts	Percentage of team success rate	Percentage of personal success rate
194	358	327	RI016	26.04	13.04	30.26%	54.09%
			WL17	35.66	18.66	32.63%	51.04%

Average action per game

**Table 5. S. Taylor (P5)**

Height	Strike height	Block height	Event	Attempts	Won attempts	Percentage of team success rate	Percentage of personal success rate
196	345	320	RI016	22.75	10.05	18.02%	45.66%
			WL17	23.06	13.08	27.58%	57.28%

Average action per game

**Table 6. K. Michal (P6)**

Height	Strike height	Block height	Event	Attempts	Won attempts	Percentage of team success rate	Percentage of personal success rate
191	328	312	RI016	19.25	9.25	18.05%	47.66%
			WL17	22.33	11	22.56%	47.06%

Average action per game

**Table 7. K. Michal (P7)**

Height	Strike height	Block height	Event	Attempts	Won attempts	Percentage of team success rate	Percentage of personal success rate
198	344	318	RI016	29	14.4	30.14%	50.62%
			WL17	34.33	16.33	28.31%	47.29%

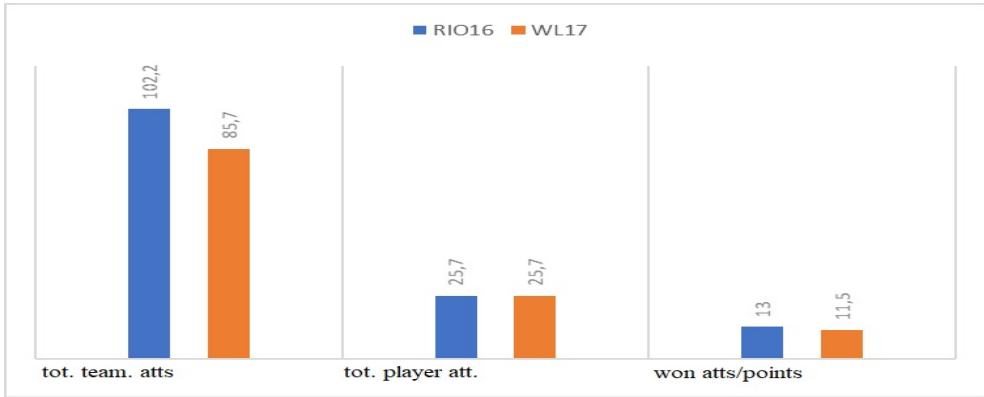
Average action per game

**Table 8. K. Egor (P8)**

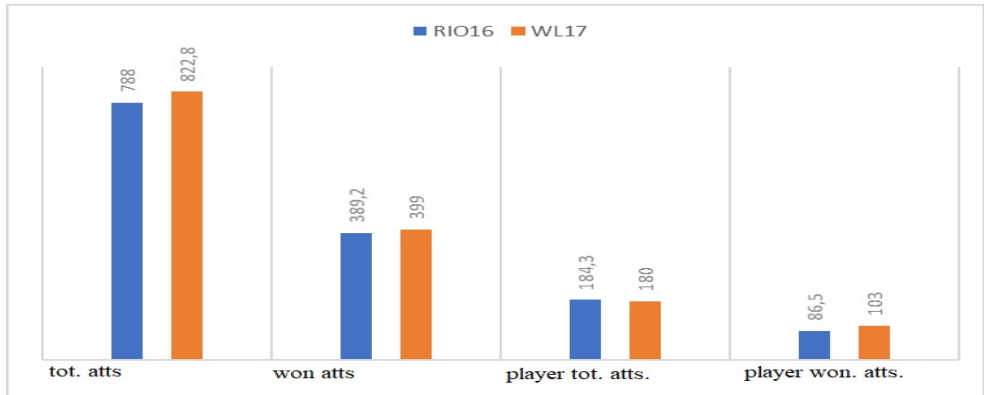
Height	Strike height	Block height	Event	Attempts	Won attempts	Percentage of team success rate	Percentage of personal success rate
208	360	350	RI016	25.75	13	24.53%	50.49%
			WL17	25.5	11.5	26.76%	48.27%

Average action per game

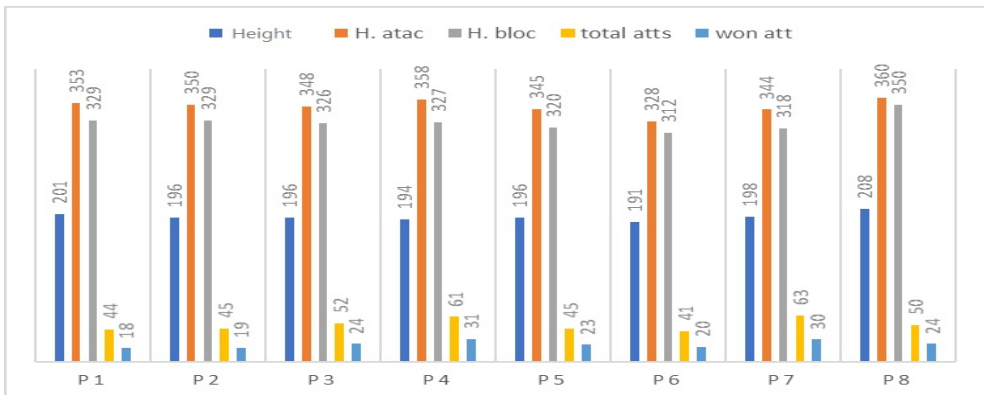




**Fig. 1.** Effectiveness of offensive actions



**Fig. 2.** The average of offensive actions distributed on events



**Fig. 3.** Player results in all events

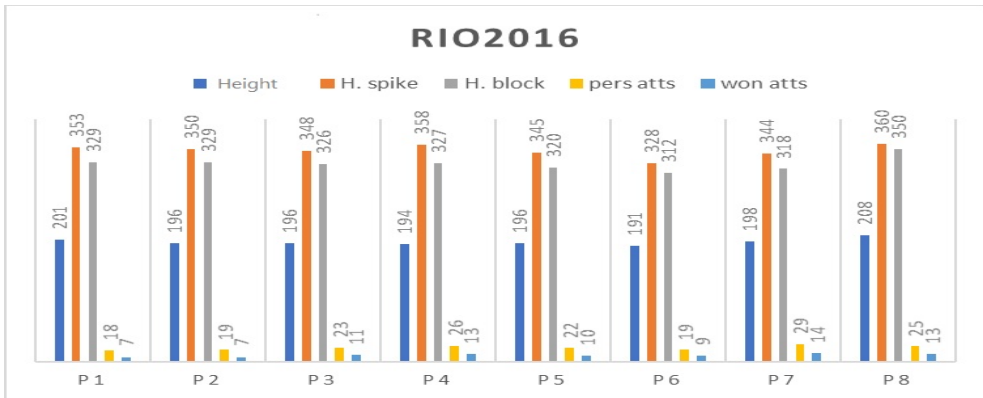


Fig. 4. Player results per event

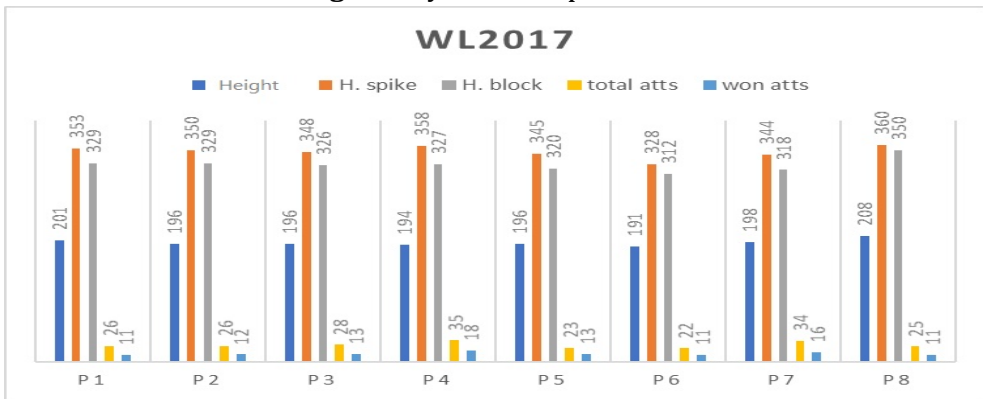


Fig. 5. Player results per event

Figure no. 3 and no. 4 reveal an increase in the number of offensive actions and an increase in successful attack attempts that led to obtaining the point. The number of successful attacks achieved in WL2017 adds up to 148 as compared to 79 accomplished in RIO2016, and the total of attempts at WL2017 are 219 compared to 181 achieved at RIO2016

## Conclusions

Winning a rally is particular to one player and involves his full participation, using all his physical, technical, tactical and mental capacity as a whole. In the modern game, each team has a value leader, a player with remarkable qualities that stands out of the "volleyball specialist on a certain position" pattern, as it is the case with the players we have analyzed, players who have made progress in terms of the number of offensive actions and

taking into account their presence in two of the world's most important volleyball events - the Olympic Games and the Volleyball World League

The high level of involvement of the players included in this study is obvious considering the number of offensive actions they carried out in the two events, but especially in the difference they recorded in the World League 2017 as compared to the 2016 Olympic Games

In the Olympic Games, the average of the passes received by the selected players was 181, out of which 84 were completed, and the number of passes at the World League showed a difference of 69 offensive actions reaching a total of 219 out of which 126 were completed and resulted in getting points, 42 more than at the won attacks accomplished at Rio Olympics according to Chart 4 and 5.

The selected players recorded a difference of 3.12 won attempts in the World League matches as compared to the Olympics, which indicates that wing spikers were involved in more offensive phases, an indicator that marks a number of successes compared to the number of attempts. In WL17, the average of the offensive actions completed by getting a point and service by a player is much closer to the number of attempts than those of the RIO16.

The performance of the attack and block action depended on the height at which it is executed and is related to the height of the net and it is determined by the player's ability to improve his jump height. Thus the average player height is 197.5 cm and it indicates that the selected players have outstanding qualities that contribute to capitalizing the attack action at the net and in the second row, through a high ball hit point 348.25 cm, the average of the attack hits and 324 cm the maximum height of the jam as shown in the figure no.3 A higher jump is essential to be able to perform an attack or strike in optimal conditions.

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## THE CONCEPT OF COMMUNICATION COMPETENCE IN KINETOTHERAPY: CONTENT AND STRUCTURE

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**ABSTRACT.** In the view of several authors, the notion of competence is approached from different perspectives, and we can certainly attribute to it three components: knowledge, skills and attitudes, in which the attitude has the role of leading, directing, bringing arguments and obtaining a result; and knowledge and skills go beyond competence. The notion of communication competence includes communication capacities obtained over the lifetime and proposes the ability to communicate, transmit, change opinions in different circumstances, in the process of manifestations and mutual actions with other people, applying the system of language standards and speech. The competence of professional communication, together with a specific language of the medical recovery sector, presupposes and includes, in addition to communication components, knowledge from the field of activity. The competence of communication in the medical language admits knowledge, skills and skills in an area where we can identify the main features of the professional communication competence: to apply the knowledge in a professional manner; to reproduce and explain by appropriate means the content of a communication, sources, notes, indications etc.; to communicate problems, solutions, information to colleagues in the medical team, and to patients involved in the recovery process.

**Key-words:** *competency, communication competence, professional communication competence, medical language of recovery, kinetotherapy.*

**REZUMAT. Conceptul de competență de comunicare în kinetoterapie: conținut și structură.** În viziunea mai multor autori, noțiunea de competență este abordată din diferite perspective și îi putem atribui cu certitudine trei componente: cunoștințe, abilități și atitudini, în care atitudinea are rolul de a conduce, direcționa, de a aduce argumente și de a obține un rezultat; iar cunoștințele și abilitățile întregesc competența. Noțiunea de competență de comunicare include capacități comunicative obținute de-a lungul vieții și ne propune abilități de a comunica, transmite, de-a schimba păreri în diferite

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circumstanțe, în procesul de manifestări și acțiuni reciproce cu alte persoane, aplicând sistemul de standarde de limbă și vorbire. Competența de comunicare profesională, alături de un limbaj specific sectorului de recuperare medicală presupune și include, pe lângă componente de comunicare, cunoștințe din domeniul de activitate. Competența de comunicare profesională în limbajul medical admite cunoștințe, aptitudini și deprinderi într-un domeniu în care putem identifica principalele caracteristici ale competenței de comunicare profesională: de a pune în practică cunoștințele printr-o manieră profesională; de a reda și de a explica prin mijloace adecvate conținutul unei comunicări, surse, note, indicații etc.; de a comunica probleme, soluții, informații atât colegilor din echipa medicală, cât și pacienților ce fac parte la procesul recuperator.

**Cuvinte-cheie:** *competență, competență de comunicare, competență de comunicare profesională, limbaj medical de recuperare, kinetoterapie.*

## Introduction

In the literature, the notion of competence is approached from different perspectives. Aristotle, Noam Chomsky, J. Raven, L. D'Hainaut, B. Rey, X. Roegiers, M. Minder, have given the term and the notion of competence several concepts with reference to a set of ideas where competence is ability based on knowledge, skills, and skills acquired through learning (Minder, 2003, p.58).

In the vision of R. Gherghinescu, C. Cucos, Vlad Pâslaru competence is *knowledge, ability and skills* (Pâslaru, 2014). Fig.1

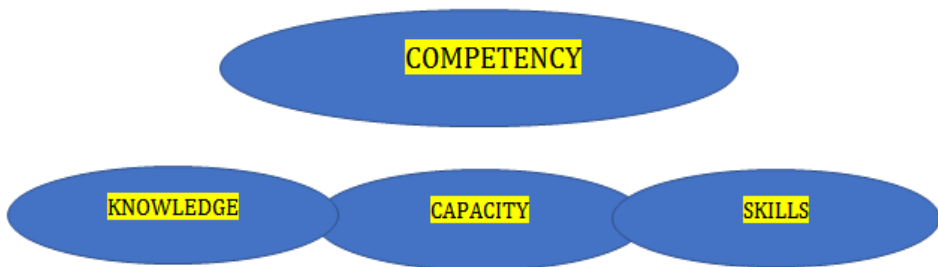


Fig.1. COMPETENCY  
(Pâslaru, 2014)

In the opinion of the researchers Vl. Guțu, E. Muraru, O. Dandara, competence is exposed as: *ability to achieve something difficult* (Dumbraveanu, 2003, p. 14).

T. Cartaleanu, O. Coșovan, V. Goraș-Postică decides, therefore, about competence: *“whatever the field, competence is guided by performance and effectiveness, being directly supported by extrinsic factors and intrinsic determinants for the conduct of any individual in part”* (Goraș-Postică, 2008, p. 7).

Thus, competence translates directly into a global dominance of a category of complex situations, by mobilizing various resources, by referring to action and the effective use of a set of resources. The integrity of competence is presented by the definitions in the literature: competence is an integrated set of knowledge, skills and attitudes that allow the subject, in front of a category of situations, to adapt, solve problems and realize projects (Voiculescu, 2011, p. 16).

In the view of researchers D. Potolea and S. Toma (2010), the notion of competence includes two dimensions: the objective-social dimension, where specific competence implies certain knowledge and skills valid in relation to the quality criteria of competence; the subjective-professional dimension refers to the person's ability to select, unify, use appropriately knowledge and skills to perform a learning task or a professional commitment in accordance with some qualitative principles (Potolea, 2010).

According to Vladimir Gutu, competence is defined as a *“set of capacities”* to act / activate in indefinite situations through: the sphere / field of activity; the level of non-determination of activity contexts; the argumentation of choice of the instruments of action (empirical, theoretical, axiological).

In the context of several visions, we can certainly attribute to the concept of competence the three components: knowledge, skills and attitudes, in which the attitude has the role of conducting, guiding, bringing arguments and achieving a result; and knowledge and skills complement the competence.

A part of language competence is communication competence. Oswald Ducrot and Jean-Marie Schaeffer define the communicative competence of Dell Hymes as a sum of social rules that allow the use of grammatical competence; it overpasses the competence of Chomsky and E. Coșeriu (Roventă-Frumușani, 2005, p. 436).

Sociolinguist Dell Hymes, taking Chomsky's theses, talks about the concept of *“communication competence”* for the first time in 1966, giving him the ability to produce and interpret messages in given situations. Daniela Roventă-Frumușani speaks in this sense of a communication competence indispensable to communication success, which does not coincide with linguistic one, but consists in knowing those rules that guide the use of speech

in a certain social context: "communication competence" is the result of the interaction: "*linguistic competence, socio-cultural competence, encyclopaedic competence and generic competence*" (Rusu, 2008, p. 65).

In the view of A. Pamfil, the competence of communication is the set of knowledge and abilities that the subject mobilizes in the comprehension. Also, in the definition of communication competence, the situations in which communication competence is expressed are: the understanding of the language, the oral and the written text; producing the language, the oral text and the written text (Mândruț, 2012, p. 219).

Beyond certain trends, communication competence is a key competence category in a global world, in the absence of which neither knowledge nor learning can be built. It is a key element for our success as a stakeholder in the prophylactic or rehabilitative process, with the goal of developing and improving a range of key competences (Callo, 2003, Ionescu, 2001). T. Callo mentions that the following principles must be observed and achieved in the effective training of communicative competences: relational; the communication environment; of pre-communicativeness; the motivational necessity; of personalization; of the partnership; of activation; responsibility; of communicative intent; equality and agreement; of socialization.

Thus, through communication competence we mean the ability to transmit and change ideas in different situations, in the process of interaction with the participants in the rehabilitation act, on the one hand and on the other side with the medical team we work with, using in properly the language and speech standards system and the choice of the appropriate communication situation.

Professional competences are given by an integrated and dynamic set of knowledge, skills and abilities that are designed to solve complex situations (Callo, 2003).

For these reasons, I. Lupu, V. Cabac, S. Gâncu states that the notion of competence complements the notion of qualification, "*A qualification is acquired when a competent body finds that the level of learning reached by a person has reached a certain standard of knowledge, skills and general skills*".

*The European Qualifications Framework and the National Qualifications Framework in Higher Education*, record two fundamental categories of competencies:

- *Professional competences*: cognitive skills; functional-action competencies;
- *Transversal competences*: Role skills; relative to market rigidities (table 1).

**Table 1.** Fundamental categories of professional and transversal competencies

<b>COMPETENCY</b>		
<b>Professional skills</b>	knowledge	<i>knowledge, and use of terminology specific to physical therapy</i>
		<i>explaining these notions to the patient's meaning</i>
	abilities	<i>applying and solving complex situations</i>
		<i>constructive reflection</i>
<i>Creativity</i>		
<b>Transversal competences</b>	value acquisitions	<i>responsibility and involvement</i>
		<i>interaction with the patient and the medical team</i>
		<i>personal and professional development</i>

*Professional competencies*, being cognitive and functional-action, fully covers professional requirements regardless of the field of activity. The foundation of the training process is the competency-based approach, which aims at developing sustainable skills, able to help the specialist in medical recovery, communicate in complex professional situations.

*Professional communication competence*, involves competencies that relate to a language specific to physical therapy and includes, in addition to the components of communication competence and knowledge in the field. The competence of professional communication in medical language would require knowledge, skills and abilities with reference to the specialized language.

In this respect, V. Goraș-Postică observes that the competence of professional communication includes the action of combining and using the knowledge, skills and attitudes in order to obtain the proposed results. Having professional skills means having a set of specific features and features: researching and examining different occupational situations, reporting a general principle to a particular case, implementing practical knowledge, using specific skills, collaborate with people in the group, clarify an unpredictable problem or situation, inform or transmit some information (Ionescu, 2001).



All this would generate that competencies result in expressing a domain according to a determined level; so we can identify the following features of professional communication competence:

- ✓ to communicate in the specialized language;
- ✓ to apply the knowledge through a professional treatment of the field;
- ✓ to reproduce and explain by adequate means the content of the recuperation program;
- ✓ to inform about, problems, solutions, etc. both colleagues in the medical team as well patients participating in treatment;
- ✓ to develop learning skills in order to be able to continue training throughout our careers, realizing that we have no identity as specialists without continuous training.

## **Material and methods**

By examining the literature, from the perspective of those analyzed in the vision of the specialized language training in kinetotherapy, we define the notion of professional communication competence through: knowledge, skills, attitudes that reflect the selection, combining and using ability that corresponds to the integrated ensemble, coherent and open; and other purchases (values and attitudes) that are specific to medical recovery in order to resolve with positive results in problem situations.

The analysis of the situation in the field allows us to accept from the above-mentioned data, to develop the transposition of the general professional competences into professional communication skills.

The trends in education policy relevant to higher education, presented in the European documents issued following the Bologna process, call for a skills characterization, highlighting the role of skills in the training of physiotherapy specialists and others.

Throughout evolution, a lot of notions, ideas about the notion of competence have emerged - about the competence of communication and less about the competence of professional communication. Making a synthesis and analyzing the sources about each one in particular, we outlined a table for professional communication competence (Table 2):

**Table 2.** Essential components and attributes of professional communication skills to kinetotherapists

<b>Characteristics of professional communication skills:</b>	<b>Actions of professional communication competence:</b>
<i>- an integrated and dynamic set of knowledge (knowledge, understanding and use of specific language) and skills (application, transfer and problem solving, creativity and innovation).</i>	<i>- to communicate in a language specific to the field of medical recovery</i>
<i>- knowledge, skills and abilities with reference to specialized language</i>	<i>- to put into practice the knowledge through a professional treatment of the medical field</i>
<i>- Investigate and examine different professional situations</i>	<i>- to inform about the problems, solutions, and information that may occur in the recovery process</i>
<i>to have an assembly of features and specific features</i>	<i>- to reproduce and explain by appropriate means the content of the recuperation program.</i>
<i>- to delimit specific work-specific limits</i>	<i>- to combine and use knowledge, skills and attitudes to achieve the proposed results</i>

## Conclusions

The analysis of the specialized literature allows me to highlight the following aspects:

- ✓ Competencies reflect an attribute of being a whole of knowledge, capabilities and attitudes, willing to give the physical therapist the attitude to achieve a goal, a role, to accomplish a task, constantly evolving and evolving.
- ✓ Competence in the instructive-educational process becomes part of the process training, has a triadic structure, is outlined in different levels of professional development.
- ✓ Professional communication competence refers both to competency issues, as well and those of communication competence.

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