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Effects of COVID-19 Confinement on the Health and Perspectives of Exercise Practice in Portugal

Nuno Loureiro [1,2,3], Luís Murta [1], Pedro Bento [1], Vânia Loureiro[1,3] *

[1] Department of Arts, Humanities and Sports, Polytechnic Institute of Beja, School of Education, 7800-295 Beja, Portugal;
[2] Project Aventura Social, Faculty of Human Motricity, University of Lisbon, Estrada da Costa, 1499-002 Cruz Quebrada, Portugal;
[3] ISAMB Research Centre, Faculty of Medicine, University of Lisbon, 1649-028 Lisbon, Portugal.

Correspondence: Vânia Loureiro (vloureiro@ipbeja.pt)

Abstract:
Introduction: Social confinement, imposed by the SARS-CoV-2 coronavirus, was an extraordinary situation and implied several consequences on people's health, which are still not fully understood. This study aimed to understand the changes in mental health and to determine the probability of returning to sports practice during the period of generalized confinement and lockdown due to COVID-19, between January and March 2021. **Methods:** A self-administered on online survey (PEF-COVID19) was applied to the general Portuguese population, aged ≥ 18 years. The t-test for paired samples and the chi-square test were used to analyze the variables, $p < 0.05$. **Results:** 811 participants filled the questionnaire and 666 were included. Our study showed that during confinement: (i) there was an increase of anxiety (before - M= 3.1 ± 2.1; during – M= 4.3 ± 2.7) and stress (before – M = 3.1 ± 2.5; during – M= 4.1 ± 3) and (ii) a greater probability of dropping out sports practice (before – M = 1.1 ± 2; during – M= 7.5 ± 3.3). **Conclusions:** The results demonstrate that the period of confinement and lockdown, significantly influenced health and the intention to remain practicing sports. These

indicators demonstrate the need to develop quality sports/exercise programs, adjusted to different target groups, especially the most vulnerable, to keep the population active, reduce sedentary time and the consequent impacts on mental and physical health.

Keywords: SARS-COV-2; Exercise; Anxiety; Stress; isolation

Introduction

The World Health Organization (OMT, 2020), on March 11, 2020, declared the existence of a pandemic due to SARS-CoV-2 (*Severe Acute Respiratory Distress Syndrome Coronavirus-2*), responsible for the disease COVID-19. The government of Portugal, faced with the exponential increase in contagions, imposed second general confinement and lockdown on January 13, 2021 (Presidency of the Council of Ministers, 2021), which lasted for 9 weeks. This measure was implemented by most countries, by regulating the obligation to remain at home and restricting population movements in their different contexts (work, education, meetings, and general activities) in an attempt to "flatten the curve" of cases of COVID-19. The public health objective of this measure was to save the population from cases and deaths from COVID-19 and to prevent the collapse of the national health system (Kumar et al., 2020). The opinion of this measure, despite being widely replicated, is not consensual. Joffe (2021) states that we are facing difficult choices since confinement can cause much more harm to the population's well-being than COVID-19 itself. However, there were projections that without mandatory confinement there would be 7.0 billion infections and 40 million deaths globally by 2020 (Walker et al., 2020). However, we were faced with a measure that could involve dangerous side effects, mainly in prolonged confinement (Joffe, 2021). While health systems around the world were concentrated, almost exclusively, to combat COVID-19 outbreaks, the management of other diseases, including mental health, which usually worsens during the pandemic, was drastically affected (Correia, 2020).

Some of the consequences identified in economically strongest countries were changes in medical treatment, increased violence against women, implications for mental and physical health (Moser et al., 2020; Roesch et al., 2020; Rosenbaum, 2020). The negative health consequences can be attributed to the emotional and physiological effects of the risk posed by the virus and the reduction in physical activity, social and human physical contact (Kerr et al., 2019). Studies of previous pandemics, such as severe acute respiratory syndrome (SARS), reveal that the duration of quarantine was assumed to be an important predictor of post-traumatic stress disorder (Hawryluck et al., 2004), depression, and anxiety (Reynolds et al., 2008). From a psychopathological point of view, this context is a relatively new form of stress or trauma for health professionals (Kang et al., 2020) and can even be comparable to natural disasters, such as earthquakes or tsunamis (Morganstein & Ursano, 2020). Psychosocial stressors within families and the loneliness, for those living alone, can also increase in confinement and have adverse effects on physical and mental health (Fiorillo & Gorwood, 2020; Smith, 2020). Concerns about their health and that of their loved ones (particularly the elderly or those who suffer from any physical illness), as well as uncertainty about the future, can generate or exacerbate fear, depression, and anxiety (Fiorillo & Gorwood, 2020). This situation is evident in the analysis of a well-being study, carried out in the United Kingdom during COVID-19, where there was an average reduction of 8.1% in mental health indicators (Banks and Xu (2020), particularly among young women. There is also evidence of an increased incidence of depression and anxiety (Qiu et al., 2020) and financial worry (Tull et al., 2020). The negative psychological effects of being confined during quarantine have recently been reviewed (Brooks et al., 2020) and include symptoms of post-traumatic stress, confusion, anger, emotional upset, depression, stress, irritability, insomnia, anxiety, and irritability.

These forced lifestyle changes have left many people with additional free time for leisure, or any voluntary activity performed during free time, such as painting or exercising (Paggi et al., 2016). However, this increase in leisure time coincided with restricted

access to popular leisure facilities such as gyms and restaurants (Courtemanche et al., 2020) causing many to seek available activities at home or nearby (Morse et al., 2021). The need to adapt and find leisure activities compatible with the restrictions of confinement may have generated additional stressful situations. It is recognized that well-being is associated with the frequency and variety of participation in enjoyable leisure activities (Pressman et al., 2009). The psychological benefits related to the practice of physical activity are also documented in a situation of confinement (Carriedo et al., 2020). Interestingly, a study carried out in Belgium demonstrated that during confinement, physical activities decreased among those who were highly active but increased among those who were previously inactive (Constandt et al., 2020). However, in general, physical activities are less likely to increase, as indicated in the study by Duncan et al. (2020), where only 27% of individuals increased the time spent in this type of activity as well as increased concerns due to increased sedentary behavior and associated consequences (i.e., glucose homeostasis, aerobic capacity, fat deposition, increased systemic inflammation and loss of muscle mass (Narici et al., 2021).

For most of the population, confinement is an extraordinary event that implies strong restriction of movement and social isolation. This situation leads to the need to understand the changes in mental health and the probability of returning to sports, that occurred during the period of confinement due to COVID-19.

Methods

This is an observational cross-sectional study using an online questionnaire. The self-administered questionnaire was made available through the internet. Data collection took place in mainland Portugal and the islands (Azores and Madeira), from February 22 to May 23, 2021. The investigation was carried out and approved by the guidelines of the Ethics Committee of IPBeja under case number 14/021 All the principles enshrined in the Helsinki Dec-

laration were respected. Participation was voluntary, guaranteeing confidentiality for each participant.

Sample

A total of 666 subjects, aged 18 years or older, who practiced regular sports, with a mean age of 46.9 years (±19.4 years), participated in this study. We included only the endear ones who agreed to participate in this study, who after reading the consent form that was presented at the beginning of the questionnaire marked the answer that confirmed their agreement. At any time, the respondent could renounce from filling out the questionnaire, without any restriction.

Questionnaire

The PEF-COVID19 questionnaire (Physical exercise level before and during social isolation) was designed to assess levels of physical exercise and the psychological impact of the general population, before and during social isolation due to the COVID-19 pandemic (Sá-Caputo et al. al., 2020). The psychometric properties of this instrument are described in the study by Sá-Caputo et al (2020), which reports the validity and test-retest reliability indices, being considered a valid and reliable instrument.

The instrument was divided into four sections: (I) Demographic, anthropometric, and health status characterization; (II) Physical exercise performed or not, pain, anxiety, and stress before COVID-19; (III) Update of the confinement situation; (IV) Physical exercise performed or not, pain, anxiety, and stress during COVID-19.

The questionnaire was designed in the *Forms Google* platform, to be self-administered and automatically hosted through a unique URL. The confidentiality of the study was guaranteed through a unique ID, protected by a password, of all author data reported

through a "Cloud" database type. The survey was carried out anonymously. The questionnaire consists of open, closed, yes/no questions, and a scale from 0 (minimum) to 10 (maximum), which was used to assess the level of pain, anxiety, stress, and probability of dropping out of sports.

The age variable was categorized into 4 categories: 1- Young people (18-24 years old); 2- Young adults (25-44 years old); 3- adults (45-59 years old) and 4 - elderly (60 years old).

Regarding the Body Mass Index (BMI) it was calculated according to the classic formula – weight/height x 2 and used the following categorization (Garrow & Webster, 1985): 1- underweight (< 18.5 m/kg2); 2 - healthy weight (18.5 to < 25 m/kg2); 3 – overweight (25.0 to <30 m/kg2); 4 - obesity (≥ 30 m/kg2).

Regarding the perception of health status, was used the following codification: 1 – cardiovascular or predisposing diseases; 2- musculoskeletal diseases; 3- neurological diseases; 4- diseases that affect mental health; 5- respiratory diseases; 6 – no disease. It was asked if they used any type of medication (0 - No and 1 - Yes). It was asked if they were smokers (0 - No and 1 – Yes) and if they have ever had COVID-19 (0-No and 1 – Yes).

Procedures

The questionnaire was sent by e-mail to members and collaborators of institutions that stimulated sports, through which practitioners and athletes were invited to participate in the study, with the shared link (https://forms.gle/EQCLbL5HhrE6AfD89) of the questionnaire. Participants' responses were protected, data were recorded, scaled, and scored with Excel software, using customized formulas for further statistical analysis.

Data Collecting and Statistical analyses

All data were exported to an Excel sheet. Nominal data were coded for statistical purposes. Statistical analyzes were performed

using IBM Statistics® for Windows (version 24.0., IBM Corp., Armonk, NY, USA). Descriptive statistical analyzes (% and no.) and the independent chi-square test, were performed.

Gender comparisons of categorical variables (age, BMI, education level, professional status, perception of health status, medication use, smoking, and COVID infection) were performed using the chi-square test ($p<0.05$). For variables related to perception and health (tiredness during exercise, anxiety, and stress) and the probability of dropping out, the means were compared by performing a t-test for paired samples ($p<0.05$).

Results

A total of 811 individuals responded, but 145 subjects (18%) were excluded for not accepting to participate in the study or for report an age below 18 years. Six hundred and sixty-six participants were included in final analyses. Table 1 describes characteristics of participants according to gender.

It is possible to observe that most participants are female (61%) and 36.3% are aged 60 years or over (elderly). In this age group, we found that there are significant differences between genders (female - 28.5%, male - 7.8%, X2 = 70,238; $p<0.0001$). No significant differences were found in BMI classification, smoking habit, and COVID infection. Regarding education, 23.4% of women have completed basic education (X2 = 57,118; $p<0.0001$) and 24.6% of women (X2 = 57.310; $p<0.0001$) reported that they were already retired.

Most subjects (54%) did not report diseases, but the most reported diseases were cardiovascular diseases, especially among women (female - 21.9%, male - 8%; X2 = 35.806; $p<0.0001$). About taking medication, 60.1% do not take medication, but of those who reported taking medication, women reported using the most (female - 21.9%, male - 8%; X2 = 50.796; $p<0.0001$).

Table 1

Sociodemographic and health characteristics of the study sample (n = 666), aged from 18 years and divided by gender. Values are presented in percentage (%) and number.

Characteristics of participants	General (%, n) (n=666)	Female (%, n) (n=407)	Male (%, n) (n=259)
Age (years) *			
Adolescents	14.6 (97)	**4.5** (30)	**10.1** (67)
Young adults	29 (193)	16.4 (109)	84 (12.6)
Adults	20.1 (134)	11.7 (78)	8.4 (56)
Older Adults	36.3 (242)	**28.5** (190)	**7.8** (52)
BMI (m/kg²)			
Underweight	2 (13)	1.5 (10)	0.5 (3)
Normal weight	50.2 (334)	31.7 (207)	19.4 (127)
Overweight	32.4 (216)	18.4 (120)	14.7 (96)
Obesity	13.5 (90)	9.3 (61)	4.4 (29)
Education level *			
Primary	28.7 (185)	**23.4** (151)	**5.3** (34)
Secondary	28.7 (185)	**12.7** (82)	**16** (103)
Higher education	29.6 (191)	16.6 (107)	13 (84)
Postgraduate	13 (84)	7,1 (46)	5.9 (38)
Professional situation *			
Retiree	31.6 (208)	**24.6** (162)	**7** (46)
Unemployed	3.6 (24)	2.9 (19)	0.7 (5)
Student	12.6 (83)	**4.5** (30)	**8.1** (53)
Private sector employee	24.6 (162)	12.6 (83)	12 (79)
Public sector employee	26.7 (176)	16 (105)	10.7 (71)
Salary reduction or unemployed due to COVID-19	0.8 (5)	0.6 (4)	0.2 (1)
Perception of health status *			
Cardiovascular diseases or predisposing	30 (198)	**21.9** (145)	**8** (53)
Musculoskeletal disorders	7.3 (48)	**5.4** (36)	**1.8** (12)
Neurological diseases	0.5 (3)	0.3 (2)	0.2 (1)
Diseases that affect mental health	2.9 (19)	**2.4** (16)	**0.5** (3)
Respiratory diseases	5.4 (36)	3.3 (22)	2.1 (14)
No disease	54 (357)	**27.5** (182)	**26.5** (175)
Medication use *			
No	60.1 (391)	**30** (195)	**30.1** (196)

Yes	39.9 (260)	**31** (202)	**8.9** (58)
Smoker			
No	91.3 (597)	56.6 (370)	34.7 (227)
Yes	8.7 (8.6)	4.3 (28)	4.4 (29)
Infected with COVID			
No	92.4 (606)	55.8 (366)	36.6 (240)
Yes	7.6 (50)	4.9 (32)	2.7 (18)

Legend: age - Young (18-24 years old); Young Adults (25-44 years old); adults (45-59 years) and seniors (60 years and over); *Chi-square test with adjusted residuals ≥ |1.9| are considered significant (in bold) $p < .05$. BMI: 1- underweight (< 18.5 m/kg2); 2 – normal weight (18.5 to < 25 m/kg2); 3 – overweight (25.0 to <30 m/kg2); 4 - obesity (≥ 30 m/kg2).

In table 2, we can compare the average results of health indicators and the probability of returning to sports practice before and during confinement. Regarding the parameter about anxiety, we found a significant increase during the pandemic (before - M= 3.1 ± 2.1; during – M= 4.3 ± 2.7) and in both genders (female before - M= 2.9 ± 2.3; during – M= 4.5 ± 2.8; male, before - M= 2.9 ± 2.9; during – M= 4 ± 2.5). The analysis of the stress level demonstrates an increase during confinement in general (before – M = 3.1 ± 2.5; during – M = 4.1 ± 3) and with a higher incidence in the female population (before - M = 3.2 ± 2.6; during – M= 4.2 ± 3.1).

The level of perceived tiredness during exercise showed a decrease compared to the period before confinement (before – M = 5.3 ± 2.2; during – M = 5 ± 2.3) and especially in men (before – M = 5.6 ± 2.1; during – M= 5 ± 2.2).

The probability of participants dropping out of their sport was very low before confinement (M = 1.1 ± 2) but there was a strong probability of dropping out during confinement (M = 7.5 ± 3.3). This trend is equally registered in both genders, but especially in women (before – M = 1 ± 2; during – M= 7.8 ± 3.1).

Table 2

Perception of symptoms and probability of dropping out of sports practice, of the study sample (n = 666), aged 18 years and over and according to gender before and after mandatory confinement. The values shown are the means ± SD

Variable	Before confinement Mean ± SD			During confinement Mean ± SD		
	General	Female	Male	General	Female	Male
Anxiety level	*3.1±2.1	*3.2±2.3	*2.9±1.9	*4.3±2.7	*4.5±2.8	*4±2.5
Stress level	*3.1±2.5	*3.2±2.6	*3±2.3	*4.1±3	*4.2±3.1	*3.9±2.7
Level of tiredness during exercise	*5.3±2.2	*5.1±2.2	*5.6±2.1	*5±2.3	*4.9±2.4	*5±2.2
Probability of dropping out of sports practice	*1.1±2.0	*1±2.1	*1.2±1.9	*7.5±3.3	*7.8±3.1	*7±3.5

Legend: *T-test for paired samples; $p<0.05$.; in the variables level of anxiety, stress, tiredness, and probability of dropping out of sports, a scale from 0 (zero) to 10 (ten) was used, where 0 represents the absence of the indicator and 10 represents the maximum

Discussion

The results of this study confirm and expand the limited knowledge about the impact of confinement in increasing levels of anxiety and stress and the high probability of abandoning the sports practice they performed before confinement.

The participants reported not taking any type of medication (60%) and had no diseases. The main diseases are cardiovascular (54%). These results agree with investigations carried out by Sonza et al. (2021).

The data obtained indicate an increase in emotional discomfort, either in general or by gender analysis, both in terms of anxiety (before - M= 3.1 ± 2.1; during – M= 4.3 ± 2.7) and stress (before - M = 3.1 ± 2.5; during - M= 4.1 ± 3). These results are in line with those reported by Stanton et al. (2020), who scored significantly higher in various states of psychological distress and particularly in women. However, we would like to emphasize that the present study was carried out during the second confinement applied in Portugal and some adaptation to this reality may have been verified. In this line, Gouveia et al. (2021) mentioned that 60% of participants considered that the second confinement was easier or equal to the first. This adaptation may have mitigated the rise in anxiety and stress values. Data from an investigation by Duncan et al. (2020) show that a perceived decrease in physical activity or exercise was associated with higher levels of stress and anxiety. This evidence indicates that increasing the level of physical activity can be a good strategy to mitigate the negative impacts on mental health in a situation of confinement. This aspect becomes even more relevant, as the health problems arising from confinement may disappear. However, an important part of this damage may be difficult or even impossible to reverse and affected individuals may experience continuous suffering (Moser et al., 2020). Also as a way to mitigate the negative impacts, in addition to the aforementioned increase in the practice of physical activity, it seems to be equally important to limit the sources that generate stress (such as limiting the time spent watching news about the theme or even restricting those that come from unofficial channels and uncontrolled sources), interrupt isolation (increase the frequency of communication by various means with their loved ones), maintain the usual rhythm and daily routines, focus on positive aspects of isolation (for being transitional and that allows the performance of other activities) and request professional help whenever necessary (Fiorillo & Gorwood, 2020). For some people, abrupt changes in the work structure may have helped to

promote a healthier work-life balance, allowing additional time for meaningful leisure activities (Morse et al., 2021).

Our data, point to a reduction in the level of fatigue perceived during exercise in the confinement period (before – M = 5.3 ± 2.2; during – M = 5 ± 2.3) and especially in men (before – M = 5.6 ± 2.1; during – M= 5 ± 2.2). This situation can be explained by the greater availability of time to practice sports or due to difficulties in exercising at home or close to home (Morse et al., 2021).

The reviewed literature suggests that the practice of physical activity is linked to the mental health of individuals (Maugeri et al., 2020). The strong increase we recorded in the probability of participants abandoning the sport they practiced before confinement and especially among women is perturbing (before – M = 1 ± 2; during – M = 7.8 ± 3.1). These data are not in line with the study by Morse et al. (2021) which states that participants claim to have an intention to continue with more than 85% of all activities in post-pandemic life. However, the authors report that it will be relevant to understand if the continued involvement in these activities will bring extensible benefits to mental health or whether activities will be interrupted as time and motivation decrease when returning to normality.

Organized exercise is very important to help people achieve their goals and maintain their levels of physical activity and important gains for physical and mental health (Constandt et al., 2020). Organized sport (for example, in sports clubs, gyms, and other institutions) is essential and plays a decisive role in promoting the practice of physical activity, especially in a part of the population that would otherwise hardly be active (Kokko et al., 2019). Thus, it seems to us that it is essential that institutions, sports, and physical activity promoters, can announce their services with an emphasis on health promotion (Meganck et al., 2017).

There are several limitations in this study that should be highlighted. No information was collected on socio-economic details, such as financial level and type of residence, which could be use-

ful in planning future interventions related to future confinement. The study was conducted over 3 months and may have found people in different states of confinement, which could affect the responses obtained. It should be noted that this study presents a large sample and adds new information about an unusual situation and therefore with limited evidence. In terms of future investigations, we believe that it would be important to study the evolution of people's health status after confinement and what are their decisions related to adoption of healthy behaviors, such as compliance with the recommendations of physical activity and healthy eating.

Conclusions

This study allows identifying and understanding the effects of confinement on stress and anxiety in a sample of the Portuguese population. It also allows to verify the high risk of abandoning the previous sports practice.

Confinement was for most people a novelty and its impact on health is quite unknown. Regarding the results presented, we consider it is important to highlight the role that health and exercise professionals can play to mitigate the negative impacts resulting from confinement, particularly on the most vulnerable and dependent people. Thus, it is essential that professionals and decision-makers can continue to develop means to consolidate the habits of regular physical activity and ways to implement them, even in contexts where people are limited in their movements and isolated. We believe that policymakers must consider the cost-effectiveness of early adopting measures to promote physical activity and mental health and taking them on as strategies to mitigate the impact of current and future confinements.

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Using Push-Pull-Legs Training : A Weight Training Method for Muscle Hypertrophy in Upper Body on Amateur Athletes

[1]Vlad Adrian Geantă
[1]PhD Student at University of Pitești, Faculty of Science, Physical Education and Informatics, Romania

Corespondence: Vlad Adrian Geantă (vladu.geanta@gmail.com)

Abstract
Introduction: Over time the information in the science of sports training is updated fantastically quickly. In weight training, in addition to classic training methods, the popularization of new training methods is sought, which come in support of the performer athlete or the individual who practices in the form of agreement, in achieving the stability objectives. **The aim** of this paper represent the hypertrophic effects that push-pull (PP) training can have on the upper body of amateur lifters. **Methods:** The study lasted for 6 weeks in a fitness center and the subjects (N = 6, $M_{(y)}$23±1.1y, $M_{(h)}$179.8±2.9 cm, $M_{(w)}$74.3±2.9 kg, $BMI_{(i)}$23.4±0.9kg/m^2) were selected as participants. The routine consisted of 3 workouts/week. The participants trained using the method (PPL) but with the observation that the study followed the hypertrophic effects achieved on the upper body following the push-pull (PP) training. Measurements of the circumference of the pectoral (Ch), flexed arm (Ar) and the width of the shoulders (Sh), were measured using a metric band in two stages, an initial stage (Ch $_{(i)}$ 102±1.8, $Ar_{(i)}$ 37.8±0.8, $Sh_{(i)}$ 46.7±2.7, and a final, to see if it exists there is -500, and for height a tachometer. For evaluating body mass $W_{(i)}$, W $_{(f)}$ and body mass index $BMI_{(i)}$ $BMI_{(f)}$, we used an Omron HGF-500 scale, and a stadiometer for height. **Results:** After the 6 weeks of training, the expected hypertrophic results were recorded ($BMI_{(f)}$22.2±0.7, $W_{(f)}$ 74.7±1.5, Ch $_{(f)}$102.9±1.7, $Ar_{(f)}$38.4±0.6, $Sh_{(f)}$47.4±2.5). Alternatively, we used the T test (T = 2.01 for $p < 0.05$) to tell us if there were any significant changes. We can say that the PP method is effective at the level of the upper train. **Conclusions:** Within the limits of the study, it can be concluded that significant changes can occur using the PP training method.

Keywords: physical activity, assessment, fitness, hypertrophy, training, athletes, bodybuilding

Introduction

Weight training is a way to improve or maintain fitness through rigorous exercise according to a schedule, depending on the needs of the individual. The interest in developing and maintaining fitness through weight training among the population of all ages is growing, but a special concern is addressed among young people (Eston and Reilly, 2009, p. 75). A workout that directly causes muscle hypertrophy is essential to be planned carefully to avoid the plateau effect. Every young person today who walks into a gym aims to either lose extra pounds, or want a hypertrophic effect as soon as possible. Muscle hypertrophy is a point of interest for leisure athletes who practice leisure, who aspires to develop their physique to the fullest. (Schoenfeld, 2010). Exercise or regular physical activity is a solid stimulus for adaptation (Zatsiorsky, Kraemer and Fry, 2020, p. 4). The stimulus in this study is PP training. In studies conducted on human subjects, factors such as temperature and humidity in the laboratory and the amount of light and noise in the test area can significantly affect physiological responses, both at rest and during exercise (Kenney, Wilmore and Costill 2020, p. 22). Scientists interested in exercise and sports science are actively engaged in research to better understand the mechanism that regulates the body's physiological response to acute exercise crises and its adaptations to training and coaching (Kenney, Wilmore and Costill 2020, p. 17). Today, gyms have become a successful business due to the growing number of subscribers. In the recreational or sedentary individual, health and fitness assessment assesses healing (Hoffman 2006, p. 3). The main objective of weight training is to improve the physical condition of the athlete through body shaping, and where appropriate and the level of performance. The development of a training model begins with the research on specialized scientific literature on sports topics, for the subsequent finding of the best solutions. In sports, general physical development is a necessity (Bompa and Haff, 2014, p. 31) because it helps to shape the future of the athlete, whether we are talking about performance or leisure. Over time,

the athlete develops and the training must be individualized, being mainly focused on the skills that the athlete has. In weight training, in addition to gaining strength, there is also gaining muscle mass. Strength exercises involve polyarticular exercises, which use large muscle groups (Hoffman 2006, p. 27). In weight training, if we either want to improve muscle mass or remove adipose tissue and build muscle, this can only be done through a specific training program (Geanta & Herlo, 2020). The multijoint or basic exercises in the popular term, evaluate both the force of the upper body and the lower body of the human body. If the goals of the training program are to maximize hypertrophy, we will need to constantly change the training stimulus (Hoffman, 2002, p. 72). In this study, we will address practical aspects of the push-pull training method. This type of training comes from the bodybuilding world (Paige, 2020) it is usefulness being in maximizing training as well as the recovery period of the athlete, essential variables in stimulating hypertrophy. Push-pull-legs (PPL) training is a method whose routine is divided into different muscle groups and workouts (Castanheira et al. 2017). The Push-Pull-Legs (PPL) workouts it is a routine consisting of 3 workouts per week, which is divided into a push training workout, a pull-up workout and a leg workout (Duqette, Walker-Ng, BHSc, PTS, 2020) and this study only focuses on the results of push and pull workouts. This method is great for any practitioner. sports. Through this method, practitioners will have the opportunity to perform shorter workouts than the classic ones. PPL method is great for any practitioners. Through this method, practitioners will have the opportunity to perform shorter workouts than the classic ones. Push training is required for the muscles of the pectoral, deltoids and triceps. Alternatively, pull training is designed for hypertrophy of the back and biceps muscles. Obviously, this routine consists of basic or compound exercises, but with a few exceptions, isolation exercises can be introduced that can push & pull. In this study, we start from the hypothesis that push-pull (PP) training will bring improvements in the body circumferences of the upper body to novice subjects. Also, the methods of training on the circuit (Geanta & Ardelean, 2021a) or by using well-known principles of

weight training in bodybuilding (Geantă & Ardelean 2021b), have had positive results among the subjects subjected to research. In the classic muscle growth technique, we stimulate one or two muscle groups every day (Armstrong, 2020). Trinh (2019) believes that the classic training method requires more time spent in the gym and has an increased risk of overtraining compared to the push-pull training method. This type of training has gained popularity among bodybuilders and those who practice this sport as a leisure activity, due to the optimization of recovery time between workouts, supporting hypertrophy and fat burning (van de Walle, 2020; Bedosky, 2021). Thus, adding push-pull exercises to our training routine can provide a balance to our body (Perez, 2020). Beginners who have less than 6 months of practice should alternate training days with recovery days performing a maximum of 3 training sessions per week for effective recovery, thus avoiding injury or overtraining (Guide to Push-Pull Workouts, 2020). Skeletal muscle is dynamic in its response to training and can adapt to various functional requirements (Hoffman 2002, p. 12). When the skeletal muscle is subjected to a stimulus of up to 60-70% of its maximum working capacity, adaptations occur, which can lead to muscle hypertrophy (MacDougall 1922, quoted by Hoffman 2002, p.12). Applying basic knowledge allows trainers to perform better and more safely (Howley & Thompson, 2012, p. 52), so very participants must be as well trained as possible.

Methods

Subjects and experimental design

A sample of male subjects (N = 6, $M_{(y)}$23±1.1y, $M_{(h)}$179.8±2.9cm, $M_{(w)}$74.3±2.9kg, $BMI_{(i)}$ 23.4±0.9kg/m^2), clients of a gym in Arad, were selected to participate in this study. Subjects accepted in the study were required to be at least 18 years old and not have health problems (Gentil, Soares & Bottaro 2015). All participants were fully motivated and curious about this training method.

Materials and methods

The aim of the study is whether using the (PP) method, the subjects will improve their body circumference at the level of the upper train through a hypertrophic response. Subjects were measured in two stages: an initial measurement and a final measurement. In terms of physical characteristics, subjects were initially measured in terms of shoulder width $Sh_{(i)}$46.7±2.7, pectoral circumference $Ch_{(i)}$102±1.8, and arm in the flexed position $Ar_{(i)}$37.8±0.8. For the measurements, we used a stadiometer for height, a metric band for measuring the circumferences (pectorals, flexed arm) as well as the width of the shoulders, and an Omron-HGF500 scale for measuring body mass and BMI. Measurement is the act of assessment (Morrow, Mood, Disch & Kang 2016, p. 5). The anthropometric measurements used by researchers depend on the purpose of the evaluation (Reiman & Manske, 2009, p. 31). Measurements performed at the beginning and end of an experiment can provide valuable information on the subjects' response to training (McGuigan, 2017, p. 4-5). The technique of measuring body perimeters involves placing a flexible measuring tape made of cloth over an area of the body and measuring its circumference (Schoenfeld, 2021, p. 69-70). According to Atherton, Phillips and Wilkinson (2015), the assessment of subjects by measuring body circumference is better compared to skin fold testing. Although the terms body mass and weight are used interchangeably, it is more accurate to use the term body mass (Haff & Dumke 2018, p. 3). Statistical analysis was performed using SPSS (v.20.0). We calculated the mean, standard deviation, and t-test dependent, for $p \leq 0.05$.

Training program

The study lasted for 6 weeks with a frequency of 3 workouts/week and with varying intensities. In order not to confuse, the subjects also performed leg training, a component of the push-pull-legs (PPL) method, but the research interest was directed toward the results generated only by the push-pull (PP) workouts. For 6 weeks, the workouts were grouped into a push workout, a leg workout and

a pull workout. Each week varied both in terms of intensity and in terms of the number of sets and repetitions so that the hypertrophic response of the subjects to these workouts was positive. Each exercise was explained and demonstrated to the participants in the most accurate way possible. Trainings have been designed to be in line with the strengths of the individual in terms of their strength and endurance. Compound exercises were mostly used to test for a positive hypertrophic response. The example of a training program for 1 week can be seen in Table no. 1.

Results

At the end of the experiment, all the parameters obtained were statistically processed and compared with the values recorded in the initial measurements. From the group of participants, there were subjects who responded very well to the training, having a good evolution, but also subjects who registered slower progress due to various causes. Obviously, the interest of the study was not only aimed at the hypertrophic response of the subjects to training but also indirectly at improving their well-being through regular exercise. In table no. 2 we can observe the physical characteristics of the participants in both the initial and final measurement, reported by Mean (M) and Standard Deviation (SD).

It can be seen that the homogeneity of the group is acceptable, although they voluntarily participated in this study. Alternatively, we used the T-dependent test to determine whether the results are significant by the working method (PP), obtaining the following values (T = 2.01). In figure no. 1, we will be able to observe much more clearly the evolution of the study participants, from the initial testing to the final one represented by the red line.

Table 1. A routine of one week of the PPL training.

Aprrox. Load (% 1RM)	65%	65%	70%	65%	70%	75%
	Workout nr. 1 - Push		**Monday**			
Barbell Bench Press	3 x 12	4 x 12	4 x 10	3 x 12	4 x 10	4 x 8
Military Shoulder Press	3 x 12	4 x 12	4 x 10	3 x 12	4 x 10	4 x 8
Triceps extension with Z-bar	3 x 12	4 x 12	4 x 10	3 x 12	4 x 10	4 x 8
Weighted crunches	3 x 12	4 x 15	4 x 10	3 x 12	4 x 10	4 x 8
	Workout nr. 2 - Lower Body		**Wednesday**			
Squats	3 x 10	4 x 12	4 x 10	3 x 12	4 x 10	4 x 8
Deadlifts	3 x 10	4 x 8-10	4 x 8	3 x 8	4 x 8	4 x 8
Leg Curls	3 x 10	4 x 12	4 x 10	3 x 12	4 x 10	4 x 8
Standing Barbell Calf Raise	3 x 10	4 x 20	4 x 10	3 x 15	4 x 10	4 x 8
	Workout nr. 3 - Pull		**Friday**			
Lat pulldowns	3 x 12	4 x 10	4 x 10	3 x 12	4 x 10	4 x 8
T-Bar Rows	3 x 12	4 x 10	4 x 10	3 x 12	4 x 10	4 x 8
Upright Rows	3 x 12	4 x 10	4 x 10	3 x 12	4 x 10	4 x 8
Biceps Z-bar curls	3 x 12	4 x 10	4 x 10	3 x 12	4 x 10	4 x 8

Table 2. Data presented with Mean and SD.

Variable	Initial	Final
Age (y)	23 ± 1.1	-
Height (cm)	179.8 ± 2.9	-
Weight (kg)	74.3 ± 2.9	74.7 ± 1.5
BMI (kg/m^2)	23.4 ± 0.9	22.2 ± 0.7
Shoulders width (cm)	46.7 ± 2.7	47.4 ± 2.5
Chest (cm)	102 ± 1.8	102.9 ± 1.7
Arm flexed (cm)	37.8 ± 0.8	38.4 ± 0.6

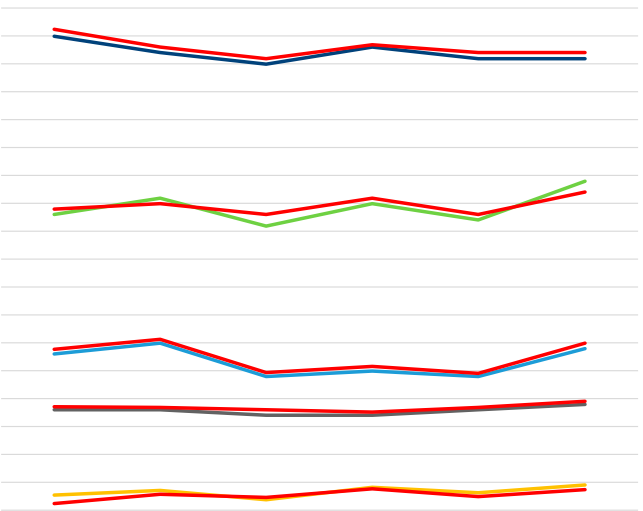

Fig. 1. Physical characteristics of the participants at the initial and the final measurements.

Discussions

As Schoenfeld (2019) tells us, muscle hypertrophy occurs when skeletal muscles receive a stimulus that causes disturbances in myofibers and the associated extracellular matrix. After 6 weeks of intense training, the results are meritorious. The most interesting thing could be a proposal to compare the PP method, with the classic bodybuilding training method, for beginners, noting which method is more effective. The results can tell us that the subjects had a natural growth. They were informed that they must have proper nutrition and recovery for their efforts to be worthwhile. Because there are both good and bad developments, certainly not all subjects strictly followed the instructions given at the beginning of the experiment. Obviously, over time to avoid the plateau effect, subjects who decide to make a lifestyle out of this sport will have to constantly change the way they train, to avoid the plateau effect. From the first week of training, we could see an increase in well-being among the participants and from here we can say that the sport practiced as a means of leisure, relaxes, improving well-being.

Conclusions

Given the importance of training periodization to get results, see that the purpose of the work has been successfully achieved. The push-pull training method (PP) was successful among amateur athletes, with a positive hypertrophic response on the upper body. One of the limited studies was that I only had 6 weeks to try the next one. The application of the program was successful, although there were participants with good evolutions and participants with less good evolutions. Alternatively, it may be possible for subjects to be evaluated in a laboratory with equipment to obtain a much greater evidence at the muscular level of the hypertrophic response, which was another limitation of the study. Because the positive results appeared, the subjects will be much more motivated in the future

to continue practicing these physical exercises, but with more pleasure. However, this study indirectly encourages young people to exercise through exercise, no matter what level they are performed.

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Importance of Physical Activity in Children's Mental Health

Edison Ikonomi
Sport University Tirana Albania
Faculty Movement Sciences
Department Individual Sports

Correspondence: Edison Ikonomi (e-mail: edisikon@yahoo.com)

Abstract

Introduction: Mental health is an important component of children's health that affects almost every aspect of their lives. One in five children in the world experiences varying degrees of mental health disorders and the burden of morbidity and mortality from these causes is increasing. For these reasons, the mental health status of children poses a serious concern for health and the health system in general. **The purpose of this paper** review is to analyze literature of mental health as an important part of a child's overall health. In fact it has a significant impact on physical health as well as on children's ability to be successful in school, work and society. Mental health as well as physical health affects the way an individual thinks, feels and acts. **Methodology:** In order to fulfill this review are using methods of literature analysis, and is made combination and comparison of data from various works of authors varied. To successfully realize this review paper we studied and analyzed the contemporary scientific literature. The methods used are: literature analysis, physical activity mental health and recommendations. **Recommendations:** all the literature used can be clearly seen the importance of understanding mental health support is essential for addressing the phenomenon and its associated consequences, including, appropriate parental communication, mental health promotion, physical activity as well as specialized psychologist assistance and medical assistance.

Keywords: physical activity, mental health, stress, methodology, emotion, children.

Introduction

Staying active is just as important for the brain, but it is also for the body. Mind and body are very much related to each other. When you improve your physical health, you automatically experience a higher mental and emotional well-being. Physical activity also releases endorphins, powerful chemicals that boost mood and provide added energy. Exercise or daily activity can have a major impact on mental or emotional health problems, relieve stress, improve memory, and help you sleep more comfortably *(Howard T., 2005)*.

Unfortunately, it is impossible to avoid most of the consequences of engaging in physical activity. But how severe they will be depends only on the child. If your child is in good health, is able to endure intense sports training, this does not mean that he will be safe from injuries and nerve irritations. Therefore, one should hope for qualified medical care, which will help more effectively to cope with the consequences of physical activity *(Felipe B & Brendon S., 2017)*.

Mental health is an important part of a child's overall health. In fact it has a significant impact on physical health as well as on children's ability to be successful in school, work and society *(Kessler et al., 2007)*. Mental health as well as physical health affects the way an individual thinks, feels and acts *(Emerson & Hatton, 2007)*.

Specialists have determined that worldwide, one in five children suffers from mental health problems. Unfortunately, it is thought that this figure will increase. The World Health Organization estimates that in 2025, children's mental health problems will be 50% higher compared to all health related problems. Thus mental health problems will be one of the top five causes causing illness, disability and death.

And while it is not yet completely clear why this number is growing so fast, many experts think it is related to stress in children and families, as well as a better diagnosis of these problems. This causes the child to have problems being able to fulfill his / her po-

tential, including consequences on health, education, work or the justice system *(W.H.O., 2013).*

However, despite the uncertainties regarding cause-effect data, it can be argued that mental health problems can cause problems such as: substance abuse, school problems, involvement in criminal activities, and suicide. Likewise, less than half of the identified cases receive treatment, but only 20% of them receive proper treatment for this problem. All children have the right to be happy, and they deserve access to effective care to prevent or treat any mental health problems they may have. In the world today, there are many children living in poverty or underdeveloped countries who cannot meet these needs.

Specialists are working to change this situation. Thus, more and more attention is being paid to the mental health problems of children, as well as the capacities of the health system in general to deal with this epidemic. Here it is very important to have action plans to determine the causes of this epidemic, but also for children to receive the right services. For example, an overweight boy who is prejudiced because of his weight may withdraw from society and may develop depressive symptoms, or may be shy about playing with other children, which contributes even more to his health problems physical and as a result also in his mental health *(Kryazheva M L., 1996).*

Types of mental health problems in children and risk factors

There are several forms of mental health problems that commonly affect children:

Mood disorders and especially depression are affecting more and more children, compared to long ago. There are more cases of depression in adolescence than in childhood. Specialists explain this with the identity crisis, which can lead to hopelessness, motivation, feeling misunderstood, etc.

Self-harm is a common mental health problem in children. Some people find it difficult to manage intense emotions and can

manage to hurt themselves. This mostly testifies to the refusal to take on responsibilities *(Mental Health Foundation & Camelot Foundation, 2006).*

Anxiety disorders many children who may change certain aspects of life such as school, society, etc., may exhibit elements of this disorder

Post-traumatic stress disorder most often in children can appear as a result of involvement in an accident, serious event, sexual or physical abuse, etc.

Hyperactivity disorder is a disorder that occurs in children who have it through impulsive behaviors, difficulty concentrating, etc.

Eating disorders usually begin in late childhood or early adolescence. They are most often caused by weight problems, but also by a distortion of self-image *(British Medical Association, 2007).*

Meanwhile, there are several risk factors that increase the likelihood of children experiencing mental health problems *(N.I.C.E., 2011).* Some of these factors include:

- Having an illness for a long time.
- Having a parent or family member with mental health problems, problems with alcohol or the law.
- Experiencing the loss of a close person.
- Having separated or divorced parents.
- Being a victim of bullying or physical or sexual abuse.
- Living in poverty and lack of a home.
- Experiencing discrimination, perhaps because of race, sexual orientation or religion.
- Caring for a relative or taking on responsibilities as an adult.
- Having constant difficulties in education.

Consequences of low physical activity in children

Movement, physical activity and sports are an important part of a child's full and harmonious development. Taking care of the health of the son or daughter takes up most of the time of the parents. And the opportunity to do physical activity is a great way,

give the child a load that is vital to the body. At this age, he himself shows an increased interest in sports sections, especially for the types of sports games: football, volleyball, etc. In the early years you need to instill in the child a love for sports and explain the role of a healthy lifestyle *(Ferreira I et al., 2019).* For above, the consequences of low physical activity are:

- Has an effect on the work of the cardiovascular and respiratory systems. If there is little movement, then breathing slows down and becomes shallow. This leads to a decrease in metabolism.
- Lack of movement leads to stagnation of blood in the legs, which reduces the performance of the whole organism and above all, the brain. The child becomes distracted, his memory weakens and the time to find the right solution is increased.
- The body of children who do not move enough, lowers immunity.
- Spine problems. Children who sit are characterized by weak muscles. Therefore, they can't keep the body sitting for a long time, as scoliosis forms.

There is a pattern that shows that, the more the child develops the ability to control his body, the faster and better he acquires theoretical knowledge and the more symmetrical, more varied and more accurate the movements, the more in both hemispheres of the brain develop equally. Children's games is a beneficial physical activity for your child and will have a huge positive impact on your child. Muscle tissue, bones will be strengthened. Exercise will help develop different muscle groups, providing a complex load for the whole body. The body will be in great shape *(Fox KR., 1999).*

The impact of physical activity on a child's development is definitely positive. In addition to any special effect on children's body, sports games teach racing behavior. How to behave when you win and how when you lose. It promotes the ability to accept defeat, respect for other people's victories, and the ability to compliment the most successful rivals *(Tammelin T et al., 2003).*

Thanks to physical activity, children develop:

- Analytical skills. They are facilitated by the ability to analyze the situation that occurs during the game.
- Sociability develops for the fact that the child falls into a group and he has to learn how to act in a team.
- Obedience to rules develops willpower, perseverance and self-control.
- Sports games provide an opportunity to develop a sense of empathy in children.

Thanks to the correct pedagogical influence, the child's health is strengthened, the physiological functions of the body are trained, movements, motor skills and physical qualities necessary for his all-round harmonious development are intensively developed *(Krakow E., 2010).*

How parents can help

If children have a warm and open relationship with their parents, they are more likely to discuss their problems with them. One of the most effective ways parents can help their children is by listening and taking their feelings seriously. Children may need a hug, may need support to do something, or may want practical help.

Usually negative feelings of children pass. Parents need to understand that it is necessary to intervene if the child continues to be stressed for a long time, if negative feelings continue to prevent them from living their lives, if these negative feelings are damaging their family life, or if the child is behaving in an age inappropriate way.

Where can we go for a specialized child psychologist?

A child psychologist can be found at:

- School.
- Community center of mental health.
- In hospitals where they cooperate with pediatricians and psychiatrists.
- In private clinics.

Promoting mental health in children

Psychologists working with children and young people are also trained to consider aspects of emotional development, social identity, cognitive and biological *(Gulliver & Griffiths KM & Christensen H., 2010).* Culture, ethnicity and language also have a significant impact on children's behavior, thus influencing methods of preventing and treating mental health disorders. Psychologists have developed several tools for assessing protective and risk factors for mental health in children, so that they can be tested for emotional problems, as well as for continuous monitoring of treatment progress *(Pappas & Frize, 2010).*

A child is likely to have good mental health when:

- Feels that others love, trust and appreciate him.
- He is interested in various aspects of life and has hope and optimism.
- Able to learn and take responsibility.
- Has a sense of belonging in the family and society.
- Accepts yourself, as well as the positive aspects of yourself.
- Feels that he has control in his life.
- Has the strength to face negative aspects of life, as well as the ability to solve problems.

Aspects that would help children to have good mental health include:

- Good physical health, eating in a balanced way, involvement in regular physical activity.
- Having time and freedom to play indoors and outdoors.
- Being part of a family where members have effective communication between them.
- Being in a school that cares about the well-being of students.
- Participation in various activities adapted to age *(Green et al., 2005).*

Research in psychology has contributed to the development of a more effective treatment and prevention of mental health disorders in children, young people and their families. This includes

programs that target children in school contexts, in transition, in adulthood, expectant mothers, etc. *(National Association of Special Schools, 2013).*

Programs have been designed that effectively involve families, schools and the community, which is a very important social support for the long-term well-being of children. It is intended that these programs be at the level:

- Individual- counseling therapy for those with mental health disorders.
- Peer-supported programs which aim to improve social skills, communication, etc.
- Family- parental education based on the emotional needs of children at each stage of development.
- Community- violence prevention programs offered in various community centers.
- Systems- reference the coordination of health services in the systems of child protection, education, justice, etc.

Purpose of the paper

Review is to analyze literature of mental health as an important part of a child's overall health. In fact it has a significant impact on physical health as well as on children's ability to be successful in school, work and society. Mental health as well as physical health affects the way an individual thinks, feels and acts.

Methodology

In order to fulfill this review are using methods of literature analysis, and is made combination and comparison of data from various works of authors varied. To successfully realize this review paper we studied and analyzed the contemporary scientific literature. The methods used are: literature analysis, physical activity mental health and recommendations.

Recommendations

The research in this paper brings the following recommendations:

- Sports activities are a great benefit for the physical and psychological development of the child. However, if the load is abused, they can provoke illness and serious injury.
- Aim for 30 minutes of activity on most days. If it is easier, three 10-minute sessions can be just as effective. Start right now by going for a walk or dancing to your favorite song.
- Plan regularly to perform three rhythmic exercises during the day that include arms and legs, such as: walking, running, swimming, weight training, martial arts, or dancing.
- Add an element of mindfulness to your exercises. Instead of focusing on your thoughts, focus on how your body feels when you move.

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The Influence of Non-active Lockdowns on Children's Motor Development through SARS-CoV-2 Pandemic

Carmen Magdalena Camenidis[1*], Irina Băiţel[2]

[1] University of Pitesti, Faculty of Physical Education, Sport and Computer Science, Pitesti, Romania

[2] Theoretical High School 'Dante Alighieri', Bucharest, Romania

Corresponding author: mcamenidis@yahoo.com

Abstract.

While the SARS-CoV-2 pandemic took the whole world by surprise, humanity sought to organize itself in the fight against an unseen enemy by now. The school has moved into the online teaching system, and physical education classes have not been nearly what they used to be. **Purpose:** In this study, we tried to investigate how children's motor development was influenced due to lack of physical activity because of school closure during the pandemic in order to know if it has influenced the weight of children by collecting data on body mass index (BMI). **Methods:** the anthropometric and motor capacity measurements; the method of comparing the results obtained with those of the National 'Biomotric project'; the bibliographic studying; the data collection; the graphic representation and the data analysis and interpretation. The study subjects/participants were 119 boys and 85 girls aged between 7-14 years old. **Results:** We measured the motor development before the pandemic (AP), respectively February 2020, and during the pandemic (DP), respectively October 2020. The item categories represent the data collected from the motor tests applied to the children when they were physically present at schools, such as mobility, long jump from the spot, abdominal crunches, and speedrunning tests on the following distances: 25m for 1st grade, 30m for 2nd to 4th grade and 50 m for 5th to 8th grade. We chose to refer to the value of the median in order to eliminate, as much as possible, the influence

of the extreme values recorded. **Conclusions:** There are minimal differences between the results obtained in the tests before the pandemic and those during the pandemic period. Although we would have expected the influence of non-active lockdown to be more significant than when schools were opened, in the sense of decreasing children's motor skills, it can be seen that this was not the case for students from Maarif International Schools of Bucharest.

***Keywords**:* body mass index, motor behavior, motor capacity, physical education, online teaching,

Introduction

On 11th March 2020, the World Health Organization (WHO) officially declared the pandemic when the WHO Director-General said, we have therefore assessed that COVID-19 may be characterized as pandemia [...] we experience never underwent a coronavirus-provoked pandemic previously. This is the initially coronavirus-triggered pandemia. (Ghebreyesus, 2020).

Studies have begun to appear around the world showing that the number of children with obesity has increased during the pandemic (Almandoz et al., 2020; Baysun & Akar, 2020; Bănuţ, 2021; Browne et al., 2021; Cuschieri & Grech, 2020; Glabska et al., 2020; Kang et al., 2021; Stavridou et al., 2021). Also, other studies have highlighted the negative impact of frequent use of smart electronic devices on the development of children (Szabo et al., 2019a).

According to Dragnea & Bota (1999, p.136), Avramescu (2006, p. 248), the students are subjected to increased demands, which are felt differently depending on their biological development influenced by the integration in the school environment with broad resonances in psychic, personality, and affective area as well.

According to Bănuţ (2021), 'social distancing, along with strict hygiene measures, has proven effective in reducing the transmission of this virus from person to person and has undoubtedly saved many lives'. However, longer time spent at home, online schooling, or working from home has led to lifestyle changes. Perhaps, the children ate more and messy and indeed became more sedentary

than before the pandemic state. In children, the initial complications associated with obesity may include gait or back pain, impaired puberty (in girls with early puberty, in boys with delayed puberty), anxiety, behavioral changes, and so on. After a few years of the evolution of obesity, children will begin to have varying degrees of hepatic steatosis, high blood pressure, and type II diabetes (Bănuţ, 2021). Lack of sports practice that implies group cohesion and socialization (Sopa & Szabo, 2015; Pomohaci & Sopa, 2018), like volleyball (Szabo & Sopa, 2015; Szabo, 2015, Sopa & Pomohaci, 2018, Szabo et al., 2019b), has led to low capacity of social integration and precarious motor development (Sopa & Szabo, 2014).

A new word, *'covibesity',* was even invented (Khan & Moverley, 2020) that needs swift, effective, comprehensive management involving multiple stakeholders. This phenomenon refers to the rapid weight gain that occurred in some people during the SARS-CoV-2 pandemic.

In Romania, in 2020, all physical activities and school competitions in which students participated have been canceled. Also, this year will remain in the history of the field of Sports Science and Physical Education for the challenge of having conducted in the online system all the lessons of physical education and sport.

For the first time, we faced the lack of a platform with educational resources specific to our field. Thus, we as teachers began to search the internet for methodologies or examples, which we can use in this new type of online teaching of our discipline.

According to Dănăilă & Golu (2000, p.33), the motor behavior of students 'represents the main driving force of the development and improvement of neural structures,' and 'the optimal range of educability for psychomotor skills is between 6 and 10 years' (Horghidan, 2000, pp. 119-121) because it will generally be 'anticipatory and not reactive' (Rosen, 2012, p.357).

According to Epuran (2011, p.75), 'the multitude and variety of exteroceptive, proprioceptive and interoceptive information are analyzed, interpreted, and organized in the cerebral cortex system […] based on which answers can be generated, both stereotypical, for ordinary situations, and unique, creative answers for new situations'.

As Ifrim & Niculescu (1988, p.147) states, 'the nervous system transforms stimuli from the environment into movements either defensive or adaptive, depending on their nature and intensity, making engrams formation (neural fingerprints from the action of stimuli), memorizing them, learning and education.

Other authors state in their books that the child's physical development depends mainly on 'hereditary baggage and environmental conditions, especially economic and social (Gurău, 1994, p.230) so that physical exercise promotes average growth and harmonious development their practice accordingly. Natural factors such as air, sun, and water 'harden the body and increase its power to adapt to environmental conditions and resistance to their sudden changes' (Ionescu, 1994, p.52).

By involving children in physical activities, the 'predominance of cortical arousal causes external stimuli to produce motor reactions' of faster adaptation when these exercises are continuously changed, coordinated, and balanced by the PE teacher (Dragnea & Bota, 1999, p.136). The same author states that 'motor skills at this stage are overflowing, motor learning ability is remarkable, but the possibilities of fixing new movements are reduced […] the systematic repetition integrates and stabilizes the new structure in the child's motor development so that the fundamental motor skills are subjected to a process of consolidation-improvement '.

According to Gagea (1994, p.357), muscle contraction changes 'the initial positions of body segments, moving according to all the classical rules of levers and according to the principles of conservation of momentum, power, and energy so that by structural anticipation, we will observe how the movement is structured (cf. Hillerin, 2021).

We think that doing physical activities is the main argument for improving and supporting physical activity to maximize the beneficial effects on the human body.

From a psychological perspective, there is a definition of the term motor intelligence, which 'expresses the result of the interdependence between motor skills and reasoning [...] which usually operates at the sensorimotor level and involves adapting to specific

data of a situation, based on reporting spatial-temporal and the possibilities to reorganize them in an efficient way' (Dragnea et al., 2006, p.6).

As it is known, the planning of the teaching contents was made at the beginning of the academic year 2019-2020, considering the official school curricula for each year of study in the Romanian education system. Therefore, in March 2020, when this system switched to online teaching, we had to adapt quickly, according to the age of the students, these contents to be able to achieve the general competencies.

What is known from the practice of teaching in students' lessons is that the children's motor skills are similar, while the level of assimilation and the peaks reached in motor learning are different in children in the same grade. Through the creativity of teaching strategies, the PE teacher also tries to consider the children's reaction to effort, the level of their motivation, habits, and attitudes native or acquired in the family, so that individual motor talent is improved during lessons at school.

To compare the motor capacity of a child with another 10 or 20 classmates only with the results obtained in a test or test from the school curriculum and not from a series of tests in total, with equivalent to the teacher's lack of understanding of the learning process for a period that does not produce a predictable result from the programming mode at the beginning of the school year.

According to Aagten-Murphy et al. (2019, p.8) and Davidenko et al. (2018), the potential mechanisms of visual perception (Brenton & Müller, 2018) are generated by the eyes saccade during the following of an object. The authors conclude that 'the perceptual system will anticipate that the visual landmark would be after the eye movement executed correctly being used to calibrate the visual space and the auditory space in the eye movements'. In physical education lessons with physical presence at school by comparison with video cameras constantly closed by students in the online teaching system, a real help in increasing attention and developing the mechanism of structural anticipation in children is also following and correcting the exercises demonstrated by PE Teachers.

As it knows, the anticipation in motor behavior shows that it is 'controlled by perception, given that visual perception serves behavior' (Gibson, 2015, p.213) confirms what Nadin (1986) stated that 'it is true that perception involves global information (sometimes accidental, entropic, unstructured) while the emission is directed, structured, essential, and 'the sensory data analysis (also called perception) cannot be significant unless we correlate sensory information with action' (Nadin, 2003).

According to Botezatu (2013, p.57) who states, in the context in which anticipation refers to the triggering of a response to a situation before it occurs, it can be defined as a 'configuration of the elements, so it can trigger the preparation of an action based on internal or external clues. Anticipation is considered a crucial factor in acquiring motor skills, which involves the presence of proactive control'. This configuration or preparation can be done through planning, which explains the variables that must be affected by our actions and the nature of their relationships.

Children's choices about whether and how an object is accessible, as well as what kind of motor skills should be used (for example, whether the object is caught with one or two hands or sports equipment), are scaled to the anthropometric properties of the person (Wagman et al., 2020, p.140). Also, at this age, the correct effort adjustment in the antepubertal children, with the avoidance of overload or underload, 'should ensure a complete capitalization of the real effort capacity and increased possibilities of progress' (Avramescu et al. 2006, p.240; Dragnea & Bota, 1999, p.138; Ionescu, 1994, p.52).

The use of movement games by children, both during classes and outside them but also during school holidays, develops their capacity for effort. Children will improve their baggage of qualities and motor skills present throughout the game. From a mental point of view, they will develop a robust, balanced, mobile nervous system, a remarkable ability to concentrate attention and resistance to stress and mental fatigue, operational, concrete thinking as well as good visual-motor coordination, excellent general reactivity, coordination good psychomotor skills, perseverance, perseverance,

speed, and efficiency in the analysis of unforeseen situations and decision making, the spirit of anticipation. Also, all these factors of child development (physical, technical, tactical, theoretical) 'have an appreciable psychological load and it is natural to be so because any means or technique addresses a man and leads to his improvement' (Epuran, 1980).

Even if the academic year 2019-2020 ended in June 2020, the restrictions imposed by the Romanian government have continued during the students' summer vacation. Thus, the new academic year 2020-2021 was opened only for schools that did not register positive Covid-19 tests among students nor teachers. This allowed us to continue at the International Maarif Schools of Bucharest in October 2020, evaluating the children's bio-motor potential from 1st to 8th grade. The concept of biomotor potential' belongs to the Romanian researchers Nicu Alexe, Virgil Mazilu, and Alexandra Focşăneanu, who used it for the first time in 1970 of the first edition of his research and who understood that both somatic and motor components must be measured in children at the same time as well (Băiţel & Camenidis, 2019).

Methods

The research hypothesis was as follow: the physical activity, as an external factor, should be able to influence the weight and results of motor tests measured objectively in the pre-pandemic period (AP) and during the pandemic period (DP).

The main research methods used were as following: the anthropometric and motor capacity measurements; the method of comparing the results obtained with those of the National 'Biomotric project'; the bibliographic studying; the data collection; the graphic representation; method of data analysis and interpretation.

The study subjects/participants were 119 boys and 85 girls aged between 7-14 years old.

Results

After performing the measurements and calculating the BMI corresponding to the mean and median values for each item category, we established a marking scale for each of them.

The item categories represent the data collected from the motor tests applied to the students when they were physically present at schools, such as mobility, long jump from the spot, abdominal crunches, and speedrunning tests on the following distances: 25m for 1st grade, 30m for 2nd to 4th grade and 50 m for 5th to 8th grade.

The highest mark, respectively 10, corresponds to the data collected, which are included in the value ranges of the most significant number of subjects in each age category registered on the BIOMOTRIC program platform (http://www.biomotric.ro) in the school year 2017-2018.

To decrease a point, which represents a weak value of the data collected from the applied tests, we used the same reference compared to the values registered on the National Institute for Sport Research (NISR).

We chose to refer to the value of the median in order to eliminate, as much as possible, the influence of the extreme values recorded.

The values obtained and the marks awarded are presented in the following tables:

Table 1. Characteristics and marks – 1st to 4th grade Boys

Source: original data resulting from research

Boys	BMI	Mark BMI	Mobility	Mark Mobility	Long jump	Mark Long jump	Crun-ches	Mark Crunches	Run-ning	Mark Running
1st grade AP	15.34	10.00	-3	9	103	9	15.0	10.0	6.75	9.0
1st grade DP	16.32	9.00	-10	7	120	10	14.0	9.0	7.91	8.0
2nd grade AP	16.38	9.50	-2	10	116	10	18.0	10.0	7.58	10.0
2nd grade DP	16.84	9.50	2	10	117	10	18.0	10.0	6.88	
3rd grade AP	17.34	8.50	6	10	132	10	23.0	10.0	5.86	10.0
3rd grade DP	17.29	8.50	-4	9	116	10	21.0	10.0	7.75	8.0
4th grade AP	18.84	8.00	-1	10	123	10	22.0	10.0	6.98	9.0
4th grade DP	19.67	7.50	-5	9	140	10	19.0	10.0	8.88	7.0

Note: AP=ante-pandemic period; DP=during pandemic period

Figure 1. The boys' graph representation for 1st to 4th

Source: figure arising from the original research activity

Table 2. Characteristics and marks – 1st to 4th-grade Girls

Source: original data resulting from research

Girls	BMI	Mark BMI	Mobility	Mark mobility	Long jump	Mark Long jump	Crunches	Mark Crunches	Running	Mark Running
1st grade AP	16.55	9.00	1	10	79	6	13.0	10.0	7.56	9.0
1st grade DP	16.98	9.00	-3	9	89	8	12.0	10.0	8.04	8.0
2nd grade AP	16.13	10.00	6	10	96	10	17.0	10.0	7.60	10.0
2nd grade DP	15.87	10.00	2	10	101	10	16.0	10.0	7.44	9.5
3rd grade AP	16.23	10.00	2	10	117	10	19.5	10.0	6.06	10.0
3rd grade DP	17.11	8.00	-4	9	103	9	18.5	10.0	7.81	9.0
4th grade AP	18.67	7.00	1	10	5	7	14.1	8.0	7.49	9.0
4th grade DP	17.59	8.00	0	10	130	10	19.2	10.0	8.72	8.0

Note: AP=ante-pandemic period; DP=during pandemic period

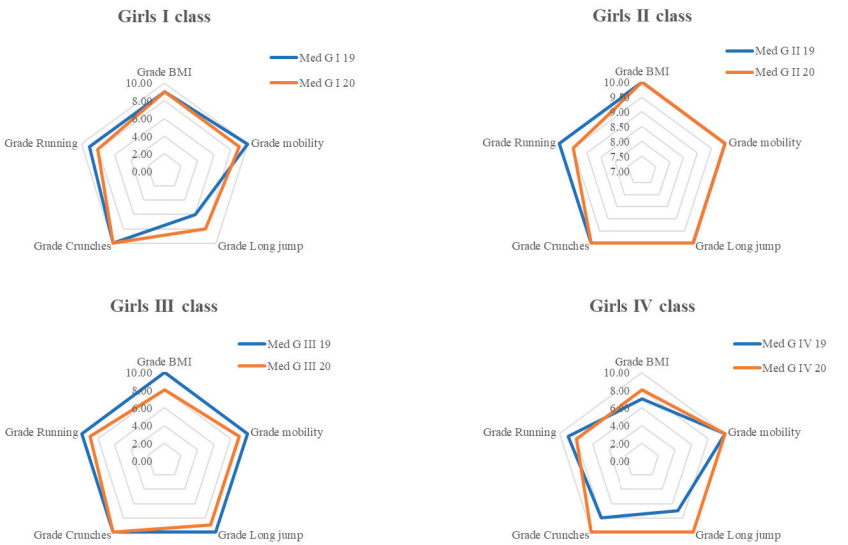

Figure 2. Girls graph representation for 1st to 4th grade

Source: figure arising from the original research activity

Table 3. Characteristics and marks – 5th to 8th grade Boys

Source: original data resulting from research

Boys	BMI	Mark BMI	Mobility	Mark Mobility	Long jump	Mark Long jump	Crunches	Mark Crunches	Running	Mark Running
5th grade AP	19.81	9.00	-3	9	143	8	23.0	10.0	10.78	8.5
5th grade DP	18.72	10.00	-3	9	133	7	23.5	10.0	9.40	9.0
6th grade AP	23.77	5.00	-9	7	136	8	27.0	10.0	10.58	8.5
6th grade DP	21.21	7.00	-16	3	127	6	23.0	10.0	9.76	9.0
7th grade AP	20.84	8.00	-6	8	177	10	24.5	10.0	8.86	10.0
7th grade DP	21.82	7.00	-3	9	170	10	27.0	10.0	9.09	10.0
8th grade AP	21.15	8.50	-2	10	176	10	27.0	10.0	8.69	9.0
8th grade DP	25.92	6.00	-6	8	175	10	23.5	10.0	8.81	9.0

Note: AP=ante-pandemic period; DP=during pandemic period

Figure 3. The boys' graph representation for 5th to 8th grade

Source: figure arising from the original research activity

Table 4. Characteristics and marks – 5th to 8th-grade Girls

Source: original data resulting from research

Girls	BMI	Mark BMI	Mobility	Mark Mobility	Long jump	Mark Long jump	Crun-ches	Mark Crunches	Running	Mark Running
5th grade AP	16.58	10.00	-4	9	104	5	20.0	10.0	11.46	8.5
5th grade DP	17.52	10.00	-6	8	120	7	20.0	10.0	10.23	9.5
6th grade AP	21.19	8.00	-6	6	114	4	21.0	10.0	11.99	7.0
6th grade DP	17.89	10.00	-1	8	127	7	21.0	10.0	9.75	9.0
7th grade AP	20.08	8.00	-6	6	166	10	19.0	10.0	10.66	8.0
7th grade DP	20.76	8.00	-3	7	134	9	25.0	10.0	10.65	8.0
8th grade AP	21.51	9.00	-6	8	136	9	18.0	10.0	9.10	9.0
8th grade DP	19.38	10.00	-5	8	135	9	20.5	10.0	9.18	9.0

Note: AP=ante-pandemic period; DP=during pandemic period

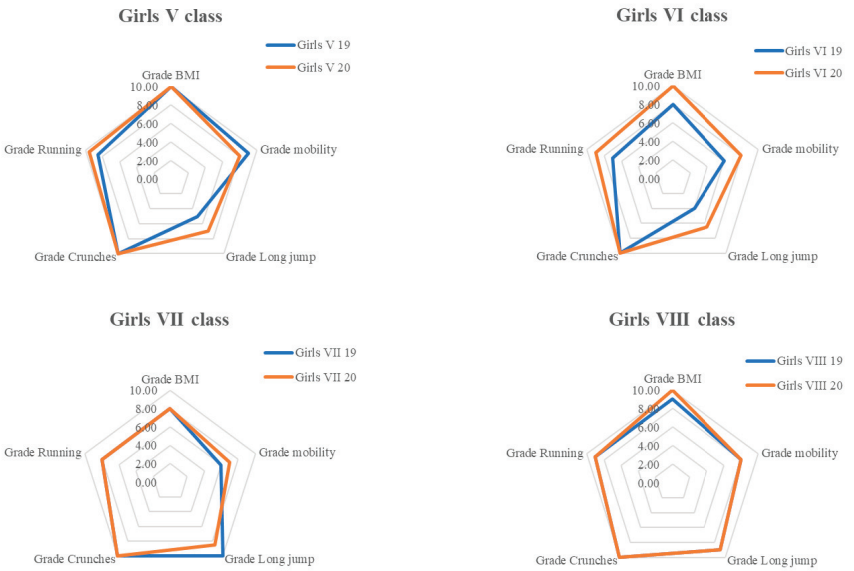

Figure 4. Girls graph representation for 5th to 8th grade

Source: figure arising from the original research activity

Discussions

Unfortunately, in November 2020, positive cases of Covid-19 appeared in our school as well, so the school had to transfer the entire didactic teaching-learning process to the online system until May 2021, when the students returned physically to school.

The complexity of assessing the bio-motor potential of students through the program with the same name did not allow us to collect data in a short time to be presented in this article as a post-pandemic period analysis of it.

Conclusions

There are minimal differences between the results obtained in the tests before the pandemic and those during the pandemic period.

Although we would have expected the influence of non-active lockdown to be more significant than when schools were opened, in the sense of decreasing children's motor skills, it can be seen that this was not the case for students at Maarif International Schools of Bucharest.

We believe that the main determining factor in this situation could be the diversified educational resources applied in online physical education classes. We could say that, despite the online system to which we quickly adapted and taught for 11 months, the physical education lessons were different from the classic ones, and yet they managed to achieve their primary goal, which is to maintain and even to improve the motor qualities and overall motor skills of our students.

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Methods and Means for Developing Resistance in the 5th and 6th Grades

Andrei Bitang[1], Sterţl Monica[2], Vasile Liviu Andrei[3], Dulceanu Corina[4], Macarie Anca[5]

[1] Champions House Foundation, [2]Frumuşeni Secondary School, Arad County, [3,4] "Aurel Vlaicu" University of Arad, [5]Chemist Dr. Max+, of Arad

Correspondence: Andrei Bitang (e-mail: bitswimm@yahoo.com)

Abstract

Introduction: In all physical education school curricula, starting with the primary cycle and going to high school and vocational school, resistance appears as an educational instructional objective formulated and materialized as a requirement in relation to class, therefore, the age of students (Scarlat E., Scarlat MB, 2002). **Purpose:** is to implement an experiment in the fifth and sixth grades in rural areas, and through the results obtained from this experiment, to be able to find optimal solutions to equip students with a high vital capacity, given that after school most students help their parents with household chores. **Methodology:** Resistance is "the ability of the human body to exert efforts with a relatively long duration and a relatively high intensity, maintaining constant indices of optimal effectiveness". **Results:** Following the evolution of the arithmetic mean in the endurance running test over the distance of 800m, the boys found that at the initial testing the control group achieved an average of 03:40, and the experiment group achieved an average of 03:29. There is a difference between the control group and the experiment group in favor of the experiment group, namely 11 sec. After the intermediate tests, the control group obtained an average of 03:37, making a progress compared to the initial test by 3 seconds, and the experiment group achieved an average of 03:24. The experiment group made even greater progress than

the control group in the final test, namely 15 sec. Following the evolution of the arithmetic mean in the endurance running test over the distance of 600m girls, we found that in the initial testing the control group achieved an average of 03:08, and the experiment group achieved an average of 03:09. There is a difference between the control group and the experiment group in favor of the experiment group, namely 1 sec. After the intermediate tests, the control group obtained an average of 03:01, making a progress compared to the initial test with 7 sec., And the experiment group achieved an average of 03:04 with 5 sec. better than the initial test. We notice that the experiment group made more progress than the control group in the final test, namely 2 sec. **Conclusion:** this paper emphasizes the importance of the exercises we used and applied to students in the first two grades of high school.

Keywords: harmonious physical development, methods, means, systematization, endurance

Introduction

The main means for developing endurance are: running, application courses, sports games, successive repetitions of technical procedures of varying lengths, other specially designed competitions, the main element of progress being the volume of effort (Dragnea A., 2000).

The method of continuous uniform effort is one of the most affordable methods and aims to develop general endurance, in aerobic mode. It is characterized by the uniform intensity of the effort and its duration (Bota A., 2004). The element of progression is the increase in duration, distance or number of repetitions. In this mode of running, the running tempo is very important, which allows the approach of distances (increased progressively) by all students (Petrescu, T., Gheorghe, D., Sabău, E. 2007). In order to respect the established tempo, it is very useful for the teacher to train "leaders" in each class who lead the "platoon" throughout the run, printing a moderate tempo (Colibaba E.D., Bota I., 1993).

Knowing and respecting the particularities of age is a pedagogical necessity, as it conditions the training, determines the selection and use of methods and means of training according to the possi-

bilities and prospects of mental development of children (Dragomir P., Scarlat E. 2004). Practice has eloquently shown that disregarding or ignoring them leads to the failure of teaching and education activities (Horghidan V., 2000, p. 86).

The working hypothesis is the following: using the means proposed by me in this paper, I consider that the resistance will improve significantly, leading to the efficiency of the physical education lesson at the level of the 5th and 6th grades.(Cârstea, 2000)

Methods

The research was conducted on a sample of 40 students, representing the numbers of two grades V and VI. From the 5th grade I chose 20 students, and from the 6th grade I chose a number of 20 students. Out of the total number of students, 10 students represented the control group and 10 students represented the experiment group, both boys and girls.(Dragnea, A. şi colaboratorii, 2000)

The training program of the two classes, the experiment class and the control class, included the same number of hours per week, namely 2 hours, according to the structure of the 2020-2021 school year.

The experiment class was used to differentiate according to the content selected and planned through the endurance motor quality, while the control class used the traditional means provided in the units and drive systems for the development of endurance motor quality (Tatu, T., Plocon, E., 2003).

Both in the experimental class and in the control class, the methods and means were used respecting the annual and semester planning, as well as the structure of the physical education lesson, the development of motor quality, endurance, being well defined in this structure (Sabău, E., Monea, G., 2007).

The experiment was planned to take place in three stages, during the school year 2020-2021, as follows:

- the experiment took place between February and June 2021, due to the conditions imposed by the pandemic;

- on February 9, 2021, the initial testing was performed;
- on April 1, 2021, the intermediate testing was performed;
- on June 24, 2021, the final test was performed.

In the elaboration of this paper we used the following methods: documentation, observation, experiment. statistical method.

Documentation is a method that consists in studying auxiliary sciences and specialized materials.

Observation is a method that offers the possibility to consciously and systematically follow the pedagogical process with its different aspects and sides, in order to achieve a previously proposed goal.

Experiment is a basic method in scientific research. We used both the pedagogical experiment, by applying the control tests from the National Assessment System to the discipline of Physical Education and Sports, measured with the help of precision recording devices, stopwatch and roulette, and the laboratory experiment, through which we obtained data on physical development, highlighted by anthropometric measurements (Tudor V., 2001).

Statistical method, collects and sorts the data obtained by accurate measurements. The results and data obtained were capitalized by applying methods of their assessment, by comparison, study, establishing statistics, which allowed the elaboration of research findings. (Barbu, C., Stoica, M, 2000)

Statistical indicators. In interpreting the data obtained from the experiment, we used the following statistical indicators: an arithmetic mean, standard deviation and coefficient of variability.

Results

The experiment took place at the Gymnasium School from Frumuşeni, Arad County having as subjects the students of the 5th grade (witness class) and of the 6th grade (experimental class). In order to assess the level of physical development of the subjects included in the research, the variable values of the somatic aspect were recorded: weight and height. In order to assess the students'

motor skills, we used classic tests of the National Assessment and Examination System: endurance running on the distance of 600 m girls and 800 m boys.

These tests were chosen taking into account the requirements of the program, the level of preparation of the classes, the individual characteristics of the students. I also explained to the students the purpose for which they were required to perform the tests, I did demonstrations where necessary and of course I gave them methodical instructions on how to perform.

The test batteries subjected to the experiment in the complete knowledge of the students and in finalizing the conclusions on the level of general physical training were of real use to me. The correct and thorough appreciation of the peculiarities of the students' physical development (age, sex, physical training), as well as of the psychic peculiarities (willpower, character, aptitudes, etc.), is an indispensable condition for the fair use of physical exercises.

The means of the experiment

The means and methods used to develop endurance motor quality are as follows:

Exercise no. 1

Work formation: in groups, in a row, long running with the change of leader, which remains at the end of the line, 4 minutes girls, 6 minutes boys, repeat 1-2 times, active break 2-3 minutes.

Exercise no. 2

Work training: students are divided into groups, running time 10 minutes girls, 12 minutes boys in 2/4 tempo, repeat once, active break walk until return.

Exercise no. 3

Work group: students are divided into groups, at the sound signal moderate running 300m tempo, 30m accelerated running tempo 4/4, repeat 2-3 times, active break 2-3 minutes.

Exercise no. 4

Working group: students divided into groups, at the sound signal, running in various tempo: 50m tempo 2/4, 30m running tempo 3/4, 20m running tempo 4/4, 40m running tempo 2/4, 60m walking, repeat 4-5 times, active break 2-3 minutes.

Exercise no. 5

Work group: students are divided into groups, at the sound signal is performed 300m running in tempo 2/4, 300m running in tempo 3/4, 20m running tempo 4/4, 200m walking, repeated 3-4 times, pause active 2-3 minutes.

Exercise no. 6

Work group: students are divided into groups, running 300m tempo 2/4, running 300m tempo 3/4, running 200m tempo 4/4, repeated 3-4 times, with active break 2-3 minutes.

Exercise no. 7

Work formation: students are divided into groups, at the sound signal, from running with ankle play to accelerated running, repeated 3-4 times, 300m active break 3-4 minutes.

Table no. 1 - Distribution of exercises during the application of the experiment

The exercise/ Weeks	Distribution of exercises during the application of the experiment																					
	February				March				April				May				June					
	1	2	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	X	X					H															
2	X	X	X	X			O															
3			X	X	X	X	L															
4					X	X	I				X	X										
5							D				X	X	X	X								
6							A						X	X	X	X						
7							y								X	X	X	X				

Anthropometric measurements and research evidence

In order to assess the harmonious physical development, the following anthropometric measurements were performed: the weight measured in "kg" and the waist measured in "m".

Weight: a factor that changes quite quickly, may decrease or increase under the influence of factors such as: diet, exercise, metabolic disorders, etc. A regular medical scale was used, and the children were dressed appropriately.

Waist: is the distance between the top of the head (vertex) and the soles and was measured in the position being controlled at the properly marked wall.

Description of evidence

Test no.1 Consists of endurance running over a distance of **600 m - girls** and **test no. 2** consists of endurance running over a distance of **800 m - boys**. These took place on the sports field. The start was given to the sound of the teacher, the running time being measured in minutes and seconds.

Table no. 2 - Endurance running over the distance of 800m boys

Subjects	The control group			The experiment group		
	Initial testing	Intermediate testing	Final testing	Initial testing	Intermediate testing	Final testing
1	03:10	03:05	03:02	03:26	03:22	03:19
2	03:24	03:22	03:20	03:30	03:25	03:21
3	03:36	03:32	03:30	03:48	03:43	03:39
4	03:58	03:56	03:54	03:16	03:12	03:09
5	03:38	03:36	03:36	03:20	03:18	03:12
6	03:05	03:02	02:58	03:10	03:06	03:02
7	04:00	03:57	03:54	04:07	03:58	03:51
8	03:44	03:40	03:39	03:40	03:34	03:31
9	03:54	03:52	03:50	03:03	02:58	02:55
10	04:12	04:10	04:08	03:32	03:28	03:23
Arithmetic mean	03:40	03:37	03:35	03:29	03:24	03:20
Standard deviation	00:22	00:23	00:23	00:19	00:18	00:17
Coefficient of variation	10,00%	10,60%	10,70%	9,09%	8,82%	8,50%

Graphic representation of the evolution of the results obtained in the 800m run (boys) (in the initial, intermediate and final testing in both the control and the experimental group, analyzing the results obtained in terms of arithmetic mean, variability coefficient and standard deviation.

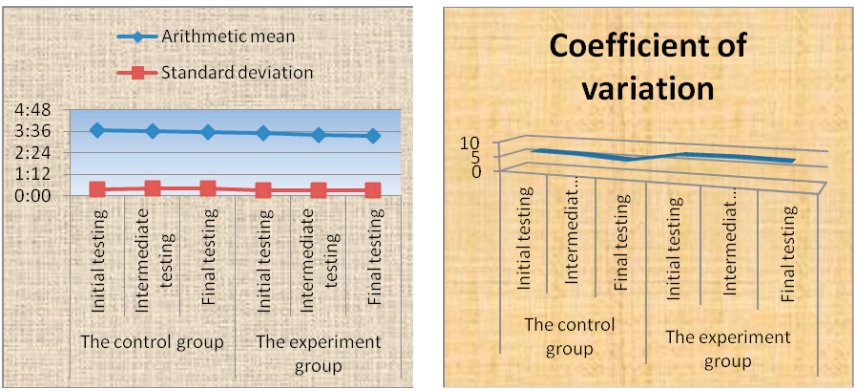

Chart no. 1 - Graphic interpretation in the 800m distance endurance running test for boys

After the initial tests, the control group averaged 03:40, and the experiment group averaged 03:29. There is a difference between the control group and the experiment group in favor of the experiment group, namely 11 sec.

After the intermediate tests, the control group obtained an average of 03:37, making a progress compared to the initial test with 3 sec., and the experiment group achieved an average of 03:24 with 5 sec. better than the initial test. We notice that the experiment group made even more progress than the control group in the final test, namely 15 sec. Following the implementation of special means throughout the experiment we notice a significant progress in the experiment group. The homogeneity of the two groups was good, because the coefficients of variability fall below 15%.

Graphic representation of the evolution of the results obtained in the 600m run (girls) (in the initial, intermediate and final testing in both the control and the experimental group, analyzing the results obtained in terms of arithmetic mean, coefficient of variability and standard deviation.

Table no. 3 - Endurance running over the distance of 600m girls

Subjects	The control group			The experiment group		
	Initial testing	Intermediate testing	Final testing	Initial testing	Intermediate testing	Final testing
1	02:50	02:45	02:50	03:13	03:09	03:04
2	02:58	02:53	02:42	03:27	03:22	03:18
3	03:09	03:01	02:50	02:56	02:53	02:51
4	03:14	02:58	02:56	02:50	02:46	02:40
5	03:02	02:58	02:51	03:03	02:59	02:52
6	03:21	03:15	03:02	03:17	03:12	03:07
7	03:08	03:04	03:00	02:52	02:49	02:44
8	02:53	02:50	02:43	03:36	03:30	03:21
9	03:22	03:15	03:12	03:15	03:10	03:02
10	03:23	03:14	03:09	02:58	02:53	02:47
Arithmetic mean	03:08	03:01	02:57	03:09	03:04	02:59
Standard deviation	00:12	00:11	00:09	00:15	00:15	00:14
Coefficient of variation	-6,38%	6,08%	5,08%	7,94%	8,15%	7,82%

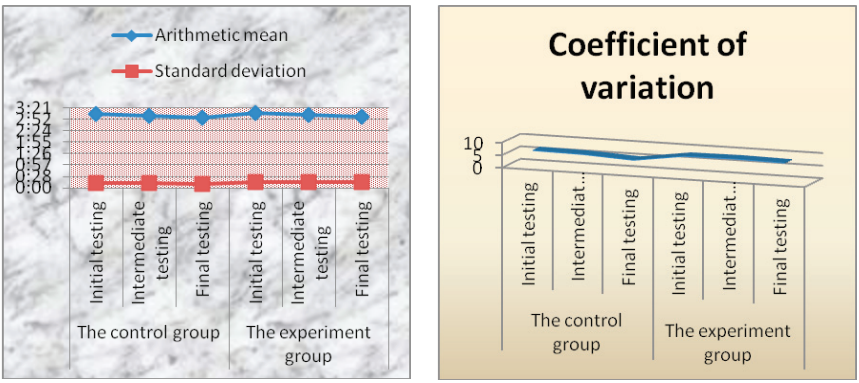

Chart no. 2 - Graphic interpretation in the 600m distance endurance running test for girls

After the initial tests, the control group averaged 03:08, and the experiment group averaged 03:09. There is a difference between the control group and the experiment group in favor of the experiment group, namely 1 sec.

After the intermediate tests, the control group obtained an average of 03:01, making a progress compared to the initial test with 7 sec., And the experiment group achieved an average of 03:04 with 5 sec. better than the initial test. We notice that the experiment group made more progress than the control group in the final test, namely 2 sec. The homogeneity of the two groups was good, because the coefficients of variability fall below 15%.

The statistical-mathematical calculation methodology allowed me to analyze and compare the results obtained by students in the ascertaining physical tests, in which I calculated: arithmetic mean, standard deviation, confidence interval, maximum value, minimum value, amplitude, dispersion, coefficient of variability and effect size. Graphical representation facilitates understanding of the significance of numerical data.

Conclusions

Without claiming to replace the traditional means and methods used in the physical education lesson, this paper emphasizes the effectiveness of the exercises we used and applied to students in the first two grades of high school, seen in two ways, instructive and educational, together forming a unitary whole.

The results of the applied experiment confirm the working hypothesis, which contribute to:

- harmonious development of the body and strengthening the health of students;
- development and improvement of all psycho-motor qualities;
- consolidating and practicing basic motor skills and utilitarian-application skills in ever-changing conditions;
- learning and consolidating technical-tactical elements specific to sports: sports games and athletics.

The progress rate of the experimental group, which is higher than that of the control group, confirms the above.

During the experiment it was observed that students manifest spontaneously and can not hide their way of being, the feelings that animate them: joy, satisfaction, anxiety, fear, perseverance, competitiveness and fair play.

The formulation of precise rules and requirements in the tests, led to the discipline of the team, to the development of responsibility towards oneself and towards colleagues, increased the students' self-confidence, taught them to take an attitude towards negative manifestations of conduct, to -develops the competitive spirit and teamwork. Having a common goal, the students got used to work together, to help each other, to encourage each other, qualities that have left their mark on their school activity, on the relations with the family and community members, on the student-teacher relationship.

The difficulties that arose developed in the students self-control, determination, courage, perseverance and perseverance. Stu-

dents who at the beginning of the year were withdrawn, shy, managed to integrate into the team, regain their confidence, became more communicative and more friendly.

Intellectual qualities were also in high demand. Creating problem situations put students in front of solving unique situations, developing their intelligence, inventive, creative spirit, thinking, insight, logic.

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Achievement Goal´s Orientation of Youth Brazilian Gymnastics: TEOSQ Factorial Exploration

Vinicius Barroso Hirota[1], Anderson Redressi[2], Francine Roberta De Lima Pinto Araujo[2], André Rinaldi Fukushima[3], Elias de França[4], Leandro Yanase[1], Jeferson Santana[1], David Botelho Barbosa[5], Marcelo Rodrigues da Cunha[6], Carlos Eduardo Lopes Verardi[7]

[1]University Center of the Americas, Department of Physical Education, São Paulo, Brazil
[2]University Center Anchieta, Department of Physical Education, Jundiaí, Brazil
[3]Faculty of Health Sciences FASIG – IGESP, São Paulo, Brazil
[4] Department of Biosciences, Federal University of São Paulo – UNIFESP, Santos, SP. Brazil
[5] High School Teacher and Technician at the Paula Souza Center, São Paulo, Brazil.
[6]Sciences College, Department of Physical Education, Paulista State University (UNESP), Baurú, Brazil.
[7]Department of Morphology and Basic Pathology, Faculty of Medicine of Jundiaí (FMJ), Jundiaí, Brazil.

Correspondence: Vinicius Barroso Hirota (e-mail: vbhirota@gmail.com)

Abstract
The aim of the research was testing the reliability and the exploratory factor analysis of the instrument TEOSQ, and then offer the results of the goals

orientation and comparing the results by age of the youth Brazilians gymnastics. **Methodology**. This research was based on a descriptive quantitative boarding, and the instrument used was the TEOSQ; Take part in this research 58 (n=58) female youth gymnastics', aged 7 to 20 years (age average 10.72±3.05) of the Itupeva City, São Paulo, Brazil. The statistical used was the Alpha´s Cronbach, Exploratory Factor Analysis (Varimax) above Mean, median, standard deviation and Spearman correlation. **The results** displayed the internal stability of the instrument with ego´s Alpha of 0.80 and task´s Alpha of 0.70; Rotated matrix (Varimax) with two factors, in factor 01 the group of issues was located related to ego orientation and for the factor 02 the group of issues were liked to task orientation. **Conclusion.** Concerning the goal´s orientation the results shows the prevalence of task orientation (4.45±0.79) besides ego orientation (2.64±1.28), so we can consider that this group is more involved in learning and practicing more to have a better performance in competition an presentation overall, the instrument seems to be relevant.

Keywords: Gymnastics, Youth Sports, Goals Orientation, Motivation.

Introduction

The practice of Gymnastics for all can manifest itself from multiple internal logics, an action modulated by the modus operandi and by the consolidation of processes within each group. In other words, the understanding of the practice, its possibilities, limits and the way to develop it will depend on the reading that each group of practitioners prints, always respecting its constituent characteristic: pure sociomotricity; that is, a collaborative sociomotricity practice, with no opponents.(Menegaldo, F. R., & Bortoleto, M. A. C.2020)

The beginning of the gymnasts' career is permeated by financial difficulties, training with improvised equipment and a lack of minimum resources, including causing some gymnasts to leave the sport[2], a fact that can influence the emotional aspects of young athletes during sports initiation. It is necessary to include works with a view to the child's psychological preparation, especially for issues such as anxiety, fear and shame are fundamental for the successful insertion of the child in gymnastics(Vargas, P. I., & Capraro, A. M. (2020).

In order for young athletes to remain in sport it is necessary that there is motivation, a fact that the role of motivation in learning and

performance seems indisputable, not being restricted to academic life, but extending to the different skills and situations of everyday life(Ferreira, N. R. C., de Oliveira2020).

The Causal Attribution Theory developed by Weiner (1985) places cognitions at the center of the motivational process that emphasizes the human being's spontaneous ability to reflect on past events, in order to draw conclusions to guide future behavior. According to this perspective, one of the main human motivations would be the search for the causes of events, in order to allow greater understanding and control of reality(Vargas, P. I., & Capraro, A. M., 2020).

In this way, Individuals tend to perform better when they perceive that they are observed by people (external evaluators), suggesting that the motivation of external regulation may have a significant influence on performance, and, although it is argued that intrinsic motivation (task-oriented) is important for maintaining sports practice and learning new skills, individual sports athletes need extrinsic motivation (ego orientation) to be successful and consequently increase performance.(Lima, C. M.; Caperuto2020)

Therefore, there is a need to obtain validated and reliable tests and scales in order to assess the different contexts and emotions that the sport is involved in. Measurements with strong psychometric properties within and between countries will facilitate the understanding of possible cultural similarities or variations in the subject of achievement motivation for sport (López-Walle, J., Tristán, J., Castillo, I. T. I., & Balaguer, I. 2011).

Consequently, the aim of the research was at fist, testing the reliability and the exploratory factor analysis of the instrument, and then offer the results of the goals orientation and comparing the results by age of the youth gymnastics'.(Günther, H. 2006).

Method

Research Model

This research was based on a descriptive quantitative boarding with mmaximum control over the context; researcher must interact with the objective of the study with neutrality and objectivity (leav-

ing feelings or impressions aside); the data collected must be analyzed using a mathematical language (statistical analysis and probability theories) to explain the phenomena[7], so this kind of study must they must meet the criteria of scientificity, such as validity, reliability, generalization and transferability of the results. Thus quantitative studies work with the concept of reliability (reliability and reproducibility) and strength of the method, namely the possibility of achieving the same result in a study re-test made under the same conditions by other researchers(Duda, J. L. 1992)..

Instruments

In the data collection of research, data was used a Likert-type motivation scale of five points – TEOSQ (Task and Ego Orientation in Sport Questionnaire) developed by Duda[9], which identified the motivational orientation to the sport. This instrument was developed through studies conducted in the classroom, containing four different areas: the purpose of the guidelines, the causes of success, intrinsic satisfaction and skill. In Brazil (Portuguese Brazilian language) too many studies were designed using TEOSQ, demonstrating stability (Hirota,V.B., Shindler, P, Villar, V. 2006, 2007, 2013, 2014). With this purpose, the TEOSQ aims to assess individual goal´s orientation in perspective the set objective in sport, by detecting if the subjects are oriented to task or ego; this instrument is requested to research participant stating their concordance with respect to the way each one applies the issues. The choice of this instrument took it limits itself the aspects of the motivation, orientation for task or ego; presented high internal consistency; Stability in the reliability coefficient; construct validity and content; Presented an adequate number of issues that added aces identification questionnaire does not produce fatigue participants; It turned out to be suitable for individuals of all ages. This is a self-applicable instrument and has an average duration of answer within 5 minutes.

Participants

The study included 58 (n=58) female youth gymnastics athlete's participants, aged 7 to 20 years (age average 10.72±3.05, coefficient of variation=28.49%), who train gymnastics in the city of Itupeva, São Paulo, Brazil. The gym school is public and main-

tained by the Municipal office, so students have no cost in order to train and practice gymnastics. Routine class of gym, it follows that students must maintain weekly frequencies of three times, and participates in the championships systematized by the municipality on the weekend. The municipality provides lunch and transportation for all participants and there we have a coach and tree assistances.(Figueiredo Filho, D. B.; Silva Jr., J. A. 2010)

Statistical data Analisys

The adopted statistical method was the calculation of *Cronbach's Alpha Coefficient* in which internal scale validity analysis was performed. Alpha is a coefficient of reliability based on internal consistency of the items within the test will be given continuity to the statistical analysis of the scale, where statistics are processed for total items; therefore, we analyze all items taking as its premise the possibility of exclusion of any. This is a general reliability coefficient that is more versatile than the other methods and a feature of this coefficient is that it may be used for items that have multiple measures of values, such as writing test and attitude scales to score as strongly agree, I agree, etc. Furthermore, the Alpha´s coefficient is probably the best to estimate the reliability most commonly used in standard test. It was performed exploratory factor analysis (rotated matrix – VARIMAX with Kaiser Normalization), as an alternative measurement process is to identify variables that "go together", i.e., variables that have the same underlying structure; according to Figueiredo Filho & Silva Jr.(Figueiredo Filho, D. B.; Silva Jr., J. A. (2010) the main function of the different factor analysis techniques is to reduce a large amount of observed variables to a few factors. We also used to complement the statistic processing calculation of the *Spearman* correlation ("rho", $p \leq 0.05$), since the psychometric non-parametric data, it was also calculated the mean, median and standard deviation and coefficient of variation of each output separately in each direction of TEOSQ instrument, namely task and ego. In order to verify possible significant differences between the means of task and ego goals, we decided to conduct the *Mann Whitney* test ($p \leq 0.05$). For all the procedures, we divide the participants, by age, into two groups: Group 1 (G1 – mean age 8.4±1.16, variation coefficient of 13.80% Median of

8 years) and Group 2 (G2 – mean age 13.21±2.48, variation coefficient of 18.77%, median of 12.5), both groups was homogenous in terms of age. For the data analysis was done, the SPSS software - Data Editor Version 22.0 for Windows was used**.**

Ethics in Research

This study included the signing of the term sheet by the director of sport schools of the City hall and signed the consent form and information, or by the parents or guardians of the study participants by paying attention to research ethics September by the Declaration of Helsinki in World Medical Association[24]. Signatures were collected from parents and guardians, in meetings held in order to explain the purpose of the study and its contribution to the community and the possible evolution of learning and performance of young athletes. Study finds with opinion approved by the Research Ethics Committee with number: 1.116.194.

Results and Discussion

The results are posted in two tables that corresponds the aims of the study. The first table contains the descriptive statistics and the second one with the factors testing.

As we can see in Table 1, the results of ego orientation match to issues number 01, 03, 04, 06, 09 and 11, and the median results appears as 3 points, following by the mean, standard deviation and coefficient of variation of each issue demonstrating stability is results uncovered by the total mean of 2,64. Results corresponding of task orientation correspond issues number 02, 05, 07, 08, 10, 12 and 13, and the median result was 5; mean, standard deviation and coefficient of variation of each issue demonstrating stability is results revealing the total mean of 4,45.

Results related to internal consistency of the instrument was done by Cronbach´s Alfa coefficient, that regarding to ego orientation the result was 0.804, and observing if each issue was deleted, all of it was important to the instrument because none of the results for each item, if deleted, would raise the total Alpha value. For the task orientation the total Alpha´s result was 0.702, consider a good score also. Taking into account if each task issue was deleted, all the values were above the total, but they are similar considering the decimal place.

Table1. Median, Mean, standard deviation, coeficient of variation, Cronbach´s Alfa and Cronbach´s Alfa if the item of the scale were deleted of the TEOSQ.

Goal´s ORIENTATION	*ISSUE*	*Median*	*Total Median*	*Mean*	*St. Deviation (±)*	*Coef. Of Variation (%)*	*Total mean (±)*	*Cronbach´s Alfa*	*Cronbach´s Alfa if issue were deleted*
EGO	**1**	**3**	**3**	2,81	1,38	49	**2.64±1.28**	**.804***	0.684
	3	**3**		2,52	1,04	41			0.720
	4	**2**		2,12	1,12	52			0.700
	6	**2**		2,24	1,22	54			0.747
	9	**3**		3,36	1,16	34			0.708
	11	**3**		2,79	1,36	48			0.685
TASK	**2**	**4**	**5**	4,33	0,75	17	**4.45±0.79**	**.702***	0.726
	5	**5**		4,36	0,90	21			0.723
	7	**5**		4,64	0,71	15			0.751
	8	**4**		4,09	0,84	20			0.713
	10	**5**		4,47	0,70	16			0.748
	12	**5**		4,69	0,75	15			0.739
	13	**5**		4,56	0,65	14			0.747

*maximus value is 1.0

Establishing the correlation between task and ego orientation the result was a weak correlation and not significant (p=0.274), demonstrating the independent of the results, so even if the task orientation increases, the trend for ego orientation to rise is small.

As we can see in this research the instrument appears stable to internal consistency, showing yet, that technical features of task orientation are highlighted how believe in your effort, are more persistent, are independent, are more creative and innovative, have a feeling of success, do not show high capacity, have greater self-control, judge your success by the quality of your work, and favor the ability to cooperate and the effort to the personal domain[25]. Winterstein classifies the motivation theory on the assumption that there must be something that triggers an action, which gives it a direction, maintains its course toward a goal and finish[25]. The same author clarifying what reasons are hypothetical constructions that are learned along the human development and serve to explain behavior.

Other similar results were found regarding the internal consistency of the instrument performed in Brazil both in physical activities and individual sports[5, 18, 16, 14, 25, 27, 28, 29], as in team sports[13, 15, 17]. So, that comparisons were possible, one of our hypotheses was to observe if there was a significant difference between different categories, in which they include athletes' ages, and for this to be possible, the formation of two groups was considered, related to the age of the athletes: G1 and G2 both groups homogeneous tested by the coefficient of variation.

The first test was to observe the difference between the ego orientation of G1 and G2, and was confirmed that the ego means of G1 (2.89±1.35) is higher than G2 (2.36±1.15) (p=0.001). For task orientation difference between G1 (4.38±0.85) and G2 (4.48±0.76), the difference was not significant (p=0.341), remembering that the G2 athletes are older than G1, and confirm the first result of total mean task orientation with their characteristic's.

Correlating ego, task and age, from G1 there is a significant and negative correlation between age and ego (rho= -0.466; p=0.001), in other words, as age tends to increase the ego orientation tends to

decrease. This can be explained by the fact that athletes gain more experience and dedicate themselves more, besides increasing participation in festival and competitions.

In the same way, in G2, the correlation between ego and age was also significant, moderate and negative (*rho*= -0.477; *p*=0.05), corroborating the idea that the characteristics related to ego orientation should fall once age of athletes increases and their experience and confidence in the sport increases.

Established the correlation between ego and task orientation, even among G1 there is a weak, positive but significant correlation (*rho*=0.148; *p*=0.05), that is, as the task orientation increases there is a tendency towards orientation for the ego to rise up merely. Therefore, we can consider and highlight the relevance of a good job of basic training of young gymnastics athletes, based on attempts at improvement, effort and determination and the quest to overcome the results according to your limits and performance of your skills[30]. That is essential to monitor the athletes, and coaches and teachers should create a mastery climate and target self-improvement and self-referenced comparisons over interpersonal competitiveness[31].

The final statistical treatment was observing the exploratory factor analysis of the instrument used in this research, plus in order to comply with the test, the normality calculation was first adopted. The result of Kaiser-Meyer-Olkin (KMO) and Bartlett test showed us suitability and significant (0.684; *p*=0.001), thus enabling be done factor analysis. Higher the better, and 0.50 as the minimum suitability level[32].

Observing the Table 2 the model of the rotated Matrix used was the Varimax with close factors, so the expectation was that the questions related to the ego were grouped in one factor and the questions related to the task were grouped in the other factor, and this was the result. In this way the latent values referring to the ego orientation are highlighted by one asterisk in order that task orientation was by two asterisks. All latent values of both orientations are higher comparing to the other, that is, if we look at question 01, which refers to ego orientation, the same latent value in factor 1 (0.797), different from factor 2 (0.178), and so on.

Table 2. Rotated matrix (VARIMAX / Factor 01 and Factor 02), extracting the values of each issue of variance of the TEOSQ scale for gymnastics

ISSUE	FACTOR 1 (EGO)*	FACTOR 2 (TASK)**	*Extraction*	% of Variance
01 (Ego)	**0.797***	0,178	0,666	26,529
02 (Task)	0,056	**0.839****	0,706	24,809
03 (Ego)	**0.717***	-0,201	0,554	9,090
04 (Ego)	**0.803***	-0,062	0,649	4,159
05 (Task)	0,287	**0.545****	0,379	7,572
06 (Ego)	**0.369***	-0,091	0,144	6,215
07 (Task)	-0,172	**0.424****	0,21	5,290
08 (Task)	0,262	**0.748****	0,628	4,633
09 (Ego)	**0.704***	0,026	0,497	3,531
10 (Task)	-0,176	**0.597****	0,387	2,874
11 (Ego)	**0.820***	0,168	0,701	1,884
12 (Task)	-0,074	**0.763****	0,587	1,750
13 (Task)	0,162	**0.781****	0,501	1,665
Eingen-values	**3,44***	**2,81****		

***Related to Factor 1**

****Related to Factor 2**

Other important result is observing the % of variance, which corresponds to the possibility of extracting values from stratified factors, that is, if we add the percentages of variance of the first and second questions, we have a total of over 50%, in this case in specific 51.32%, thus confirming the concentration of motivational orientations in two factors. Our study corroborates the study of López-Walle et al. that explain that the exploratory factor analysis supports the structure of two factors, explained by 55.9% of the total variance; and confirmatory factor analysis confirms the hypothesis two-dimensional structure[6].

Conclusion

It becomes evident in this study that the TEOSQ instrument presents an exploratory factor analysis defined in its two groups of questions - Factors (task orientation and ego orientation), demonstrating its effectiveness, reproducibility and reliability , which can be replicated. Still with the data, it is possible to affirm that the group of female gymnasts is task oriented, despite being a sport of an individual nature, in which performance depends solely on the athlete's performance themselves, thus demonstrating that young athletes train hard, strive to learn new techniques, they empathize with the group and possibly perform satisfactorily with themselves.

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Movement Games, Relay Races and Application Paths - Means of Training in School Physical Education

Rodica Lucian[1], Viorel Bitang[2]
[1]Vinga Technological High School/ Arad County School Inspectorate,
[2]Aurel Vlaicu University of Arad

Correspondence: Rodica Lucian **(**e-mail: lucian_rodica@yahoo.com)

Abstract
Introduction: In order to achieve high efficiency, efficiency in preparing students for life, it is necessary to address the issue in terms of methods and techniques appropriate to achieving the objectives, assessment methods (attractive and interesting), the efficiency of the use of devices and materials. **Purpose:** Using in the experiment described in the paper permanently motion games, relay races, application paths, I wanted to check their effectiveness and confirm the hypothesis that the method I chose to improve the manifestation of motor skills and level of motor skills is higher compared to two tests, and the methods used were correctly chosen and applied. **Methodology:** I highlighted the means of school physical education provided in the training program, and in them I presented aspects specific to the three means targeted in the experiment: movement games, relay races and application paths, which we also described in detail, also visually, through kinograms. I considered a special aspect, the one related to the cooperation between teachers and students in the school training process, without which the physical education lesson cannot achieve its objectives . **Results:** The results materialized in the level of preparation of the students and the progress registered in the experiment period show that, through the use of complex exercises, the activation of the students on the basis of awareness was achieved and their motor and spiritual forces were mobilized. **Conclusion:** the hypothesis I started from was that by systematically using the chosen means, they will make progress in the tests administered in the experiment.

Keywords: movement games, harmonious physical development, methods, means, systematization

Introduction

Exercising is a joy, a necessity.

To teach children to discover and understand the beauty of the movement, to want to achieve perfection in its execution and to achieve what is beautiful and beneficial for them (Raţă, 2002). The desire of children to imitate the adults creates the beauty and originality of the movements that lead to the education of the will and to the formation of the firm character (Dragu, 2002)

The personality of the teachers, the creative spirit, the desire to seek and promote the new, the interweaving in the teaching activity of all that is beneficial and beautiful, the memory of one's own childhood will bring the teachers closer and closer to the children, to their requirements (Cojocaru, 2002).

This makes a more obvious contribution to increasing the efficiency of school physical education, ensures the maintenance of optimal health and increases the ability to adapt to environmental factors, ensures the influence of the correct and harmonious evolution of the body, development of motor skills utilitarian - applied and basic sports skills and last but not least the independent practice of physical exercises and different sports along with the balanced manifestation of team spirit and competition according to an accepted system of rules (Dragomir, Scarlat, 2004).

General aspects regarding the complex structures of exercises: they develop skills, abilities and motor qualities, they allow the complex manifestation of the personality, they create positive emotional states, their specific activity is collective, which implies the assumption of responsibilities, critical and self-critical attitude (Colibaba-Evulet, Bota, 1998). It develops initiative, observation and the ability to anticipate and generalize. They have as a characteristic element the competitiveness, the competition increasing the students' interest, mobilizing and stimulating them (Todea, 2002)

In my career as a physical education teacher for 10 years, my permanent concern has been to make physical education lessons at Vinga Technological High School a pleasure for my students, to channel them towards the positive release of their energies in competitions organized in physical education lessons in the form of relays, application courses (obstacle courses) and movement games.

Also, in my capacity as a responsible teacher, of the Vinga area pedagogical circle and a physical education teacher at Vinga Technological High School, I noticed that too few colleagues use such pleasant means for students - movement games, relay races, application courses to lift the emotional condition of students and to guide them to move and train independently (outside of physical education classes).

For these reasons, I considered it appropriate to address such a topic in a scientific-methodological paper, which led me to choose the topic of this paper.

Methods

In the research I included a middle school class, from Vinga Technological High School, 7th grade A, experiment group, which had a staff of twenty students (10 girls and 10 boys). The class is homogeneous in age, intellectual and physical development. In terms of research, the experiment class conducted two hours of physical education per week during which motion games, relay races, and application courses were systematically used throughout the eight-month experiment, making obvious progress.

Along with the set of motion games, relay races and application courses, we also administered control tests in the experiment:

- running speed 50m;
- long jump from the spot;
- running (endurance) 800m girls, 1000m boys;

The research period was divided into two stages:

- Initial testing - 1 Oct. 2016 - 15 Oct. 2016: it was intended to record the performance of the experiment group;

- Final testing - June 1, 2017 - June 10, 2017. We followed the differences between the two stages of the experiment, comparatively monitoring the evolution of students, guided by the idea of confirming research hypotheses.

The objectives of the experiment are:

- development of the execution capacity with maximum correctness of the motor skills targeted in the games of movement, relay races and applied paths
- increasing the indices of manifestation of the motor qualities involved
- stimulating the interest for the constant practice of physical exercises
- forming a positive attitude towards oneself and others.

In order to outline with maximum precision the place and importance of movement games, relay races and applied courses in the physical education lesson, we designed questionnaires for students and physical education teachers in the Vinga area pedagogical circle.

From the answers given by the surveyed teachers, it appears that the movement game has a double aspect, one instructive and the other educational and can be present in any material conditions, in the classroom or outdoors.

From the students' answers it results that they love movement games because they are fun, they recreate, they are attractive, being aware of the educational value of movement games as well as other complex exercises such as relays or application courses.

The research methods used in the elaboration of the paper were: bibliographic study, observation method, test method, statistical method, conversation and survey method, graphic representation method, comparative method (Tudor, 2001).

Results

The results materialized in the level of preparation of the students and the progress registered in the experiment period show that, through the use of complex exercises, the activation of the

students on the basis of awareness was achieved and their motor and spiritual forces were mobilized.

In the assessment, the following were taken into account:

- correct execution
- following the rules
- number of successful actions
- total mistakes or penalties
- the number of students eliminated from the game.

1 . The evolution of the subjects' executions during the experiment (relay races, application paths, movement games)

Students	Initial stage	Final stage	progress
correct execution			
20	68,75%	93,75%	+25%
following the rules			
20	56,25%	87,58%	+31,33%
successful actions			
20	62,50%	87,50%	+25%
mistakes (penalties)			
20	15,62%	6,25%	-9,37%
students eliminated from the game			
20	18,75%	12,50%	-6,25%

It was found that the progress made was superior as a result of the preparation process carried out during the planned period, demonstrating the efficiency of intensive use (hour by hour) of movement games, relay races and application courses.

Along with the set of motion games, relay races and application courses, we also administered control tests in the experiment:

- running speed 50m;
- long jump from the spot;
- running (endurance) 800m girls, 1000m boys;

Table. 2. Dynamics of experimental performance in the 50m girls / boys speed test

Subjects	Speed running - 50 m			
	Girls – The experiment group		Boys – The experiment group	
	Initial testing	Final testing	Initial testing	Final testing
1	8.8	8.5	8.2	7.8
2	8.5	8.7	8.4	7.9
3	8.9	8.3	8.1	7.6
4	8.7	8.4	8.5	7.8
5	8.9	8.7	8	8.1
6	9.0	8.8	8.5	7.4
7	8.6	8.2	7.8	7.5
8	9.1	8.6	7.9	7.9
9	8.6	8.3	7.9	8.0
10	8.9	8.4	8.6	8.2
Mean	8.8	8.5	8.2	7.8
Amplitude of variation	0.60	0.60	0.80	0.80
Coerfficient of variation	2%	2%	4%	3%
Standard deviation	0.19	0.20	0.29	0.26

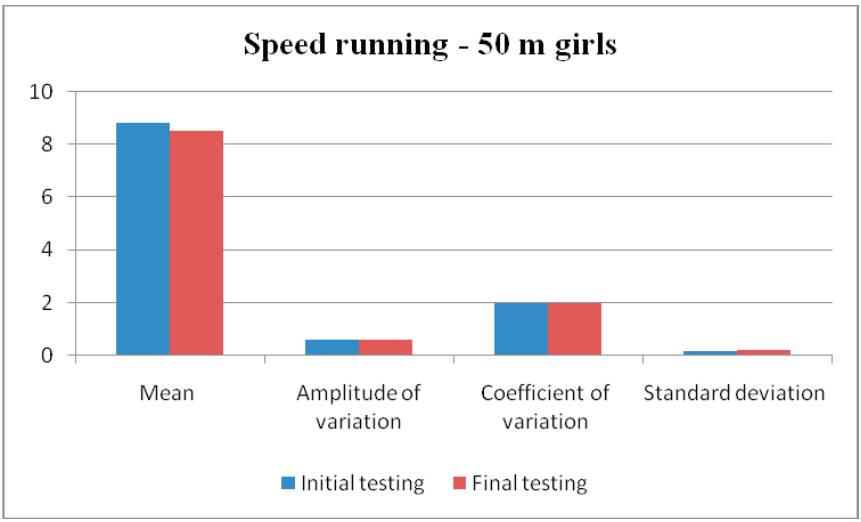

Fig. 1. Evolution of statistical indicators in the 50 m girls event

In the experiment class the arithmetic average in the speed test on the distance of 50 m girls, in the initial test the value of 8.8 „ was registered at girls, and in the final test it was registered the value of 8.5". For girls, the difference is 0.3 ".

From the analysis of the evolution of the statistical indicators in the 50m girls event, the following conclusions can be drawn:

- Within the observed values, by examining the statistical sequence can be identified a minimum and a maximum value. The difference between the maximum value (xmax) and the minimum value (xmin) is called the amplitude of variation of the statistical string, which, for the analyzed example, has the value of 0.6 for both the initial and the final test;
- and the indicator amplitude of variation indicates a relatively narrow range of variation, expressing the same conclusion as the statistical coefficient indicator of variation;
- under the ratio of the coefficient of variation all the primary data come from homogeneous sets both in relation to the initial test and the final test, (s% = 2%);
- the lower the standard deviation, the lower the degree of scattering of the values of the studied characteristic, for the initial testing this statistical indicator has the value of 0.19 and for the final testing it has the value of 0.20.

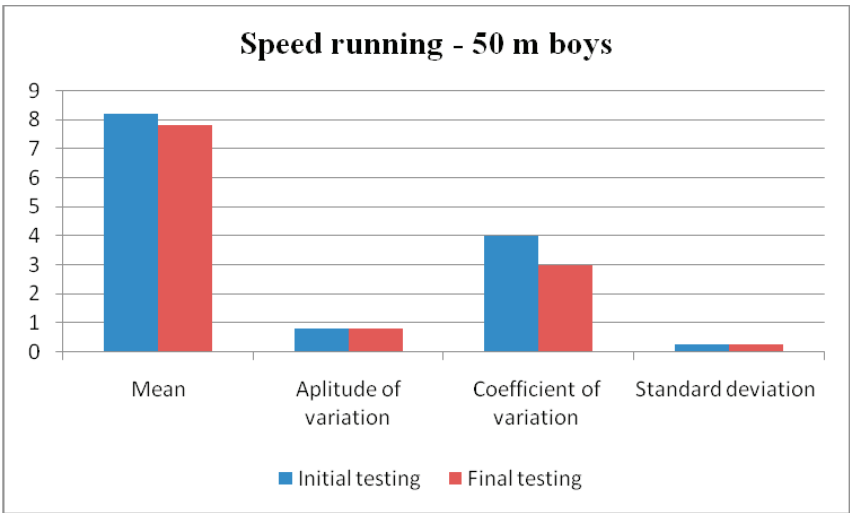

Fig. 2. The evolution of statistical indicators in the 50m boys' event

At boys, at the initial test, the arithmetic average, in the speed test over a distance of 50 m, the value recorded by timing is 8.2 " and at the final test, the value is 7.8". The difference between the initial test and the final test is 0.4 ".

From the analysis of the evolution of the statistical indicators in the 50m boys test, the following conclusions can be formulated:

- The difference between the maximum value (xmax) and the minimum (xmin) is called the amplitude of variation of the statistical string, which for the analyzed example has the value of 0.8 for both the initial and the final test;
- in terms of coefficient of variation all primary data come from homogeneous sets both in relation to the initial test and the final test, (s% = 4% initial test and 3% final test);
- and the amplitude variation indicator indicates a relatively narrow range of variation, expressing the same conclusion as the statistical coefficient of variation indicator.
- the standard deviation, for the initial testing has the value of 0.29 and for the final testing has the value of 0.26.

Table. 3 . Dynamics of experimental performance in the long jump test on the spot

Subjects	Long jump from the spot			
	Girls – The experiment group		Boys – The experiment group	
	Initial testing	Final testing	Initial testing	Testarea finală
1	1.52	1.62	1.70	1.82
2	1.49	1.55	1.69	1.76
3	1.47	1.63	1.65	1.65
4	1.45	1.52	1.68	1.68
5	1.52	1.52	1.72	1.69
6	1.55	1.54	1.71	1.77
7	1.44	1.59	1.66	1.81
8	1.43	1.53	1.73	1.78
9	1.51	1.52	1.67	1.8
10	1.49	1.52	1.69	1.82
Mean	1.49	1.55	1.69	1.76
Amplitude of variation	0.12	0.11	0.08	0.17
Coerfficient of variation	3%	3%	2%	4%
Standard deviation	0.04	0.04	0.03	0.06

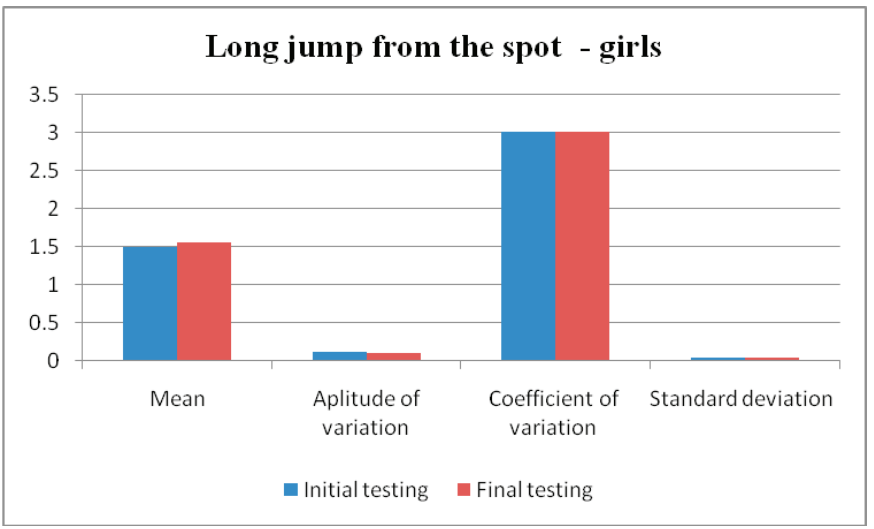

Fig. 3. Evolution of statistical indicators in the long jump test on the spot - girls

In the long jump test on the spot - girls, at the initial test, **the arithmetic average** is 149 cm, and at the final test, the performance value is 155 cm. The difference between the performances is 6 cm.

From the analysis of the evolution of the statistical indicators in the long jump test on the spot - girls, the following conclusions can be formulated:

- the amplitude of variation of the statistical string, for the analyzed example has the value of 0.12 for the initial testing and 0.11 for the final testing;
- the indicator amplitude of variation indicates a relatively narrow range of variation, expressing the same conclusion as the statistical coefficient indicator of variation;
- in terms of coefficient of variation all primary data come from homogeneous sets both in relation to the initial test and the final test, (s% = 3%);
- the lower the standard deviation, the lower the degree of scattering of the values of the studied characteristic, for the initial and final testing this statistical indicator has the value of 0.04.

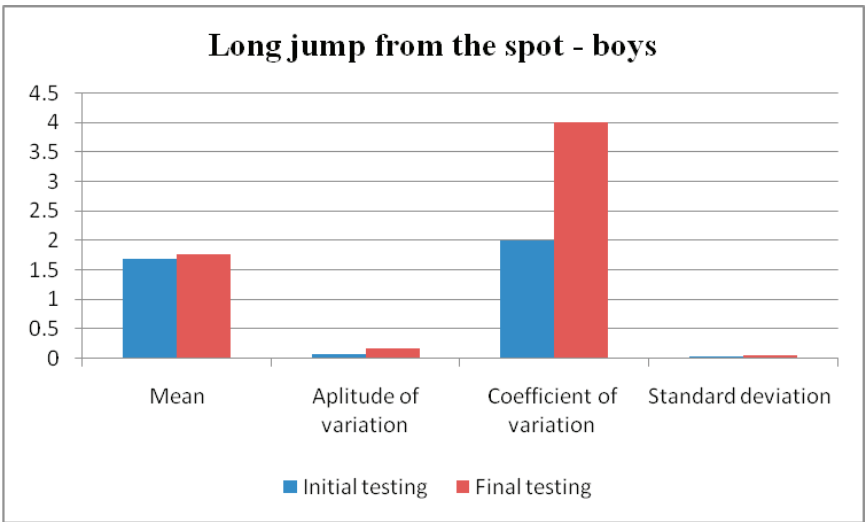

Fig. 4. Evolution of statistical indicators in the long jump test on the spot - boys

In the long jump test on the spot - boys, at the initial test, **the arithmetic average** is 169 cm, and at the final test the performance value is 176 cm. At boys, the difference is 7cm.

From the analysis of the evolution of the statistical indicators in the long jump test on the spot - boys, the following conclusions can be formulated:

- the difference between the maximum value (xmax) and the minimum (xmin) is called the amplitude of variation of the statistical string, which for the analyzed example has the value of 0.08 for the initial test and 0.17 for the final test;
- the coefficient of variation is used to make the comparative analysis between distributions with variability expressed in different units of measurement. It is equal to the percentage ratio between the standard deviation and the arithmetic average;
- in terms of coefficient of variation all primary data come from homogeneous sets both in relation to the initial test and the final test (s% = 2% initial test and 4% final test);
- and the amplitude variation indicator indicates a relatively narrow range of variation, expressing the same conclusion as the statistical coefficient of variation indicator.
- the standard deviation, for the initial testing has the value of 0.03 and for the final testing has the value of 0.06.

Table. 4. Dynamics of experimental performance in the endurance running test

800m girls / 1000m boys

Subjects	Endurance running			
	800m		1000m	
	Girls – The experiment group		Boys – The experiment group	
	Final testing	Initial testing	Final testing	Initial testing
1	4.3	4.28	4.2	4.2
2	4.4	4.35	4.4	4.3

3	4.5	4.33	4.3	4.4
4	4.6	4.29	4.3	4.25
5	4.2	4.44	4.2	4.33
6	4.5	4.5	4.4	4.28
7	4.3	4.27	4.6	4.44
8	4.6	4.25	4.7	4.45
9	4.3	4.29	4.5	4.52
10	4.2	4.5	4.8	4.22
Mean	4.390	4.350	4.440	4.339
Amplitude of variation	0.400	0.250	0.600	0.320
Coerfficient of variation	3.5%	2.2%	4.7%	2.5%
Standard deviation	0.152	0.095	0.207	0.108

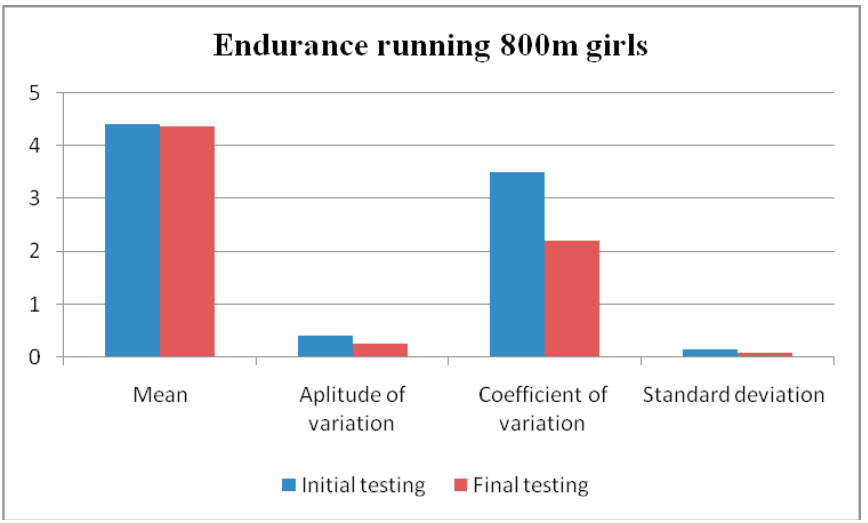

Fig. 5. Evolution of statistical indicators in the 800 m endurance running event - girls

In the 800 m girls' endurance running test, **the arithmetic average** was 4'40 „in the initial test, and the value was 4'35" in the final test.

From the analysis of the evolution of the statistical indicators in the 800m endurance running test - girls, the following conclusions can be formulated:

- the amplitude of variation of the statistical string, for the analyzed example has the value of 0.40 for the initial testing and 0.25 for the final testing;
- and the indicator amplitude of variation indicates a relatively narrow range of variation, expressing the same conclusion as the statistical coefficient indicator of variation;
- in terms of coefficient of variation all primary data come from homogeneous sets both in relation to the initial test and the final test, (s% = 3.5% for the initial test and 2.2% for the final test);
- the lower the coefficient of variation, the lower the variability of the characteristic, the more homogeneous the collectivity, and the higher the degree of representativeness of the arithmetic mean;
- the lower the standard deviation, the lower the degree of scattering of the values of the studied characteristic, for the initial testing this statistical indicator has the value of 0.152 and for the final testing the value of this indicator is 0.095.

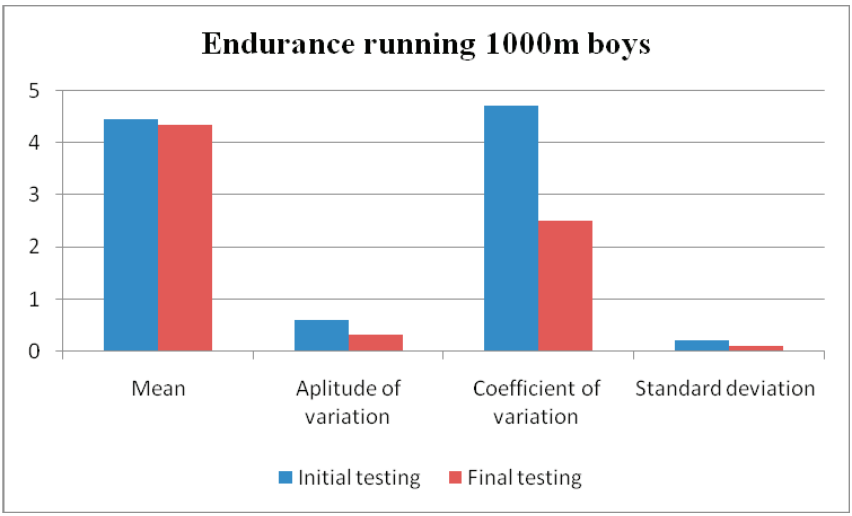

Fig. 6. Evolution of statistical indicators in the 1000 m endurance running test – boys

In the endurance test 1000 m boys, at the initial test, the arithmetic average was 4'44 ", and at the final test the value of 4'33" was recorded.

From the analysis of the evolution of the statistical indicators in the 1000m endurance running test - boys, the following conclusions can be formulated:

- the difference between the maximum value (xmax) and the minimum (xmin) is called the amplitude of variation of the statistical string, which for the analyzed example has the value of 0.60 for the initial test and 0.32 for the final test;
- the coefficient of variation is used to make the comparative analysis between distributions with variability expressed in different units of measurement. It is equal to the percentage ratio between the standard deviation and the arithmetic mean;
- in terms of coefficient of variation all primary data come from homogeneous sets both in relation to the initial test and the final test (s% = 4.7% initial test and 2.5% final test);
- and the indicator amplitude of variation indicates a relative-

ly narrow range of variation, expressing the same conclusion as the statistical coefficient indicator of variation;
- the standard deviation, for the initial test has the value of 0.207 and for the final test has the value of 0.108.

So it is confirmed again, the hypothesis from which the experiment was started, namely that, using systematically and permanently the correctly chosen means, they determined progress in all 3 tests administered in the experiment.

Conclusions

The experiment led to the conclusion that by using the three specific means as complex exercises, the basic motor skills, application utilities, basic sports and some motor skills are strengthened and perfected.

We can say that students whose activity is based on a deep motivation get the best results and that physical exercise is the most frequently used operational model for achieving the proposed objectives (Carstea, 1993).

We are also talking about feedback for the teacher who is concerned and motivated.

It is worth mentioning the following statement by Professor Kieer Kegaard: „The learning process begins when you, the teacher, learn from the student, when you, standing in his place, understand what he understood and how he understood." (Bota, 2004),

The work I have prepared on the subject of "Motion Games, Relay races and Application Routes" is intended to be a warm encouragement to my colleagues, physical education teachers, to use this method in the lessons of their lords, to constantly create joy for students and an appropriate framework for the manifestation of personality and at the same time to highlight once again the educational values of these means of school physical education.

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Contributions Related to Optimizing Mobility Indices in Gymnasts by Means of Aerobic Gymnastics

Piscoi Georgeta Lucia, Petran Denis, Băltean Alexandru Ioan
"Aurel Vlaicu" University of Arad

Corespondence: Piscoi Georgeta (geta@piscoi.ro)

Abstract
The aim. The purpose of this research is the formation of gymnasts with good general and special physical training, apt to meet the competitive requirements at national level, currently and in perspective. We consider that the introduction of operational means specific aerobic gymnastics designed for the increase in indices mobility will result in an increase in. **Methodology**. At the start of the experiment, we conducted a series of tests on girls who want to become gymnasts.. Due to the fact that the athletes subject to the experiment are aged between 7 and 9 years, most of them having 8 years, the appreciation of motor quality mobility is only through 2 samples, and for speed we chose the rehearsal speed. After these requirements, the two tests specific to articular mobility will be carried out: a) test 1 mobility in lumbar spine: top bridge; b) test 2 mobility in coxo-femoral joint: lateral string; c) test 3 repetitive speed: the rigle method. Through these samples, the degree of lumbar and coxo-femoral mobility was tested. **Results.** For lumbar mobility, the top bridge, relevant progress has been made. The coefficient of variability was in both tests between 0-10%, which means high homogeneity and low dispersion, ie C.V.i =5.46% and C.V.f= 6.8% with a decrease of 1.3% of homogeneity at the final test. For the mobility of coxco-femoral joint, lateral string, significant progress has been made. The coefficient of variability was between 4.09% and 4.60%, which shows us that the homogeneity of the group is large C.V.i. = 22.5% and C.V.f. = 42.5%. For the repetition speed, the homogeneity of the group is high both in the initial test and the final test, the group losing homogeneity in the final test. At this test C.V.i. = 2.83%, and

C.V.f. = 3.92% dispersion being very small. **Conclusions.** Following the analysis and interpretation of the statistics indicators presented in the tables and studying the initial and final data presented, the main statistical indicators were discussed: average deviation, standard deviation and variability coefficient.

Keywords: aerobics, motor skills, training, motor features, somatic features

Introduction

"Aerobics" comes from the Greek word "Aerovichi" meaning oxygen gymnastics "or, more precisely, oxygenation of the body to maximum effort. Adordance "aerobics means a living organism that lives only when it consumes oxygen representing, in this way, all processes that take place through the participation of oxygen.

"Aerobic gymnastics is a sporting physical activity, with multiple positive valences with the main reference element, the motor and mental capacity of the individual, with beneficial effects on physical condition and health''(Kulcsar, 2000).

"Compared to the modern evolution of the sports natrenammet, an improvement is imperative, leading to the improvement of the methodology applied judically through the perspective of each component of the training''(Stoenescu, 2000). Aerobic gymnastics is a maintenance gymnastics that is an integral part of the aerobic exercise system and performing with musical accompaniment. In this system, it is particularly incorporating the sports disciplines with cyclic movements (repeat movements) such as: walking, running, cycling, swimming, etc.

"Aerobic training has the systematic, rhythmic oxygenation of the athlete for solving energy metabolism in intensity training: small, medium or large''(Kulcsar, 2000).

Mobility is defined differently in the literature. Thus, the Explanatory Dictionary of the Romanian Language (www.dexonline.ro), considers that the term has the following valences: "the acquisition of being mobile, to change its place"; The property to be moved, moved change, transformation, variability "Human's

ability to change its expression", the second valence expresses the particularity of the notion in domain terminology''(Alexe, 1993), defines mobility as "man's ability to maximize the anatomical locomotic potential in a particular joint or in the body joints, materialized by carrying out great amplitude movements". This definition highlights' the link between the anatomical structure (joint) and the amplitude of the movement. Mobility / suppleness and coordinating skills with two forms of manifestation: static and dynamic, each of which is generally in appearance, active and passive''(Raţă, 2006).

The suppleness is defined by several authors, starting in 1978, J.M.of Chevalier quoted by Rață, of the musculo-articular mechanisms which, within the limits of heritability and under the influences of the activity, offer the movement of the locomotor segment".

In the process of developing mobility it is recommended to use all types of exercises presented because each of them acts in certain directions. For the development of mobility, it is recommended to comply with the following methods and methodical indications:

- "exercises for mobility development will be selected according to the requirements of each sports branch or basic and applicative driving skills and the level of preparation of the executors''(Piscoi, 2009).
- search for special exercises for mobility, but also of the highest amplitude technique.
- parallel to mobility exercises, it is recommended to use force exercises.
- before conducting mobility exercises, a good heating of the locomotor (until the occurrence of perspiration) is required and, in particular, the joints on which it will act in that lesson.
- mobility exercises are performed in the first part of the lesson, at heating
- (stretching) or between resistance or strength exercises, and as the lesson, after heating or after the themes or objectives of the lesson.
- it is advisable to avoid working for the development of mobility when the body is tired after strengths and strength,

because exercises no longer have the desired efficiency'' (Piscoi, 2009).

Somatic and functional features

During the "growth and development, the various tangible elements show differentiations from one age to another, so it is necessary to specify that there are some discrepancies between chronological and biological age. For these reasons, a series of investigations are made for the establishment of the biological age, the only one to allow the efficient individualization of sports training''(Alexe, 1993).

"Muscle strength is relatively low, and maintaining balance requires additional effort''(Dragnea, 1999). At 7 years there are several processes involved in growth and development. After 7 years, ossification in the basin in the girls is intense, as well as the calcification processes in the handhand. **"**The joints are also strengthened. Increases the volume of muscles. The fine muscles of the hand develop**"** (Şchiopu, 1981).

"Influenced by the integration into the school environment with wide psychic resonances, personality, emotional, student is subject to increased demands, felt differently according to its biological development''(Dragnea, 1991).

Curiosity of children is very vivid, their attention being maintained more time in interesting activities. ''Among the mental peculiarities of the small school age, attention is particularly attracted to intellectuals that condition the educational process and at the same time determined. Children are attracted by the dynamics and the external attributes of objects.Game or Construction activities keep more time focused, but they also produce fatigue**" (**Epuran, 2005).

Regarding the particular speed education peculiarities at this age, various games and exercises are used, such as: races on numbers, rapid changes in signal positions, signal turns, etc. "Given that in this sporting branch, the execution speed is expressed by the rhythm of execution imposed by the specificity of the discipline, namely the rhythm of the chosen musical movements, is the one with a great share in the execution of the movements, the

speed exercises will Axis mainly on educating this form of manifestation, which is made without difficulty or even in relieved conditions''(Stroescu, 1968). Increasing the level of difficulty, requirements for choreography of competition exercises, requires a rigorous approach to increasing the value of mobility, coordination and balance of athletes. "All training programs should include the fundamental factors of sports training, namely: physical, technical, tactical, artistic, biological and theoretical. These are an essential part of any training program, regardless of the age of the athlete, the individual potential, level or preparation phase''(Bompa, 2001).

Methodology

At the start of the experiment, we conducted a series of tests on girls who want to become gymnasts. The children's testing took place at the Gymteam Sports Club in Arad, under the club has a gym with a good equipment. The experiment was carried out during the year 2021-2022, between November 1, 2021 and April 15, 2022. For experimental research, we chose a sample consisting of 16 athletes between 7 and 9 years old.

The purpose of this research is the formation of gymnasts with good general and special physical training, apt to meet the competitive requirements at national level, currently and in perspective. We consider that the introduction of operational means specific aerobic gymnastics designed for the increase in indices mobility will result in an increase in. These tests consisted of initial measurements to follow the stage from which we started, and at the end of the experiment, to achieve the final measurements. Due to the fact that the athletes subject to the experiment are aged between 7 and 9, most of them having 8 years, the appreciation of motor quality mobility is only through 3 samples, and for speed we chose the speed of repetitive. After completing these requirements, the three tests specific to articular mobility will be carried out: a) test 1 mobility in the lumbar spine articulation: the top bridge; b) test 2 mobility in coxo-femoral articulation: lateral string;c) test 4 repeat speed rigle

method. Through these samples, the degree of lumbar and coxo-femoral mobility was tested.

Means and methods used in the experiment, which was used to improve joint mobility:

Nr. crt.	Name of the exercise	Number of reps	Number of series
1.	Right -leg swinging, stretched out of dorsal bed with outstretched arms	20x	1
2.	Left -foot swings, stretched out of dorsal bed with outstretched arms	20x	1
3.	Swing with legs stretched and open in side string, from the dorsal lying with outstretched arms and crossed fingers	20x	1
4.	The bottom bridge	10x	1
5.	The top bridge	10x	1
6.	String forward with the right leg to the bench	1x	2
7.	String forward with the left foot at the bench	1x	2
8.	Side string with the right leg on the bench	1x	2
9.	Side string with left foot on the bench	1x	2
10.	Package in close to the heels on the bench and benchs on the bench next to the legs	1x	2
11.	Package in the distance with heels on the bench and bracelets on the bench between the legs	1x	2
12.	State on the tip turned down with palms on the ground	1x	2
13.	State on the knees with a partner	1x	1
14.	Balancing to the spine with the right foot forward	8x	2

15.	Balancing to the spine with the left foot forward	8x	2
16.	Balancing to the spine with the right foot	8x	2
17.	Balancing to the spine with the left foot	8x	2
18.	Swinging back with the right leg stretched	8x	2
19.	Swinging back with the right leg bent to the head	8x	2
20.	Swinging back with the left leg stretched	8x	2
21.	Swing back with left foot to the head	8x	2
22.	Swings on the line: forward, side and back with left and right foot	2x	2
23.	Walking in the bridge	1 soil length	2
24.	Walk on the tip turned out of the feet	1 soil length	2

Results Obtained

For lumbar mobility, the top bridge, relevant progress has been made. The coefficient of variability was in both tests between 0-10%, which means high homogeneity and low dispersion, ie C.V.i=5.46% and C.V.f= 6.8% with a decrease of 1.3% of homogeneity at the final test. For the mobility of coxco-femoral joint, lateral string, significant progress has been made. The coefficient of variability was between 4.09% and 4.60%, which shows us that the homogeneity of the group is large C.V.i. = 22.5% and C.V.f. = 42.5%. For the repetition speed, the homogeneity of the group is high both in the initial test and the final test, the group losing homogeneity in the final test. At this test C.V.i. = 2.83%, and C.V.f. = 3.92% dispersion being very small.

In order to interpret data properly and following the application of the experiment, we have done a simple and as much as possible tabular centralization.

By comparing the results obtained from the initial tests with the final ones, there is an improvement in the indices that reveal it.

Table no.1. Test values made in experimental research – T.I and T.F

Nr crt.	Name and surname	The top bridge		The lateral string		Repeat Speed	
		Ti	Tf	Ti	Tf	Ti	Tf
1.	M.P.	29	26	37	34	23	22
2.	A.D.	30	26	36	33	24	22
3.	A.A.	26	24	35	32	24	23
4.	A.F.	26	24	35	32	23	22
5.	M.B.	27	23	34	31	25	24
6.	M.M.	30	27	38	35	25	25
7.	A.S.	27	22	37	34	24	23
8.	A.D.	27	23	39	36	24	24
9.	M.G.	30	27	37	34	24	24
10.	A.R.	28	25	39	36	23	23
11.	G.S.	31	28	38	35	23	24
12.	C.L.	27	23	36	33	24	24
13.	C.T.	27	23	36	33	24	24
14.	N.E.	29	25	35	32	24	24
15.	M.M.	26	24	35	32	23	22
16.	N.P.	26	23	37	34	23	23
	X	27.875	24.5625	36.5	33.5	23,75	23.3125
	S	1.7078251	1.7876894	1.505545	1.505545	0.68	0.94648
	C.V.(%)	6.1267269	7.2781247	4.124782	4.494165	2.87634	4.05999

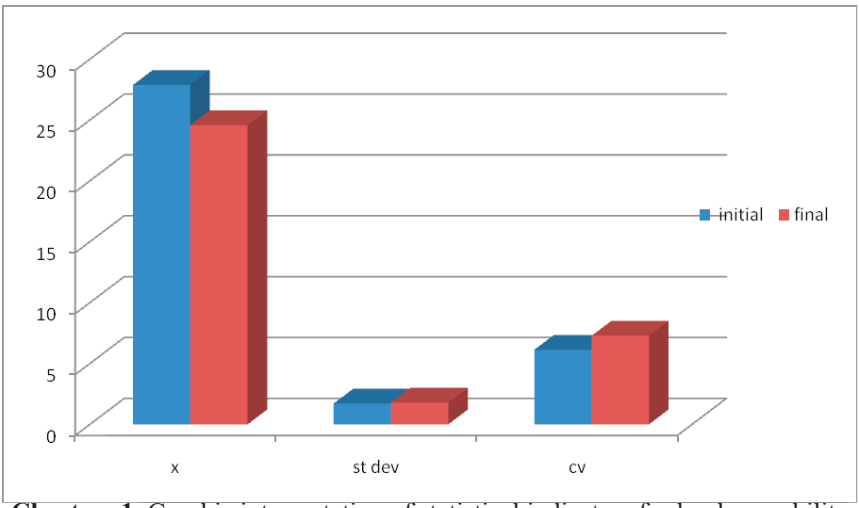

Chart no 1. Graphic interpretation of statistical indicators for lumbar mobility - top bridge

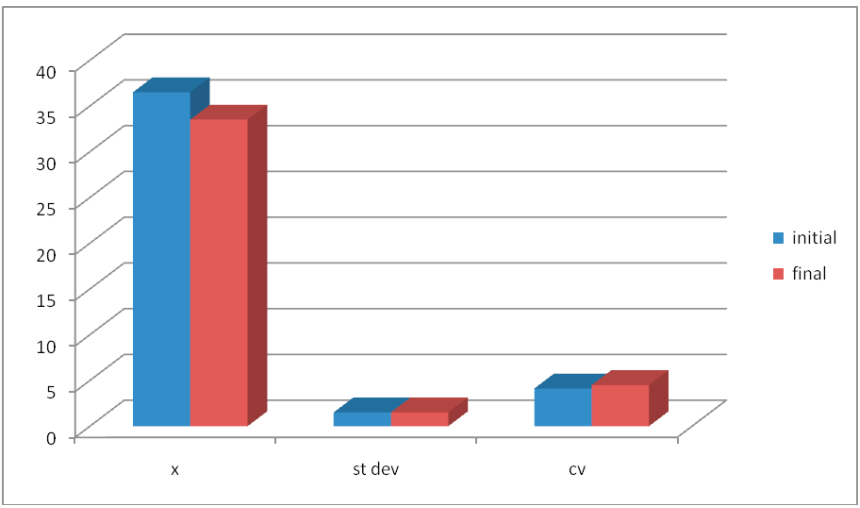

Chart no 2. Graphic interpretation of statistical indicators for coxo-femoral articulation (string lateral)

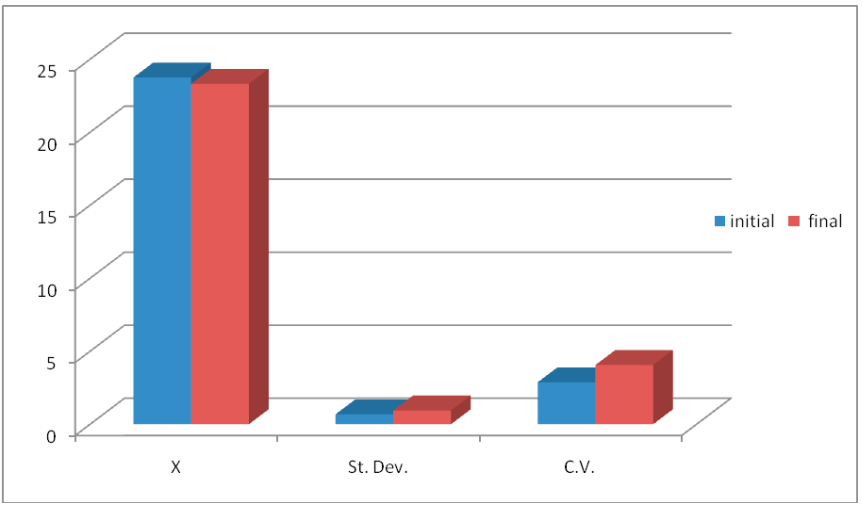

Chart No. 3. The graphical interpretation of the values of the statistics indicators for the speed of repetition

Conclusions

Following the analysis and interpretation of the statistics indicators presented in the tables and studying the initial and final data presented, the main statistical indicators were discussed: average deviation, standard deviation and variability coefficient.

According to these three indicators, the calculations have highlighted significant integral and final tests.

Regarding the statistical indicator for lumbar mobility, respectively the top bridge, relevant progress has been made. Taking into account the average deviation, has emerged in the final test a significant progress . The coefficient of variability was in both tests between 0-10%, which means a high homogeneity and a low dispersion, namely C.V.i = 5.46% and C.V.f = 6.8% with a decrease of 1.3% of homogeneity in the final test.

In the case of sample for coxco-femoral joint (s) significant progress has been made.The coefficient of variability was between

4.09% and 4.60%, which shows us that the homogeneity of the group is large C.V.i. = 22.5% and c.v.f. = 42.5%.

Regarding the statistical indicator of the repetition, the progress is small.Only a few sports are highlighted that have achieved more relevant results.In the case of other progress, it is less obvious, as this quality is less perfection. The homogeneity of the group is high both in the initial test and the final test, the group losing homogeneity in the final test. At this test C.V.i. = 2.83%, and C.V.f. = 3.92% dispersion being very small.

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Possibilities for Optimizing Physical Training for Children Through the Pilot Program: Judo in School from Rural Areas

Mihai Kunszabo
"Children's Palace" Arad, Romania

Contact: mihaikunszabo@yahoo.com

Abstract:
Purpose. The main purpose of the research is to highlight the effects in terms of physical training of an experimental program applied to students aged 8-10, through the hours of physical education with selected content from judo. **Methods.** A number of 24 male subjects, students of Ghioroc Secondary School were tested. For the statistical interpretation of the research results we used in the comparison of the research groups (control and Experimental) the Independent Sample t Test, arithmetic mean, standard deviation and statistical significance through the statistical program IBM SPSS ver. 23, both at the level of the initial test and at the level of the final test. **Results.** From the statistical interpretation of the research results we can draw the following conclusions: at the beginning of the experiment the two research groups present average values without statistically significant differences ($p > 0.05$) at all test samples and at the end of the experiment, the two research groups show significant statistic differences in all test samples as follows: $p < 0.05$ in test samples: long jump from the spot; respectively $p < 0.001$ at the shuttle test, trunk lifts, push-ups and knee bends. **Conclusions.** The experimental hypothesis was confirmed, the results obtained supporting this. At the level of the initial test, the research groups presented similar values, the results of comparing the average values highlighting the lack of significant differences ($p > 0.05$) in all test samples. Based on the data collected at the end of the experiment, it was found that the total physical capacity of the subjects was significantly improved at the thresholds of statistical significance of $p < 0.05$

and p <0.001, demonstrating the superiority of the application of judo sports content compared to classic content, for 1 school year, at the physical education classes of 8-10 year old students from rural areas.

Keywords*:* - judo, physical training, motor skills, teaching strategy

Introductions

This type of martial arts - judo, was developed in Japan at the end of the 19th century, in few words can be considered: a sport or a form of mental and moral education. Young people have had the chance to discover that judo can be both physical exercise and an opportunity to build a better future (frjudo.ro, Ardelean, 2013).

Training in performance sports is a rather difficult task as each sport, branch or event, requires complex efforts. "During training, the athlete reacts to various stimuli, some of which are more predictable than the others. (Bompa, 2001) Many specialists in the field of sports consider this branch of sport as particularly important and appreciated. "Judo is more than a tatami sport, being the synthesis of knowledge of anatomy, physiology, biomechanics, physiology, psychology, etc., obtained over time through Asian philosophy and thinking as a result of careful study of the surrounding nature. and human resources". (Herlo, 2010) From training technical / tactical skills to physiological and psychological training, the coach or judo teacher must know the requirements of Sports Science and Physical Education, in order to improve the potential of judo practitioners in all these aspects. Bogdan & Telechi (2003) argue that "the development of specific skills contributes to the creation of automation in triggering the execution of technical procedures with maximum efficiency". The father of judo stated that "practicing judo brings many satisfactions: physical exercise produces pleasant states for the individual and gives the body satisfaction" (Kano, 2013).

We also highlight the fact that our city has a rich tradition in practicing performance judo with outstanding results, confirmed by the successes in competitions of legitimate athletes, but also by the number of places where you can practice this noble art. Sta-

tistics and some studies show that more than half of the existing clubs in Arad County (both in cities and communes) have well-knit judo sections (Ardelean, 2013). This fact obliges us to identify the best methods of training, and to take advantage of this openness of young people to this sport, giving them the chance to assert themselves and to obtain very good results as early as possible (judoinfo.com).

For children, it is very important to incorporate exercises for the development of general strength and physical condition, in a pleasant, fun way during the physical education classes in the program or in the hours allocated for „sports" or we can encourage children to perform regularly at home some exercises with body weight that are done during training (Amtmann, Cotton, 2005). Some basic psycho-motor skills such as: agility, technical elements of judo, flexibility, endurance, strength, speed, power, mental skills, tactics, can be variables that condition performance in judo. These skills, controlled and improved, are the key to success in judo. Some authors claim that the decisive factor for success is speed motor quality, which is extremely complex and largely genetically determined; its position is that of king in judo (Galea, Ardelean, Popa, 2015).

In the process of preparing the children in the school, in order to be selected for the performance judo teams, it is very important to act on all the training factors. Among them, it is recommended to act on physical training, even if we use adapted means and methods, consisting in training with our own body weight or with helping objects (Ardelean, 2016).

It is also important to start preparing students for judo early because Judo, as a structured physical activity with the appropriate frequency, intensity and duration of exercise for preschool and school age children can complement the WHO recommendation on the amount of daily exercise needed. This is also important for combating the sedentary lifestyle of this age group and the growing wave of obesity (Kowalczyk, Zgorzalewicz-Stachowiak, Błach, Kostrzewa, 2022).

Material & methods

Research aims

Highlighting the effects in terms of physical training, of an experimental program applied to students aged 8-10, through physical education classes or sports ensemble classes with selected judo content or exercises that are predominantly used in judo gyms. In addition to these proposed exercises that were applied at least twice a week, partially or fully, and are presented in the table below, we also applied a series of dynamic games specific to judo, to develop different motor skills and abilities or to learn specific techniques, like other authors said (Chirazi, 2006). The duration of the experiment was 8 months.

Table 1. Presentation of some means that were applied during the experiment.

Nr.	Exercises performed	Nr. of rep./ time	Nr. of series
1	Shuttle speed running	4x10 m	2
2	Rope climbing, 3 m	2-3	2
3	Push-ups with bench support	15	3
4	Throwing a 1 kg medicine ball	20	3
5	Lifting the torso from dorsal lying	25	3
6	Trunk extensions from face lying	30	3
7	Forward lunges	30	3
8	Squats with jumping	20	3
9	Distance running 800m	1	3
10	Uchikomi (with speed)	20	2
11	Nage- Komi (with speed)	20	2
12	Randori	1,30 min	2

Research hypothesis

If in the physical education classes of 8-10 year old students from rural areas, we apply content collected from judo sports, the physical capacity of the subjects will improve significantly. Participants: Students aged 8-10, boys, from Ghioroc Secondary School, Arad County, n = 24, randomly divided into two groups: the control group (n.m. = 12) and the experimental group (n.e. = 12)

Procedure/ Skill Test protocol

The five applied tests were selected in order to test the main motor qualities involved in judo.

- Shuttle 5 x 7.5 m - assuming movement 5 times, at maximum speed, between two points at 7.5 m, reaching extreme points
- Vertical trunk lifts from supine position - consisting of performing a maximum number of repetitions in 30 ‘’.
- Push-ups consisting of no. maximum repetitions.
- Knee bends (maximum number of repetitions)
- Length jump from the spot (in m)

Data collection and analysis

For the statistical interpretation of the research results we used the comparison of the research groups (control and Experimental) through the Independent Sample t Test, through the statistical program IBM SPSS ver. 23, both at the level of the initial test and at the level of the final test.

Results and discussions

The test results of the two research groups are presented in Tables 1 and 2 below. In table no. 1, the values obtained by the control group at the initial and final testing at the following verification tests are highlighted: shuttle, trunk flexions, push-ups, knee bends, long jump from the spot.

Table 1. Initial and final test results of control group

Control group (GM) at initial and (TI) final test (TF)											
	Initials	Shuttle (sec.)		Trunk flexions (no rep.)		Push-ups (no rep.)		Knee bends (no rep.)		Long jump (m)	
		TI	TF	TI	TF	TI	TF	TI	TF	TI	TF
1.	A. C.	8.98	8.00	18	20	10	12	16	18	1.60	1.67
2.	D. Ș.A.	8.89	8.01	18	21	10	12	14	16	1.51	1.59
3.	D.M.	9.01	8.50	17	18	10	13	15	17	1.59	1.64
4.	D.G.	9.04	8.05	18	20	15	17	15	18	1.55	1.60
5.	F.C.A.	9.03	8.37	18	20	14	16	14	16	1.47	1.52
6.	F.A.Ș.	9.04	8.26	16	18	15	17	14	16	1.43	1.49
7.	H.V.	10.93	9.45	15	17	13	16	14	17	1.54	1.60
8.	H.G.A.M.	11.04	10.32	14	16	8	10	12	15	1.30	1.40
9.	J.M.N.	10.98	9.45	17	20	11	15	16	18	1.64	1.74
10.	L.C.M.	11.01	10.12	16	18	14	16	14	17	1.53	1.60
11.	I. V.	13.03	12.01	15	17	13	16	14	17	1.59	1.65
12.	M.M.	11.03	10.17	16	18	14	17	15	18	1.67	1.71

The analysis and statistical interpretation of the differences between the test environments for the control group are presented in table no. 2 below: (Epuran, 2005)

Table 2. Statistical-mathematical interpretation of the results obtained by *control group*

Control group		**Shuttle 5x7,5m**	**Trunk lifting no.rep in 30”**	**Push-ups (maximum no of repetitions)**	**Knee bends (maximum no of repetitions in 20”)**	**Long jumps (m)**
T.I	$\bar{x}$	10,16	16,50	12,25	14,41	1,53
	S	1,34	1,38	2,34	1,08	0,10
	Cv%	13,21	8,37	19,10	7,51	6,54
T.F	$\bar{x}$	9,22	18,58	14,75	16,91	1,60
	S	1,25	1,56	2,37	0,99	0,09
	Cv%	13,59	8,41	16,12	5,88	5,93
D ($\bar{x}_I - \bar{x}_F$)		-0,94	2,08	2,50	2,50	0,06
t		10,81	14,01	12,84	16,58	11,82
p		<0,001	<0,001	<0,001	<0,001	<0,001

Note: Control group (n = 12), f = n-1 = 11 For f = 11 at the value level of 0.05, the value of t = 2,201; at the value level of 0.01 the value of t = 3.106 and at the value level of 0.001 = 4.437 (Fisher tab.)

In the 5x7.5m shuttle test, the value of the arithmetic mean at the initial test is 10.16sec, and at the final test at 9.22sec, highlighting an improvement of the average by 0.94sec.

The standard deviation is 1.34 at the initial test and 1.25 at the final test, thus a decrease of the standard deviation values is observed at the end of the preparation period. The coefficient of variability has the value of 13.21% at the initial test and 13.59% at the final test, the dispersion being small, the group presents a high homogeneity, the averages being representative. The comparative analysis of the means between tests highlights the value of “t” calculated 10.81 higher than the tabular “t” (Fisher) at P <0.001, highlighting highly significant differences between tests (99.9%).

In the trunk lifting test no. rep. in 30 ‘’ the value of the arithmetic mean at the initial test is 16.50 repetitions and at the final test it is 18.58. The average progress between the two Ti - Tf tests is 2.08 repetitions.

The standard deviation is 1.38 at the initial test and 1.56 at the final test, so there is an increase in the values of the standard deviation at the end of the preparation period. The coefficient of variability has the value of 8.37% in the initial test and 8.41% in the final test, where the dispersion is small, the group has a high homogeneity, the averages being representative.

The comparative analysis of the means between tests highlights the value of “t” calculated 14.01 higher than the tabular “t” (Fisher) at P <0.001, highlighting highly significant differences between tests (99.9%).

We find out that in the float test the value of the arithmetic mean at the initial test is 12.25 repetitions, and at the final test it is 14.75 repetitions. The average progress between the two Ti - Tf tests is 2.50 repetitions.

The standard deviation is 2.34 at the initial test and 2.37 at the final test, so there is an increase in the values of the standard deviation at the end of the preparation period. The coefficient of variability has the value of 19.10% at the initial testing and 16.12% at the final testing, the community is relatively homogeneous, the averages being sufficiently representative. The comparative analysis of the means between tests highlights the value of “t” calculated 12.84 higher than the tabular “t” (Fisher) at P <0.001, highlighting highly significant differences between tests (99.9%).

Regarding the knee flexion test, the value of the arithmetic mean at the initial test is 14.41 repetitions and at the final test it is 16.91. The average progress between the two Ti - Tf tests is 2.50 repetitions. The standard deviation is 1.08 at the initial test and 0.99 at the final test, thus a decrease in the standard deviation values at the end of the preparation period is observed. The coefficient of variability has the value of 7.51% at the initial test and 5.88% at the final test, the dispersion being small, the group presents a high homogeneity, the averages being representative. The comparative analysis of the means between tests highlights the value of “t” cal-

culated 16.58 higher than the tabular "t" (Fisher) at P <0.001, highlighting highly significant differences between tests (99.9%). In the long jump test, the value of the arithmetic mean at the initial test is 1.53 m, and at the final test an average of 1.60 m was recorded. The average progress between the two Ti - Tf tests is 0.06m. The standard deviation of 0.10 at the initial test and 0.09 at the final test, thus showing a decrease in the values of the standard deviation at the end of the preparation period. The coefficient of variability has the value of 6.54% at the initial test and 5.93% at the final test, the dispersion being small, the group presents a high homogeneity, the averages being representative. The comparative analysis of the means between tests highlights the value of "t" calculated 11.82 higher than the tabular "t" (Fisher) at P <0.001, highlighting highly significant differences between tests (99.9%).

In table no. 3 we highlighted the values obtained by the experimental group in the two tests performed, namely: initial and final testing at the following verification tests: shuttle, torso flexions, push-ups, knee bends, long jump on the spot.

Tabel 3. Initial and final test results of experimental group

Experimental group (GE) initial (TI) and final test results (TF)											
	Initials	**Shuttle (sec.)**		**Trunk flexions (nr. rep.)**		**Push-ups (nr. rep.)**		**Knee bends (nr. rep.)**		**Long jump (m)**	
		TI	TF	TI	TF	TI	TF	TI	TF	TI	TF
1.	A. L.	7.09	6.00	19	30	10	38	12	28	1.55	1.65
2.	B. P.	7.56	6.51	20	30	10	34	13	28	1.70	1.76
3.	B. M.	8.53	7.52	15	28	15	18	16	18	1.10	1.71
4.	V. C.	8.04	7.01	18	20	18	20	12	20	1.50	1.65
5.	C.D.	8.01	7.05	17	22	18	23	15	23	1.54	1.61
6.	P. D.	7.03	6.01	17	30	18	37	12	28	1.65	1.72
7.	D.I.	8.04	7.05	18	29	16	35	12	28	1.69	1.71
8.	H. F.	8.09	7.04	15	27	12	29	11	24	1.36	1.70
9.	M. S.M.	7.97	7.08	18	28	15	27	13	25	1.60	1.77
10.	N. A.	8.06	7.08	16	29	14	28	12	27	1.69	1.80
11.	N.D.A.	8.24	7.56	19	25	11	23	14	23	1.36	1.61
12.	P. I..	7.76	7.05	19	25	15	26	13	25	1.48	1.53

The analysis and statistical interpretation of the differences between the test environments for the experimental group are presented in table no. 4 below: (Epuran, 2005)

Table 4. Statistical-mathematical interpretation of experimental group test results

Exeprimental group		Shuttle 5x7,5m	Trunk lifting no.rep in 30"	Push-ups (maximum no of repetitions)	Knee bends (maximum no of repetitions in 20")	Long jumps (m)
T.I	$\bar{x}$	7,86	22,25	22,08	19,08	1,51
	S	0,44	3,49	4,69	2,10	0,17
	Cv%	5,64	15,70	21,27	11,05	11,65
T.F	$\bar{x}$	6,91	26,91	28,16	24,75	1,58
	S	0,49	3,28	6,64	3,33	0,15
	Cv%	7,21	12,21	23,59	13,46	9,80
D $(\bar{x}(\bar{x}_i - \bar{x}\bar{x}_p)$		-0,95	4,66	6,08	5,66	0,07
t		6,41	5,56	9,60	11,05	5,33
p		<0,001	<0,001	<0,001	<0,001	<0,001

Note: Experimental Group (n = 12), f = n-1 = 11 For f = 11 at the value level of 0.05, the value of t = 2,201; at the value level of 0.01 the value of t = 3.106 and at the value level of 0.001 = 4.437 (Fisher tab.)

In the 5x7.5m shuttle test, the value of the arithmetic mean at the initial test is 7.86sec, and at the final test at 6.91sec, highlighting an improvement of the average by 0.95sec.

The standard deviation is 0.44 at the initial test and 0.49 at the final test, so there is an increase in the values of the standard deviation at the end of the preparation period. The low values of the coefficient of variation (CvTi = 5.64% and Cv Tf = 7.21%) indicate a high homogeneity, the averages being representative. The comparative analysis of the means between tests highlights the value of "t" calculated 6.41 higher than the tabular "t" (Fisher) at P <0.001, highlighting highly significant differences between tests (99.9%).

In the trunk lifting test no. rep. in 30 ,' the value of the arithmetic mean at the initial test is 22.25 repetitions and at the final test it is 26.91. The average progress between the two Ti - Tf tests is 4.66 repetitions.

The standard deviation is 3.49 at the initial test and 3.28 at the final test, thus a decrease of the standard deviation values is observed at the end of the preparation period. The coefficient of variability has the value of 15.70% in the initial testing - the community is relatively homogeneous, the average being sufficiently representative - and 12.21% in the final testing, where the dispersion is small, the group has a high homogeneity, the average being representative. The comparative analysis of the means between tests highlights the value of "t" calculated 5.56 higher than the tabular "t" (Fisher) at $P < 0.001$, highlighting highly significant differences between tests (99.9%).

We find out that in the float test the value of the arithmetic mean at the initial test is 22.08 repetitions, and at the final test it is 28.16 repetitions. The average progress between the two Ti - Tf tests is 6.08 repetitions.

The standard deviation is 4.69 at the initial test and 6.64 at the final test, so there is an increase in the values of the standard deviation at the end of the preparation period. The coefficient of variability has the value of 21.27% at the initial testing and 23.59% at the final testing, the community is relatively homogeneous, the averages being sufficiently representative. The comparative analysis of the means between tests highlights the value of "t" calculated 9.60 higher than the tabular "t" (Fisher) at $P < 0.001$, highlighting highly significant differences between tests (99.9%).

Regarding the knee flexion test, the value of the arithmetic mean at the initial test is 19.08 repetitions and at the final test it is 24.75. The average progress between the two Ti - Tf tests is 5.66 repetitions.

The standard deviation is 2.10 at the initial test and 3.33 at the final test, so there is an increase in the values of the standard deviation at the end of the preparation period. The coefficient of variability has the value of 11.05% at the initial test and 13.46% at

the final test, the dispersion being small, the group presents a high homogeneity, the averages being representative.

The comparative analysis of the means between tests highlights the value of "t" calculated 11.05 higher than the tabular "t" (Fisher) at P <0.001, highlighting highly significant differences between tests (99.9%).

In the long jump test, the value of the arithmetic mean at the initial test is 1.51 m, and at the final test there was an average of 1.58 m. The average progress between the two tests Ti - Tf is 0.07 m.

The standard deviation is 0.17 at the initial test and 0.15 at the final test, so there is a decrease in the standard deviation values at the end of the preparation period. The coefficient of variability has the value of 11.65% at the initial test and 9.80% at the final test, the dispersion being small, the group presents a high homogeneity, the averages being representative. The comparative analysis of the means between tests highlights the value of "t" calculated 5.33 higher than the tabular "t" (Fisher) at p <0.001, highlighting highly significant differences between tests (99.9%).

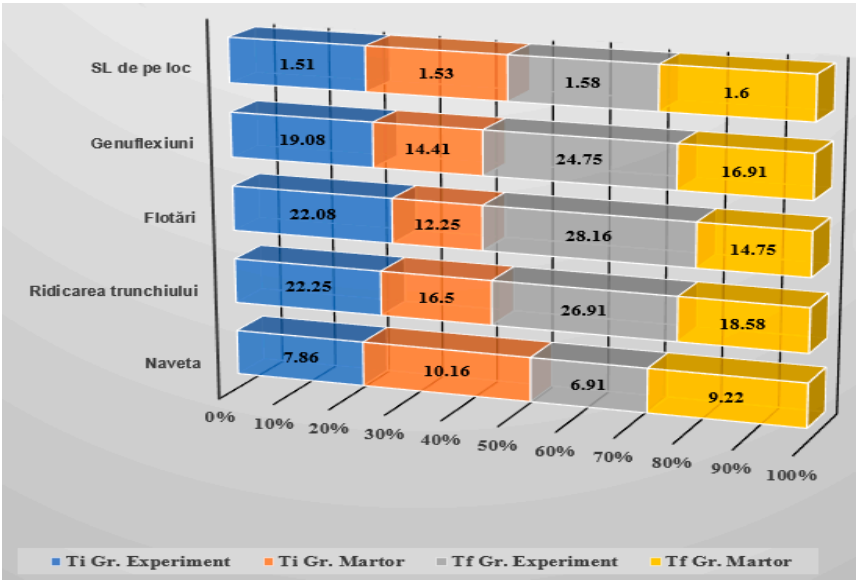

Chart no. 1 Comparative analysis of the average results obtained by the two groups (experimental group and control group)

Interpretations

The statistical interpretation of the research results shows the following:

a. At the beginning of the experiment the two research groups present average values without statistically significant differences ($p > 0.05$) in all test samples

b. At the end of the experiment, the two research groups show statistically significant differences in all test samples as follows:

- $p < 0.05$ in the test samples: long jump from the spot
- $p < 0.001$ in the shuttle test, trunk lifts, push-ups and knee bends. (Gagea, A., 1999)

Conclusions

The experimental hypothesis was confirmed, the results obtained supporting it. In initial test, the research groups presented similar values, the results of comparing the average values highlighting the lack of significant differences ($p > 0.05$) in all test samples. Based on the data collected at the end of the experiment, it was found out that the total physical capacity of the subjects was significantly improved at the thresholds of statistical significance of $p < 0.05$ and $p < 0.001$, demonstrating the superiority of the application of judo sports content compared to classic content, for 1 school year, at the physical education classes of 8-10 year old students from rural areas.

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„AUREL VLAICU" UNIVERSITY OF ARAD
FACULTY OF PHYSICAL EDUCATION AND SPORT
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***Acknowledgments*:** list all those who have contributed to the research; financial and other material support should be disclosed and acknowledged.

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