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TRIATHLETES PERFORMANCE PREDICTION MODEL

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Abstract: The prediction of sport performance is relevant for identifying talent and establishing training strategies. The aim of this paper is to establish a model that has the ability to predict the performance of triathletes. It was used discriminant analysis, which is a multivariate analysis technique. 21 volunteers, 7 professionals and 14 amateurs, all male, was selected. Anthropometric, physiological and training variables, easy to be measured, without the need to use specific laboratories were selected. This study showed that the use of some variables can seek to infer the performance triathletes. The correct prediction rating was above 92 %, which can be considered very good. The expected performance is vital, whether for the detection of talent, whether for the structuring of training, which shows the importance of developing models of this kind.

Keywords: triathlon, performance, training, talent detection.

Introduction. The prediction of sports performance is important to detecting talents and establishment of training strategies. Many studies have utilized discriminant analyses to rank and predict athlete’s performance. Le Meur et al.¹ had utilized this technique to predict overreaching in endurance athletes, while Saavedra et al.² applied this method to predict performance in youth swimmers and Opstoel et al.³, by anthropometric variable data and performance, utilized discriminant analyses to rank young athletes in nine sports modalities.

The purpose of the current study was to establish a model that has the capacity to predict the performance of triathletes using the discriminant analysis (multivariate analysis) which is a linear regression model that aim to find the best equation able to predict what is looking for. In this case, we were looking for a model capable to measure the potential performance based on few predictive variables. We supposed that was possible to establish a simple model accessible to use in clinical practice.

Methods

Variables

The study was approved by the ethics committee (approval no. 48748015.8.0000.5509). The sample size was calculated utilizing the G*Power software and to reach a α=0,05 and β=0.80 the minimum volunteers needed was 16. The inclusion criteria were: (1) practice triathlon for, at least, one year; (2) without previous musculoskeletal injuries; (3) do not use doping substance. The subjects were excluded if: (1) presented body mass index (BMI) equal or higher than 30kg/m², (2) presented neuromuscular disease. They were divided in two groups: group 1 (professionals) and group 2 (amateurs). From January to December 2013, 21 healthy men (7 professionals, 14 amateurs), participated in this study. We chose male to have homogeneous and make the discrimination easier by the performance model. If female subjects had been included it would increase the results variability due to the difference in performance between genders and it would make the ranking more complex as well as subject to higher error rates. All participants signed the consent form.
Table 1 shows the variables measured and data collected by questionnaire in the current study. They were selected based on previous studies.4-9 The maximum oxygen uptake (VO_{2Max}) were indirectly calculated from 3000 meters running at maximum effort, weekly swimming distance training (WSD), weekly cycling distance training (WCD), weekly running distance training (WRD) and age of subjects.

**The technique utilized**

The discriminant analysis is indicated to rank specific element in one of k groups previously assessed. The aim of this technique is to create a function that maximize the variance between groups and, simultaneously, minimize the variance among groups.10 By its aim, it is noticeable the importance of choosing the sample and regressors. The sample must be as homogeneous as possible, except the performance level, which is what we intend to discriminate.

The discriminant function represents the discriminant score Z which is the sum of regressors statistically selected by the model, weighted by their respective weights.

\[ Z = c + p_1v_1 + p_2v_2 + \ldots + p_nv_n \]

‘Z’ is the discriminant score, ‘c’ is a constant of model, ‘p’ is the weight of each variable ‘v’ selected.

Table 1. Variables analyzed in both groups mixed (professionals and amateurs).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Coefficient of variation</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI (kg/m²)</td>
<td>23.51</td>
<td>±1.72</td>
<td>0.07</td>
<td>Gilinky et al. (2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Knechtle et al. (2012)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Knechtle et al. (2010)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>38.71</td>
<td>±8.7</td>
<td>0.22</td>
<td>Gilinky et al. (2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Millet et al. (2002)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Knechtle et al. (2012)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Knechtle et al. (2010)</td>
</tr>
<tr>
<td>HRR (bpm)</td>
<td>50.14</td>
<td>±9.92</td>
<td>0.20</td>
<td>Laursen &amp; Rhodes (2001)</td>
</tr>
<tr>
<td>VO_{2Max} (L/min)</td>
<td>52.73</td>
<td>±8.00</td>
<td>0.15</td>
<td>Hue (2003); Laursen &amp; Rhodes (2001); Millet et al. (2002)</td>
</tr>
<tr>
<td>Years practicing triathlon</td>
<td>11.29</td>
<td>±7.18</td>
<td>0.64</td>
<td>Gilinky et al. (2014)</td>
</tr>
<tr>
<td>WSD (Km)</td>
<td>11.00</td>
<td>7.14</td>
<td>0.65</td>
<td>Gilinky et al. (2014)</td>
</tr>
<tr>
<td>WCD (Km)</td>
<td>221.90</td>
<td>93.95</td>
<td>0.42</td>
<td>Gilinky et al. (2014)</td>
</tr>
</tbody>
</table>

As pointed out by Hair et al.10, the discriminant analysis is relatively robust to some violations required by multivariate analysis model, such as normality, linearity and homoscedasticity. However, due to sample size is relatively small (less than 30, that characterizes small sample size) and after carry out some normality and linearity tests, it was decided to work whit transformed values, aided by natural logarithm (nl), adjusting the data in order to minimize eventual issues coming from the violation of some classical premises of the model.

The statistical analysis was performed using the software SPSS v.21 (IBM SPSS Statistics v.21.0), to normality tests was used Kolmogorov-Smirnov and Shapiro-Wilk. To measure the linearity, we chose the scatterplot and the analysis of homoscedasticity was performed using Levene test.

**Results**

The coefficient of variation has shown higher variability in years of practice and weekly swimming distance, while Body mass index has shown lowest variability. After inserting data and performing basics tests to verify the sample suitability to classical premises of multivariate analysis, the analysis to elaborate the model was started (table 2).
Table 1. Standard deviation (SD) and variables coefficient of variance utilized in model elaboration, as well as studies that have utilized the same indicators. BMI – Body mass index; HRR – Heart rate at rest; \( VO_{2\text{Max}} \) – Maximum oxygen uptake; WSD – Weekly swimming distance training; WCD – Weekly cycling distance training; WRD – Weekly running distance training; Km – Kilometers.

Table 2. Significance level and effect size.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Wilks' Lambda</th>
<th>F</th>
<th>Sig.</th>
<th>Hedges (^g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>nlBMI</td>
<td>.741</td>
<td>6.647</td>
<td>.018</td>
<td>1.19</td>
</tr>
<tr>
<td>nlAge</td>
<td>.838</td>
<td>3.674</td>
<td>.070</td>
<td>0.89</td>
</tr>
<tr>
<td>nlHRR</td>
<td>.472</td>
<td>21.294</td>
<td>.000</td>
<td>2.33</td>
</tr>
<tr>
<td>nlVO(_2\text{Max})</td>
<td>.572</td>
<td>14.243</td>
<td>.001</td>
<td>1.75</td>
</tr>
<tr>
<td>nlYT</td>
<td>.980</td>
<td>.392</td>
<td>.539</td>
<td>0.29</td>
</tr>
<tr>
<td>nlWSD</td>
<td>.324</td>
<td>39.623</td>
<td>.000</td>
<td>2.91</td>
</tr>
<tr>
<td>nlWCD</td>
<td>.694</td>
<td>8.366</td>
<td>.009</td>
<td>1.34</td>
</tr>
<tr>
<td>nlWRD</td>
<td>.650</td>
<td>10.216</td>
<td>.005</td>
<td>1.48</td>
</tr>
</tbody>
</table>

Table 2. nlBMI – Body mass index natural logarithm; nlAge – Age natural logarithm; nlHRR – Heart rate at rest natural logarithm; nlVO\(_2\text{Max}\) – Maximum oxygen uptake natural logarithm; nlYT – Years of triathlon practice natural logarithm; nlWSD – Weekly swimming distance training natural logarithm; nlWCD – Weekly cycling distance training natural logarithm; nlWRD – Weekly running distance training natural logarithm.

Table 3 shows the ranking coefficients based on variables selected by discriminant analysis model to both professional and amateur groups.

Table 3. Ranking coefficient (Fisher's linear discriminant functions)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group</th>
<th>Profissionals</th>
<th>Amateurs</th>
</tr>
</thead>
<tbody>
<tr>
<td>nlWSD</td>
<td>29,253</td>
<td>20,573</td>
<td></td>
</tr>
<tr>
<td>nlWCD</td>
<td>46,751</td>
<td>41,400</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-176,098</td>
<td>-125,819</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. nlWSD – Weekly swimming distance training natural logarithm; nlWCD – Weekly cycling distance training natural logarithm

Table 4 shows the centroid (midpoint) of each group and table 5 shows the results regarding to original model and cross-validation model to both groups. Cross-validation is done only for the analysis cases. In cross-validation, each case is classified by functions derived from all different cases of this case.

Table 4. Functions in centroid of each group.

<table>
<thead>
<tr>
<th>Group</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2,338</td>
</tr>
<tr>
<td>2</td>
<td>-1,169</td>
</tr>
</tbody>
</table>

Table 4. Group 1: Professionals; Group 2: Amateurs.

Table 5. Original model and cross-validation model

<table>
<thead>
<tr>
<th>Group</th>
<th>Predicted group association</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Profissionals</td>
<td>Amateurs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Discussion

The aim of the present study was to establish a model that have the capacity to predict the performance of triathletes using the discriminant analysis (multivariate analysis) based on few predictive variables. Considering the relevance of each variable to explain the phenomenon studied, it could be verified that weekly swimming distance training, heart rate at rest and VO$_{2\text{max}}$ were the most relevant based on significance level.

Our hypothesis was confirmed, been able to establish a simple prediction model accessible to be used in clinical setting. Measuring the effect size, we could notice that weekly swimming index appears to have a huge capacity of discrimination, as the heart rate at rest and VO$_{2\text{max}}$. This result was similar if we analyze measuring the $p$. value, but measuring the effect size it was possible to verify that the weekly running and cycling distance are relevant variables also.

The inclusion of effect size analysis is fundamental to better practical phenomenon assessment that intend to study$^{11}$. In the present study, we chose to use Hedges’ $g$ instead Cohen’s $d$ due to small sample size, as well as by the size difference between groups$^{12}$.

In the discriminant analysis, it is possible to choose for enter method, which all the variables that meet the minimal prerequisite of the model are forced to be in the final discriminant function, or stepwise method. In the stepwise method, the variables only stay in the model if they contribute to enhance the model’s predictive capacity.

Therefore, we could notice that the most relevant variables to construct the discriminant model were the weekly swimming distance and weekly cycling distance. Such information seems to be very relevant because they are not anthropometric neither physiologic variables, appearing that the performance in triathlon depends on training strategies.

Obviously when intend to distinguish athlete’s performance to classify them in two groups (professionals and amateurs), many physiologic and anthropometric variables, besides training, looks important. The model tells us that when analyzed together, considering correlation and interaction among variables, it is possible to accurately infer the triathlete’s performance by measuring the weekly swimming and cycling training.

It was noticeable the existence of two discriminant functions, being one to professionals and other to amateurs. Both are linear functions with one constant and two explanatory variables (weekly swimming distance natural logarithm and weekly cycling distance natural logarithm). Based on two equations and considering the values of centroid it was possible to rank the athletes in one of those groups.

By making the weighted average of each group centroids through sample size of each group, in the present study it would be zero and the values above zero would be closer to the amateur performance and values below zero would be closer to professional performance. These data from centroid of each group made easier the calculation of $z$ cut score regarding performance.

Due to small sample size, we chose to work with original and cross-validation. The cross-validation can make $n$ models, being $n$ the sample size used, and it is important to test the predictive capacity of the model$^{13}$. The accuracy tends to be lower than original model, but it is a situation close to reality and is extremely
important when working with small sample size. Therefore, each athlete is tested in a built model without him in data base. Generally, the degree of accuracy in original model is higher than cross-validation model, because in the original model the athletes that were in the sample to build the model were tested and ranked with the same model.

The predictive capacity of the model, based on data can be considered as really good. It has occurred only one small percentage of bad rank, and it was specifically in an amateur athlete that the results are close to professionals. The present research showed that using some anthropometric, physiologic and training variables it is possible to infer performance in triathletes. The prediction performance in vital, whether to talent detection or for training program.

The limitation of the current study was the inability to create a model that translate exactly the reality, as the model is a simplification of reality with aim to facilitate the analysis and decision make. The contribution of our research was show a possibility to be explored, with building models to predict performance and ranking athletes based on multivariate analysis.

Conclusion

We concluded that is possible to predict the performance in triathletes by establishing a simple prediction model accessible to be used in clinical setting. To date, there is no study establishing models utilizing simple variables. We suggest new studies with other complex variables to, eventually, get more accurate results.

Conflict of interest

None.

References


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**APPENDIX**

**Triathlete assessment questionnaire**

**General Data**

Name: _________________________________________________________
E-mail: ________________________________________________________
Country: ________________________________________________________
Gender: ( ) Male ( ) Female
Age: __________________________
Height (m): __________________________
Peso (kg): __________________________
Beats per minute (at rest): __________________________
Years practicing triathlon: __________________________
Average amount of competitions per year: __________________________
Number of short triathlon: __________________________
Number of Olympic triathlon: __________________________
Number of 70.3 triathlon: __________________________
Number of 140.6 triathlon: __________________________
Has coach? ( ) Yes ( ) No
Has a nutritionist? ( ) Yes ( ) No
Has sports psychologist ( ) Yes ( ) no
Has (specialist in) sports biomechanics ( ) Yes ( ) no

**Complementary Activities**

Do you do resistance training? ( ) Yes ( ) No
Do you do stretching training? ( ) Yes ( ) No
Do you do yoga? ( ) Yes ( ) No
Do you do pilates? ( ) Yes ( ) No
Do you do plyometric training? ( ) Yes ( ) No
Do you do crossfit training? ( ) Yes ( ) No
Do you do high intensity interval training (HIIT)? ( ) Yes ( ) No

**Method for measuring training Intensity**

( ) Heart Rate (BPM)
( ) Perceived exertion
( ) Pace
( ) Power meter
( ) Other(s) ____________________________

Supplementation

<table>
<thead>
<tr>
<th>Supplements</th>
<th>Before</th>
<th>During</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrate gel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbohydrate solution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caffeine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein bar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whey Protein</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BCAA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creatine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recovery (solution, gel, bar)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamins/Minerals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dopamine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pre-Psychology Test

( ) No
( ) Positive Thinking
( ) Relaxation

Body composition (bioelectrical impedance test result)

Body mass index (BMI) (do not fill)
% Total fat: __________
% Total lean body mass: __________
Weight of lean mass: __________
Body hydration: __________
Muscle Hydration: __________

Time – Maximum Effort

Swimming
700 metres: __________
Cycling:
5 Km: __________
Running:
3 km: __________

Average distance by modality (weekly)

Swimming: __________
Cycling: __________
Running: __________

Distance by intensity level

<table>
<thead>
<tr>
<th>INTENSITY ZONE</th>
<th>SWIMMING</th>
<th>CYCLING</th>
<th>RACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z1 (extremely light)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z2 (light)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z3 (moderated)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z4 (slightly hard)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z5 (strong)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z6 (very strong)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Training hours (a week) by intensity level

<table>
<thead>
<tr>
<th>INTENSITY ZONE</th>
<th>SWIMMING</th>
<th>CYCLING</th>
<th>RACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Results by competition (Best times)**

<table>
<thead>
<tr>
<th>Competition</th>
<th>Swimming</th>
<th>Cycling</th>
<th>Race</th>
<th>Transitions</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Olympian</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>140.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Do you have sports biomechanics (    ) Yes (    ) No

Do you do specific ergospirometric assessment? (    ) Yes (    ) No

How many times a year? __________

Performs lactatemia test? (    ) Yes (    ) No

Is there a periodization of training? (    ) Yes (    ) No

Which model? __________

Performs fitbike? (    ) Yes (    ) No

During the competition what limits your performance?:

**Short-triathlon**

Swimming:
- Muscle fatigue (    )
- Respiratory fatigue (    )
- Mental fatigue (    )

Cycling:
- Muscle fatigue (    )
- Respiratory fatigue (    )
- Mental fatigue (    )

Running:
- Muscle fatigue (    )
- Respiratory fatigue (    )
- Mental fatigue (    )

**Olympic triathlon**

Swimming:
- Muscle fatigue (    )
- Respiratory fatigue (    )
- Mental fatigue (    )

Cycling:
- Muscle fatigue (    )
- Respiratory fatigue (    )
- Mental fatigue (    )

Running:
- Muscle fatigue (    )
- Respiratory fatigue (    )
- Mental fatigue (    )

**70.3 triathlon**

Swimming:
- Muscle fatigue (    )
- Respiratory fatigue (    )
- Mental fatigue (    )

Cycling:
- Muscle fatigue (    )
- Respiratory fatigue (    )
- Mental fatigue (    )

Running:
- Muscle fatigue (    )
- Respiratory fatigue (    )
- Mental fatigue (    )

**140.6 triathlon**

Swimming:
- Muscle fatigue (    )
- Respiratory fatigue (    )
- Mental fatigue (    )

Cycling:
- Muscle fatigue (    )
- Respiratory fatigue (    )
- Mental fatigue (    )

Running:
- Muscle fatigue (    )
- Respiratory fatigue (    )
- Mental fatigue (    )
THE CORRELATION BETWEEN TRAINING WITH WEIGHTS AND PLYOMETRIC TRAINING, AND THEIR IMPACT ON THE DEVELOPMENT OF CERTAIN PHYSICAL QUALITIES IN SHOOTING IN EXTENSION FOR HANDBALL PLAYERS

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Benzidane Houcine - Institute of Physical Education and Sports, University of Mostaganem, Algeria
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Annotation: Strength training is the basis for the physical preparation of players of different age groups. Many researchers highlight the need for weight training in the content of training programs. The aim of this research is to understand the correlation between weight training and plyometric training and their impact on the development of certain physical qualities and the extension shooting for handball players (13-15 years) through a proposed training program for identification of the following: Effect of training with weights and plyometric training and their impact on the development of certain physical qualities and shooting in extension for Handball players.

Materials. The research sample consisted of 64 cadet players, practicing in four different teams in the Hand Ball regional championship, in the west, divided into four groups of 16 players. The researchers carried out an experimental method using four groups; three experimental groups and one fixed. The first group uses training with weights, the second group uses plyometric training, the third group uses the combined (with weights and plyometric) and the fourth uses usual traditional training. The experimental work took place for three months Research methods. Scientific-methodical and special literature analysis, testing, pedagogical experiment, methods of mathematical statistics. Results. The results showed progress in the experimental groups, in particular the mixed application group (weightlifting and plyometric). The effectiveness of the development of certain physical qualities and the extended shooting of handball players (13-15 years-male) showed it vividly.

Keywords: modern training, the planning of youth training, plyometric training, combined training.

INTRODUCTION

The planning of youth training in various sporting activities has become a necessary means for advancing the training of players. Considerable scientific progress in the methods of training and preparation of players based on scientific facts provided by other sciences as biological, psychological, social or technological fields which led to a better implementation of the training process.

The subject of physical character has always interested many scientists and researchers from various disciplines, who have agreed on its paramount importance; because they constitute a conviction for the athlete, to reach the highest levels of the sport.

In order to improve the physical qualities of the game, coaches must have sufficient knowledge about the standards of modern training and its processes; This for the good on the ground through the realization of training programs that take into account the requirements of efficiency and follow-up the most significant events, mainly on the physical level, using the most appropriate and most effective training methods.

Handball is among the collective sports that have existed since time immemorial, and it was not long before the occupation of its place among the other games, because of its speed and enthusiasm (8)

Strength training is the basis for the physical preparation of players of different age
groups. The performance depends on the movement of the body, and by more effective contractions and thus increase the speed and jump in extension for the performance of a player. Many researchers highlight the need for weight training in the content of training programs (15).

Plyometric is one of the recommended training methods for improving power in detents and in running speed. It leads to improvements in performance particularly in activities requiring explosive muscle contractions (11). The Plyometric training techniques are used by athletes in all types of sports to increase strength and explosiveness (4). Plyometric consists of a rapid stretching of a muscle (eccentric action) immediately followed by a concentric or shortening action of the same muscle and connective tissue. The stored elastic energy within the muscle is used to produce more force than can be provided by a concentric action alone (12).

In dealing with the latest studies, researchers have deduced that plyometric training, for the development of physical qualities as well as training with weights. Previous studies have recognized the need to use these methods for muscle development, especially the lower limbs and extension. This is consistent with the previous study of Hamdi sofiane (2011), Matavulj and all (2001), and the study of Vladan milié (2008) (20,13, 22).

Perez-Gomez (2008) evaluated the effect of combined weight training and plyometric exercises on some aspects of physical fitness such as vertical jumping and anaerobic capacity in soccer players in a six-week period and stated that after the training period all players showed significant improvement in vertical jump and anaerobic capacity tests (16).

The problem of the study through the field monitoring, at the level of the teams of the national handball championship, and the lack of diversification and combination of modern methods of training, especially in the development of particular physical qualities. Despite the confinement of weight training programs in some teams, and plyometric training to others, we noted the correlation between these different styles, in the development of certain physical characteristics and shooting in extension of Handball players.

The aim of this research is to understand the correlation between weight training and plyometric training and their impact on the development of certain physical qualities and the extension shooting for handball players through a proposed training program for identification of the following:

1. Effect of training with weights and plyometric training and their impact on the development of certain physical qualities and shooting in extension for Handball players.

2. Main differences between the effect of training with weight and both (weight training and plyometric training) on certain physical characteristics and the extension shooting for handball players.

3. Reciprocal interactions of the effect of weight training and combined training, in the development of certain physical characteristics, and extended shooting for Handball players.

**Research Procedures:**

**Research methodology:** The researchers carried out an experimental method using four groups; three experimental groups and one fixed.

**Participants**

The research sample consisted of 64 cadet players, practicing in four different teams in the Hand Ball regional championship, in the west, divided into four groups of 16 players.

The first group uses training with weights, the second group uses plyometric training, the third group uses the combined (with weights and plyometric) and the fourth uses usual traditional training.

**Physical tests**

1. Course 30 m
2. Shuttle Race
3. Vertical jumping
4. Launch the Ball medicine (3 kg)
5. Shooting at goal

**Statistical Analysis**

Data is presented as mean ± standard deviation. Changes in performance between training
groups were compared using an independent t-test using Microsoft Excel. Within-group analysis was also done using a dependent t-test. A value of p < 0.05 was used to determine the significance of the results within the experiment. And test of F with value of p < 0.05.

The basic experience

RESULTS

Table (01): equality between the fourth groups in research variables

<table>
<thead>
<tr>
<th>Tests</th>
<th>Variances</th>
<th>Total deviations</th>
<th>Degree of freedom</th>
<th>Average of squares</th>
<th>F calculate</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course 30 meter</td>
<td>Between Groups</td>
<td>0.22</td>
<td>03</td>
<td>0.09</td>
<td>0.85</td>
<td>Not Significant</td>
</tr>
<tr>
<td></td>
<td>In the groups</td>
<td>12.31</td>
<td>60</td>
<td>0.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shuttle course</td>
<td>Between Groups</td>
<td>0.08</td>
<td>03</td>
<td>0.01</td>
<td>0.36</td>
<td>Not Significant</td>
</tr>
<tr>
<td></td>
<td>In the groups</td>
<td>5.04</td>
<td>60</td>
<td>0.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>launch medicine</td>
<td>Between Groups</td>
<td>0.79</td>
<td>03</td>
<td>0.29</td>
<td>0.64</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Ball 3 kg</td>
<td>In the groups</td>
<td>25.44</td>
<td>60</td>
<td>0.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertical Jump</td>
<td>Between Groups</td>
<td>0.39</td>
<td>03</td>
<td>0.05</td>
<td>1.66</td>
<td>Not Significant</td>
</tr>
<tr>
<td></td>
<td>In the groups</td>
<td>3.59</td>
<td>60</td>
<td>0.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shooting at goal</td>
<td>Between Groups</td>
<td>0.58</td>
<td>03</td>
<td>0.18</td>
<td>0.45</td>
<td>Not Significant</td>
</tr>
<tr>
<td></td>
<td>In the groups</td>
<td>25.69</td>
<td>60</td>
<td>2.16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table F = 2.76, Significance Level 0.05

The value of F Tabular trend display at the level of the no significance of the 0.05 = 2.76. It is clear through the results of table (01) differences statistically function at the level of the significance of 0.05 and the degree of freedom (60-3), F Tabular trend display 2.76 the smallest F calculated each tests this requires the use of the method of Tioki breach of finding more accurately the moral teams.

Table (02): the differences between the the averages of the tests in each group

<table>
<thead>
<tr>
<th>Groups</th>
<th>Tests</th>
<th>Measurements before</th>
<th>Measurements after</th>
<th>T calculate</th>
<th>% Of progressio n</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>X</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weights training group</td>
<td>Course 30 meter</td>
<td>5.80</td>
<td>0.56</td>
<td>5.50</td>
<td>0.53</td>
</tr>
<tr>
<td></td>
<td>Shuttle course</td>
<td>22.44</td>
<td>0.78</td>
<td>19.77</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>launch medicine</td>
<td>8.12</td>
<td>1.26</td>
<td>11.18</td>
<td>1.60</td>
</tr>
<tr>
<td></td>
<td>Ball 3 kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vertical Jump</td>
<td>3.04</td>
<td>0.33</td>
<td>3.67</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>Shooting at goal</td>
<td>0.03</td>
<td>1.52</td>
<td>07</td>
<td>1.57</td>
</tr>
<tr>
<td>Plyometric training Group</td>
<td>Course 30 meter</td>
<td>5.80</td>
<td>0.11</td>
<td>5.54</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td>Shuttle course</td>
<td>22.32</td>
<td>0.06</td>
<td>19.15</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>launch medicine</td>
<td>08.06</td>
<td>1.28</td>
<td>12.18</td>
<td>1.42</td>
</tr>
<tr>
<td></td>
<td>Ball 3 kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vertical Jump</td>
<td>3.12</td>
<td>0.22</td>
<td>3.92</td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td>Shooting at goal</td>
<td>3</td>
<td>1.49</td>
<td>7</td>
<td>1.58</td>
</tr>
<tr>
<td>Combined training group</td>
<td>Course 30 meter</td>
<td>5.82</td>
<td>0.12</td>
<td>5.52</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td>Shuttle course</td>
<td>22.35</td>
<td>0.21</td>
<td>19.01</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>launch medicine</td>
<td>8.0</td>
<td>1.25</td>
<td>12.31</td>
<td>1.29</td>
</tr>
<tr>
<td></td>
<td>Ball 3 kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vertical Jump</td>
<td>3.14</td>
<td>0.24</td>
<td>4.02</td>
<td>0.37</td>
</tr>
</tbody>
</table>
Checking table (02), it’s obvious that there exist significant differences between calculated averages for both pre-test and post-test sample measurements on whom set of training with weights were applied aiming to develop the distinctive strength speed as the players of the handball, where calculated T was estimated to between 6.30 as the smallest value and 21.63 as the largest value is greater than the value of T tabular which reached 2.13 at degree freedom 15, level of indication 0.05 which means that there exist a statistically significant difference in favor of the sample post measurement.

The existence of significant differences between calculated averages for pre and post measurement of the sample on which the set of mixed training (weight and plyometric) were applied aiming to develop the strength characterized by speed for high parties muscles where calculated T was estimated to between 7.72 and 19.45 which is higher to tabulated T that reached 2.13 in the freedom degree of 15 and significant level of 0.05. Which means that there were significant differences in favor of post test concerning the research sample.

The existence of significant differences between calculated averages for both pre-test and post-test sample measurements on whom set of traditional training were applied aiming to develop the distinctive strength speed as the players of the handball, where calculated T was estimated to between 04.55 as the smallest value and 14.56 as the largest value is greater than the value of T tabular which reached 2.13 at degree freedom 15, level of indication 0.05 which means that there exist a statistically significant difference in favor of post test concerning the research sample.

The existence of significant differences between calculated averages of pre and post measurement of the sample on which the set of mixed training (weight and plyometric) were applied aiming to develop the distinctive strength speed as the players of the handball, where calculated T was estimated to between 7.67 and 23.59 which is higher to tabulated T that reached 2.13 in the freedom degree of 15 and significant level of 0.05. Which means that there were significant differences in favor of post test concerning the research sample.

Table (03): analyzes deference between the four groups in search tests

<table>
<thead>
<tr>
<th>Tests</th>
<th>Source of Deviation</th>
<th>Total Deviations</th>
<th>Degree of Freedom</th>
<th>Square Mean</th>
<th>F Calculate</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course 30 meter</td>
<td>Between groups</td>
<td>5.15</td>
<td>03</td>
<td>2.08</td>
<td>41.8</td>
<td>Significance</td>
</tr>
<tr>
<td></td>
<td>In the groups</td>
<td>3.43</td>
<td>60</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shuttle course</td>
<td>Between groups</td>
<td>9.47</td>
<td>03</td>
<td>3.06</td>
<td>35.25</td>
<td>Significance</td>
</tr>
<tr>
<td></td>
<td>In the groups</td>
<td>4.23</td>
<td>60</td>
<td>0.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>launch medicine</td>
<td>Between groups</td>
<td>52.9</td>
<td>03</td>
<td>15.46</td>
<td>6.74</td>
<td>Significance</td>
</tr>
<tr>
<td>Ball 3 kg</td>
<td>In the groups</td>
<td>95.68</td>
<td>60</td>
<td>2.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertical Jump</td>
<td>Between groups</td>
<td>4.39</td>
<td>03</td>
<td>1.46</td>
<td>8.58</td>
<td>Significance</td>
</tr>
<tr>
<td></td>
<td>In the groups</td>
<td>10.52</td>
<td>60</td>
<td>0.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shooting at goal</td>
<td>Between groups</td>
<td>351.68</td>
<td>03</td>
<td>117.22</td>
<td>47.59</td>
<td>Significance</td>
</tr>
<tr>
<td></td>
<td>In the groups</td>
<td>145.42</td>
<td>60</td>
<td>2.53</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F of table = 2.76, level of significance 0.05

The value of F Tabular trend display at the level of the significance of the 0.05 = 2.76. It is clear through the results of table (03) differences statistically function at the level of the significance of 0.05 and the degree of freedom (60-3), F Tabular trend display 2.76 The smallest F calculated each tests this
requires the use of the method of Tioki breach of finding more accurately the moral teams.

**DISCUSSION**

We note, through Table (02), significant differences between the preliminary and the subsequent test of the experimental samples. Where there is a statistically significant difference in the control group. The researcher reports it to the effect of training, but this improvement was not consistent. As can be seen from the previous and subsequent results on the 30 m test samples, the weight group outweighed that of the plyometric test.

The researcher showed a correlation between high and vertical jumps with the same qualities as Hand Ball. This was confirmed by Sobhi Hassanine (1997), supported by Talha Houssam Eddine and al. Weight training is used to drill the muscles, and that of speed can progress through weight. were Radcliffe (1994) adds, offers ideas on how resistance training and plyometric should be used together in training to develop all the components of power. He gives an example of a resistance training session in which the athletes are not only lifting weights, but are also doing plyometric work such as squat jumps and medicine ball drills in between resistance training exercises (17). And Bielik, Lundin, Chu, and Rogers (1986) recommend that plyometric be used before resistance training. Gambetta believes that resistance training and plyometric should not be combined. He states that mixed training gives mixed results.

We note through the table (03) concerning the test of the race had results superior to those of the control group, that of plyometric more than that of the weight. The practice of the plyometric has generated interesting results, improving the strength of the feet.

Essayed Abdelmaqssoud (1997) quotes that the plyometric training accentuates the speed of the movements, with an average of explosion during the movement. This is consistent with the study by Hamdi sofiane (2011), Vladen milić (2008) demonstrating that the plyometric training program has a positive effect on the development of physical qualities of the sample the research.(20, 22).

The effectiveness of a plyometric program depends on sport-specific movements and the appropriate intensity and frequency of the plyometric program. Sport-specific movements enhance neuromuscular development, which allows the athlete to perform a specific movement with a greater amount of available muscle mass. The increased use of muscle mass allows for greater force generation during the movement (5).

Through the previous results demonstrated in the table, it was noted that the experimental groups have achieved considerable development. The plyometric training group was better than the training with weights group. This is explained by the consistency during the plyometric, in the jump exercises in height, from where the muscles are moving, and helps to more explosion. This is consistent with the vision of Christostos (2006), Matavulj and others (2001). They find that the number of the muscular fibers increases hence the accentuation of force (12, 13)

Through the preliminary and posterior results of the sample to the medical ball thrust test, it appears that the group at the plyometric training was better than that of the training with weights.

The researcher explains that the plyometric training accentuates the performance of the movements, from where the muscles are forged considerably, and these muscles are consolidated, without generating an increase of the mass of the muscle, and to the weight of the body. This is what Abderrahmane Ezzahar quotes. The results obtained correspond to those of the study by Yasser Debbour (1996). And this is consistent with the study of Labuber Christon Anne (1993), Kotzamanidis, C (2006), Hamdi Sofiane (2011)and Benzidane houcine & al (2015) and Bensikadour & al (2005).(10, 9,20 , 3, 2).

Through the results obtained in the combined training group, it was noted that this was the best. The importance of this combination is noted, in order to achieve good physical development results for Handball
players, also confirms Hooks Gene (1996) the distinctive strength speed as necessary if we are to reach the highest levels of excellence and sporting success, which requires this type of power production strength as well as speed in the jump movements and jump and bounce and so requires athletic specialist activity(5, 18).

The researcher finds that extension is necessary for the game of Handball. This is confirmed by the results obtained during the tests of the shooting: Extension and realization.

**Deductions:**

1. Weight training, plyometric training, and combined training are of great importance to the development of certain physical qualities and to the improvement of extension shooting for Handball players.
2. Plyometric training is useful for the development of foot muscles.
3. Plyometric training is useful for the development of the horizontal jump, and better than the weight training.
4. There is similarity between the research samples and some differences in the rate of performance.
5. Combined training has more effects.
6. There is a complementary correlative relationship between weight and plyometric training.

**Acknowledgments**

Our thanks and appreciation to the Presidents and trainers and Players in clubs in of the championship regional of Handball in Algeria to participate in the completion of research.

**References**


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WSB BOXERS’ COMPETITIVE ACTIVITY STUDY

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An Annotation. Since new rules in boxing were adopted highly-qualified sportsmen changes considerably the ways of conducting sports combat organization and definite objectives solution in possible situations during combat. In sports and competitive activity competitions form the main and initial component and trainings form subordinate component, which is the means of training for competitions. Material. Competitive activity study of highly-qualified boxers from the World Series Boxing (WSB) in order to determine the level of training, taking into consideration rules changes, for timely correction of educational-training process. Research methods: scientific literature analysis and summarizing, pedagogical observation, the indices of boxers' technical-tactical actions during competitive activity registration by means of combats video analysis, methods of mathematical data handling. Results. 7 tables are created, which fully reflect competitive activity of boxers and their technical-tactical mastery. Comparative analysis of competitive activity helps to reveal advantages and disadvantages of sportsmen and also helps to correct timely the plan of training boxers to take part in competitions, taking into account potential opponents. Conclusion. Trainers are recommended to pay attention to technical-tactical actions organization, the tightness of conducting a combat, psychological mood and readiness, to watch the dynamics of a sportsman combat results at important competitions. Keywords: comparative analysis, accuracy of blows, technical-tactical mastery, purposefulness, training sportsmen.
in combat sports competitive activity indices are often understood as competitive activity effectiveness: activity and diversity of the used techniques and technical-tactical actions. In our research work the following items were reflected as competitive activity indices: general number of blows during the round, combat (each blow separately and the place of hit), number of attacks, number of counterattacks during the round, combat, number of series of attacks during the round, combat, number of defensive actions during the round, combat, general number of tactical actions during the round, combat, number of rules violations during the round and combat, number of repetitive attacks (combinations). All blows were divided into fulfilled and achieving the aim. The main activity parameter was the arithmetic average of the fulfilled blows general number.

Table 1 – Number of the fulfilled blows during a round and combat

<table>
<thead>
<tr>
<th>Round</th>
<th>General number of blows</th>
<th>Achieved the aim</th>
<th>CBE</th>
<th>Didn’t achieve the aim</th>
<th>Blows to the head</th>
<th>Achieved the aim</th>
<th>CBE to the body</th>
<th>Didn’t achieve the aim</th>
<th>Blows to the body</th>
<th>Achieved the aim</th>
<th>CBE to the body</th>
<th>Didn’t achieve the aim</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0.115</td>
<td>77</td>
<td>78</td>
<td>6</td>
<td>0.77</td>
<td>72</td>
<td>9</td>
<td>5</td>
<td>0.555</td>
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<tr>
<td>2</td>
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<td>0.173</td>
<td>81</td>
<td>90</td>
<td>14</td>
<td>0.155</td>
<td>76</td>
<td>8</td>
<td>3</td>
<td>0.375</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>96</td>
<td>16</td>
<td>0.167</td>
<td>80</td>
<td>87</td>
<td>15</td>
<td>0.172</td>
<td>72</td>
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<tr>
<td>Total</td>
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<td>70</td>
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<td>360</td>
<td>388</td>
<td>55</td>
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<td>333</td>
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</table>

Boxer A, combat 2

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<tr>
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Boxer B

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<td>Total</td>
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<td>76</td>
<td>8</td>
<td>0.105</td>
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</table>

Boxer C, combat 1
Boxer B has a low index of tempo of combat. Boxer C is technically and tactically well-trained, fulfills the blows achieving different aims and places, but tightness of combat decreases to the end of the combat. If we consider the rounds, the number of blows during the first two rounds is ~62 blows during the round, during last three rounds the number of the fulfilled blows decreases till ~49 blows during the round and it shows very low tempo of combat. That is why boxer C should work over holding the tempo of combat in order not to decrease the tightness of combat to the end of the combat, but, on the contrary, increase it.

4. Boxer D: during the whole combat accuracy is 19,24% and it is slightly below the average index, even taking into consideration the fact, that not all blows are fulfilled in order to achieve the aim definitely. During the combat a boxer makes false, light, reconnoitering, provoking, preparatory and controlling the distance blows in order to reveal the defense of the opponent, prepare, conceal attack, come to attacking distance and reject an opponent’s attack. If we consider the rounds, the number of blows during the first three rounds is ~85 blows during the round, during last three rounds the number of the fulfilled blows decreases till ~72 blows during the round and it shows the decrease of combat tempo. Functionally well-trained boxer during the whole combat doesn’t let the tempo decrease from round to round or increases the tempo with each following round.

2. Boxer B: during the whole combat accuracy is 11,83% and it is below the average index, even taking into consideration the fact, that not all blows are fulfilled in order to achieve the aim definitely. If we consider the rounds, the number of blows is comparatively not big ~74 blows during the round and it shows a low tempo of combat. Boxer C has a low index of blows, which achieved the aim.

3. Boxer C: during the whole combat accuracy is 16,75% and it is slightly below the average index, even taking into consideration the fact, that not all blows are fulfilled in order to achieve the aim definitely. A boxer is technically and tactically well-trained, fulfills the blows achieving different aims and places, but tightness of combat decreases to the end of the combat. If we consider the rounds, the number of blows during the first two rounds is ~62 blows during the round, during last three rounds the number of the fulfilled blows decreases till ~49 blows during the round and it shows very low tempo of combat. That is why boxer C should work over holding the tempo of combat in order not to decrease the tightness of combat to the end of the combat, but, on the contrary, increase it.

Table 1 shows the following:
1. Boxer A: during the whole combat accuracy is 19,24% and it is slightly below the average index, even taking into consideration the fact, that not all blows are fulfilled in order to achieve the aim definitely. During the combat a boxer makes false, light, reconnoitering, provoking, preparatory and controlling the distance blows in order to reveal the defense of the opponent, prepare, conceal attack, come to attacking distance and reject an opponent’s attack. If we consider the rounds, the number of blows during the first three rounds is ~85 blows during the round, during last three rounds the number of the fulfilled blows decreases till ~72 blows during the round and it shows the decrease of combat tempo. Functionally well-trained boxer during the whole combat doesn’t let the tempo decrease from round to round or increases the tempo with each following round.

2. Boxer B: during the whole combat accuracy is 11,83% and it is below the average index, even taking into consideration the fact, that not all blows are fulfilled in order to achieve the aim definitely. If we consider the rounds, the number of blows is comparatively not big ~74 blows during the round and it shows a low tempo of combat. Boxer B has a low index of blows, which achieved the aim.

3. Boxer C: during the whole combat accuracy is 16,75% and it is slightly below the average index, even taking into consideration the fact, that not all blows are fulfilled in order to achieve the aim definitely. A boxer is technically and tactically well-trained, fulfills the blows achieving different aims and places, but tightness of combat decreases to the end of the combat. If we consider the rounds, the number of blows during the first two rounds is ~62 blows during the round, during last three rounds the number of the fulfilled blows decreases till ~49 blows during the round and it shows very low tempo of combat. That is why boxer C should work over holding the tempo of combat in order not to decrease the tightness of combat to the end of the combat, but, on the contrary, increase it.

4. Boxer D: during the whole combat accuracy is 19,24% and it is slightly below the average index. At the same time, he fulfills accurate and effective blows to the head, to the end of the rounds “boosting” the tempo. It should be noted that the opponent stood out the tightness of combat. It can be the sign of well-trained
opponent or it means that Boxer D fulfilled not so many blows to the body in order to decrease the opponent’s endurance level.

**Conclusion:**
1. Competitive activity analysis helps to reveal advantages and disadvantages of sportsmen and also helps to correct timely the plan of training boxers to take part in competitions, taking into account potential opponents.
2. Dynamics analysis of competitive activity indices, taking into account the changes of rules and differences reduction in training boxers can be used as the means of boxing development tendency determination for a timely introduction of the corresponding corrections in order to increase the training level of highly-qualified boxers.
3. As a result of comparative analysis of WSB boxers’ competitive activity, we came to the conclusion that all WSB sportsmen are well-trained enough physically, functionally and technically-tactically. That is why all WSB sportsmen have almost the same level of training and mastery, any boxer can become a winner. There is always a high level of competition. Each boxer should work hard over broadening the arsenal of his technical-tactical actions, as one and the same arsenal of combinations doesn’t do for all opponents. It is very important to define the aim and the objectives of the future competitions, taking into account potential opponents.

**Practical recommendations**
1. It is recommended to study boxers’ competitive activity regularly at every important competition in order to fulfill timely correction of the training process.
2. To fulfill comparative analysis of technical-tactical indices of competitive activity between highly-qualified boxers from different regions and countries.
3. To compare the average indices of different ages (every year) in order to estimate the dynamics, effectiveness and the set aims of competitive activity achievement.
4. It is necessary to analyze the combats of the future opponents, the members of Russia national team and the winners of the Europe,
World championships and the Olympic Games last championships.
5. Combats video watching and analysis between professional boxers in different weight categories in the best years of their career in order to improve own technical-tactical mastery.

As the result of this research work, trainers are recommended to pay attention to technical-tactical actions organization, the tightness of conducting a combat, psychological mood and readiness, to watch the dynamics of a sportsman combat results at important competitions.

References
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FACTORS CAUSING TO EFFICIENCY INCREASE IN FITNESS AEROBICS TRAINING

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Abstract. Fitness-aerobics refers to sports gaining popularity among children, adolescents and youth. A variety of motor dance, gymnastic and acrobatic exercises performed in the group to the sound of music meet the requirements in physical activities, self-realization, self-knowledge, self-development and self-improvement. Material. In the literature, the authors consider various ways of solving efficiency increasing problem of athletic training in fitness aerobics finding additional resources, ways of organizing the training sessions; the development of motional activity leading qualitative sides. Factors influencing the training process effectiveness increase are discussed, which allow to better understand the fitness aerobics specifics, its essence; more targeted control of the motivational sphere, to stimulate the need for systematic fitness aerobics.

Research methods: analysis and systematization of scientific and scientific-methodic literature, generalization of practitioners advanced experience in the field of fitness aerobics, pedagogical experiment, observation, testing, statistical processing of the material.

Results. The method of sports training level increase on the basis of key factors that enhance the effectiveness of sports training in fitness aerobics is developed. The author pays great attention to the importance of the composition development, largely aerobics, determines the athletes artistic and entertainment performances, the optimal sequence of structural elements, the uniform distribution technically difficult exercises in the beginning, middle and final part of the program, the logic of using static and dynamic postures, gestures, facial expressions, specific means of expression and artistry of the performance.

Conclusion. The results of the pedagogical experiment showed that the developed method of athletic training efficiency increasing in fitness aerobics on the basis of the identification and use of leading factors showed the feasibility of its application, as it provides the ability to control the motivational sphere of gymnasts, underlying sports skill increase, as well as indicators of motional and musical culture.

Keywords: fitness-aerobics, athletic training, factors, artistry, technique, pedagogical experiment.

Urgency. A feature of modern sport is its transformation through the integration of forms and methods of music, dance, drama pedagogy, which led to the emergence of sports activities new types, characterized by creative imagination, self-expression, creating a situation of success. Such sports include fitness-aerobics. The concept of "fitness" is considered as a system of physical exercises aimed at all-round, harmonious development. "Aerobics" - rhythmic gymnastics with elements of dance under the sound of music. In the compositions of aerobic-fitness performances elements of various complexity, which require flexibility, which gives the movements, plasticity and gracefulness are well presented. The level of flexibility determines the amplitude of the motor action, causing the degree of their complexity. One of the main means of fitness aerobics is the choreography, which provides opportunities to foster a culture of movement, posture, expressiveness and artistry, which is important for strengthening of motivation to go in for the elected sports. Systematic training for aerobic fitness contribute to the improvement of the morphofunctional status, which increases self-esteem, confidence, skills of communication with surrounding people [1].
A variety of steps with different amplitude, direction, nature of execution, combined with jumps, leaps, spins and other multi-directional and multi-temporal elements plays a major role in the content of fitness-aerobics. A variety of motor acts determines the necessity of their combination in a uniform composition with well thought out logic of their combination, distribution, complexity, form, entertainment. The program of fitness aerobics should be structured in such a way that alternated fast and slow parts, changed motor rhythms, high and low postures, etc., given the growth-weighted, age-related, phenotypic characteristics; the nature of the musical accompaniment, the of muscular strength development, speed of movements, agility, accuracy, plasticity and other motional-coordinating qualities [5]. Bright, original composition performances allows to fully express athletes physical, aesthetic, intellectual, strong-willed potential that makes high requirements to its development.

The aim of this work is theoretical and experimental substantiation of the factors identification importance influencing the sport training in fitness-aerobics effectiveness increase.

Tasks. 1. To identify and theoretically prove the leading factors that contribute to athletic performance in fitness-aerobics.

2. To develop a method of sports training level increasing on the basis of the leading factors.

Materials. Fitness-aerobics refers to the artistic and aesthetic kind of sport that combines dance and music culture, artistry and expressiveness of movements, complexity and virtuosity of execution, originality and creative imagination. The level the gymnast skills is caused by his physical and technical readiness, understanding of motor acts that constitute the program performance content; according to the degree of their emotional-aesthetic impact on the performer and other people, the ability to transfer their feelings, emotions, thoughts by means of fitness-aerobics [6, 7]. The force of influence on the audience is caused by the athlete readiness to create artistic and aesthetic motor of the image corresponding to his spiritual and moral development level.

Composition, created in accordance with the requirements of the rules, provides efficient use of all sports fields and different directions of movements: straight line, diagonal, circular, zigzag, and arc; the alternation of high and low body positions; high-far jumps and exercises in the stalls; swing, power, quick, slow, powerful, expressive and plastic motor actions [8]. A correctly written composition allows to combine the specific rhythm of the dance steps and choreography, jumps with gymnastic and acrobatic elements in a special rhythmic music and movement space of a uniform artistic-aesthetic image, not detailed perception of which fills the soul of the viewer with the charm of a creative imagination flight.

Conceptualization of the artistic-aesthetic image as a result of the achieved performance level is based on a high level of the composition development importance understanding as a major component of self-expression inner vision possibilities models by fitness-aerobics means. A correctly written composition provides an opportunity to think in parameters that go beyond conventional ideas about the subject abilities to control the psycho-emotional state, turning the performances platform in the creative space, allowing more fully realize psycho-physiological resources of the body. The composition should be structured and programmed in such a way as to create the conditions for duality of the aesthetic and functional nature perception of each physical action, aimed at solving a complex set of interrelated and interdependent tasks of improving, developing and harmonizing orientation [2, 3].

For composition development, we used a person-oriented approach, based on the following principles:

- self-actualization, satisfying the athlete need in the realization of his abilities and opportunities;

- subjectivity based on the use of forms and methods enriching the gymnast personal training and competing experience.
success, representing the opportunity of expression through the natural instincts, purposeful development of personal and motional-coordinating qualities implementation;

- individualization aimed at identifying the athlete phenotypic characteristics.

The process of sports training in fitness-aerobics should be considered as a complex multi-level system, the effectiveness of which is caused by the following factors:

- ability to develop original compositions;

- accounting of regularities to strengthen the physical, technical and artistic training;

- understanding conditionality of competitive activity results by motivational sphere development degree;

- awareness of the need for more subtle interaction of individual body parts and establishing a closer relationship between them.

**Results and their discussion.** To check the significance of these factors and improve the efficiency of athletic training in fitness-aerobics a pedagogical experiment was held, where 28 qualified (first category and candidate of masters) athletes of 15-19 years old participated. The control (CG) and the experimental (EG) groups were organized, each consisting of 14 people. Before the pedagogical experiment a test was held with the aim to identify the level of physical, technical and artistic readiness.

Physical fitness was assessed by the following control exercises: running 100(second), long jump (cm) running 2000m (min); bending and unbending of hands in front support position (quantity); lifting and lowering the torso of the supine position (quantity). The level of technical readiness was identified by the following indicators: the number, diversity, originality and purity of complicated gymnastic, acrobatic and jumping elements performing according to their spatial-temporal and spatio-power parameters. Artistry was determined by: unity and plasticity of motor actions performance, their expressiveness, entertainment postures, gestures and facial expressions, the ability to transfer the artistic-aesthetic image; musical accompaniment character correspondence to motor actions. Analysis of the data revealed no significant differences in terms of the physical, artistic and technical readiness of the CG and the EG athletes. In the CG the training lessons were held according to traditional methods in accordance with the program recommended by the fitness-aerobics Federation. In the EG created by us methodology was used, based on implementation of factors that determine the training and competitive activities effectiveness.

Without psychosomatic apparatus mechanism understanding it is impossible to consciously achieve a high physical and technical training level. We can achieve increase of these indicators when systematic implementation of special exercises for development of muscular strength, speed, endurance, and other qualitative parties of motive activity; consistent assimilation of preparatory, feed and basic motor acts, conducive to the absorption of high complexity motional actions rational technique in a specific environment are used. [5, 6]. The summation of trace processes from the corresponding load leads to the training increase. The expected training effect is achieved when the volume and intensity of sports activity corresponds to age, level of fitness, psycho-emotional stability of the subject. As the body's adaptation to physical activity, it should gradually increase, providing growth of sports skill.

Accounting regularities of improving physical, technical and artistic training allows the athletes to more effectively manage the training and competitive activities, enhances the effectiveness of athletic training. Understanding the causality of competitive activity results by the degree of motivational sphere development defines the construction of sports training system on the basis of identifying individual characteristics, abilities and possibilities of the subject. The result of training and competitive activities is caused by the athlete fitness level, however, the main component of his skills growth is his
motivation to sports activities. Motives of sports activities differ in their focus:

for process activities, ensuring the satisfaction of needs for physical activity, realization of the desire for competition and self-affirmation; such motivated athletes, as a rule, do not reach high level of sports skills;

the result, in this case, the athlete is committed to self-development, self-improvement and self-realization by achieving high performance.

When developing methods of sports skill increase for people involved in fitness-aerobics, great attention was paid to identifying the motives, activities involved in the transformation of primary motivation to the socially-significant motivation of higher order, contributing to the understanding of sport essence, as the possibility of intellectual, physical and volitional self-knowledge capacities for self-development and self-improvement, acquisition of communication skills, rivalry, mutual exchange and enrichment of spiritual and material values

The penetration to the motivational sphere is an important condition of the training process effectiveness. Without motor activity, normal functioning of the body is not essential. Therefore, the need for sport is natural. A factor of the motivational sphere is the goal that determines the choice of ways satisfying needs. When setting goals, it is necessary to consider its stimulating function, manifested:

- the harmonious development and morphofunctional status improvement;
- positive dynamics of health, physical and technical readiness indicators; the results of competitive activity;
- participation in competitions of different scale;
- the acquisition team's performances in qualifying and controlling competitions;
- possibility to travel to other cities competitions.

The basis of socially important motivations are spiritual and moral ideals, beliefs, sense of duty, the desire of sports lifestyle formation, high level of intellectual and physical performance.

Fitness-aerobics includes in its content difficult coordinate and simple structure motor actions, the aesthetic perception of which is conditioned by the level of accuracy, rhythm and plasticity of movements development [4]. This requires consistency of motor and vegetative functions, coordination of the muscle groups involved in performance of motor acts; permanent, timely distribution and redistribution of muscular effort. In this regard, awareness of the need for more subtle interaction of separate parts and the parts of the body, establishing between them a closer relationship is a significant factor in sport training efficiency increasing. Relying on this factor in the training sessions process, we paid attention on the dependence of the dance beauty, running and normal steps, turns, rotations, static and dynamic poses from a bearing condition, head position, gaze direction, hands lines, hands arrangement. Engaged in fitness-aerobics performed in front of the mirror a variety of motor acts in place and in motion, in a high rack and in a stall, choosing the most spectacular pose, expressive gestures and facial expressions, which was estimated by the expert group.

After the pedagogical experiment, additional test was held with the aim of establishing the nature of physical, technical and artistic training indicators changes. Analysis of the survey data showed that improvement occurred in both groups: KG and EG, with different degrees of change. If KG with initial data at 100m of 15.43±0.32 s to the end of the pedagogical experiment the results improved to 15.19±0.45s (p>0.05), in the EG with the initial data of 15.47±0.21s increased to 15.01±0.44s (p>0.05); in the CG with the initial data in the long jump from the place 179,44±9,22 cm, to completion of pedagogical experiment the results improved to 183,11±7.36 cm (p>0.05); in the EG with the initial data 179,09±9.35 cm, to the end of the pedagogical experiment the results increased to 191,21±10.84 cm, (p<0.05). This trend of more significant indicators improvement in the EG was revealed according to other tests.

The indicators of technical readiness changed in the following way. In the KG input
data were $3.61 \pm 0.30$ points, to the end of the pedagogical experiment the results improved to $3.76 \pm 0.16$ points ($p<0.05$); in the EG respectively, with the input indicators $3.72 \pm 0.25$ points to the end of the pedagogical experiment the results improved to $4.31 \pm 0.18$ points ($p<0.05$).

The degree of the athletes’ artistry was assessed in terms of expressiveness and plasticity of the composition performance, contact with the audience, creating artistic and aesthetic image. In the KG with the initial data $3.69 \pm 0.15$ points to the end of the pedagogical experiment the indices improved to $3.82 \pm 0.26$ points ($p>0.05$); in the EG, respectively, with the initial data $3.57 \pm 0.24$ points, to completion of the pedagogical experiment the results increased to $4.31 \pm 0.27$ points ($p<0.05$).

**Conclusion.** Thus, the results of the pedagogical experiment showed that the growth of sports achievements is determined by many factors: the motivation to sports activity formation; the level of a trainer competence; health indicators, general, motional and musical culture, choreographic skills, as well as compliance of intellectual, physical and personal qualities with the essence of this sport activity. Among the various factors determining the growth of sports skill, the leading place is: the ability to develop original compositions; consideration of increasing fitness patterns; the degree of the motivational sphere formation; understanding of the chosen kind of sports activities, their implementation contributes to the fitness-aerobics athletic training efficiency.

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THE DYNAMICS OF SPEED INDICES ANALYSIS AMONG RUSSIAN ICE-SKATERS AT 500 METERS DISTANCE DEPENDING ON AGE AND QUALIFICATION

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Annotation. Modern tendencies in the sphere of speed skating are mainly connected with the speed of running increase along the distance and, as a result, with sports results improvement. Therefore, the specialists in speed skating face the following problems: training process optimization and rationalization, the search for new means, methods and methodologies of the training process organization and training sportsmen in accordance with modern tendencies of speed skating development. Materials: The aim of this research work is in differences revelation and the factors determination, which condition them, in the results of Russian ice skaters of different age and qualifications. This article presents the factorial analysis of the results at 500 meters distance among ice-skaters at the World Championship according to the separate distances, Russia Championship according to the separate distances, the Championship of Russia among juniors, and young people of all ages (season 2015). Research methods. The information for the research was received as a result of video of running and the official score sheets analysis. Statistical data handling was fulfilled with the help of the following programs: Microsoft Excel (2010) and STATGRAPHICS Centurion. Results. At the first stage of the research it was stated that common planned schedule includes the competitions of Russia Championship and the Championship of Russia in 5 age groups and a tight schedule of elimination competitions. Ice-skaters of the junior age group have considerable differences in the level of physical and technical readiness and in general are characterized by a low level of sports qualification (II sports category and lower). The next step belongs to the mid age group - 30% of boys exceed the set norms of Candidate Master of Sports. However, there is no further sportsmanship improvement – the results of Candidate Master of Sports among senior age group and juniors is more than 80%. Only 19% of juniors were able to fulfill the normative of the master of
sports of Russia - all were the participants of the Championship of Russia. At the second stage of the research, with the help of Principal Component Analysis, it was stated that 99.13% of the full sampling variance are conditioned by two components: a) difference in speed of movement along the distance, connected with biological, physiological and functional differences of ice-skaters of different age groups; b) technical-tactical mastery while passing the turns, by the ability to gain maximum speed of running at the given parts of the distance. Conclusion. Master of sports level achievement is closely connected with the ability to increase speed while running along the turn. During technical-tactical mastery improvement ice-skaters should pay attention to the technique of passing as the most favorable part for maximum speed development. 

Keywords: speed skating, the technique of running along the turn, the differences in qualification level.

Introduction. Modern tendencies in the sphere of speed skating are mainly connected with the speed of running increase along the distance and, as a result, with sports results improvement [7]. With the help of the specialists [8] it was stated that speed of running at all distances considerably increase: at 500 meters distance – to 49.52%, at 1000 meters distance – to 47.55%, at 1500, 5000 and 10000 meters distances – to 54.52%, 54.08% and 61.49% [4].

The important factors, which provide distance speed of running increase, are the power of the step indices and an optimal ratio of the steps length and frequency [8], the indices improvement is achieved with the help of ice-skaters’ level of physical and technical readiness increase. At the same time, modern sport in general, and speed skating in particular, is characterized by out-of-limit loads. Not all people can stand these out-of-limit loads. The volume of neuromuscular loads reached their limit [2]. Therefore, the specialists in speed skating face the following problems: training process optimization and rationalization, the search for new means, methods and methodologies of the training process organization and training sportsmen in accordance with modern tendencies of speed skating development.

According to the results of sports results analysis among world-level ice-skaters [7] it was revealed, that the final result of ice-skaters at 500 meters distance mainly depends on the ability to develop maximum speed in running along the turn, that is why sportsmanship improvement during the turn passing demands special attention.

The aim of our research work is different factors revelation, which influence Russian ice-skaters’ (of different age groups and qualifications) final result at 500 meters distance.

Objectives:
1. To study the level of readiness among ice-skaters of different age groups, who take part in the final competitions of Russian Championship and the Championship of Russia.
2. To reveal the components, which condition the difference in the results of Russian ice-skaters of different age groups and qualifications.

Research methods and research organization. During the research the results of passing 500 meters distance by Russian ice-skaters at Russian Championship and championships of Russia among juniors, young people of all ages (junior, mid, senior) during season 2014-2015.

At the first stage of the research with the help of the final score sheets study at Russian Championship and the Championships of Russia among juniors, senior, mid and junior age boys the following results were revealed and summarized:
- the final results in each age group;
- the number of participants in each age group;
- the fulfilled sports categories.

At the second stage of the research the following results were handled:
- the average speed of the distance overcoming (not taking into account 100 meters starting stride);
- time of every 100 meters distance overcoming by the ice-skaters of different age groups and qualifications;
- the speed of 100 meters distances overcoming by the ice-skaters depending on their age and qualification.

Speed indices analysis of 500 meters distance overcoming was fulfilled with the help of Principal Component Analysis. Statistical data handling was fulfilled with the help of the following programs: Microsoft Excel (2010) and STATGRAPHICS Centurion.

Research results and their discussion. The results, received at the first stage of the research, are presented in table 1.

Table 1 – The results of the competitions among ice-skaters in different age groups

<table>
<thead>
<tr>
<th>Age of the participant</th>
<th>Russia Championship</th>
<th>The Championship of Russia among juniors</th>
<th>The Championship of Russia among senior age boys</th>
<th>The Championship of Russia among mid age boys</th>
<th>The Championship of Russia among junior age boys</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>18+</td>
<td>15 – 17</td>
<td>13 – 15</td>
<td>10 – 13</td>
<td></td>
</tr>
<tr>
<td>Number of participants of the final competitions</td>
<td>24</td>
<td>31</td>
<td>66</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>Number of elimination competitions (number of participants)</td>
<td>3 stages (94 people)</td>
<td>3 stages (72 people)</td>
<td>3 stages (172 people)</td>
<td>3 stages (199 people)</td>
<td>1 stage (206 people)</td>
</tr>
<tr>
<td>Sports categories distribution</td>
<td>Master of Sports of International level (MSIL)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Master of sports (MS)</td>
<td>22</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Candidate in masters of sport (CMS)</td>
<td>1</td>
<td>26</td>
<td>48</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>I (j)</td>
<td>18</td>
<td>35</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>6</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>III</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I (j)</td>
<td>1</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>II (j)</td>
<td></td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As it is seen from the results, presented in table 1, common planned schedule includes the competitions of Russian Championship and the Championship of Russia in 5 age groups and a tight schedule of elimination competitions, according to which ice-skaters are selected for the final competitions.

For Russia Championship 24 best sportmen were selected and it is 25% of general number of ice-skaters, who take part in elimination competitions. The number of participants of the final competitions of the Championship of Russia among juniors, senior, mid and junior age boys is within 30-
40% of general number of the participants of the elimination competitions. At the same time, it was revealed that the number of participants of the Championship of Russia among juniors considerably decreases relatively similar indices among boys of senior age (72 juniors – 172 boys of senior age). Thus, we come to the conclusion that at the age of 18 the number of sportsmen, who go in for speed skating, considerably decreases and the problem of national team resources renewal with the help of worthy candidates becomes very urgent.

Picture 1 presents the results analysis, demonstrated during the Championship and the Competitions of Russia in accordance with Common all-Russian sports qualification.

Among 24 ice-skaters, who took part in the Championship of Russia, only one person was able to improve the normative of MSIL. 92% of the results correspond with the normative – MS. The level of MS was demonstrated by 16% participants of the Championship of Russia among juniors. The main part of the results during both Championships among the boys of senior age belongs to the level- CMS (84% and 81%). The part of results, which correspond with the level of the 1st category, among senior age boys is 19%. 58% of the final results among senior age sportsmen exceeds the normative of the 1st category, the results of 30% of ice-skaters from this age group exceeds the normative – CMS. Most part of the results, demonstrated during the Championship of Russia among junior age boys, didn’t exceed the normative of the 2nd category and is characterized by diversity in the results.

**Picture 1 – The level of results, demonstrated during the Championship of Russia and Russian Championship among juniors, boys of senior, mid and junior age groups in accordance with Common all-Russian sports qualification (CASQ)**

Thus, it was stated that ice-skaters of junior age group have considerable differences in the level of physical, functional and technical readiness and in general are characterized by a low level of sports qualification (the 2nd sports category and lower). The next step belongs to the mid age group - 30% of boys exceed the set norms of Candidate Master of Sports. However, there is no further sportsmanship improvement – the results of Candidate Master of Sports among senior age group and juniors is more than 80%. Only 19% of juniors were able to fulfill the normative of the master of sports of Russia- all
were the participants of the Championship of Russia. So we see the problems of training ice-skaters at the stage of sports specialization, as a result of which sportsmanship of most part of sportsmen, who go in for speed skating, stops at the level of CMS, and it is one of the reasons of dropout in junior age.

Let’s consider the results of the second stage of the research, which is based on speed of running along the distance analysis among the sportsmen of different age groups and qualification.

In order to reveal the features, which differ Russian ice-skaters of different age groups and qualification from world class sportsmen, the final results of 500 meters running were handled at the World Championship according to the separate distances, Russian Championship according to the separate distances and The Championship of Russia among juniors, boys of senior, mid and junior age (season 2015), the average speed of the distance overcoming (not taking into consideration 100 meters starting stride); time and speed of each 100 meters distance overcoming by the ice-skaters of different age groups and qualification.

Table 2 presents summarized data of the results analysis and speed of running among ice-skaters of different age groups and qualification at 500 meters distance.

<table>
<thead>
<tr>
<th></th>
<th>World Championship</th>
<th>Russia Championship</th>
<th>The Championship of Russia among juniors</th>
<th>The Championship of Russia among senior age boys</th>
<th>The Championship of Russia among mid age boys</th>
<th>The Championship of Russia among junior age boys</th>
</tr>
</thead>
<tbody>
<tr>
<td>The average result, demonstrated by a sportsman (sec)</td>
<td>35, 25</td>
<td>36, 52</td>
<td>38, 28</td>
<td>40, 19</td>
<td>41, 77</td>
<td>47, 11</td>
</tr>
<tr>
<td>Standard deviation (sec)</td>
<td>±0, 36</td>
<td>±0, 67</td>
<td>±0, 99</td>
<td>±1, 31</td>
<td>±2, 04</td>
<td>±3, 36</td>
</tr>
<tr>
<td>The average speed of distance overcoming (not taking into account starting stride) (km/h)</td>
<td>56, 27</td>
<td>54, 51</td>
<td>51, 9</td>
<td>49, 08</td>
<td>46, 95</td>
<td>41, 6</td>
</tr>
</tbody>
</table>
The average result of sportsmen at the World Championship is 35.25 sec. (±0.36 sec.). The average speed of running along the distance is 56.27 km/h (±0.68 km/h). The result of sportsmen at Russia Championship, in the average is 36.52 sec. (±0.67 sec.), speed of running in this case is 54.5 km/h (±0.98 km/h) and it is 3.13% lower than the average speed of running at the World Championship. The speed of running among sportsmen at the Championship of Russia among juniors is less than 53.5 km/h (51.9 km/h ± 1.55 km/h), which provides in the average the result at the level of 38.28 sec. The average speed of 500 meters distance running by Russian Juniors is 4.64% lower than the speed of ice-skaters at the National championship for adults. The results of sportsmen of senior, mid and junior age groups in the average is 40.19 sec. (±1.31 sec.), 41.77 sec. (±2.04 sec.) and 47.11 sec. (±3.36 sec.) and it corresponds with the speed of running along the distance at the level of 40-50 km/h.

Table 3 presents the analysis results according to Principal Component Analysis. For the analysis 5 features were determined, which correspond with the number of 100 meters parts of the distance.

### Table 3 – Analysis results according to Principal Component Analysis

<table>
<thead>
<tr>
<th>Number of the component</th>
<th>Proper value</th>
<th>The influence degree of a factor on total variance, %</th>
<th>Accumulated degree of factors influence on total variance, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.81631</td>
<td>83.726</td>
<td>83.726</td>
</tr>
<tr>
<td>2</td>
<td>1.070186</td>
<td>15.404</td>
<td>99.130</td>
</tr>
<tr>
<td>3</td>
<td>0.030173</td>
<td>9.693</td>
<td>99.733</td>
</tr>
<tr>
<td>4</td>
<td>0.008708</td>
<td>0.174</td>
<td>99.908</td>
</tr>
<tr>
<td>5</td>
<td>0.004621</td>
<td>0.092</td>
<td>100.000</td>
</tr>
</tbody>
</table>

99.13% of total sampling variance are explained by two components and if they change, changes the distribution law in general.

Table 4 presents dependence of every component weight on the segment of 500 meters distance.

### Table 4 – The component’s weight depending on the segment of the distance

<table>
<thead>
<tr>
<th>The segment of the distance</th>
<th>Component 1</th>
<th>Component 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>V100</td>
<td>0.45675</td>
<td>0.343206</td>
</tr>
<tr>
<td>V200</td>
<td>0.4472</td>
<td>0.349304</td>
</tr>
<tr>
<td>V300</td>
<td>0.46587</td>
<td>0.349803</td>
</tr>
<tr>
<td>V400</td>
<td>0.44589</td>
<td>0.765724</td>
</tr>
<tr>
<td>V500</td>
<td>0.45657</td>
<td>0.345659</td>
</tr>
</tbody>
</table>

As it is seen from table 3, in the column Component 1 all components are distributed evenly between all studied segments of the distance. That is why it is reasonable to
connect this component with the speed of movement along the distance, which is mainly conditioned by mutual dependence of ice-skaters’ physical and technical readiness and is closely connected with the age of sportsmen and the level of their qualification.

The greatest weight in the column Component 2 has the segment of 300-400 meters distance, which corresponds with the second turn. That is why the speed of the second turn overcoming influences greatly total sampling variance.

Picture 2 presents the average running diagrams of the studied sportsmen at 500 meters distance.

Sportsmen, who participate in the World Championship, have the rising diagram of speed till 400 meters mark, which corresponds with maximum speed of running, after that the speed of running has the tendency to decrease. The diagram of sportsmen’s speed of running, at the Championship of Russia, has the same tendencies, the difference is only in the fact, that the gained speed of running at each segment is lower than the speed of running among the participants of the World Championship. The diagram of skaters at the Championship of Russia among juniors, boys of senior, mid and junior age groups in general has the same tendency – the speed of running increases till 300 meters mark (the end of the transferring line), after that at 300-400 meters distance there some decrease of speed, at 400-500 meters distance (home stretch) the speed increases again. Thus, the disadvantages of technical mastery are revealed during the turn overcoming among juniors, boys of senior, mid and junior age groups.

The analysis of the second turn overcoming at 500 meters distance by the sportsmen of Russia depending on qualification, helped to state that ice-skaters, who exceeded the normatives of MS, increased the speed of running according to the set segment. Sportsmen, who showed the results of CMS, but who are close to the normative of MS (+0,5 sec.), also had the tendency to increase the speed. Ice-skaters, whose results were worse than 38,3 sec. (speed of running

Скорость бега, км/ч- speed of running, km/h
Отрезки дистанции-segments of the distance
Чемпионат Мира-the World Championship
Чемпионат России-Russia Championship
Первенство России (юниоры)- the Championship of Russia(juniors)
Первенство России (старший возраст)- the Championship of Russia(senior age)
Первенство России (средний возраст)- the Championship of Russia(mid age)
Первенство России (младший возраст)- the Championship of Russia(junior age)

Picture 2 – Diagram of the average speed of running of sportsmen in different age groups
less than 53.5 km/h), couldn’t keep the gained speed during the second turn overcoming (picture 3).

![Dynamics of speed of the second turn overcoming at 500 meters distance by ice skaters from Russia depending on their qualification](image)

Thus, it was stated that the level of MS (+0.5 sec.) achievement is closely connected with ice-skaters’ technical-tactical mastery, their ability to increase speed while running along the turn.

**Conclusion.** After running analysis among Russian ice-skaters of different age groups and qualification at 500 meters distance we came to the following conclusions:

1. The level of sportmen’s qualification at the Championship of Russia among juniors, boys of senior, mid and junior age groups corresponds with the normative of the candidate Master of Sports. The level of MS ice skaters mainly achieve at the age of 18 and more. The number of sportmen, who showed the results, which exceed the normatives of MS, is three times less, than CMS level sportmen. Thus, in prospect every third sportmen can turn from the candidate Master of Sports into Master of sports of Russia.

2. The number of sportmen, who took part in the final and elimination trials of the Championship of Russia among juniors, decreases more than twice in comparison to the number of sportmen in senior age group. Thus, at the age of 18 the number of sportmen, who go in for speed skating, considerably decreases and the part of talented young people, who can become the future members of the national team disappears.

3. The difference in the results of sportmen from different age groups is conditioned by 2 features:

   - difference in speed of moving along the distance, connected with biological, physiological and functional differences of ice skaters of different age groups;
   - technical-tactical mastery during turns overcoming, ability to gain maximum speed at the given parts of distance.

4. Master of sports level achievement is closely connected with the ability to increase speed while running along the turn. During technical-tactical mastery improvement ice-skaters should pay attention to the technique of
passing as the most favorable part for maximum speed development.

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METHODOLOGY OF ICE-SKATERS’ TECHNICAL MASTERY AND SPECIAL PHYSICAL READINESS IMPROVEMENT USING SHORT-TRACK IN THE TRAINING PROCESS

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Annotation. Speed skating nowadays undergoes a new wave of its development, connected with constant increase of sports results. Quick running speed increase among ice-skaters at all distances is the consequence of the training process effectiveness and optimization, conditioned by new means, methods and approaches of training use. An important question in the training process of ice-skaters organization remains the search for the optimal training means and methods of their use. Materials: The methodology creation of ice-skaters’ technical mastery and special physical training improvement, using short-track and experimental substantiation of its effectiveness. Research methods: literature sources on the problem of the research and current materials analysis and summarizing, pedagogical observation, pedagogical experiment, pedagogical testing, methods of mathematical statistics. Results. At the first stage of the research the methodology of short-track application in the training process of ice-skaters was created. Two demands are important in the methodology: 1) concentration of the made efforts considerably exceeds the same indices in classical skates; 2) technical stereotype models competitive exercise – running along the standard track. At the second stage of the research experimental testing of the offered methodology was held. Ice-skaters, who use short-track in the training process, according to the test “flying lap” had higher indices of an individual coefficient of a step power and could develop higher speed in running the turn, which finally provided time of “flying lap” overcoming improvement. Conclusion. Short-track use in the training process of ice-skaters provides power of the step and the speed of running along the turn increase and it leads to speed of running increase in general along the distance. During technical mastery and special physical readiness improvement ice-skaters should include short-track into the training process. Keywords: speed skating, short-track, technique of running along the turn, special physical readiness of ice-skaters.

Introduction. Speed skating nowadays undergoes a new wave of its development, connected with constant increase of sports results. Quick running speed increase among ice-skaters at all distances is the consequence of the training process effectiveness and optimization, conditioned by new means, methods and approaches of training use [8].

Means of training in speed skating include all forms of sportsman’s activity in the training process, mainly, physical exercises of general-preparatory, special-preparatory and specific character, which are necessary for the technique of the chosen kind of sport teaching and improvement and for the necessary motional skills development [5].

Speed skating demands developed speed-power qualities, as the technique of competitive exercise demands not only great power, but also great speed of motional actions fulfillment.

The specialists in speed skating stated that power of a step increase and an optimal ratio of length and frequency of the steps [9] provide the increase of the running speed and their indices improvement is provided by the level of ice-skaters’ physical and technical readiness increase. At the same time, it was stated that great importance for maximum possible results achievement has technical mastery in running the turn, which helps the ice-skater to gain maximum speed of running along the distance [7].

In this case an urgent question of ice-skaters’ training process organization stays searching for the optimal means of training and methods of their use.

Scientific-methodical literature analysis showed that the main principle of the
exercises selection is in kinematic and dynamic similarity with skating: angles, angular speed, reactions of the support, force gradients, impulses of support reactions [9]. The principle of biomechanical similarity is in the fact that speed, tempo, weight of poundage in special and general-preparing exercises are chosen depending on kinematics and dynamics in joints in the competitive exercise. Thus, during training process organization the used means and methods should not only create the conditions for motional apparatus functioning, like competitive ones, but also should model the future record results [6]. At the same time, the problem of searching for the optimal means in training process of ice-skaters is an urgent problem nowadays, especially in terms of speed skating integration with the kinds of sport, such as short-track and rollerskating.

The examples of sportsmen, who were successful in the past and present in short-track and rollerskating, make sportsmen and trainers and also theorists and practitioners of speed skating think about their success and analyze the peculiarities of training, taking into account training for competitive activity in short-track or rollerskating.

That is why the aim of our research work is the methodology creation of technical mastery and ice-skaters’ special physical readiness improvement using short-track and experimental substantiation of methodology effectiveness.

In order to achieve the set aim the following objectives were determined:
1. To create the methodology of short-track use in yearly cycle of ice-skaters.
2. Experimentally test created methodology.

**Research methods and research organization.** The following methods form the base of the research: literature sources on the problem of the research and current materials analysis and summarizing, pedagogical observation, pedagogical experiment, pedagogical testing, methods of mathematical statistics.

At the first stage of the research, on the basis of literature study about the question of the training process organization in short-track and speed skating and the peculiarities of technical mastery improvement in short-tracking the methodology of ice-skaters’ technical mastery improvement using short-track was created.

At the second stage of the research the pedagogical experiment was held during which 13-15 year-old ice-skaters, who have sports category master of sports, were divided into two groups – the experimental group (EG) and the control group (CG). The respondents from the control group trained according to the recommendations of the program for sports schools with a standard load division in a yearly cycle. Their opponents from the experimental group included trainings at a short track with a full correspondence to short-track demands – necessary implements and equipment.

During the second stage pedagogical testing was held with the help of control exercises method. For special physical and technical readiness estimation popular in speed skating test “flying lap” was used, the essence of which is in distance overcoming, which is equal to one lap along the small track (without transfer) with gained beforehand speed, close to maximum speed. The results of testing were received by means of hand timing (general time of distance overcoming) and with the help of pulsometer with integrated GPS-navigator Garmin HRM-RUN.

Validity of differences was determined by means of parametric Student t-test for unrelated sampling.

**Research results and their discussion.**

At the first stage of the research the methodology of short-track application in the training process of ice-skaters was created. The main condition for a successful use of short-track will be an optimal ratio of the made efforts during turns running with less radius. Two demands are important in the methodology: 1) concentration of the made efforts considerably exceeds the same indices in classical skates; 2) technical stereotype models competitive exercise – running along the standard track. It will help to direct the training process to mastering the technics of a
turn running, paying great attention to the power of push-off increase, caused by opposition to centrifugal inertial forces, which influence a sportsman during the turn overcoming, by means of centripetal forces applying, created with the help of muscular activity and it will lead to length of a step increase and will increase the speed of the turn overcoming. The time of a step also increases owing to the power and duration of single-support push-off increase. Thus, during the training process a sportsman will constantly model competitive effort without excessive intensification of the training process.

The base of the offered methodology formed the regulations of “Speed skating” Federal standard (further-FSST(Federal Standard of Sports Training)), created by the Ministry of sports and tourism of the Russian Federation.

FSST states the ratio of the volumes of the training loads according to the kinds of training. The ratio of general physical training (GPT) and special physical training (SPT) and sports training (ST) depending on the stage of sports training. At the age of 13-14 a sportsman makes first efforts at the stage of sports mastery improvement, that is why the volume of SPT and technical training will increase not only by means of relative worth of these kinds of training increase in percentage ratio, but also by means of general number of hours, which considerably increases at the stage of sports mastery improvement. That is why during the training process of 13-15 year-old ice-skaters’ planning it is necessary to keep to the lower bound of the possible indices of SPT and technical training in percentage ratio.

On the basis of speed skating program for sports schools for children and teen-agers and specialized schools for children and teen-agers [5] the following hours scheduling for SPT is recommended: 57,4% for special-preparing exercises ();34,4% for rollerblading; 8,45% for bending walking (picture 1).

Picture 1 – SPT means distribution in a yearly plan of the group of sports improvement (according to FSST program)

Бег на роликовых коньках- rollerblading
Пригибная ходьба- bending walking
Специально-подготовительные упражнения- special-preparing exercises

Short-track introduction into the training process of ice-skaters leads to redistribution of SPT means ratio in the training process picture 2). The part of special-preparing imitating exercises decreased from 57,2% to 49,5%. Rollerblading takes 24% of general time, which is given for SPT in terms of yearly cycle. The volume of the training load in bending walking decreased from 8,4% to 4,4%. The rest of the time- 22,1%, given for SPT, will be spent on the rink.
The greatest volume of the training load in short-track is during the following months: June-July-August-September – 15-18 hours a month, as during this period special-preparing stage of the preparing period is held. The aim of this period is to increase the level of SPT among ice-skaters. While getting close to the main competitions of the season the accent transfers to special training, the number of hours at short-track gradually decreases and during competitive period is 4 hours a week. In March the number of hours increases – sportsmen need gradual transfer from sports form, for which gradual training loads decrease is necessary and a gradual transfer from special training to general physical training. In this case trainings on the rink with predominantly rehabilitation orientation will help to correct such an important moment in training ice-skaters. During the transition period short-track use is not recommended, as the main aim of this stage is rehabilitation after a difficult competitive activity during the season, including psychological tension removal, which was caused by great volume of loads and monotonous character of special training.

At the second stage of the research the results the offered methodology testing were discussed. For this purpose “flying lap” test was held, during which the following indices were registered (table 1):
- general time of the lap;
- average speed of the segment overcoming;
- speed of 100-meter segments overcoming;
- tempo of running along the turn.

On the basis of these indices the coefficient of the power of a step was calculated (CPS).

<table>
<thead>
<tr>
<th>Statistical indices</th>
<th>Контрольная группа</th>
<th>Экспериментальная группа</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
<td>Test 2</td>
<td>Test 1</td>
</tr>
</tbody>
</table>

Table 1 – The results of “flying lap” test
As it is seen from the results, presented in table 1, the results of the respondents from the control and the experimental groups in test 1 (before the experiment) were almost equal. Ice-skaters from the control group fulfilled “flying lap” in the average in 27,33 sec (±0,17), respondents from the experimental group in 27,38 sec (±0,28). According to the results of testing in the control group the increase was 0,92%. The increase of the respondents from the experimental group was 4,05%.

The speed of 100-meters segments overcoming analysis according to principal components method helped to reveal, that 83,2% of total variance of sampling are determined by 2 components – speed of overcoming the 1st and the 2nd turns during the “flying lap” (table 2).

Table 2 – The results of the analysis using principal components method

<table>
<thead>
<tr>
<th>Component 1</th>
<th>Component 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>V0</td>
<td>0,466779</td>
</tr>
<tr>
<td>V1</td>
<td><strong>0,609133</strong></td>
</tr>
<tr>
<td>V2</td>
<td>0,514081</td>
</tr>
<tr>
<td>V3</td>
<td>-0,20732</td>
</tr>
<tr>
<td>V4</td>
<td>0,0214246</td>
</tr>
</tbody>
</table>

For the characteristics of the speed of the turn running “coefficient of the power of a step” (specific speed of a step) was used, which is quotient of the running speed at a segment (V) by the number of steps (N). Table 3 presents the results of the individual coefficients of the steps in running along the turn among the respondents from the control and the experimental groups before and after the experiment.

Table 3 – Individual coefficients of the power of a step in running along the turn among the representatives of the control and the experimental groups

<table>
<thead>
<tr>
<th>№ of the respondent</th>
<th>CONTROL GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Test 1</td>
</tr>
<tr>
<td></td>
<td>Turn 1</td>
</tr>
<tr>
<td></td>
<td>V1, m/s</td>
</tr>
<tr>
<td></td>
<td>V3, m/s</td>
</tr>
<tr>
<td>Average value</td>
<td><strong>13,14</strong></td>
</tr>
<tr>
<td></td>
<td><strong>14,31</strong></td>
</tr>
</tbody>
</table>
As it is seen from the results, presented in table 3, CPS in test 1 among sportsmen from the control group was 0,83 (±0,04) during the 1st turn overcoming and 0,95(±0,07) during the 2nd turn overcoming. According to the results of the second test CPS increased to 1,19% during the 1st turn overcoming and to 3,06% during the 2nd turn overcoming. CPS of the respondents from the experimental group was 0,81 (±0,01) during the 1st turn overcoming and 0,92 (±0,07) during the 2nd turn overcoming. It is necessary to mention that these indices are inferior to the same results of the respondents from the control group, showed before the experiment. According to the results of the second test CPS increased to 9,89% during the 1st turn overcoming and to 16,36% – during the 2nd turn overcoming.

Validity of differences of the individual CPS in running along the turn among the representatives of the control and the experimental group was stated by means of Student t-test calculation for unrelated samplings. The received empirical value (t=6)
is within the area of interest, that is why the validity of individual CPS differences among the sportsmen from the control and the experimental groups was stated (picture 3).

<table>
<thead>
<tr>
<th>Critical values</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>p&lt;0.05</td>
<td>2.07</td>
<td>2.82</td>
</tr>
<tr>
<td>p&gt;0.05</td>
<td>2.07</td>
<td>2.82</td>
</tr>
</tbody>
</table>

Picture 3 – Validity of individual CPS differences among the sportsmen from the control and the experimental group

Результат: t_{эмп} = 6

Conclusion. As a result of the held research the following conclusions can be made:

1. The success of the offered methodology of short-track use in the training process of ice-skaters includes the following demands:
   - concentration of the made efforts considerably exceeds the same indices in classical skates;
   - technical stereotype models competitive exercise – running along the standard track.

2. According to “flying lap” test considerable differences between the respondents from the control and the experimental groups were revealed. Ice-skaters, who use short-track in the training process, according to “flying lap” test had higher indices of an individual coefficient of the power of a step and could develop greater speed in running along the turn, which finally led to time of “flying lap” overcoming improvement.

References


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BIOMECHANICS OF MOVEMENTS IN THE MAIN PHASES OF A MOTIONAL ACTION
(by the example of darts)

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Annotation. Studying the course "Biomechanics of motor activities", students are faced with the need to understand the biomechanical characteristics of the different trajectories of the movements.
Pedagogically expedient to consider the subject technology profile cycle of biomechanical movements in various types of games, as the game naturally appears a system of movements of the human body. **Materials.** The study of the movements of the game led to the development of the research direction "Biomechanics of movements in the game", which allows you to see many aspects of playing technique in interaction with the biomechanical characteristics. **Research methods:** scientific-methodical literature analysis and summarizing, pedagogical experiment, laboratory analysis methods of biomechanics. **Results.** Future specialists in the field of adaptive physical culture have studied the technique of throwing and found that the game will help the children feel the distance (near - far), contributes to the development of large and fine motor skills. Darts is not only interesting and useful game for many generations, but is also an international sport that can teach a person to control the movements of your body. The material is used as teaching material in the classroom, in the laboratory work, and to perform individual tasks using the design technologies. **Conclusion.** Darts has special ingredients of building a movement and trajectory of the throw, and therefore useful for children with developmental and motor activities – cerebral palsy (CP) and Down syndrome. Darts has a huge social value: it is safe, attributes of the games are available for children and adults. **Keywords:** training; biomechanics of motor activities; biomechanics of movements in the game; Darts; throw technique; biomechanical characteristics of the feet; torso; arms, head.

**Introduction.** There appeared the necessity to consider biomechanics of movements in a game, taking into account tactical and technical peculiarities of different kinds of games. Direction “Biomechanics in a game” [3,4] showed its pedagogical expediency, as students study not only the peculiarities of movements in a game of adults and children, gather information about the game, but also popularize mass sport and forgotten games or uncultivated kinds of sport. Individual tasks become individual projects of informational or educational orientation. The fulfilled task comprehension leads to scientific-research activity development in a subject. The result of students’ research work in a subject is social acceptance or scientific works publishing in different editions [5,7]. It should be noted, that with a new group of professional competencies introduction there appeared the necessity to combine pedagogical principles, methodical peculiarities and practical reality. Biomechanical movements study while playing darts broadens methodical base of laboratory works fulfillment and is a pedagogical base for peculiarities of movements study for the specialists in the sphere of adaptive physical culture [6]. Darts has special components of movements and a trajectory of a throw construction that is why it is very useful for children, who have peculiarities of development and physical activity - infantile cerebral paralysis (ICP) and Down's syndrome.

Darts has deep historical roots, is always popular and is an international kind of sport [5].

Darts has its own rules, as in bowling technique of throwing is very important in darts and it consists of several elements [8]. **Urgency.** Biomechanical characteristics of darts are not studied enough and not presented in scientific literature. Scientific research work by V.M. Lyapin, O.B. Nemtsev (2009) is about accuracy of throwing movements formation (by the example of darts). It considers kinematic characteristics of a throw in darts (definite according to dart movement), fulfilled in different conditions, and also several positions of the standard throws fulfillment are shown in this work [2].

During comparative analysis of the throwing technique and kinematics of a throwing tool movement in other kinds of sport we saw the similarity with knives throwing [7]. Technique in darts gives an opportunity to consider static character of a sportsman’s pose, taking into account biomechanics of movements.

The aim of the work: structural-methodical aspects orientation while studying the peculiarities of movements biomechanics in darts; study the opportunities of controlling body through modeling different movements.
An objective: it is possible to study biomechanical movements playing darts only considering the stages and positions of a throw and the position of the body parts in it. During the technique of throwing study by students 7 main parameters were determined, which help to understand biomechanical characteristics of a throw in darts. Such kind of scientific approach helps not only to broaden methodical basis of “Biomechanics of motional activity” course study in unit “Kinematics”, but also helps to create new laboratory work of the applied character with further experimental works among the groups of different specialties students [6]. Thus, it will be possible to study fully the peculiarities of movements in darts, taking into account age-related characteristics and contraindications in case of diseases.

Research results.
At the initial stage of the applied studies (they include educational experimental research works) students study the structure of movement. Let’s define structural-methodical aspects in peculiarities studying of movements biomechanics in darts.

1. Legs position determination in a game.
A sportsman stays towards the target in a side position (on the right) [3, p. 34-36]. The reference position form straight legs. Feet of the legs are placed at shoulder length and reference point is chosen. The scheme of the reference point is formed, as it is constant from a throw to throw. One leg is placed near the line of throwing and fully rests on a foot, in another leg the reference point is a toe. Biomechanical movements in darts are determined by three main poses of body before fulfilling a throw: side, main and front. A sportsman independently chooses comfortable pose. Specialists-practitioners consider, that correctly chosen pose makes a throw more technically correct, it means that a dart achieves the aim. From the point of biomechanics poses differ in body position relative to the target plane, which directly depend on feet position.

Let’s consider side positions before a throw fulfillment and its biomechanical characteristics. In a side position not big angle of body turn (90°), relative to the target plane is used. The right foot is parallel to the target plane at the line of a throw, the left foot is led back at the distance of shoulder length and leans on a toe. Parts of the body control happens according to the following trajectory of a movement biomechanics: legs, pelvis and shoulders are in one plane; body and head are leaned in the direction of the target, general mass center is translocated forward towards a stationary foot. The right hand is on the line of the shoulders, the angle between it and the line of shoulders is approximately 180°, the left hand is down. Let’s analyze the peculiarities of a sportsman’s body poses. The main body pose differs from the side pose in the angle of turn decrease (45-60°). The right leg is on the line of a throw, the foot is turned with the toe forward towards the target at the angle approximately 45° with the body lean towards the target, general mass center is translocated forward towards a stationary foot. The angle, formed by the hand, which fulfills the throw, and the shoulder line, is 100-120°. It is important for a sportsman not to lean hard in order not to lose the balance. Head is half-turned with orientation to the target and lean towards the leading hand. In case of front initial body position the angle of turn is almost absent. In case of front position of a foot legs are parallel to each other and are moved apart towards the target. It should be noted that during the throw general mass center is translocated forward and towards the hand. The head is tilted towards the target, a sportsman sees the target, muscles are in tension.

2. Biomechanical characteristics of body position.
Body position of a sportsman is vertical, with a slight lean forward and creation of the constant reference point during the definite time of a throw fulfillment. Body muscles are in a definite settled position while watching the training process of sportsmen.
Picture 1 – Pose of movement shows the direction of the head and neck muscles

Picture 2 – During such kind of a lean there is no any reference point necessary for a throw
3. Biomechanics of head movements is important for a qualitative aiming.

Neck muscles, which hold the head in a vertical position and take part in turning of the head towards the target, shouldn’t be tense, or a sportsman will lose the balance. As the held research shows, it is not always possible to alleviate tension, a sportsman should be in the mood to relax.

4. Biomechanical characteristics of hands position.

Hands movements modeling in a throw (Izotov E.A.) [1]. The lifted hand is directed towards the target, forming the angle between the body and a shoulder 70°, bending. The shoulder of the leading hand is at the stage of fixation in a shoulder joint owing to tension of the corresponding muscles. Hand position change in a throw gives different angle (from 10 till 160°). If the angle in an elbow joint is within the range of 10 - 90°, the hand is leaned
back towards a forearm, if the angle is more than 90°, the hand is leaned forward. A shoulder, forearm, hand should be in one plane – the plane of a throw. Let’s consider the position of the other hand (not leading). It differs from the position of the leading hand. Not leading hand is along the body of a sportsman and fulfills an auxiliary function of darts holding. Fingers tension shouldn’t be excessive, as it can lead to general tension of body muscles. It is important for a sportsman to train the fingers, in order to feel own fingers and be able to release tension in time. Moreover, a sportsman should be able to feel a dart by fingers.

Picture 5,6,7 – Positions of a dart in hand
Conclusion. For the first time the applied scientific research works with adaptive and health-improving physical culture (AHPC) faculty students were held in “Biomechanics of motional activity” laboratory work. More than 100 pictures of different biomechanical movements were taken. Nadezhda Nazarenko professionally goes in for knives throwing (World champion in this kind of sport) [7]. She showed the ways of body control while playing darts. This game develops coordination of movements, orientation in space, at the same time, the eye-muscle is very active (distance close-far). Students- recreation therapists got the first experience of fine and gross motor skills development among children with peculiarities in movements.

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THE RESULTS OF AUTOEXPERIMENT INVOLVING THE USE OF THE TRAINING PROCESS ORGANIZATION COMPLEX METHOD WHILE TRAINING A FEMALE ATHLETE FOR THE RUSSIAN SWIMMING CHAMPIONSHIP AMONG VETERANS

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Annotation. Literary sources analysis helps to find sufficient evidence of low effectiveness concerning traditionally used periodization method of training process organization in training swimmers. In this connection the search for a more effective method of the training process organization in sports swimming is very urgent. Materials. A complex method approbation of the training process organization in a training cycle of a female athlete (age- 56) for the Russian Swimming Championship among veterans. Research methods: scientific literature analysis and summarizing, the method of sports working capacity laser stimulation, experiment. Result. The article presents the results of an individual experience of using a complex method of the training process organization while training the female athlete for the Russian Swimming Championship among veterans. It has been reported about the effectiveness of using respiratory exercises, fulfilled according to the methodology of A. V. Sidersky, in training the female athlete-veteran, as well as about the effectiveness of a course use of general health-improving Tibetan herbal tea, prepared according to N. A. Badmaev formula and about the effectiveness of using the sports working capacity laser stimulation method in pre-start training of the female athlete. Conclusion. The use of a system physiology laws in the training process planning and organization, purposiveness and an optimal character of the training loads in combination with full regeneration of an athlete between the training lessons guarantee its effectiveness. Keywords: adaptation laws, a complex method of the training process organization, expediency and an optimal character of training loads, respiratory exercises in training, pre-start laser stimulation.
XXth century by the Olympic champion, Merited Master of Sports, Merited Trainer of the USSR, doctor of pedagogics A.P. Bondarchuk. The base of such kind of the training process organization method forms adaptation laws, which state structural-functional specificity of motor acts and adaptive changes of an organism [9, 14], modern principles of the training process organization (expediency and an optimal character of the used training loads, purposefulness of the training process organization in general) [1, 2], and also the laws of training transfer state [13]. The experience of the training process organization complex method use in sports swimming was stated in the articles of S.E. Pavlov, T.N. Kuznetsova, I.V. Afonyakin (2001) and T. N. Pavlova, E.A. Mekhteleva, S.E. Pavlov (2015) [10, 12].

This complex method of the training process organization was used by us in the training cycle of the female athlete (age-56) for the Russian Swimming Championship among veterans (Penza, April, 2017). The female athlete trained three times a week (with 4 days of rest). In general she had 26 training lessons. During each training lesson one and the same standard complex of exercises was fulfilled, initially it included freestyle swimming 25 meters distance with different speed. Freestyle swimming 50 meters distance was included into the training task during 5 final training lessons before the Russian Championship. General volume of the female athlete swimming load during one training lesson wasn’t more than 600 meters (including warming-up in water). At the same time, 15% of the swimming load during each training lesson included the work over swimming technique. Training work at maximal and submaximal speed of swimming was 30%. During the same period (during 2 weeks every day) the female athlete was fulfilling a complex of respiratory exercises according to the methodology of A.V. Siderskiy in order to increase the effectiveness of external respiration apparatus [5, 6]. Additionally during 4 weeks this female athlete every day took general health-improving Tibetan herbal tea, prepared according to N. A. Badmaev formula. Just before the competitive start the female athlete had the session of laser stimulation using photonic-magnetic-laser infrared therapeutic apparatus “MILTA-Sport” using the method of transcutaneous polyzonal laser impact [4, 7, 8, 11, 14].

The initial result of the female athlete in freestyle swimming 25 meters distance was 15,80 seconds. The best result at the same distance at the end of the training cycle was 14,51 seconds. The initial result of the female athlete in freestyle swimming 50 meters distance was 34,69 seconds. During the Russian Championship among veterans (Penza, Russia, April, 2017) in freestyle swimming 50 meters distance she had the following result: 33,19 seconds (picture 1). With such kind of result the female athlete took the 1st place at the Russian Swimming Championship among veterans in freestyle swimming 50 meters distance.
The cycle of 26 training lessons wasn’t enough in order to improve the female athlete’s fitness state (the state of sports fitness is characterized by the stability of the demonstrated by a sportsman results during training lessons and during competitions), which correlates with the results received by A.P. Bondarchuk (2015), who claims that in order to achieve the state of fitness, using a complex method of the training process organization, 40 and more training lessons are necessary [3]. To a certain extent the state of fitness formation was violated by the content change of the training lessons (replacement of the exercises “swimming with maximal and submaximal speed 25 meters distance from the start” by the exercises “swimming with maximal and submaximal speed 50 meters distance from the start” during the training lessons at the final stage of training). At the same time, purposeful and optimal character of the training loads, in case of enough time for recovery of the female athlete between the training lessons, provided the increase of her special training level and it is reflected in the dynamics of the results, stated during the training lessons.

We consider 4 weeks course of general health-improving Tibetan herbal tea, prepared according to N. A. Badmaev formula, effective.

Earlier we were sceptical about the effectiveness of a single pre-competitive (pre-start) laser stimulation, not denying, however, the urgent effect of a sportsman’s working capacity increase after a single laser procedure.
The use of transcutaneous polyzonal laser method impact by the female athlete at the Russian Championship helped us to reconsider the attitude to the use of laser stimulation during pre-start training of athletes, however, we still think that the course use of laser stimulation at the stage of pre-competitive training is more effective.

According to the results of the held research we came to the following conclusions:

1. The use of a system physiology laws in the training process planning and organization guarantees its effectiveness.

2. Purposiveness and an optimal character of the training loads in combination with full regeneration of an athlete between the training lessons is the base for an effective training process.

3. The effectiveness of a swimmer’s training process organization complex method is proved.

4. The effectiveness of respiratory exercises, according to the methodology of A.V. Siderskiy, in training a swimmer was proved.

5. A course use of general health-improving Tibetan herbal tea, prepared according to N. A. Badmaev formula, is effective as an additional means of sports working capacity increase.

6. Additional evidence was received about the effectiveness of pre-start laser stimulation with the use of transcutaneous polyzonal laser method impact for sports working capacity increase.

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TO THE QUESTION OF THE PHYSICAL CULTURE LESSON CONTENT AND STRUCTURE DEVELOPMENT, AIMED AT THE TRP COMPLEX STANDARDS IMPLEMENTATION TRAINING

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Annotation. Within the framework of the present study, issues related to the development of the structure and content of physical culture lessons aimed at training for the All-Russian Physical Culture and Sports Complex "Ready for Labor and Defense" (WFSK TRP) testing were studied.

Material. At the present time, it is still not clearly defined, by what forms of physical exercises it is necessary to train for the surrender of TRP standards. In connection with this, the purpose of the study was to find the most appropriate forms of training for the successful implementation of TRP standards and justify their structure and content. 144 physical culture teachers of the Krasnodar region general educational organizations took part in the study. The developed questionnaire covered issues aimed at obtaining information on the selection of the most appropriate forms aimed at training for the TRP's tests, as well as the scope, structure and content of physical education lessons as a possible form for the TRP training. Research methods: analysis and synthesis of the scientific literature, questionnaires, statistical data processing. Results. The findings of the study indicate that the most appropriate forms of physical exercises in training for the TRP are physical culture lessons. The amount of time for lessons to train for TRP testing, according to experts, should be: physical training - 57.7%; technical training - 21.4%; theoretical - 11.1% other - 10.0%. When distributing the "Physical training" section, exercises should be used to bring up all physical qualities, but the degree of their priority may be different. In particular, the motor tasks aimed at fostering endurance, strength and speed-strength abilities are priority. Conclusion. The information obtained in the course of the research makes it possible to develop the structure and content of the lessons aimed at training for the WFSK TRP tests fulfilled. These lessons should be included in the variable part of the physical education program or in the section "Physical improvement" of the program basic part.

Keywords: All-Russian physical culture and sports complex "Ready for work and defense", standards, forms of employment, "lesson of the TRP", questionnaire.

Introduction. All-Russian sports and fitness complex "Ready for work and defense" is valid for only three years. Despite such a short period of time, it has come a long way and at the moment, in fact, becomes our country citizens physical fitness standard [3]. According to the number of specialists [6, 7, 8, etc.] the introduction of the Complex will create an effective state system for the population physical education. In this regard, the implementation of TRP standards with the appropriation of relevant publicly significant distinctions is a powerful motivational incentive for systematic physical training [6, 9, 10, etc.].

At the same time, the data of numerous studies [1, 4, 11, 14, 15, etc.] certify that the indicators of our country population and above all of the younger generation physical preparedness are at a very low level. This fact indicates that the methodology for the TRP test training is not effective enough. In particular, it is not defined, by what forms of physical exercises it is necessary to carry out.

In this regard, the aim of the study was to find the most appropriate training forms for the successful delivery of TRP standards and to justify their structure and content.

Methods and organization of the research. In the framework of this study, a survey of physical education teachers was conducted to determine the priority form of training aimed at training for the implementation of the WFTU TRP regulatory requirements.

Physical culture teachers of the Krasnodar region general educational organizations took part in the study. The total number of respondents included 144 participants whose professional service averaged 12.1 ± 0.72 years.

The questionnaire developed by us covered questions aimed at obtaining information on the selection of the most appropriate forms aimed at training for the TRP testing, as well as the scope, structure and content of physical education lessons as a possible form for the TRP training.
Results of the research and their discussion. First of all, it is necessary to find out: what form of physical training is most suitable for the TRP tests training. The results obtained in answering this question are presented in Table 1.

Table 1

<table>
<thead>
<tr>
<th>Forms of physical training, recommended by teachers for the TRP complex tests training.</th>
<th>Teachers’ opinions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical education lessons</td>
<td>70.1 ± 3.81%</td>
</tr>
<tr>
<td>Sectional lessons in the form of sports, as well as in groups of General Physical Training</td>
<td>50.0 ± 4.17%</td>
</tr>
<tr>
<td>Self-employment</td>
<td>38.9 ± 4.06%</td>
</tr>
<tr>
<td>Physical culture and sports events</td>
<td>28.4 ± 3.76%</td>
</tr>
<tr>
<td>Morning hygienic gymnastics (charging)</td>
<td>8.3 ± 2.30%</td>
</tr>
</tbody>
</table>

Analysis of the data presented in Table 1 shows that the majority of experts (70.1%) consider the most appropriate form of physical exercise in training for the TRP - physical culture lessons. Indeed, despite the fact that there are various forms of training aimed at improving the level of physical fitness, physical education lessons have been and remain the most sought-after activity in this plan. This is due to the fact that the physical education lesson is an obligatory form of organized physical exercises, which is conducted on scientifically based programs under the guidance of highly qualified specialists. In our opinion, if there is an employment form that will allow to change the negative situation, connected with the population physical preparedness level, this is, first of all, physical culture lesson. While, according to some experts [2, 5, 11], the effectiveness of the physical education lesson is not yet fully exhausted. Accordingly, its capabilities should be developed and improved, based on existing realities and current scientific achievements.

Less significant, but quite common are sectional classes in sports. For their use as training for the TRP 50% of the respondents expressed their opinion. However, it must be born in mind that classes in sports are largely aimed at the formation of special physical qualities, and skills that do not always meet the requirements of the TRP. At the same time, in the framework of sports training, there must be a section "General physical training", which, among other things, can be used to train for the TRP's tests.

As for classes in general physical training groups (PTG), it should be acknowledged that they are currently not sufficiently popular. At the same time, it is assumed that classes in these groups will be in demand if their content is reoriented to train for the WUSC TRP testing.

The popularity of independent studies in training for the TRP's tests for implementation among respondents is on average about 39%. The main advantage of independent training sessions is the possibility of selecting for them convenient time and comfortable conditions. But independent physical training is expedient only if the competitor has a sufficient competence level in the field of physical education [13].

Training the population for the TRP in the framework of physical culture and sports events, as well as the morning hygienic gymnastic can be used, but will be less effective, since they are mainly aimed at solving other problems.

Thus, the data presented allow us to determine the priority forms of physical exercise in order to train for the TRP trials.

The next stage was the teachers opinions study regarding to the amount of study time devoted to various types of testing training. The data obtained are presented in Table 2.
The amount of time required to train for the TRP standards implementation

<table>
<thead>
<tr>
<th>Types of training</th>
<th>Teachers' opinions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical training</td>
<td>57.7 ± 1.35%</td>
</tr>
<tr>
<td>Technical training</td>
<td>21.4 ± 1.12%</td>
</tr>
<tr>
<td>Theoretical training</td>
<td>11.1 ± 0.51%</td>
</tr>
<tr>
<td>Other</td>
<td>10.0 ± 0.43%</td>
</tr>
</tbody>
</table>

Analysis of the study results shows that experts assign the largest amount (on average 57.7%) of study time to physical training (upbringing physical qualities). This is due to the peculiarities of the TRP's tests structure, in which mandatory tests are aimed at assessing the basic qualitative physical qualities (speed, endurance, strength, flexibility).

To successfully pass the tests you also need the correct technique for fulfilling the exercises. Therefore, when training for testing it takes some time to learn the correct procedure for testing. For example, when carrying out the test "flexing and extending the arms in the rest lying on the floor," not only the number of movements is taken into account, but also the strict observance of the rules: the elbow is no more than 45° apart; touching the "contact platform" with the breast; the need to keep the head, trunk and legs on a straight line, etc. Taking this into account, experts recommend for the technical training of the TRP's tests 21.4% of the study time.

Theoretical training is the process of arming students with special knowledge aimed at mastering the ability to perform motor actions. Underestimation of theoretical training leads to the lack of the exercise essence understanding [8]. Apparently, on the basis of this, teachers in planning the training for testing of the WFSK TRP are recommended to include the corresponding theoretical section. At the same time, the total amount of time devoted to theoretical training should be about 11% of the study time.

In the "other" section, experts most often indicated psychological training. This training type is aimed at shaping the personality traits of students necessary for the activities successful performance related to the reliable performance of the TRP's tests. Indeed, when testing WFSK TRP such moral and volitional qualities as perseverance, self-control, endurance, purposefulness, etc. are required. Therefore experts consider to include this species in the general plan for TRP testing training in the amount of 10% of the study time.

As noted above, the main component of lessons aimed at the TRP training are exercises related to the physical qualities upbringing. This makes time for specific physical abilities formation. According to experts participating in the survey the greatest amount of time devoted to physical training should be provided by exercises aimed at fostering endurance. In the section "physical training" these exercises, according to teachers, should be 21.7% (Table 3).

Smaller volume amounting to slightly more than 18%, should, according to respondents, include motor tasks aimed at developing power capabilities.

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Smaller volume amounting to slightly more than 18%, should, according to respondents, include motor tasks aimed at developing power capabilities.

Table 3

<table>
<thead>
<tr>
<th>Physical qualities and abilities</th>
<th>Teachers opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endurance</td>
<td>21.7 ± 0.61%</td>
</tr>
<tr>
<td>Force</td>
<td>18.2 ± 0.41%</td>
</tr>
<tr>
<td>Speed-power</td>
<td>17.4 ± 0.53%</td>
</tr>
<tr>
<td>The rate of speed</td>
<td>16.9 ± 0.42%</td>
</tr>
<tr>
<td>Flexibility</td>
<td>14.9 ± 0.46%</td>
</tr>
<tr>
<td>Dexterity</td>
<td>13.4 ± 0.45%</td>
</tr>
</tbody>
</table>

For the education of high-speed and speed-strength qualities, experts recommend about 17% of time spent for physical training. Education of flexibility and dexterity, in their opinion, should be respectively, 14.9 and 13.4%.

Thus, in the distribution of the section "Physical training" exercises should be used aimed at upbringing all physical qualities, but the degree of their priority may be different.

When answering the question about the content of the TRP lessons, the opinions of the experts were significantly divided. In particular 50% of respondents believe that at these lessons an advantage should be given to exercises that are similar in structure to those of the WFSK TRP. The same number of experts within the framework of such lessons suggest using exercises of different orientations.

In our opinion, it is impossible to speak so categorically about the content of the TRP lessons. We believe that in order to train for the tests, the TRP should be used as exercises similar in structure to the TRP's tests and exercises of different orientation. At the beginning of the academic year (in the process of the "preparatory" period) it is expedient to use various physical exercises in the direction, volume and content and as we approach the testing procedure, change the nature of the motor tasks towards the "approach" to the TRP.

Conclusion. The information obtained in the course of the research makes it possible to develop the structure and content of the lessons aimed at preparing for the performance of the WFSK TRP tests. These lessons ("TRP lessons") can be included in the variable part of the physical education program or be a component of the "Physical Improvement" section of the basic part of the program.

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WEIGHTLIFTING MEANS EFFECTIVENESS DURING POWER ABILITIES DEVELOPMENT AMONG 9-11-YEAR-OLD CHILDREN

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Annotation. In the article the effectiveness of weightlifting elements in harmonization of 9-11-year-old pupils physical development is proved, antropometric development and power development indices in the author’s methodology of power abilities development are corresponding. Material. The empirical basis of the research was the measurement of antropometric and morpho-functional indicators, indicators of test exercises for general and special physical training of 9-11 years pupils in the control and experimental groups. Methods. Theoretical and methodological analysis of the power abilities development in primary school children, pedagogical observation, anthropometry, pedagogical testing, pedagogical experiment, methods of statistical data analysis are applied. Effectiveness of the weightlifting means and methods use in the educational program of non-specialized educational institutions for children of primary school age is confirmed, an annual program of an educational course on the development of power skills taking into consideration our methodology is corrected. Conclusion. By the results of the empirical data analysis, tendencies of physical development harmonization are revealed and the growth of performance indicators in the experimental group general education key areas of knowledge is confirmed

Keywords: physical culture and sports activity, students, unity of motor and intellectual activity, personality-oriented approach, physical readiness, attendance and academic performance.
As a result of considering the format, structure, elements and the algorithm of the program of power abilities development, by means of weightlifting among primary school age children, current physical development indices among children of this age group were analyzed in different regions of the Russian Federation and were compared with the normatives of WHO (World Health Organization) (Publication: “Disharmonic modern physical development of 9-11-year-old children”). As a result the urgency of creation and introduction of new physical development methods among children was proved experimentally. The base for this statement is revealed in all studied regions disharmonic character of morphologic-functional state of children, including evident overweight in terms of deceleration in growth and unproportional development of chest and waist. Scientists come to the conclusion that it can be conditioned by a new form of asthenization and it needs measures creation in order to level these negative indices and harmonize children’s physical development [4, 5, 7].

The aim of the research: to study the formation of power abilities among 9-11-year-old children and create the methodology of their development by means of weightlifting.

The object of the research: the process of power abilities formation among primary school age children (9-11-year-old).

The subject of the research: means and methods of weightlifting, which provide effective increase of power abilities indices among primary school age children.

Objectives of the research:
1. To analyze theoretical-methodological basis of power abilities formation among pupils, in particular modern approaches with the use of weightlifting means and methods, taking into consideration age-related peculiarities.
2. To create the program of the research determining and substantiating the most effective methods.
3. To create experimental substantiation of the power abilities development methodology among primary school age children using weightlifting means and methods while creating:
   a) content and structure of the experimental methodology;
   b) means for power abilities development among pupils;
   c) the plan of physical load distribution in terms of physical fitness of pupils.
4. To estimate the effectiveness of the created power abilities development methodology among primary school age children:
   a) to analyze the dynamics of changes and results of anthropometric indices increase and morphological-functional characteristics among 9-11-year-old pupils in the control and experimental groups;
   b) to fulfill the comparative analysis of indices changes dynamics in test exercises of physical fitness among 9-11-year-old children in the control and the experimental groups;
   c) to study the influence of power abilities development with the help of weightlifting means on the level of progress among primary school age children in terms of educational program;
   d) to create practical recommendations, concerning power abilities formation among primary school age children with the help of weightlifting means, on the basis of the research results.

Research methods and research organization. Pedagogical experiment was held during September-October, 2016 at Moscow gymnasium №491. Two 2nd forms and one 3rd form took part in the experiment. The number of children was 84: control group 1 (the 2nd form pupils) - 29 people; control group 2 (the 3rd form pupils) - 26 people; experimental group (the 2nd form pupils) - 29 people.

The first stage of the research works included the first (introductory) test, teaching correct fulfillment of the exercises and the stated load.

The second stage included pedagogical experiment itself, which provided different means and methods use (September-October, 2016) in terms of Physical culture educational program, unit “Track and field”. In the control groups lessons were held according to generally adopted program; in the experimental group a lesson was divided into two parts: the 1st part -25 minutes were given
for mastering the means of generally adopted program; the 2nd part - 20 minutes was devoted to created by us methodology, using weightlifting means (table 1). At the end of the second stage one more test was held (October, 2016).

The main criterion of the pedagogical experiment was the increase in test exercises.

Table 1 – Methodological recommendations concerning weightlifting means introduction into the unit “Track and field” of Physical culture general educational program for the 2nd-3rd forms

<table>
<thead>
<tr>
<th>Units</th>
<th>Name of the exercise</th>
<th>Dosing</th>
<th>The influence of the load on the definite groups of muscles</th>
<th>Organizational -methodical recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Track and field</td>
<td>1. Jumps on a low vaulting box 5/5; 2. Burpee 5/5 3. Bodybar chest press 5/5 weight 4kg</td>
<td>20 min</td>
<td>Legs muscles strengthening, explosive power of the developed groups of muscles upbringging</td>
<td>Back straight, jumps are fulfilled from half-squat position, bent knees. Two legs push-off. Burpee is fulfilled from prone position at bent arms, after a press-up stand up and clap hands behind neck.</td>
</tr>
<tr>
<td>Track and field</td>
<td>1. Jumps with bodybar from sitting position 6/5, weight 3kg 2. triple jumps 3/3 3. Prelum 15/3</td>
<td>20min</td>
<td>Exercises for back and legs muscles.</td>
<td>Jumps are fulfilled from sitting position jumping upwards, back straight, bodybar is settled on the shoulders.</td>
</tr>
<tr>
<td>Track and field</td>
<td>1. Squatting grasp with a jerk, with bodybar. 5/5weight 4kg 2. Bodybar pull with a jerk 5/5, weight 6kg 3. “Boat” exercise10 s/3</td>
<td>20min</td>
<td>Exercises for holding balance, for legs and back muscles.</td>
<td>Hands straight, bodybar is over the head. Rest between the attempts 40-50 sec. “Boat” exercise is fulfilled with back straight and lumbus bent, hands behind the head.</td>
</tr>
<tr>
<td>Track and field</td>
<td>1. Jumps on a high vaulting box 6/5 2. Medball throwing behind-the-neck sitting, 1kg 3/3</td>
<td>7min</td>
<td>Legs and arms muscles strengthening, speed-power qualities and explosive power development.</td>
<td>Back straight, landing in jumping is fulfilled with the legs bent. Two legs push-off. Throwing with two hands behind-the-neck.</td>
</tr>
<tr>
<td>Track and field</td>
<td>1. Arms bending-extension exercise with a medball behind-the-neck, 2kg 12/3 2. bodybar press from sitting position, 5/5 weight 4kg</td>
<td>20min</td>
<td>Exercises strengthen arms and back muscles.</td>
<td>Arms bend till 90 degrees, unbind straight upwards, press from sitting position is fulfilled with the back straight.</td>
</tr>
</tbody>
</table>
Units | Name of the exercise | Dosing | The influence of the load on the definite groups of muscles | Organizational-methodical recommendations
---|---|---|---|---
Track and field | 1. Jumps on a low vaulting box 7/5, 2. Burpee 7/5 3. Bodybar chest press 8/5, weight 4kg | 20 min | Exercise strengthens legs muscles, develops speed-power qualities, press develops shoulder girdle muscles. | Back straight, jumps are fulfilled with half-squat position. Two legs push-off. Burpee is fulfilled from prone position at bent arms, after a press-up stand and clap hands behind neck.


Track and field | 1. squatting with bodybar at chest 5/5 2. Bodybar pull with a jerk 5/4 3. “Boat” exercise 10s/3 | 20 min | Exercises for holding balance, for legs and back muscles. | Hands bent, bodybar is on the chest, back is bent back, elbows ahead. Rest between the attempts 40-50 sec. “Boat” exercise is fulfilled with back straight and lumbus bent, hands behind a head. Pull is fulfilled with a broad grasp.

Research results and their discussion. As a result of empiric data it was possible to reveal considerable differences in several anthropometric and morphological-functional indices.

Concerning arms, legs, back muscles strength evident improvement was among the experimental group (EG), where in comparison with both control groups, there was a harmonious increase.

In the control group 1 (CG1) power indices of back, legs muscles have insignificant increase: maximum increase value – 12 kg, the average index increase – 3kg. At the same time, the index of arms power has more distinct increase. Power indices increase after the experiment is proportional to initial power indices before the experiment).

In the control group 2 (CG2) power indices also increased not so evidently: the average increase of back dynamometry index was 3.9 kg, carpal dynamometry-3 kg. In some cases changes were absent. At the same time, we can see disproportional development of back and carpal dynamometry indices- back and legs muscles development “doesn’t coincide” with hands muscles development among pupils from the control group 2.

At the same time, in the EG there is evident power indices increase of hands, back,
legs muscles in a clear ratio (“balance”) of indices after the experiment with the indices at the beginning of the experiment.

**Picture 1— Results dynamics of back and carpal dynamometry testing before and after the experiment in control group 1 (n=29), kg**

Динамометрическая тяга (становая динамометрия), до эксперимента – Dynamometric draft (back dynamometry), before the experiment

Динамометрическая тяга (становая динамометрия), после эксперимента – Dynamometric draft (back dynamometry), after the experiment

Динамометрия-правая рука (кистевая динамометрия), до эксперимента- Dynamometry-right hand (carpal dynamometry), before the experiment

Динамометрия-правая рука (кистевая динамометрия), после эксперимента- Dynamometry-right hand (carpal dynamometry), after the experiment

**Control group 1**

The indices of a harmonious increase of height didn’t change, but, undoubtedly, changed natural values.

Concerning weight there is break decrease in the separate values and it means, that there is some level of harmonization at the end of the experiment.

In the coefficient of weight and height ratio some harmonization is proved and it is the sign of positive changes.

Variance decrease (variation) of dynamometric draft to 11, 13 units, range decrease to 8 units and lower bound increase to 8 units prove more homogeneous results at the end of the experimental period. At the same time, considerable change was in the homogeneous character of the index increase – back and legs muscles power developed and became more harmonious. Right hand dynamometry has insignificant decrease of all indices.

The range of chest volume indices didn’t change, but inconsiderably increased the break between the separate values (variance) - from 3,71 to 3,78 units, and in general it gives the idea of the single deviations, conditioned by age-related changes. The range of shoulder circumference also didn’t change. At the same time, the spread in some values decreased...
insignificantly. Lower arm circumference, the increase of the upper border of values, the average index and of variation of the separate values increased. It can be said, that there is insignificant development of a forearm in the absolute value inside CG1.

Waist line stayed the same, the level of the separate values variation decreased – the index of insignificant harmonization in waist development.

There is insignificant increase of the hip circumference mean value and the level of some values variation decreased – the index of insignificant harmonization in a hip development.

More significant increase got the mean value of calf circumference and insignificantly increased some values variance – the index of changes absence in calf development harmonization.

*Picture 2 – Results dynamics of back and carpal dynamometry testing before and after the experiment in control group 2 (n=26), kg*

Динамометрическая тяга (становая динамометрия), до эксперимента – Dynamometric draft (back dynamometry), before the experiment
Динамометрическая тяга (становая динамометрия), после эксперимента – Dynamometric draft (back dynamometry), after the experiment
Динамометрия-правая рука (кистевая динамометрия), до эксперимента- Dynamometry-right hand (carpal dynamometry), before the experiment
Динамометрия-правая рука (кистевая динамометрия), после эксперимента- Dynamometry-right hand (carpal dynamometry), after the experiment
Динамометрическая тяга (становая динамометрия), до эксперимента – Dynamometric draft (back dynamometry), before the experiment
Динамометрическая тяга (становая динамометрия), после эксперимента – Dynamometric draft (back dynamometry), after the experiment
Динамометрия-правая рука (кистевая динамометрия), до эксперимента- Dynamometry-right hand (carpal dynamometry), before the experiment
Динамометрия-правая рука (кистевая динамометрия), после эксперимента- Dynamometry-right hand (carpal dynamometry), after the experiment
Thus, the situation with the groups is the following:

**Control group 2**
In CG2 height increase was more evident – minimal and maximum values increased, as well as the mean value. At the same time, the difference inside the group index increased and it proves heterogeneity of development. In weight of the respondents there was also proportional increase, relevant to age period and passed time. The variance of weight indices inside the group slightly increased.

In the coefficient of weight and height ratio within one academic year changes are insignificant - some spread in values decrease, but a lower bound of weight and height values reflects the increase. Considerably reduced the break of values inside the group according to dynamometric draft index and it proves a considerable harmonization level of back and legs muscles power index.

In carpal dynamometry in CG2 the range of values increased, at the same time, inner “consistency” of values almost didn’t change – the level of development harmony in dynamics didn’t change.

In chest circumference changes in natural volume were insignificant and the indices of development harmony slightly increased. The situation with lower arms, waist and shin circumferences is the same.

Hip circumference is distinguished by a moderate decrease of indices range, it means that there is some harmonization of development.

**Experimental group**
Height changes among children from the EG is the same as with children from the CG2, and changes in weight are the same as with the children from the CG1: height increase with weight increase in terms of
increasing inside the group difference in height (disbalance) and decreasing difference in weight (balance).

Bodymass index reflects harmonization of development.

Considerable changes in terms of both control groups are seen in muscles power indices, especially in back and legs muscles—mean value of the index increased 2.5 times.

Mean value of carpal dynamometry showed the increase twice relative to both control groups. At the same time, in the range of values there is a positive increase relative to the groups 1.5-1.8 times.

Chest, shoulder and forearm circumference was measured more evenly, than in the control groups and formed more harmonious results of values.

It should be noted that waist circumference decreased in the range of the values and in natural value and it together with insignificant changes of dispersion also can be considered as the index of harmonization.

Less expressed are the indices of hip and calf circumferences (but they are in the range of the same values).

On the basis of the received results the offered author’s program for development harmonization of primary school age children is directed at power of the main muscular groups development and strengthening, symmetric body shape and correct bearing formation, weight-height characteristics correction of 9-11-year-old children.

The received results of children’s development at the end of the experiment are compared with the norms of WHO (World Health Organization) (Publication: “Disharmonic modern physical development of 9-11-year-old children”).

In CG1 there is not high general level of changes in anthropometric and morpho-functional indices. In CG2 there is also not high general level of changes in anthropometric and morpho-functional indices, at the same time, the key direction is in the sphere of physical development and power indices development disbalance.

According to the analysis of empirical data the tendencies of physical development harmonization in the experimental group are revealed, where power development indices considerably exceed the level of the control groups. High results in these exercises among the pupils from the experimental group are conditioned by power orientation of the used loads and the increase of muscular mass in case of regular training.

During progress in studies comparison (table 2) among primary school age children according to the program of comprehensive school there is a higher statistics of progress among the pupils from the EG in comparison with the pupils from the control groups in most cases, which is conditioned by a high level of organization and stress resistance by means of volitional qualities upbringing during physical culture lessons on the basis of created by us methodology.

Table 2 – Statistics of progress in studies among primary school age children according to the course of educational program

<table>
<thead>
<tr>
<th>Subject</th>
<th>Average grade, EG</th>
<th>Average grade, CG1</th>
<th>Average grade, CG2</th>
<th>Mean value according to 2 CG</th>
<th>The level of progress increase EG</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>4,3</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>0,3</td>
</tr>
<tr>
<td>Fine arts</td>
<td>4,7</td>
<td>4,8</td>
<td>4,5</td>
<td>5</td>
<td>0,0</td>
</tr>
<tr>
<td>Computer science (Information-communication technologies ICT)</td>
<td>4,9</td>
<td>4,8</td>
<td>4,3</td>
<td>5</td>
<td>0,3</td>
</tr>
<tr>
<td>Dramatic reading</td>
<td>4,5</td>
<td>4,3</td>
<td>4,2</td>
<td>4</td>
<td>0,3</td>
</tr>
<tr>
<td>Subject</td>
<td>Average grade, EG</td>
<td>Average grade, CG1</td>
<td>Average grade, CG2</td>
<td>Mean value according to 2 CG</td>
<td>The level of progress increase EG</td>
</tr>
<tr>
<td>----------------------</td>
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<td>--------------------</td>
<td>--------------------</td>
<td>-----------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>Mathematics</td>
<td>4,3</td>
<td>3,8</td>
<td>3,9</td>
<td>4</td>
<td>0,4</td>
</tr>
<tr>
<td>Music</td>
<td>5</td>
<td>5</td>
<td>4,7</td>
<td>5</td>
<td>0,1</td>
</tr>
<tr>
<td>Surrounding world</td>
<td>4,4</td>
<td>4,3</td>
<td>4,3</td>
<td>4</td>
<td>0,1</td>
</tr>
<tr>
<td>Russian</td>
<td>4,1</td>
<td>3,6</td>
<td>3,8</td>
<td>4</td>
<td>0,4</td>
</tr>
<tr>
<td>Technology</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>0,0</td>
</tr>
<tr>
<td>Physical culture</td>
<td>5</td>
<td>5</td>
<td>4,9</td>
<td>5</td>
<td>0,0</td>
</tr>
</tbody>
</table>

The system of self-control, which is an integral part of physical exercises, organizes and conditions all spheres of children’s life, first of all, during new knowledge gaining and mastering.

**Conclusion.**

In terms of the research in order to solve the set objectives we analyzed the main theoretical-methodological approaches to the process of power abilities formation among 9-11-year-old children with author’s definitions revelation for further work. Weightlifting means and methods were qualified in order to develop effectively power abilities among primary school age children, on the basis of which the author’s methodology was created and experimentally substantiated and also the course of physical culture lessons was formed for unspecialized general education establishment.

The program of the research was created with the most effective methods determination and substantiation.

Experimental substantiation of the power abilities development methodology among primary school age children is created with the use of weightlifting means and methods use:

a) content and structure of the experimental methodology;

b) means for power abilities development among pupils;

c) the plan of physical load distribution in terms of pupils physical fitness.

The effectiveness of the created methodology of power abilities development among primary school age children was estimated:

a) the dynamics of changes and results of anthropometric indices increase and morphological-functional characteristics among 9-11-year-old pupils in the control and experimental groups was analyzed;

b) the comparative analysis of indices changes dynamics in test exercises of physical fitness among 9-11-year-old children in the control and the experimental groups was fulfilled;

c) practical recommendations, concerning power abilities formation among primary school age children with the help of weightlifting means, on the basis of the research results were created.

The main hypothesis, which was in educational program creation and introduction on the basis of weightlifting means and methods and which took into consideration age-related physiological and social-psychologic peculiarities of the age period and the specificity of unspecialized general education establishment, helped to have a positive influence on physical development of children, was proved.

In the experimental group of primary school age children a considerable increase of power indices development was proved in terms of the tendency to physical indices harmonization. In the control groups, where there were no elements of weightlifting in the program of physical development as the means of power abilities development, there were heterogeneous results, which reflected the absence of balance in physical development and power indices.

Also the sampling showed the presence of correlation between power abilities development by means of weightlifting and the
level of progress in studies among 9-11 year-old children.

The conclusions from the results of power abilities development analysis among primary school age children by means of weightlifting can be used at the stage of educational programs and curricula formation and realization at unspecialized general and further education establishments.

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THE ORGANIZATION OF SCHOOLCHILDREN PHYSICAL TRAINING IN SPECIAL MEDICAL GROUPS

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Annotation. Pedagogical analysis of special medical groups results in the Astrakhan region schools allowed us to determine substantial differences in the methods and forms of educational process on physical education organization, as well as pedagogical and medical control. Material. The paper presents a research of carrying out physical education lessons forms and methods in the Astrakhan region secondary schools, in special medical groups "A" and "B". Determination of differentiated physical activity level for schoolchildren with pathological changes in health status is presented. Research methods. Analysis of the annual and ongoing medical examinations results, functional tests, clinical data of health care institutions (MH), pedagogical control. Results. The research was conducted to determine the effectiveness of physical education lessons in secondary schools special medical groups. These results justify that an adequate selection of pedagogical methods, as well as educational groups differentiation on the disease, will help to optimize the schoolchildren physical condition and health. Rational organization of lessons will allow to use individually means of physical education in health and rehabilitation purposes depending on the pathology. Keywords. special medical group, physical culture, pedagogical and medical control.

Introduction. According to the Astrakhan Committee of state statistics, the incidence in the region among schoolchildren over the last five years increased dramatically. The overall incidence increased by 23%, infectious diseases - 53%, neoplasms - 84%, diseases of the endocrine system and metabolic disorders - 20%, diseases of the nervous system - 40%, circulatory system diseases - 32%, respiratory 20%, diseases of the digestive system - 43%, musculoskeletal system - 24%, diseases of the genitourinary system - 63% [10]. (Fig. 2). At the same time, many experts believe that adequate exercise allows to increase the reserve capacity of the organism [1,2,4,5,6,7,8,9]. Increase of the organism adaptive capacity to the increasing physical activity helps to improve the activation of tissue metabolism and redox processes [3]. Thus, the problem of physical training of children with chronic diseases not only lost its
relevance, but on the contrary, in recent years, became more significant.

**Research organization.** The research was conducted with schoolchildren in 10 Astrakhan region schools in 2014 – 2016, schools were determined by random sample. In the course of work functional tests, methods of practical training of special medical groups "A" and "B", the data of regular medical examinations were analyzed. The research was carried out using the program for work with electronic tables in Microsoft Excel 2007 with macro complement to XLSTAT –Pro (Microsoft, USA), a software package for statistical analysis Statistica10 (Stat Soft Inc. USA). The research was conducted on the bases of Astrakhan region secondary schools.

**The results of the study.** In the result of the research it was determined that in most schools (over 80%) in classes with a contingent of special medical groups lessons were conducted by the physical education teacher and in many cases these activities were combined with the main and preparatory groups.

In other schools the classes were held on the basis of health centers, clinics medical physical education (physical therapy) clinics. Lessons of physical education in these cases were conducted by the methodist or physiotherapist. In addition, it was revealed that in 20% of schools there was no impaired children physical education system, in 70% of schools lessons in SMG were held by physical education teachers and only in 10 % of schools classes were conducted by physiotherapists in well-equipped halls (Fig. No. 1). Almost in all schools the distribution of schoolchildren in medical educational groups was based on the results of the annual medical checkup or according to the conclusion of the medical – preventive establishment (TPI), correction of the medical group in the course of the school year was recorded rarely. Children referred to the special medical group "B" in 72% of schools were exempted from practical lessons and only their presence in the classroom was recorded. Monitoring of the cardiovascular system hemodynamic parameters in the SMG class "A", was conducted episodically mainly when the schoolchildren were performing exercises for overall endurance. The vast majority of classes SMG "A" were combined with lessons of the main and preparatory medical groups, making it difficult to conduct individual control of the volume and intensity of physical activity for schoolchildren of the respective medical groups. Differentially structured study material of practical exercises in accordance with the existing pathology was used in most cases rather formally by children, due to a number of factors, the main of which, in our opinion, were: lack of qualified physical education teachers, and combined practical training of MMG and SMG.

In 93% of cases because of maladaptive reactions development risk of SMG "B" schoolchildren in the performance of motor tasks of the physical education teacher freed older students from practical classes and the development of the subject was restricted to theoretical section in the form of writing tasks essay, and in elementary and middle school physical education was confined to the presence in the classroom.
Fig. 1.

The ratio in Astrakhan region schools SMG physical education organizational forms

Fig. 2.

The incidence increase of the Astrakhan region secondary school children

Conclusion. Thus, the research indicates that training at secondary schools special medical groups in many cases is held formally and individually structured teaching material is used not in full. The combination of basic and special medical groups for physical education classes does not allow to differentially control the intensity of children with various pathologies motor actions execution. The risks of developing
disadaptation reactions to physical activity of students referred to special medical group "B" lead to a situation where the certification of the subject is conducted mainly by the presence in the classroom.

Based on the foregoing, we can conclude that the combination of the main and special medical groups activities in practical lessons does not solve the issues of recovery and rehabilitation, when using the means of physical education for children with deviations in health. Separate lessons for UMG and SMG, as well as individual educational and current medical control will allow timely adjustments to the pathological condition of children by means of physical education, increasing the reserve capacity of their organism.

References

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THE LEVEL OF MOTIVATION FOR PHYSICAL CULTURE LESSONS AMONG STUDENTS OF HIGHER EDUCATIONAL ESTABLISHMENTS

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Annotation: The urgency of the research is conditioned by the fact, that modern requirements for the process of physical upbringing among students predetermine the necessity to create and use new technologies of teaching, new principles of educational process organization and new forms of physical readiness and functional state control and estimation. In this context, during physical upbringing technologies creation, which should provide and increase the level of motivation, it is necessary to understand clearly what kind of demands and needs stimulate realized going in for physical culture and sport among students and what main trends form motivation for these lessons. It is also important to know how changes the structure of motivation during the whole period of education at a higher educational establishment. These details should form the base of all components of physical upbringing process among students. Material. The main demands, needs, “expectations”, motivational stimuli and their level revelation among students of humanitarian higher educational establishments. Research methods: scientific literature analysis and summarizing, questionnaire survey, methods of mathematical statistics. Results. In order to solve the set problem questionnaires for students were created and interviewing in two higher educational establishments of Pyatigorsk - Pyatigorsk Medical- Pharmaceutical Institute- the branch of the Federal State Budgetary Educational Establishment of Higher Education “Volgograd State Medical University” and Pyatigorsk State University was held. The results of interviewing showed, that most students wanted
to increase the level of their physical readiness. Most students go in for physical exercises in order to improve health and appearance and most of them like physical culture, after lessons they feel good. Most respondents would like to get regular information about the level of own physical readiness and functional state, predominantly about weight and height, endurance and physical working capacity, and it mainly corresponds with the desires of teachers. It should be noted that there was a high percentage of “indifferent” to physical exercises students, whose state after the lessons was not quite satisfactory.

**Conclusion.** It should be noted that the lowest level of interest in physical culture, some kind of indifference to systematic monitoring of own state and even health was among students of the 2nd course. These facts prove a low level of motivation for physical exercises. It can be connected with the fact that at the 2nd course the greatest volume of educational material is mastered and the load is maximal. This circumstance determines the definite “problem” category of students and predetermines special attention to it in all aspects of physical upbringing process at a higher educational establishment.

**Keywords:** students, physical upbringing, physical readiness, functional state.

**Urgency.** Nowadays the required course of physical culture at higher educational establishments helps to solve the problem of the main physical qualities (endurance, quickness, flexibility, power, dexterity and a person’s physical culture formation) complex development. At the same time, a very important aim of physical upbringing at a higher educational establishment is students’ requiremental- motivational sphere formation in physical activity [1, 2, 10, 12].

The effectiveness increase of physical training process among students of higher educational establishments, which becomes more and more urgent, is impossible without taking into account individual characteristics, needs and motivation of students [4, 6, 7].

It is mentioned in the literature, that in order to activate students’ physical activity and form the main components of motivational sphere, physical upbringing course should be based on personality-oriented pedagogical technologies, which should provide taking into consideration physical-sports interests and needs of students, characteristics of gender, health state, the level of physical readiness [3, 8, 11].

Only if the interests of the individual are satisfied, it is possible to provide realized motivation formation for physical culture, which will be the base for considerable improvement of students’ physical readiness and their health state improvement [5, 9, 10, 13]. That is why it is necessary to create and scientifically substantiate pedagogical technologies of differentiated physical training among students of higher educational establishments.

Considering these objectives, it is necessary to say that motivation increase for physical culture and sport can be realized only on the basis of these lessons importance realization by students and the possibility to satisfy the definite individual needs through them.

In this context, during physical upbringing technologies creation, which should provide and increase the level of motivation, it is necessary to understand, what needs and demands are the driving force, stimuli for realized going in for physical culture and sport among students and what main trends form motivation for these lessons. It is also important to know how changes the structure of motivation during the whole period of education at a higher educational establishment.

These details should form the base of all components of physical upbringing process among students. It concerns theoretical part of “Physical culture” educational program, where the necessity and importance of physical culture lessons and sport is substantiated and also practical part in choosing means (physical exercises), methods and forms of lessons and in the volume of the load determination and in parameters for control and monitoring determination.

The effectiveness of physical upbringing process in general will depend on
Taking into consideration the most important components of motivational sphere.

Taking into account all mentioned above, we can say that the main objective of this research is the main demands, needs, “expectations”, motivational stimuli and their level revelation among students of humanitarian higher educational establishments.

**Methodology.** In order to solve the set problem questionnaires for students were created and interviewing in two higher educational establishments of Pyatigorsk - Pyatigorsk Medical- Pharmaceutical Institute- the branch of the Federal State Budgetary Educational Establishment of Higher Education “Volgograd State Medical University” and Pyatigorsk State University was held.

263 students took part in the questionnaire survey (4 courses of Pyatigorsk Medical- Pharmaceutical Institute- the branch of the Federal State Budgetary Educational Establishment of Higher Education “Volgograd State Medical University” and Pyatigorsk State University)

The number of the respondents according to courses was the following: the 1st course- 48 students, the 2nd course – 72 students, the 3rd course- 98 students and the 4th course-45 students.

All students were offered to choose one or several answers to 6 questions of the questionnaire:
1. Would you like to improve your physical readiness?
2. Do you willingly go in for physical exercises and what is the degree of your willingness?
3. What is the aim of your going in for physical exercises?
4. Would you like to get regular information about your physical readiness and functional state?
5. What are the parameters of your physical readiness and functional state that you want to get regular information about?
6. How do you feel after the lessons?

The results of the questionnaire were handled and systematized.

**Research results.** Answering the question about the desire to increase the level of own physical readiness, most students of all courses answered in the affirmative (affirmative answers were within the range of 54.2 to 87.7% of the respondents (picture 1)).

At the same time, there is a considerable decrease of motivation and desire to increase the level of own physical readiness among students of the 2nd course – to 54.2% with 75,0% at the 1st course, among the 3rd and the 4th course students this desire again increases considerably – till 85,7 and 84,4%.

![Graph](image-url)
3 курс—the 3rd course
4 курс—the 4th course
Да-yes; нет-no; всё равно—don’t care

At the 2nd course many students mentioned, that they don’t want to improve the level of their physical conditions (23,6%) or indifferent to it (22,2%).

Answers to the question about the desire to go in for physical exercises and the degree of this desire also differed among students, depending on the course of study. At the 1st course 56,3% of the respondents had the desire to go in for physical culture. However, there were a lot of respondents, who were indifferent to physical culture (39,6%) with insignificant number of students, who didn’t want to pay any attention to physical exercises—4,2% (picture 2).

At the 2nd course the desire to go in for physical culture considerably decreases (29,2% from the number of the respondents), most students become indifferent to physical exercises (59,7%) and slightly increases the number of students, who go in for physical culture without any desire (6,9%).

At the 3rd course situation changes greatly. The number of students, who go in for physical culture without any desire still slightly increases (till 12,2%), but the number of students, who are indifferent to physical culture decreases twice in comparison with the 2nd course (23,5%). Owing to such kind of “reorientation” of students, who are indifferent to physical exercises, increases the number of students, who like physical culture lessons (65,3%).

Picture 2 – The degree of desire to go in for physical exercises

Interesting are the answers of students concerning the aim of their going in for physical exercises. Most students, going in for physical culture, want to improve their health (picture 3). At the same time, this motivation is strengthened from course to course: at the 1st course this aim have 50,0% of the respondents, at the 2nd course—54,2%, at the 3rd course and

81
The 4th course-77.6% and 68.9% of the respondents.

Picture 3 – Priority aims of students while going in for physical exercises
1 курс - the 1st course
2 курс - the 2nd course
3 курс - the 3rd course
4 курс - the 4th course
Улучшение внешнего вида (красивое тело)-Appearance improvement (nice body)
Укрепление здоровья-Health improvement
Повышение уровня физической подготовленности-The level of physical readiness improve
Выработка оптимизма и бодрости как преобладающего настроения-Optimism and cheerfulness accumulation as the predominant mood

The survey showed that appearance improvement is also very important for students. 41.7% of the 1st year students, 37.5% of the 2nd year students, 52.0% of the 3rd year students and 66.7% of the 4th year students try to improve their appearance.

The aim of own physical readiness improvement and optimism and cheerfulness accumulation as the predominant mood was not very popular among students, within the range of 14.3% - 28.6%.

Most students answered that they would like to get regular information about own physical readiness and functional state (picture 4)
The desire of students to get regular information about physical readiness and functional state

<table>
<thead>
<tr>
<th>Course</th>
<th>Сost and weight</th>
<th>Сил and power</th>
<th>Выносительь and endurance</th>
<th>Быстрасти and quickness</th>
<th>Параметры кровообращения and parameters of blood circulation</th>
<th>Параметры дыхания and parameters of breathing</th>
<th>Физическая работоспособность and physical working capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 курс</td>
<td>43.5%</td>
<td>57.8%</td>
<td>64.3%</td>
<td>41.7%</td>
<td>39.6%</td>
<td>57.8%</td>
<td>46.7%</td>
</tr>
<tr>
<td>2 курс</td>
<td>48.6%</td>
<td>52.2%</td>
<td>60.7%</td>
<td>45.4%</td>
<td>42.1%</td>
<td>55.8%</td>
<td>48.7%</td>
</tr>
<tr>
<td>3 курс</td>
<td>56.3%</td>
<td>57.8%</td>
<td>68.9%</td>
<td>53.5%</td>
<td>45.6%</td>
<td>61.3%</td>
<td>52.7%</td>
</tr>
<tr>
<td>4 курс</td>
<td>73.5%</td>
<td>60.7%</td>
<td>72.2%</td>
<td>57.3%</td>
<td>58.9%</td>
<td>65.4%</td>
<td>56.7%</td>
</tr>
</tbody>
</table>

This desire to get information increases among students from junior to senior courses (from 56.3 and 48.6% at the 1st and the 2nd courses till 73.5 and 68.9% at the 3rd and the 4th courses) and unwillingness to get the information decreases (from 22.9% at the 1st course till 2.2% at the 4th course). At the same time, the part of indifferent people to the information about own physical conditions among students of different courses was approximately constant, within the range 18.4 till 29.2% and wasn’t increasing or decreasing.

The answers to the question about the parameters of physical readiness and functional state, about which students would like to get information, were the following (picture 5). Most students want to get regular information about own weight and height (39.6 – 72.2%), endurance (26.4 – 57.8%) and physical working capacity (30.6 – 46.7%) and it corresponds with the desires of the teachers.

Picture 5 – Students’ preferences in getting information about the parameters of own physical readiness and functional state

1 курс - the 1st course
2 курс - the 2nd course
3 курс - the 3rd course
4 курс - the 4th course

Да-yes; нет- no; всё равно- don’t care

Students’ preferences in getting information about the parameters of own physical readiness and functional state

1 курс - the 1st course
2 курс - the 2nd course
3 курс - the 3rd course
4 курс - the 4th course

Рост и вес - weight and height
Сила - power
Выносливость - endurance
Быстрота - quickness
Параметры кровообращения - parameters of blood circulation
Параметры дыхания - parameters of breathing
Физическая работоспособность - physical working capacity

Picture 6 presents the answers concerning general state after physical culture lessons. Most respondents have good state after the lessons (50.0 – 64.3%), less students feel satisfied after physical exercises (30.6 – 41.7%). Just some part of students mentioned...
that after physical culture lessons they feel bad (2.2 – 5.1% of the respondents).

**Picture 6 – Degree of students’ general state after physical exercises**

1 курс-the 1st course  
2 курс-the 2nd course  
3 курс-the 3rd course  
4 курс-the 4th course  
Хорошее-Good  
Удовлетворительное-Satisfying  
Плохое-bad

**Conclusion.** Thus, the results of interviewing showed, that most students wanted to increase the level of their physical readiness. Most students go in for physical exercises in order to improve health and appearance and most of them like physical culture, after lessons they feel good.

Most respondents would like to get regular information about the level of own physical readiness and functional state, predominantly about weight and height, endurance and physical working capacity, and it mainly corresponds with the desires of teachers.

It should be noted that there was a high percentage of “indifferent” to physical exercises students, whose state after the lessons was not quite satisfactory.

It should be noted that the lowest level of interest in physical culture, some kind of indifference to systematic monitoring of own state and even health was among students of the 2nd course. These facts prove a low level of motivation for physical exercises. It can be connected with the fact that at the 2nd course the greatest volume of educational material is mastered and the load is maximal. This circumstance determines the definite “problem” category of students and predetermines special attention to it in all aspects of physical upbringing process at a higher educational establishment.

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EFFECTIVENESS ESTIMATION OF SCHOOLCHILDREN TRAINING METHODOLOGY FOR THE NORMS OF THE IV STAGE OF THE RLD COMPLEX FULFILLMENT

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Annotation. New RLD (ready for labor and defense) complex introduction is the stimulus for better understanding of the necessity to improve state system of physical upbringing at educational establishments. Nowadays schoolchildren have the following problems: weak motivation and interest in lessons, a low level of physical readiness and as a result, the number of children, who can’t fulfill RLD complex normatives increases. However, as the research works show, most modern schoolchildren don’t get any physical activity, apart from physical culture lessons. In order to solve these problems it is necessary to introduce author’s innovative projects into the practice of physical upbringing, which help to increase the effectiveness of physical development among oncoming generation together with RLD complex. Materials. The aim of RLD complex introduction will be achieved in case of students’ readiness provision to use regularly available methods, preparing exercises and modern technologies in training for RLD complex normatives fulfillment. This research considers innovative directions of physical qualities development among boys-students by means of special site of training for the normatives of a new RLD complex, the results of their fulfillment are presented during the pedagogical experiment. Research methods: scientific-methodical literature analysis and summarizing, pedagogical experiment, methodology, testing, questionnaire survey, statistics analysis and handling. Results. The use of created by us methodology of motional qualities improvement among schoolchildren provides physical readiness indices increase. In our opinion, one of the important conditions for physical culture lessons effectiveness increase is modern technologies use on the basis of rationally selected method and preparing exercises, which are the most available for schoolchildren with a low level of physical readiness. Conclusion. The results of this experiment showed, that the use of created by the author methodology during the lessons provides physical readiness increase among boys-schoolchildren; the skills development of systematic independent physical exercises fulfillment as extracurricular activity; the volume of motional activity increase as an important condition for RLD complex normatives fulfillment.
Keywords: schoolchildren, training methodology, physical readiness, health, normatives of RLD complex.

Introduction. The necessity to popularize physical culture and sport is conditioned by the personality’s rights, needs, age related characteristics of development, constantly changing criteria of vital activity and by social order for healthy people upbringing. Lack of motional activity led to the process of biological degradation among population and it caused considerable adaptation of an organism to sedentary lifestyle, health indices and physical and mental working capacity decrease. In order to realize these items and create an effective state system of population physical upbringing the Decree of the Russian Federation Government on “All-Russian RLD (ready for labor and defense) complex” renewal (June, 11, 2014 №540 Moscow) was approved. Such kind of necessity is conditioned, first of all, by the tendencies of sickness rate among schoolchildren, by their low level of motivation to lead a healthy life style, great increase of schoolchildren, who have poor physical fitness and disharmonic physical development [2, 3, 8]. It explains the necessity to search for innovative projects, which, together with RLD complex, help to increase the effectiveness of the oncoming generation development.

The aim of the presented work is in theoretical and practical importance substantiation of the methodology creation of training boys-schoolchildren for the norms fulfillment of the IVth stage of RLD complex, which provides physical readiness improvement.

Objectives:
1. To reveal the level of physical readiness among schoolchildren during the normatives fulfillment of the IV th stage of RLD complex.
2. To analyze the most effective methods of 13-15-year-old boys training for the norms of RLD complex fulfillment.
3. To study the attitude of 13-15 year-old boys to the renewed RLD complex.
4. To create the methodology of training 13-15-year-old boys for the norms of RLD complex fulfillment and check its expediency during the pedagogical experiment.

Results and their discussion. Literature analysis and the materials of our own research works revealed the fact, that the modern RLD complex demands corresponding readiness from schoolchildren for its fulfillment, the methods of training should include the content of different preparing exercises, which correspond to the age, the level of readiness and interests of those, who train. It conditions the necessity to search for innovative projects, which, together with RLD complex, help to increase the effectiveness of the oncoming generation development.

In September 2014 the normatives of the IVth stage of RLD complex were tested among boys-schoolchildren from schools of Nizhnekamsk of the Republic of Tatarstan. As a result we revealed a low level of physical readiness among 13-15 year-old boys-schoolchildren. It is proved by the norms of 60 meters running - 24.7% of the respondents didn’t fulfill the normatives of the Complex. The same tendency is in the long jump, in 1500 meters running. Only 30% of boys can fulfill the normatives of the complex, in spite of the fact that modern RLD complex is considerably simplified in comparison with the old one [9].

According to the results, received by M.V. Tomilova, in May, 2015 the 1st testing among 11-15 year-old schoolchildren students was realized in terms of Unified RLD decade. From the general number of children (5280372 people) 620 thousand schoolchildren were able to participate (11.7%) [7]. Necessary number of norms was fulfilled by 29519 children or (4.8%) of children, who took part in testing:
49.9% of children got 14739 bronze badges;
41.8% of children got 12331 silver badges;
8.3% of children got 2449 golden badges [7].
In this connection, we consider it urgent to study the attitude of 13-15-year-old boys to the renewed RLD complex and on the basis of the research results to create the methodology of motional qualities development among boys-schoolchildren during the process of training for the norms fulfillment of the IVth stage of RLD complex.

In order to check the effectiveness of these directions a questionnaire survey and a pedagogical experiment were held. 135 boys-students (13-15-year-old) from comprehensive school № 10 in Nizhnekamsk (the Republic of Tatarstan) took part in the experiment.

The results of the questionnaire survey showed, that 81,5% of the respondents said, that they understand the importance of RLD complex introduction in Russia, answering the following question: “Why is RLD complex renewed?” and 18,5% of the respondents couldn’t give an answer.

75% of the respondents expressed a wish to fulfill RLD complex norms, 21,7% of the respondents fulfill the normatives, 3,3% of the respondents expressed disinclination for the normatives fulfillment.

During the questionnaire survey we informed the boys about created by us methodology of training for RLD complex normatives fulfillment. 79,3% of the respondents were interested in using created by us methodology of training for the norms of RLD complex fulfillment, 14,1% of the respondents couldn’t answer, 6,5% of the respondents didn’t want to use it.

As a result of scientific-methodical literature analysis, insufficient use of training means and methods among 13-15-year-old boys for the norms of RLD complex was revealed.

We consider that one of the methods in training for the norms of RLD complex fulfillment is circuit training. It solves important problems within a short time period, develops the main motional qualities quicker and it is more effective during complex demonstrations of motional qualities development [4].

In this connection, on the basis of circuit training method, the methodology of motional qualities development in training boys-schoolchildren for the norms of RLD complex fulfillment is created.

Picture 1 presents the structure of created by us methodology of 13-15-year-old boys’ motional qualities development for the norms of RLD complex fulfillment.

Picture 1 – The structure of motional qualities development methodology among 13-15 year-old boys for the norms of RLD complex fulfillment.
The aim of this methodology is training 13-15 year-old boys for the normatives of the IVth RLD complex fulfillment (in order to get golden, silver, bronze badges).

In accordance with the Order of RLD complex testing and introduction into general education establishments of the Republic of Tatarstan, RLD complex normatives fulfillment during the year is divided into three sessions: September-November- autumn session, December-March- winter session, April-June- spring sessions [5].

Our methodology is formed on the basis of the Order and includes kinds of tests during the sessions:

1. Autumn session is based on training for 3 kinds of tests: 60m running, standing long-jump, 2 km running.
2. Winter session is based on training for 2 kinds of tests- pull-up at a high bar, 3 km ski race.
3. Spring session is based on training for 3 kinds of tests- leaning forward from standing position, ball throwing, body lifting from lying position.

In order to create the atmosphere of interest and motivation for students during the lessons and after them we created the site of training for the normatives of the IVth RLD complex fulfillment.

In order to register and enter the site we offered the following algorithm of actions for each of student:

1. Open the browser at a mobile computing device (communicator, computer, pad, smartphone), which has Internet access.
2. Find the site in the Internet (http://mobile-gto.ru), getting the password from the site manager beforehand (mir_vip_92@mail.ru).
3. Enter the system supplying the given password and personal e-mail address (picture 2).

Picture 2 – Entering the system
4. Then there will be the window with the training exercises for the normatives fulfillment during the sessions.
The window, which presents the information about the content of circuit training lesson

In the main window full information about the lesson is presented. The following things are described: session, the lesson of circuit training, the date of lesson, the date of RLD complex tests fulfillment in the Testing Center, exercises and the number of fulfillment at the stations, the function of listening exercises at the stations is offered, music is used during circuit training (picture 3).

In order to train for the kinds of RLD complex tests fulfillment during the sessions we created the complex of circuit training preparing exercises, used in the variative part of physical culture lessons according to the program, by means of the site. Created by us methodology is realized during the main part of the lesson (10 minutes - 2 circles each includes circle 5 stations).

The main aim at the sessions before training is the initial level of physical readiness diagnostics. Before each session boys-schoolchildren fulfill RLD complex normatives. Those, who don’t fulfill the normatives, get the circuit training load of the 1st lesson; those, who get bronze badge, have the circuit training load of the 2nd lesson; those, who get silver badge, have the circuit training load of the 3rd lesson.

The preparing exercises form the base of the circuit training in training boys-schoolchildren for RLD complex normatives fulfillment.

The 1st week of the 1st circuit training lesson includes the preparing exercises of autumn session:

The 1st station. Speeding up 10 m from the high start for the prize.

The 2nd station. Preparatory position (PP) – crouch, arms are led back. To fulfill an energetic arms swing forward-up with simultaneous legs extension and heel rise (10 times).

The 3rd station. Jumping on one leg with legs change at half of 10 m distance.

The 4th station. PP – crouch (deep knee-bend), arms are led back. To fulfill an energetic arms swing forward-up with simultaneous up jumping with both legs pushing off (10 times).

The 5th station. Shuttle run3×8 m.

The 1st week of the 2nd and the 3rd lessons includes the same preparing exercises, but the amount of exercises and distance increase.

Thus, autumn session includes 8 weeks of lessons, winter session includes 11 weeks of lessons, spring session includes 13 weeks of lessons (3 lessons each week). Each next week includes additional new preparing exercises.

Each week of training at physical culture lessons develops motional qualities for the normatives of RLD complex fulfillment during the sessions. During autumn session we included the exercises for quickness, maximum quickness, speed power, speed endurance development and also the exercises for general, special and power endurance development. During winter session we included the exercises for maximum power, general, special and power endurance development. During spring session we included the exercises for quickness, maximum quickness, speed power, speed endurance development and also the exercises for active and passive flexibility development.

On the basis of diagnostics the control group (CG) and the experimental group (EG) were formed, each included 15 boys. At the beginning of the experiment the initial level of readiness was revealed with the help of the normatives fulfillment.

Statistical data handling didn’t reveal considerable differences between the CG and the EG (р>0,05).

In the end of the session the main referee of the Testing Center checked how the boys from the CG and the EG fulfill the normatives of RLD complex. Only boys, who had the main and preparatory health groups according to the results of medical check-up and the pediatrician’s opinion, were permitted to take part in the test. The received results analysis showed, that their improvement was in both groups: the CG and the EG, with the evident advantage of the EG. The received results handling helped to reveal the fact, that the results increase was in both groups, but with the evident advantage of the EG. Thus, in the
normative “60 meters running” in the CG with the initial results 8,9±0,15 seconds to the end of the pedagogical experiment the indices increased and were 8,8±0,14 seconds (p<0,05); in the EG with the initial results 8,7±0,08 seconds the indices increased till 8,4±0,08 seconds (p<0,05). In the normative “standing long-jump” in the CG with the initial indices 204,9±6,35 cm to the end of the pedagogical experiment the results increased and were 205,2±4,64 cm (p>0,05). In the EG with the initial indices 203,6±3,95 cm to the end of the pedagogical experiment the results improved and were 211,1±4,13 cm (p<0,05). The same tendency of more considerable physical readiness results improvement in the EG was revealed according to other normatives of the Complex. If before the experiment the boys from the CG and from the EG didn’t have valid differences at the sessions, after the experiment the results of testing and further statistic handling revealed valid differences among boys according to 5 tests, apart from standing long-jump with both legs push off, pull-up at a high bar and body lifting from dorsal position. In the EG the interest in training for the normatives of RLD complex fulfillment considerably increased, the boys used created by us site during extracurricular activity with great pleasure and it provided their opportunity to train independently for the normatives fulfillment.

For example, before the experiment 9 boys of the EG got golden badges for the normative “60 meters running”, after the experiment 12 boys were able to fulfill the normative. In the CG before the experiment the normatives were fulfilled by 8 boys, after the experiment by 9 boys. Such kind of tendency of more considerable results improvement in the EG was revealed according to 8 kinds of tests.

Conclusion. Thus, the questionnaire survey among 13-15 year-old boys revealed the desire to fulfill RLD complex normatives and the diagnostics helped to reveal their low level of physical readiness. The most effective method in training for the normatives of RLD complex fulfillment is circuit training. Created by us methodology of preparatory exercises, on the basis of circuit training, with the use of the site proved the effectiveness of the author’s methodology.

The results of the pedagogical experiment showed the effectiveness of the offered methodology of motional qualities development among boys in training for the normatives of the IVth RLD complex fulfillment.

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FUTURE SPECIALISTS’ NORMATIVE-JURIDICAL TRAINING METHODOLOGY IN THE SPHERE OF SOCIAL TOURISM

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Annotation. The normative juridical proficiency of the specialist in the sphere of social tourism is one of the most important components of the professional competence. Knowing the normative-juridical basics of the profession and having the skills of using them depends mainly on market economy conditions which demand new skills from the specialist. These skills are: enterprise, economic liberty of actions, talent for risk. Therefore, it is necessary to create the methodology of specialists’ professional training in the sphere of social tourism which will satisfy the requirements of this developing branch of the social-economic sphere of the society, the strategic target of which is social-juridical orientation of the future specialists’ training process. Material. The material is...
presented by the main components of the future specialists’ training methodology in the sphere of social tourism. Methods. Theoretical analysis and synthesis, methods of induction and deduction, modeling. Results. The future specialists’ training conception in the sphere of social tourism demonstrates the modern content of their future professional occupation, is presented by the main components: targeting, qualitative, functional and procedural characteristics of the future specialists’ normative-juridical training in the sphere of social tourism, range of definite criteria and indices, which show the level of the normative-juridical culture of specialists. Conclusion. The realization of the methodology presents the system of specialists’ normative-juridical training regulators in the sphere of social tourism will help to arrange the educational process in a higher educational establishment according to the requirements of the developing sphere of social tourism. Keywords: normative-juridical training, specialist, social tourism, training methodology.

Introduction. The creation of the specialists’ normative-juridical training concept in the sphere of social tourism is determined by the necessity to bring the vector and the content of this specialists’ category professional training in correspondence with the requirements of social tourism sphere which is an important factor of Russian society, social-economic development.

The objective of the research is the scientific substantiation of the methodological basics of the specialists’ normative-juridical culture formation in the sphere of social tourism. The aims of the research are the following: to identify the meaning of the notions “normative-juridical culture of the personality” and “normative-juridical training”, to substantiate the methodology of the specialist normative-juridical culture formation in the sphere of social tourism.

The concept is presented as the methodological base which stimulates the specialist’s normative -juridical culture formation, development of his juridical culture formation, development of his juridical awareness and social-juridical competence. It is a system of the main regulators in accordance with which the educational process is planned and actualized.

Results. The given methodology is one of the specialist’s professional training process forms with the help of which the main idea, main theoretical approaches and regulations, the principles, the specificity of the professional activity and fulfillment of the specialist’s main functions in the sphere of social tourism in accordance with the civil society norms are defined.
organization and creation of recreational – sanitary and rehabilitation activities’ programs in tourist groups, resort and recreation complexes; specialist (instructor-methodologist, trainer, teacher, teacher of touristic-regional profile guide – instructor and others) who creates and realizes special-purpose cycle of recreational and travelling lessons [2].

Thus, there is a great necessity of highly qualified specialists’ multidiscipline training for the sphere of social tourism. The successful work of these specialists demands intensified of such professional qualities as: enterprise, creativity and freedom of action, talent for risk and others. Modern requirements for specialists’ professional training in the sphere of social tourism demands the creation of conceptual basics of this process. It is necessary to give this process definite purposeful, intentional and procedural characteristics, which will help to realize a social function of the specialists in the sphere of social tourism of normative-juridical culture formation.

The main notions of the conception are: “personality normative-juridical culture” and “normative-juridical training”.

We consider the personality normative-juridical culture as the part of the individual’s general culture, as the integral personal education which includes some qualitative characteristics: juridical awareness, social – juridical competence, civil-juridical value orientation, need for juridical knowledge and activity in the context of juridical field, ability to identification and trust, civil liability and initiative as system indices. This conception reflects the psychological – pedagogical context of the specialist’s professional activity in the sphere of social tourism. We present the main qualitative characteristics of the specialist’s normative-juridical culture in the sphere of social tourism in context with his professional activity. Social-juridical competence of the specialist in the sphere of social tourism. Social – juridical competence of the specialist in the sphere of social tourism is understood as the ability to solve the problems effectively in the context of juridical field, interacting with people, on the basis of knowledge and experience actualization in this field of activity. The regulator of the social-juridical activity is the development degree of the person’s legal awareness, the level of inclusions of juridical norms in the system of his values.

Civil-juridical value orientations. Axiological component of the specialist’s normative-juridical culture in the sphere of social tourism forms a set of civil-juridical values, which play a great role in his activity as a specialist. This activity means interaction with different groups of people-needy layer of the population, students, pensioners, disabled people and others. Civil-juridical values, which form the essential characteristics of humanistic oriented profession, are seen through the prism of ideas, conceptions, theories, knowledge and skills, which the specialist in the sphere of social tourism masters, gets and develops in the process of practice and which have a great meaning in professional and reality situations.

Need for juridical knowledge and activity in the context of juridical field. An important characteristic of a specialist is a constant desire to knowledge renewal which will help to orient in different situations of juridical choice: the choice of social priorities, talent to risk and others. From the point of personally oriented approach the choice and creation of necessary ways, modes, methods, facilities, technologies of specialist’s activity in the sphere of social tourism form the technological component of the normative-juridical culture. Ability to identification and trust. Ability to identification and trust is an important characteristic of a profession connected with people interaction. The first place takes the humanistic component of the profession: acceptance and understanding of a person through identification with him. I.V. Shapovalenko considers identification to be an emotional-cognitive process the mechanism of which is an identification of the individual with another subject or a group of people, ability to put oneself in person’s place. For the specialist in the sphere of social tourism that means to model “semantic field
of an interlocutor”, which will provide an optimal mutual understanding [3]. Thus, the main mechanism which provides harmony and consent, in case of a manager in the sphere of social tourism and a tourist communication becomes tolerance. In a tolerant personality there are the characteristics which show psychological-ethical sides of human relations. These characteristics are the following:
- humanity, which means attention to the inner life of a person, belief in the kindness, humaneness of interpersonal relations;
- reflectivity, when you know yourself as a personality, you know your strengths and weakness and try to combine them in a tolerant worldview;
- freedom, which excludes violence and prohibition but demands discipline and duty and this allows to appeal to the laws which guarantee success in life;
- responsibility as an inner stimulus in a definite situation, which demands decision making, its realization on the basis of variative approach and the system of personal demands;
- protectability as the guarantee of understanding and support, as the safety feeling in actions on the basis of unification with other people in society, ruinous impact confrontation;
- flexibility, as an ability to make a decision taking into account the participants views and circumstances which can influence the relations construction on the basis of having information;
- self-confidence, which means an adequate (objective) valuation of personal abilities and belief in the ability to overcome obstacles;
- self-possession as an ability to control oneself, to control emotions, actions;
- variability, which is multivariable approach to surrounding evaluation and making adequate decisions according to circumstances and norms;
- perception, which is an ability to notice and define different qualities and personal features of people, an ability to penetrate into their inner world;
- empathy as the specialist’s important quality in his interaction with different people,
case, it necessary to take into consideration different factors, which influence the process of its formation.

The objective factors are examined on three levels:
- macrolevel, which reflects social-political and economic situation in the state, public policy and ideology in the sphere of education;
- mezolevel - regional peculiarities including national-regional peculiarities. This level demands the study of social sciences, youth movements, informal communication;
- microlevel – family, relatives, friends.

Subjective factors are examined from the position of personal-group orienting points:
- world outlook factors include ideas, views, beliefs, ideals;
- requirement-motivational factors include requirements, motives and interests;
- values include a set of civil-juridical values.

Normative-juridical culture of the specialist in the sphere of social tourism as a result of the normative-juridical training in a higher educational establishment is determined by several considerable circumstances among which the main is the aim of the professional training.

Modernization of the higher education in Russia and making it possible in the context of the Bologna process defined the main aim as the provision and control of education quality. That is why the educational activity of a higher educational establishment is oriented at upbringing and training of competitive specialists on home and world market. It is necessary to mention, that the expansion of services market in social tourism demands a wide range of competences from the specialists in this sphere. This result of education is the main factor in building any specialist’s model, including the specialist in the sphere of social tourism.

The professional training of a wide profile specialist for the sphere of social tourism causes the social character of the educational process in a higher educational establishment. The process and content of the normative-juridical training are developed according to socially important aims of education and this defines the social character of the training. It is necessary to notice, that the process of the specialist training goes in a wide society using its pedagogical potential. At the same time the society, consumers in the sphere of tourist services have their own demands to professional-personal qualities of the specialist in the sphere of social tourism. By this is defined the specialist’s normative-juridical training in the content of which the main thing is upbringing of the socially responsible personality. Thus, a social character of the normative-juridical training is defined by the fact, that the society demands a high quality of the specialist education.

Combination of the “contextual” and special organization of the juridical education comes out of the fact that the normative-juridical training is understood as a part of a single process of the specialist professional training. Juridical education as a pedagogical phenomenon appears as a result of two circumstances: the need of the state for the specialists with a high level of normative-juridical culture and the need of social tourism sphere for the specialists who are competent in all aspects of the normative-juridical regulation of their activity (special professional order).

Students’ training in a juridical sphere, normative-juridical atmosphere demands an organization of a special atmosphere in a higher educational establishment, which creates and supports the culture of juridical relations among students and teachers, on the basis of the basic, common and national values acceptance, each of which is reflected in the system of moral values and conceptions. Special attention demands the problem of normative-juridical sphere saturation with national values, which are the part of common to all mankind culture and this requires harmony among all participants of the educational process. As a result, the display of such phenomena as: mentality, national mindset, tolerance become an important aspect in educational process creation. The presentation of the procedural characteristics of the specialist normative-juridical training in the sphere of social tourism is based on the fact that this process is functionally determined,
that is why it is viewed from the point of functional expediency.

So, the procedural characteristics of the normative-juridical training of the future specialist in the sphere of social tourism are seen in the following elements:

- categorical-notions, functions, peculiarities of the normative-juridical training;
- structural-aims, objectives, principles, conditions.

Notions, functions, peculiarities of the normative-juridical training. Normative-juridical training as an important part of the specialist professional training in the sphere of social tourism is a controlled process of personality normative-juridical culture formation, which is realized on the basis of other training elements. The created conception of the future specialists normative-juridical training is based on fundamental ideas of culturological and system approaches to environment phenomena and processes study, on the theory and practice, on the theory of succession and this helps to define historical and logical connections between the juridical systems. Normative-juridical training of specialists in the sphere of social tourism is realized in unity with federal and University components, taking into consideration the peculiarities of the social-cultural situation on the definite territory, is a difficult system presented by interaction of different structural components. This system is based on functional objectives, which are solved on a special stage where each proceeding stage is a preparation for study on the next stage and this provides succession in juridical education of the specialists in the sphere of social tourism. The most important functions of the normative-training are the following:

- inclusion into the system of juridical education the specialists-practitioners from the sphere of social tourism;
- stimulation of the future specialists interest to normative-legal documents, which regulate the activity in this sphere;
- development of a general and special education on the normative-juridical basis;
- realization of the social theory and practice interdependence;
- stimulation of the pilot researches oriented on content, new methods and technologies of juridical education development;

The content base of the future specialists normative-juridical training in the sphere of social tourism includes:

- diagnosis of the normative-juridical culture state;
- state-normative support;
- existence of the age range in historical, social sciences and civil disciplines study;
- succession in personality social orientation formation;
- pedagogical support of the normative-juridical culture formation process components;
- creation of the educational space for the person’s democratic, humanistic and creative qualities demonstration and development;
- inclusion of the future specialists in the sphere of social tourism into practical law-making activity through the system of additional education and youth public organizations.

Aims, objectives, principles, conditions of the normative-juridical training. The aim of the normative-juridical training is mastering the norms and rights in the sphere of tourism by the future specialists, examination of their functioning experience, creation of the conditions for including the future specialists into social relations, civil-juridical and professional-juridical activity on tourist services to less protected groups of population (children, disabled people, pensioners and others).

The objectives of the normative-juridical training are:

- knowledge formation about the specificity and essential characteristics of the law-making activity in the sphere of social tourism, about its main method and factors;
- individualization, differentiation, humanization and humanitarianization of the specialists normative-juridical training in the sphere of social tourism;
-formation of the qualities necessary for the future professional activity, such as mercy, kindness and others;
satisfaction of a personality educational needs in understanding social phenomena and processes, an ability to influence them as a basis of self-regulation, self-education, self-perfection.

The content of the specialist normative-juridical training in the sphere of social tourism is defined by several principles:
-the system principle provides the integrity of the personality establishment process of the specialist in the sphere of social tourism on the basis of the system normative-juridical knowledge, system-logical construction of the studied courses, demonstration of the normative-juridical connection between different topics and this helps to form the ability to systematize knowledge;
-the principle of normative-juridical training humanization shows the orientation to building of humanistic relations of the educational process participants (teacher- student) through the joint- cooperation organization in the context of juridical field;
-the principle of personality orientation, which is in the fact that while building the normative-juridical training system and creation of its functioning mechanisms the priority is given to the components which create the conditions for formation of the personally significant for the students moral qualities characterizing the specialists in the sphere of social tourism;
-the principle of theory and practice unity is a guiding principle of the integrated training combining the courses of juridical direction and different kinds of students’ activity in the context of juridical field;
-the principle of culture conformity directs the choice of content, methods and forms of the normative-juridical training, which reflects the cultural values peculiar not only to Russian ethnos but also to the regional society, to its different social groups;
-the principle of content optimization means enlargement and intensification of the education content on the basis of new society functioning tendencies, regarding the main component of the specialist normative-juridical training , approbation of curriculum and programs;
-the principle of dialogue provides interenriching influence process;
-lingvoculturological principle is in need for learning native language and it develops the students’ sense of value and equality of languages and cultures;
-the principle of continuity and succession is the system of measures on the united system of school, college and further normative - juridical training of the future specialist in the sphere of social tourism organization as accounting the results of previous activity in the context of juridical field, social-juridical competence formation level, legal awareness, the quality of knowing juridical norms and skills got while studying different disciplines and the level of personal qualities development.

Summary. Material presented in the article , approved in a real educational process helps to increase the effectiveness of the future specialists normative-juridical training in the sphere of social tourism which provides process integrity in unity and validity of its all components, which reflect the modern content, its pedagogical accompaniment, presented by the regulators system. The normative-juridical culture of the personality as the part of the subject general culture, as the integral personal education, reflects the psychological-pedagogical context of the specialist professional activity in the sphere of social tourism, realized in close interaction with people. The normative-juridical training of the specialist in the sphere of social tourism is a continuous, controlled process of the professional normative-juridical culture, realized on the basis of all training elements integration. The conception of the normative-juridical training of the future specialists in the sphere of social tourism is a methodological base which helps to project the process of the specialist’s professional training in a logical succession and scientific validity.

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SPORTS MANAGERS COMMUNICATION SKILLS DEVELOPMENT WITH THE INSTALLATION ON TRUST IN THE IMPLEMENTATION OF GAME ACTIVITIES

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Abstract. The article discusses the possibility of the sports managers communication skills development with the confidence in the implementation of sports and sporting events game orientation. Materials. Analysis of specialists scientific-research works allowed to carry out justification of playing sports use in sports managers training, aimed at the formation of their communicative abilities with the installation on trust. The purpose of this research is theoretical and practical substantiation of communicative abilities formation method with the confidence of future sports managers through the use of team sports. Research methods. Analysis of scientific and methodical literature, questionnaire survey, pedagogical observation, rapid assessment, testing the level of formation of communicative skills, the testing, the method of mathematical statistics. Results. In the first phase of our research pedagogical conditions for the realization of methods of learning, including playing sports and promoting the effective development of communication skills with the confidence of the sports managers are identified. In the result of pedagogical observation and
The analysis of scientific-methodic and special literature four pedagogical conditions are identified. Practical implementation of methods aimed at developing communicative abilities with the confidence of sports managers showed growth and a significant predominance of high level of communicative abilities formation with the confidence of the students in the experimental group. In the control group, there was a slight change. Conclusion. Implementation methodology creation of optimum pedagogical conditions contributed to the improvement of communication skills level with the confidence of the sports managers.

**Keywords:** sports managers, pedagogical conditions, team sports, communication skills.

**Introduction.** The President of the country Vladimir Putin noted that "In Russia a lot is being done to engage young people on the values of physical culture and athletes training system improvement. One of the most important steps in this direction - the creation in Sochi the Russian International Olympic University. This University aims to become an authoritative centre in the field of specialists training, sports management and innovative educational methods and technologies implementation." These words should be the impetus to create new technologies and methods for sports managers training. Whatever questions we had not considered, all the more urgent at the modern stage of the new entity formation, the key should be the question of communicative abilities formation with the installation of the trust in the sports specialists training. Just only trust and trust relationships can raise our country higher and higher [5].

In connection with the above words you should pay attention to the fact that study of communicative abilities formation problem of sports managers installing on trust from the pedagogical viewpoint is conditioned by the society social order, namely the development of a socially formed identity as a future professional specialist, as an expert in his field.

In the works of many authors it is shown that the future specialists communicative abilities formation should have central place in the educational process [1,2,3,4,6]. The necessary level of communicative abilities formation is one of the important components of students ' readiness to learn, providing thereby the possibility of a successful future professional activities in the team. In this regard, the use of team sports through which a student acquires the necessary experience, collective engagement, trust and trust relationships in complex, changing situations can be the basis of specialists training capable to work in modern conditions and to build effective professional relationships.

In this regard, the development of this theme is topical considering the needs of society in a healthy nation.

The purpose of the study is theoretical justification of sports managers communicative abilities process formation with installation on trust using team sports. The main objectives of the study was to develop the pedagogical conditions necessary for the substantiation of future sports managers communicative abilities formation method with the installation of trust using team sports.

**Methods and research organization.** To address this goal, we used such research methods as analysis of scientific and methodical literature, testing the level of communicative skills formation, the testing, the method of mathematical statistics.

The research was carried out on the basis of the Ural State University of physical culture. Students of the specialization sports managers in the amount of 64 took part in the research.

**Results.** For the effective implementation of methodical approach to sport managers communicative abilities formation with installation on trust we developed pedagogical conditions that need to be considered.

Taking into consideration that the process of sport managers communicative abilities formation by establishing trust relationships was not described in the literature.
This provision requires the development of pedagogical conditions in order to clarify and substantiate the process of sport managers communicative abilities formation with installation on trust.

The first pedagogical condition, formulated by us, includes for sport managers the process of a positive subject-developing environment creating which is able to act as a stimulant in a single educational space development of the student as a specialist, which in turn promotes the communicative abilities formation with installation on trust. In this example, sports games with simplified rules, which can be realized in practical classes and in the training and production practice of students are used. This approach is an innovative solution to enhance motivation of students to professional activity. The use of team sports allows students to form a positive attitude towards the learning process.

Without establishing a shared, friendly space for participants in the educational process it is impossible to resolve the formation of a trusting relationship between participants and teachers. The second pedagogical condition, therefore, involves the organization of a single value-semantic cooperation of all educational process participants. This approach makes extensive use of the communication process through game activities, which include understanding the nature of the game, reaction to the game and the actions of participants on command and rivals.

The creation of communicative and interactive bases of all educational process participants mutual relations could become the third pedagogical condition. The individual moral development in the team should be considered in terms of communicative interaction and relationships enhancing. Within this pedagogical condition playing sports act as a communicative and interactive communication bridge, which is formed in the game process.

Systematization of tools and methods in team sports allows to use them in accordance with the psycho-pedagogical individual characteristics of each student and it could be the fourth pedagogical condition.

In our example of the sport managers communicative abilities formation with installation on trust happened in the process of team sports implementation. The use of various symbolic tools, for ease of participants communication understanding in the game such as: gestures, signs, technical and tactical receptions and actions of the various commands, speech, etc. was included. It allows to increase the social competence of the student in the process of game actions with peers, teachers. In the process of the game and game actions students are connected in a single educational process of cooperation in the framework of certain rules implementation that allows to build a relationship not just in knowledge of the game rules, but trust each other in performing technical and tactical techniques aimed at achieving results. For example, a good serve in volleyball, a good reception of the ball understanding the partner's action in the game. In basketball, a good reception and passing the ball, attack ring with effective action of connecting the participants in the game. In football also occurs teamwork building a clear relationship between the players. In the game of badminton and table tennis trust is realized through confidence in the teammates.

To establish a trust relationship during gaming activities not only knowledge of the game rules is necessary, but a set of tactical and technical actions are needed. In this regard, inclusion of sport managers communicative abilities formation process with installation on trust sports activities should form the basis for the experimental techniques creation. Creating game situations in the game space promotes freedom and voluntary relations between the players of the team and the opposing team. Knowledge of the game rules and use of in-game actions depending on the situations within certain rules allows to change relationships in the game and after the game, discipline the order of relations and behavior. Noted that the rules of the game require their obedience and respect. Breaking the rules of the game can't be in the game because it will
lead the complexity of relationships and will cause a lack of trust. Trust relationship building in the game can also transferred to the other process relations. Players on the team easier to understand each other in production.

Game actions help to build mutually beneficial relationships between the players, give the opportunity to create and unite the team. The appeal of the game is so great and the game contact of people with each other so complete and deep that the Commonwealth games discover the ability to survive after the end of the game.

Thus, the involvement of students in team sports contributes to solving problems need formation, which excites, stimulates the mind, sets up a search for optimal solutions. Also gives a physical improvement, because in its active form it involves learning and application agility, care, fast, the ability to navigate and move.

At the development stage of the communicative abilities experimental procedure formation with the installation of trust in the practical part of the course included training with the inclusion of team sports. And installing that students voluntarily attended extra-curricular sports. For selection suggested volleyball, basketball, badminton, football, table tennis, etc.

Playing sports are essentially a preparatory stage for sports managers future profession in which the systematization, strengthening, generalization and supplement of existing knowledge and skills happens. Games have a significant influence on the individual student personality formation and in the process, he receives a significant degree of freedom in this process contributing to skill of independent action skill formation, reflecting the potential of the student to create a plan personal activities in the game, to find means for its realization, maintaining conceived them to control their actions in diverse situations, put in the sports.

The whole process of the organization, which was carried out with the purpose of sport managers communicative abilities formation with installation on trust built on the basis of the purposeful inclusion of students in activities, which consisted of several stages.

The first stage – the preparatory stage, characterized by identifying students relations to the concepts of trust and trust relationships with the subsequent compilation of trust individual profiles.

The second phase, pilot studies of communicative abilities formation with the confidence of a sports management and conduct of students' desire to practice competitive sports.

The third stage is characterized by the implementations of all activities aimed at the sport managers communicative abilities formation with installation on trust. To do this in the first place we implemented a special course “Sport managers communicative abilities formation with installation on trust”, at practical lessons widely used sports and games with simplified rules and with the analysis of the participants game activities.

At carrying out pedagogical experiment, all diagnostic procedures were performed in compliance with the rules of the research organization. It should be emphasized that the acquisition of control and experimental groups were not guided by friendship and emotional preferences of students, and divided the group based on the identified relationships to the concepts "Trust" and "Trusting relationship" and use them in life. The experiment involved 64 students, which in the course of studies were divided into one control and one experimental group consisting of 32 students.

During the pedagogical experiment the results of formation of communicative abilities formation were assessed on the following criteria, with the identification of either their presence or absence:

1) the ability to dialogue and negotiation with participants, team;
2) the ability to perform mutual monitoring of actions;
3) show respect and to assess the joint result of the activities;
4) the ability to provide mutual assistance in the implementation of the joint command and tactical actions;

5) rationality of the used motor actions.

The experimental results obtained before and after the experiment are presented in Table 1.

<table>
<thead>
<tr>
<th>the study group</th>
<th>the level of formation of communicative abilities with the installation on trust before the experiment, (%)</th>
<th>the level of formation of communicative abilities with the installation on trust after the experiment, (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG (n=32)</td>
<td>high: 15 (46,8%), medium: 10 (31,3%), low: 7 (21,9%)</td>
<td>high: 16 (50,0%), medium: 11 (34,4%), low: 5 (15,6%)</td>
</tr>
<tr>
<td>EG (n=32)</td>
<td>high: 15 (46,8%), medium: 11 (34,4%), low: 6 (18,8%)</td>
<td>high: 19 (59,4%), medium: 13 (40,6%), low: 0 (0%)</td>
</tr>
</tbody>
</table>

Table 1 presents the results of the pedagogical experiment. The students results distribution by levels of communicative abilities development with the installation on trust before the experiment showed that the groups were homogeneous. After the practical implementation of the developed by us method aimed at sport managers communicative abilities development with the installation on trust in the implementation of team sports, we got the results with the significant predominance of sport managers high level communicative abilities formation with the installation on trust in the experimental group. In the control group, there was a slight change.

Thus, the comparative analysis of the quantitative data obtained through the experiments, we can conclude that the implementation of optimum pedagogical conditions methodology contributed to the sport managers communication skills improvement level with the installation on trust. The use of sports within the sports activities of the students stressed the usefulness, the possibilities of realizing the potential of sports activities as a basis for social adaptation of first year students to University life.

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PHYSICAL EDUCATION AND PERSONAL DEVELOPMENT OF STUDENTS ON THE HISTORY OF SLAVIC MARTIAL ARTS "ROSS, THE FEAST, THUNDER"

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Annotation. The article considers the question of martial arts systems using in the educational process of physical culture lessons for students personality patriotic, social-moral self-development formation. For training them to serve in the Russian Federation armed forces for the Motherland protection, for students upbringing on the best traditions established by our fathers and grandfathers.

Material. This article is addressed to the issue of students Patriotic education social-moral mechanism formation at the physical culture lessons by means of martial arts.

Research methods. Analysis of scientific and scientific-methodical literature on the research problem, pedagogical observation, questionnaire, experiment.

Results. Developed and implemented in the educational process of students social-moral self-development patriotic education mechanism at physical culture lessons by means of martial arts, which gave positive results in the educational process of the University.

Conclusion. The research confirms that the use in the educational process of the University students the Russian self-defense system helps to create a physical sport personal safety competence. Physical education goes beyond the only applied professional competencies but also creates interdisciplinary competence.

Keywords: feast, martial arts, culture, system, personal safety competence.

Introduction
Culture – a broad concept, representing the harmonious unity of many components, one of them is physical culture[4]. The Slavic peoples original physical culture found expression in folk games, rites, and customs. Ancient national system of military martial arts "ROSS, FEAST, THUNDER" were
particularly spiritual, they were blessed with the light of humanism and patriotism. In contrast to the "East," "West" model of Russian forces never opposed themselves to the whole society but instead sought to identify themselves with it [1,2,3].

The names "RISTIISA, funeral FEAST," associated with the funeral rites of the pagan Slavs – a solemn farewell to the fallen in the battle, a knight in the military, battle or game. About the nature of military custom, designed from the living to ward off death, who demonstrated their survival and viability, according to the ancient sources. "ROSS, FEAST, THUNDER" could grow and be born not only among soldiers, military life: it was customary to give farewell honor – military battle or a game only for the dead warrior; civilians engaged in agriculture did not know the system, "ROSS, FEASTS, THUNDER" and managed just a commemoration.

During feasts, the armor, the dead warrior was placed on a high mound on top that they inspired competing as military symbols. Military games were accompanied by songs, which glorified feats of deceased. Before the burial a solemn feast was made on a grave. Warriors funeral military games consisted of competitions in wrestling, hand-to-hand and fist combat, running, archery, throwing the discus, etc. Expensive prizes were intended for the winner in each kind of competition. The word "FEAST" is translated as "win", "overcome" (in the fight). In vocabulary related to the Slavs languages there is not still etymologically close term, so the word is recognized as exclusively Slavic. In ancient books of Church Slavonic language (three(s)value) is used to mean a contest, a battle. Also, this word is listed in the ancient azbukovnik. The words "trezise", "FEAST", corresponded to the ancient Greek notions of "competition", "struggle". The Greek Olympic games were translated as "five-year Trizna". Trezise was equivalent sometimes to the field, to the space for upcoming events. The pagan rite was one of communication forms with the God Perun, who DAZHDBOG symbolizes the sphere of heavenly deities: Perun – the sword and the fire horse – the God of lightning, thunder, fire, patron of the military; Give God with a sun sign – the sun deity, light, mythical ancestor of the Russian people, the wealth giver. Perun – one of the terrible deities, combatants-soldiers, armed with axes, which became symbols of the storm. Perun was made of oak wood, with silver head and with golden moustaches.

Slavs had not constant army in the epoch of the political entities. To fight the enemy were all the population, the ability to protect and carry various weapons. Features of the Slavic warriors training come from the conditions of hostilities at that time. Is primarily: 1) the protective ammunition; 2) the correlation of forces; 3) the duration of the battle; 4) the systematic participation in the wars; 5) the venue of the fight; 6) weapons; 7) climatic conditions. The main protection of the Slavic warriors always was considered the mail. But chainmail could not stand straight, stabbing, hard strike, that is why the warriors used their body mobility, to prevent direct punch and kick had slanting blow. The Slavs fought with the more numerous cavalry of nomads, and against the byzantines, the livonians, the teutons, who were much better protected and armed. Soldiers were able to fight with the enemy attacking from four sides, i.e., against the group, they had superiority in the individual training to achieve success. This was facilitated by the rite of feasts when one fighter on the mountain fought with the whole group. Later in the Christian period, after the prohibition of all pagan rites the fight on the mountain of the "feasts" was renamed "king of the hill". This kind of tradition reached our days. We had a number of references in Chronicles on the battle duration, which told that the battle went from dawn to dusk and sometimes continued at night. It was possible to withstand the battle with such duration only by using cost-effective technique of martial arts, not making any unnecessary movements and in the most optimal range of motion. Since the striking surface of the weapon was it fist, sword, spear, foot or otherwise was very small, there was no need to do protective amplitude movements as in martial arts. At low amplitude
the enemy had the impression that the fighter was nearly defeated and became vulnerable. Due to this false impression the enemy chose the wrong tactics of battle. Strike of the warrior from the enemy attack line was minimal on the striking surface of the weapon, the weapon slid along the surface of the armor. At minimum amplitude, it was possible to do greater frequency of movements, the care was done in the direction of rapprochement with the enemy and not for separation. It allowed the enemy to develop in the attack maximum power and the Slavic warrior at low amplitude had the opportunity to strike a fatal blow. The Slavic tribes were almost constantly at war with their geopolitical location at the crossroads of Europe and Asia and were forced to repel the attacks as "Western" and "Eastern" civilizations, military equipment movements worked out by them professionally [2]. The venue of the match was of great importance to the individual fighting. Our ancestors tried to choose places where it was inconvenient to use the troops with a large number of soldiers that were difficult to maneuver and the setting was unusual for the enemy, where the numerical advantage and physical strength were meaningless and all was decided by the skill and agility of each fighter. The soldier who was more flexible, elastic, more stable usually won. Working on the mountains Slavs worked the best stability, insurance in falling, because they were dropping of tough hills with a slope of 30 degrees. Standing on a higher level it was more profitable to work with feet and standing below with hands. On the plain it was better to strike blows above the waist, and not below the belt. In winter the fighting took place on rivers, lakes, and it should be taken into account the warriors training standing wide on a slippery surface. Rack width did not exceed the width of the shoulders, otherwise stability and maneuverability was lost. In the Eastern martial arts rack width was much greater because the struggle took place mostly on solid ground. There is a difference in the technique of a cold weapon possession. The weapon was heavier and more inert than that of the East peoples, so the movements were cyclic, continuation of one was the beginning of another.

The aim of our research is the development and introduction in educational process of students patriotic education social-moral self-development mechanism formation at physical culture lessons with the means of combat and to develop the competence of personal safety.

Center for Slavic martial arts "ROSS, FEAST, the THUNDER" at the Institute of art and culture aims to implement in the educational process of the university this kind of sport [1,2,3,4].

Methods and research organization. Students of the art and culture institute took part in the research, the experimental group of 63 people involved in the specially developed program of physical culture with the Russian domestic self-defense system inclusion.

Results and their discussion. Currently competitions in the HEI are carried out on one of the main sections: hand to hand combat. During the competition, tritnite, melee work in full contact, in leather gloves with a weight of 300 g. the 2 phalanges of the hands fingers are seen from the gloves. Blows to the head and side kicks are allowed. The limbs and body strikes are allowed with hands and feet. Possible Throws, holding, hooking, painful and suffocating receptions, bends of the arms are allowed; foul blows by open glove to the throat, face, groin are bumped. Students trained according to the system of self-defense "ROSS, FEAST, THUNDER" at the University for four years showed positive statistical changes in the competence of personal safety formation. At the beginning of the experiment, the level of competence formation was low - 87%, relative - 11%, average - 2%. At the final stage of the experiment, the relative level was 7% in the experimental group, an average - 45% high-40%, the highest excellent - 8%. According to the statistics of the Perm military enlistment office 86% of students involved in martial arts systems serve in the Russian Federation special armed forces.

Conclusions
The research confirms that the use in the educational process of the University students of the Russian self-defense system contributes to the physical-sports competencies personal safety formation. Physical education forms not only professionally applied competencies but also creates interdisciplinary competence in the field of Patriotic education.

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FACILITATION AND ITS ROLE IN CULTURE-CONSTRUCTIVE MANAGEMENT OF PHYSICAL-SPORTS ORGANIZATION

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Annotation. Special emphasis in work is given to the principles of culture-constructive management formation, which reflect philosophy of modern business education at physical culture higher educational establishment. First of all, it is the principle of facilitation, the real realization of which in practice is facilitators’ activity concerning organizational knowledge coordination and physical-sports organization leaders’ personal knowledge generalization. Material. Recommendations creation connected with facilitation role estimation in culture-constructive management of physical-sports organization. Research methods: scientific, scientific-methodical literature and the experience of specialists-experts in the sphere of organizational knowledge coordination analysis and summarizing. Result. The effectiveness of culture-constructive management in physical-sports organization is estimated from the point of a complex approach. Taking into account the principles of facilitation, the ways of knowledge conversion in the sphere of organizational culture-construction are substantiated. Conclusion. The final part of the work is dedicated to the principles of facilitation: readiness for changes, responsibility for reputation of physical-sports activity, mutual cooperation in order to achieve one aim, constant support of the main directions of this activity from the administration of the physical-sports organization, which include organizational culture-construction. As it is shown in the research, facilitation is understood as culture-constructive management, the base of own professional knowledge improvement by sports managers.

Keywords: physical-sports organization, facilitation, sports management, system effect, processual competence.

Facilitation, being one of the kinds of compensatory communication, helps to solve professional problems of any entrepreneurial organization competently (adopt useful approaches and avoid ineffective working techniques). It concerns, first of all, facilitation of organizational culture-construction, the main objective: strategic development, confidentiality of corporate relations, values transfer from agency center of physical-sports organization to its departments in space and time.

Facilitators are conductors of organizational culture-construction and conductors of getting system (synergetic) effect on this base. They help to form corporative thinking, awaken imagination, encourage creativity in the sphere of entrepreneurial activity and support the search for the new ways of competitiveness provision.

The activity of facilitators is fundamental for culture-constructive management (CM), which is based on the theory of general management in physical-sports organization, integrates the techniques and methods of many functional kinds of management concerning the specificity of managing organizational culture. According to its content it is a complex system of actions, which consists of interconnected managerial decisions creation, each of which contributes to the increase of competitiveness and steadiness of physical-sports organization activity (table 1).

In a general way the functions of any managerial system can be structured in the following algorithm: analysis-planning-the adopted managerial decisions realization-motivation-consideration-control over realization-regulation (feedback). These functions directly concern culture -
constructive management (taking into consideration its definite objects of management and objectives).

The structure of the mechanism of culture-constructive management is determined by the following: outer and inner mechanism of relations regulation in the sphere of organizational culture, informational support of culture-constructive management, the system of management and control methods over managerial decisions realization in the sphere of organizational culture-construction. Evolutational processes study in organizational culture-construction has the definite algorithm [1]. Organizational culture-construction is connected not only with inner environment of physical-sports organization (PSO), but also its working environment, which is conditioned by the relations with contractors.

| Table 1 – Culture-constructive management (CM) in the organization: a complex approach |
|-----------------------------------|-----------------------------------|
| Unit content | Unit |
| 1. Essence, functions and strategies of culture-constructive management | 1. Essence, aim and objectives of CM |
| | 1.2 Functions and mechanisms of CM |
| | 1.3 Strategy of CM, its content and succession of creation |
| 2. The algorithm creation of evolutational processes study in organizational culture-construction | 2.1 Culture-constructive analysis of external environment in the organization |
| | 2.2 Culture-constructive analysis of inner environment in the organization |
| | 2.3 Strategy and tactics of organizational culture-construction |
| 3. Organizational basis of CM | 3.1 System-forming elements selection of inner and outer culture-construction |
| | 3.2 Facilitation of organizational culture-construction |
| | 3.3 The subject of organizational culture coordination |

The main principle of organizational culture-construction should be its correspondence with all the elements of PSO management system. In practice this principle means, that during changes creation or introduction in the strategy, structure and other elements of management system, managers should estimate the degree of their realization potential in terms of existing culture and, if it is necessary, should be able to take measures in order to change it. At the same time, it should be taken into consideration that culture, by its nature, is more inert, than other elements (of the management system), that is why actions concerning its change should anticipate all other transformations and understand that the results won’t be at once [2]. The algorithm of organizational culture-construction, in its tern, includes the following: the style of management and the system of reward for work change, education, new personnel policy (special approach to personnel selection), attention to artifacts, inner PR system formation. At the same time, the most problem zone should be mentioned: inertia of thinking and stereotypes of behavior. That is why, according to some specialists, the following is very important: 1) the complex of values creation, which reflect the specificity of PSO business and which have a positive influence on its effectiveness and competitiveness (top-management should be the example); 2) new people introduction into a cultural organizational context of a corporate enterprise (they shouldn’t be the initiators of “resistance movement”); 3) interconnect space of OC creation (without local subcultures formation). In order to realize this it is necessary to imagine organizational culture in a function form, factor, method and the means of the realized reforms in the sphere of organized knowledge (taking into consideration the characteristics of a corporate enterprise).

Some authors speak about cognitive management and its principles [4] and also
about organizational learning activity, taking into account three principles:

- the recipient of knowledge selection on the basis of the objective similarity and its context;
- the nature of the objective (in terms of its regularity and the rate of occurrence);
- the type of the transferred knowledge.

We speak about the single principle finding and the experience of facilitators transfer and also about indirect and strategic transfer.

Cognitive management appeared from the fact realization, that the directions of competition during recent years had changed greatly and the struggle for intellectual resources pushed back the dependency on natural resources. Mentioned above concerns PSO (in terms of physical culture sphere and sport of national economics).

The term “cognitive management” is determined as “a systematic control over the processes, by means of which knowledge is identified, accumulated, distributed and used” [3]. We understand knowledge as decoding of organizational culture. It is also knowledge in the sphere of organizational culture-construction. Taking into consideration all mentioned above, we give the following definition of culture-constructive management (as a modern economic notion of the organized knowledge).

Culture-constructive management is a systematic (stage by stage) organization in terms of PSO general (obvious) and implicit knowledge, its widened reproduction (gaining) and protection as a commercial secret. Taking into account the principle of facilitation, its structure can be presented in a following way (picture 1).

It should also be noted that CM is a specific knowledge, which is conditioned by organizational culture-construction, formation of which determines “constant innovations” and through them determined the advantages in competitiveness of this physical-sports organization. That is why one of the latter main objectives is special knowledge protection and integration, which is “one of the most popular cure for uncertainty” [6].

Taking into account the principles of facilitation, the main in culture-constructive management is a constant learning on the basis of different experience and knowledge conversion in the sphere of organizational culture (culture, oriented at knowledge and business success). We can name 4 ways of this culture conversion (picture 2). All they are connected with considered by us question concerning the specific (organized) knowledge and the role of facilitation in culture-constructive management in PSO.
From implicit knowledge to obvious knowledge

<table>
<thead>
<tr>
<th>Implicit knowledge as consequence</th>
<th>(Socialization) Knowledge as experience</th>
<th>(Externalization) Conceptual knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obvious knowledge</td>
<td>(Internalization) Applicative knowledge</td>
<td>(Combination) System knowledge</td>
</tr>
</tbody>
</table>

Picture 2 – Four ways of knowledge conversion (taking into account the principle of facilitation)

PSO managers, who form organizational culture-construction, should search for effective ways of the current experience transformation into organizational knowledge, which can be used in order to provide competitiveness. It should be distinguished from bookish knowledge, instructions and the database (we especially underline this).

Thus, the aim of culture-constructive management is organizational knowledge gaining from outer sources or its independent creation, systematization, transfer and also its protection (as implicit knowledge, which improves physical-sports activity and not reproduced by competitors). It is also important that systematization (decoding, codification) of organizational knowledge is a problem, the solution of which belongs to a qualified specialist facilitator in a definite sphere, who is able to define, which knowledge is suitable “from the PSO aims point of view”.

From the structure of culture-constructive management, presented by us earlier, let’s define “management of notions”. It is necessary in order to understand the nature of organizational culture (“Define the notion, wrote the ancient philosopher, - and you will free the world from half of miscomprehensions”).

As an example, let’s present the definition of some keywords and expressions, which are necessary for understanding “culture-constructive management” from the positions of facilitation. The base, in this case, form the definitions presented by N. Holden [3].

1. **Business communication** – the set of procedures, by means of which the enterprise tries to initiate, support and regulate relations with the interested subjects of society and find the ways for resources promotion in the Internet. According to this notion, the formed relations make the processes of exchange between the enterprise and its partners easier (including cash, goods and services, information and values, experience and the ways of behavior transfer). Such kind of communicative processes mean that the function of a tongue is not only in information transfer, but also in support provision while the atmosphere of good will and cooperation creation between PSO and its partners.

2. **Culture-conditioned knowledge** is knowledge formed from general-cultural and specific knowledge and culture-constructive technologies.

3. **Diversity management.** Managing diversity is the art of mastering a person’s potential in any forms of its existence and the abilities of each worker combination, in spite of inner borders, which exist in the organization, for the benefit of each worker and PSO in general.

4. **Interactive transmission** is the form of culture-constructive activity, during which the participants are involved into work (multicultural) of groups in order to create general approach to the problem and its understanding in terms of international company. It is also the process of teaching how to work in such teams. Interactive transmission is necessary for processual competence.
creation, which provides intra- and inter-organizational transfer of knowledge, values and experience (and its modulation).

5. **Language of management.** The set of linguistic symbols, available in any language (for example, in English, German, Japanese, Russian and others) and which include standard terms and informal elements (for example, indirect expressions, humor, deception), which are necessary for management objectives conceptualization, description and realization and also for mutual use of managerial information. The language of management has three pragmatic aspects: management objectives description, the means of work in the Internet support and “wisdom”, its practical knowledge and worldview storage.

6. **Network organization.** The activity concerning the ways creation of resources, competence and opportunities transfer, which are necessary for the organization in order to support it and manage the canals of information transfer. An effective network organization demands attention paid to business and is an important process of culture-constructive learning activity.

7. **Processual competence.** The skills of organizational-cultural communications, necessary for an effective discussion, for example, of a group project, even when two languages are used. Processual competence helps to keep the principle of equality in solving general objective and provides mutual use of knowledge, experience transfer and group learning activity stimulation.

8. **Specific cultural knowledge.** Knowledge, specific for this source of general knowledge, is subjective in a way that is gathered in accordance with the objectives, solved by the enterprise. Such kind of knowledge in accordance with the adopted norms can be implicit and obvious. It appears probable that more important is how deep those, who perceive and interpret this knowledge, already know the subject.

9. **Organizational-cultural communication** is harmful effects of noise revelation and reduction, this “main source of restrictions in communication” in the system, formed by subcultures in terms of PSO. It is also work in network, which supports knowledge and experience transfer in the sphere of organizational culture-construction.

10. **Culture-constructive technologies.** The base component of the main PSO competency, with the help of which mutual use of knowledge and organizational learning contribute to economic competition. They create the base for learning mutual use of organizational knowledge by means of inner and outer network. First of all it concerns knowledge of PSO itself, useful during intercultural interaction. Organizational-cultural technologies can be received on the basis of two other forms of knowledge (general-cultural and specific), however, they are very often subjective and are presented only in personal experience. They also can present implicit knowledge, for the transfer of which personal contacts are necessary. Organizational-cultural technologies make interaction easier, provide processual competence and stimulate mutual organizational-cultural learning.

11. **Culture-constructive management** is the sphere of PSO management, the objective of which is effective interaction provision, learning and the role of organizational culture estimation in the structure of managerial relations. Such kind of work is realized the spheres of contacts, where knowledge, values and experience are transferred into multicultural products of entrepreneurial activity. It is also the processes study of “fusions” creation, evolution and management or “alloy of cultural diversity”, concerning PSO policy, its strategy and achievements. In a more comprehensive sense we speak about the culture of PSO management, not only about organizational, but also business culture in the system of management and agency center of the definite physical-sports organization.

12. **Facilitation** (from the English “facilitate” – alleviate, assist, help, promote). Facilitation concept is conditioned by the demands, which are claimed on facilitators:

- deep understanding of the way how PSO works, including understanding its structure, material-technical support, values,
inner systems of communication, markets and customers;
- analytical, based on the facts, systematic approach to business and good skills of planning;
- real ability to work effectively and cooperate with people, who belong to other cultures;
- developed skills of communication and the skill of listening;
- the ability to set the problems and search for their solution;
- skills of presentation;
- the ability to work independently for a long time in the direction of culture-constructive management essence understanding;
- the knowledge of own professional language (the language of facilitation), which determines the field of own activity in the sphere of communications (interactions in terms of PSO). We speak about facilitation (audit) of PSO departments, the level of minimal standards of PSO fulfillment estimation (the main rules, settled in the “Principles” of its management).

In fact facilitation is culture-constructive management, the experience of PSO study and distribution, the corresponding recommendations, created by a facilitator, communication to all workers. It is also the base of own professional knowledge broadening using different ways:

1) mastering and recording “new” knowledge about PSO from its departments point of view at three levels of culture-conditioned interaction: national, corporate and professional; 2) adapting own behavior and style of communication to local peculiarities; 3) putting the mastered knowledge first; 4) converting knowledge into a convenient form for transfer to PSO departments of PSO workers, for whom it can be useful.

We will enumerate the principles of facilitation, which are created during our research works and the experience of the leading PSO (the most competitive ones) summarizing:

1. Readiness to accept changes. They should be predicted and used in order to get specific effect, the volume of which depends on the speed of this readiness realization, conditioned by the power and effectiveness of organizational culture, decoding of which is available to all PSO managers and workers.

2. Each department should realize clearly the volume of own responsibility for physical-sports activity reputation and the level of decisions, concerning business success achievement. Each working group and each worker should have advanced aims in business and competence improvement and also they should timely get feedback during the process of own work.

3. Mutual work for general aim achievement. It is necessary to combine constantly the skills and the powers in order to achieve general aim; trust each other and accept the right of each person for independency of ideas in organizational culture-constructive management, the aim of which is constant improvement and yearning for business success.

4. Reliability of PSO business and image is the base of culture-constructive business. It is the search for acceptable PSO identity and values (quality, care, development, innovations, consistency) ways and the variety of opportunities demonstration (enthusiasm, freedom, self-actualization).

5. Constant support of the main directions in the sphere of facilitation provided by the leaders of PSO:
- culture, which provides activation of work with the present and the future managers in problem-simulating direction (in accordance with the slogan “form is not less important, than the content”);
- sports management improvement (attracting outer facilitators on order to create professional, practice-oriented modules of teaching PSO personnel);
- problematization from the position of information gathering about the best methods of work and new achievements. In terms of this direction of facilitation realization in practice the most useful is the leading specialists participation in schools-seminars connected
with sports manager’s institutional way of thinking formation and development;
the structure of culture-constructive management optimization on the basis of organizational knowledge and experience bank formation (own PSO and other PSO). On the basis of such kind of experience best examples in the sphere of organizational culture-construction it is necessary to learn how to understand, use the received information and make it available (for example, through local networks of culture-constructive management).

Lets’ mention that collision because of culture in reality is the consequence of search for own social identity (Kleppesto, 1998) by PSO. This is exactly the item (in interconnection with business success), which conditions the essence of activity in the sphere of culture-constructive management, oriented at knowledge gaining and creation. So, only from this positions culture will really be “organizational resource” of entrepreneurial physical-sports organization.

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MILITARY HIGHER EDUCATION INSTITUTIONS CADETS FIREARMS TRAINING BASED ON THE DEVELOPMENT OF MENTAL PROCESSES

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Annotation. Military universities cadets firearms training requires the study of the psychological aspects of aimed shot technique, improvement technique of shooting in conditions close to combat situation and professional activities. Improving firearms training of the cadets identify the role of mental processes in the work on the shot and their place in different phases of the shot. In particular, the control and improvement of mental processes allow to assess the readiness of cadets to implementation of the shot, to improve shooting technique. Research methods. Analysis and generalization of scientific and methodical literature, pedagogical observation, research of mental processes, statistical analysis. Materials. The article deals with the problem of military higher educational institutions cadets firearms training taking into account mental processes. Psychological processes and peculiarities of their formation in firearms training of the cadets is clarified. Such psychological processes as sensation, attention, memory, thinking, emotions and volitional qualities are considered. Education of specific sensitivity in the process of firearms training of cadets is an important point in the training process experience. Results. In the first stage psychological processes and peculiarities of their formation in the shooting training of military schools cadets are clarified. Psychological processes include: sensation, attention, memory, thinking, emotions and volitional qualities. An exemplary training facility aimed at the development of balance feeling, muscle tone, steady state is developed. It is noted that the development of mental process and sensation of the cadets within the firearms training is the basis for the formation of the cadets willingness to shoot. Conclusion. The study of the psychological processes mechanisms and the use of special complex exercises aimed at the development of these processes allow the cadet in difficult circumstances by strong-willed effort to regulate his mental state to focus on the actions that he must perform.

Keywords: cadets, shooting training, mental processes, sensation, attention, memory, thinking, emotions, willpower.

Relevance. In Russia the priority direction of professional-applied training of specialists is the training of military specialist, who owns modern equipment and weapons in any extreme environment with maximum efficiency [1,2,3,4,5,6]. This requires a high level of physical and psychological preparation, in which a special place occupies the firearms training of cadets. Analysis of scientific-methodical literature showed that the psychology of the shooting sport reveals the psychological characteristics of this sport. Military higher educational institutions cadets firearms training consider the study of psychological aspects of technique aimed shooting, improving shooting technique in
conditions close to combat situation and professional activities. Improving firearms training of the cadets identify the role of mental processes in the work on the shot and their place in different phases of the shot.

In this regard, the problem of military universities students mental processes development in the firearms training is actualized.

The aim of this work was to identify the peculiarities of the manifestation and perfection of students mental processes in the framework of the firearms training.

Research methods: analysis of scientific and methodical literature, questionnaire survey, testing, mathematical-statistical processing of the results.

The results of the discussion. The main goal of firearms training is the improvement of technical and tactical actions of cadets with overcoming psychological difficulties in the process of educational and professional tasks implementation.

The process of psychological training requires individual and joint actions of cadets. In this connection, much attention in the preparation of the cadet is given to independence, consistency, risk tolerance, failure avoidance and the ability to work in a team.

The growth of the cadets shooting proficiency is changing the specific weight of psychological training in a common set of comprehensive training. In the first phase of firearms training psychological training is aimed at the rapid acquisition of technical actions and execution of various commands by the cadet. In the process of improving firearms training specific psychological qualities are formed, depending on the peculiarities of the person’s mental properties. The formation of individual psychological qualities of cadets impact on the end result of the firearms training.

In the first stage psychological processes and peculiarities of their formation in the process of cadets firearms training is clarified.

The psychological processes of the specialists will include: sensation, attention, memory, thinking, emotions and volitional qualities. Mental process of the objects individual properties sensation, as well as the internal state of the body, especially the condition of the muscles, is important in the process of adopting the original position, the readiness, grip, finger position on the descent in the classroom at the cadets fire training lessons. The basis of sensation is a neuro-physiological process in bodies, which is necessary for further development. Specific sensitivity education in the process of cadets firearms training is important for the training process experience.

To this end, we have developed a training system aimed at the development of balance feeling, muscle tone, steady state.

Table 1 presents a set of exercises aimed at the development of feeling in the firearms training process of military schools cadets. It is noted that the development of mental process and sensation of the cadets within the firearms training is the basis for the formation of the cadets General willingness to shooting. For this purpose, specific exercises, taking into account all phases: starting position, ready, aiming are used.

Table 1 – a set of exercises aimed at the development of cadets feeling in the process of firearms training

<table>
<thead>
<tr>
<th>№ p/p</th>
<th>Name and the content of the exercises</th>
<th>the Dosage</th>
<th>methodic instructions</th>
<th>exercises Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hold hands in the ready position</td>
<td>To the tiring (to Failure)</td>
<td>To determine the time and degree of tension in the muscles of the hand,</td>
<td>The education of the hand muscles tension degree feeling</td>
</tr>
</tbody>
</table>
Mental process of perception is the reflection of the cadets consciousness of the external and internal influences on the body. Perception is important in the training of cadets, as it is the basis of the shift arms prevention, performing the involuntary muscle tremors that may lead to the displacement of arms from flies. The shooter thinks that he executed the shot with proper sinking flies towards the target, and in fact have been an oversight of the moment involuntary muscle jerk. In this situation, the signal about the changes could come, but the shooter this time was not perceived by the consciousness. Muscle activity of the shooter in this situation was small, but the mind was busy with more important motor actions, the final execution of the shot. Therefore, perception is a process that it is necessary to train on the level of feelings. This requires that in the final phase of making a visual image of the observed object reacts to the visual analyzer less than one thousandths of a second. Only then the shooter can see the movement. Otherwise, the shooter will not notice the movement of weapons and will not pay attention to the error. For further improvement of the perception process it is necessary to train the muscle feeling and use it to adjust the action.

Thus, the mental process of perception is the key point of a cadet shooting impact, so it is necessary to teach the cadets the correct perception of their feelings. The correctness of the perception is particularly important in a competitive environment.

Attention is seen as an active force cadet sent to motor action in training to fire. It is well known that attention can be focused on both internal and external activity form. In this regard, cadets need to learn to focus on thoughts and actions which are defined by the objectives of the lesson, disconnect from the environment (such as noise, conversations, behavior, teammate), to suppress extraneous thoughts.

Raising attention of students in the process of psychological training should be done in conjunction with other aspects of training. Attention develops in the process of awareness of the need for firearms training to achieve the goals, but also to increase interest in firearm training and having emotional recovery from a well done job. The formation of duty to the Motherland consciousness, family and awakening to perform work on a high professional level are also the basis for the cadets attention formation.

Memory for the cadets in firearm training aimed to capture, preservation and reproduction of past experience, manifested in motor actions. The training of visual, emotional and muscle memory is especially important for firearms training. Visual memory is key at all stages of the cadet training to shooting. Visual memory is improved in the course of the shooting.

The basis of mastering the technique of motor actions in the shooting is muscle memory. In the training process shooters always need to allocate special classes to enhance and support muscle memory.

The knowledge accumulated in the process of lessons provide the students the thinking pattern of the whole training process.
Cadets must learn to manage thoughts, depending on the specific situation. In training and fighting cadets meet unusual situations, faced with which they need to make the right decision. Cadets thinking education in the firearms training process aims at avoiding critical situations and emotional outbursts. The process of accurate shot for the cadets is not a mechanical action, but a conscious process, which is always controlled by consciousness. Preparation for firing, firing and participation in competitions require constant reference of the thought processes.

For the cadets mental background development we defined guidelines to foster active mental processes:

- clear knowledge and view of the performed action and the ability to mentally replay all the actions;
- control of muscle tone, its increase or decrease;
- evaluation of the actions taking into consideration the shortcomings and errors;
- analysis of actions taken in parts and as a whole;
- ability to assess and evaluate the state of readiness for firing.

Emotions as a mental process can influence human behavior both positively and negatively. Emotions can cause profound changes in the autonomic system of the person. Management of emotional background is the basis for the cadets firearms training. Emotions are not amenable to direct volitional influence. To control emotional background special techniques are necessary to possess.

Cadets training process includes the following methods:

- proper formulation of the goal in the competition;
- setting higher and more responsible tasks to training sessions;
- mental representation of the competition situation;
- analysis of negative emotional manifestations;
- stimulation of emotions; control of breathing, heart rate and behavior.
- monitoring of the athlete emotional state.

All by the aforementioned mental processes are improved and brought up in the process of building a competent educational and training process of cadets firearms training.

When developing methods of cadets firearms training given the psychological processes the following methodological features were taken into account:

- correct formulation of educational and training sessions objectives;
- create a general idea about the end result;
- production of private higher and more challenging tasks in the process of training;
- rigor and discipline to the quality of jobs;
- education of attention stability;
- planning of each lesson.

Principle of firearms training for cadets should be a requirement of the shot awareness to execute specific tasks. It is necessary to teach the cadet to mentally carry out the action in general and in the phases of execution. Major elements in firearms training are stand point of reducing the speed of lifting hands arms, release hands to stop flies to the target, the formulation of the index finger in the extraction of the descent, building up pressure on the trigger, check the consistency of descent and aiming efforts. The cadet needs to "scroll" in mind the above steps with special attention and with interest, without diversion of attention to the side.

A comparison of all motor actions performance with the standard is the basis for the cadet understanding the actions result.

The transition to private tasks of the training process requires a necessary inclusion in the educational process of actions implementation method in parts. For example, in the training of cadets, it is possible to use the exercise without the use of cartridges, i.e., the exercise tedious and monotonous, without end, without hitting the target. The execution of motor actions in parts allows the cadet to more deeply master the elements of the action. For example, an important private objective for students is to learn to control muscles in the
shoulder that hold the arm with the weapon in the ready position.

Thus, rational planning of competition and training loads of cadets firearm training aimed at the development of mental processes in the course of many years of training, gives the necessary effect only in the presence of its progress monitoring system. The study of the psychological processes mechanisms and the use of special exercises complex aimed at the development of these processes contribute to foster these qualities that will allow the cadet in the difficult conditions of wrestling to regulate the mental state and focus on the actions he needs to perform.

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PARTİCİPATİON İN PHYSİCAL ACTİVİTY AND SHYNESS ACCORDİNG TO GENDER

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Annotation: It is known that feeling of shyness is an important factor that influences relationship among people. A number of studies have been done in order to make people more sociable, social and minimize this feeling or sense. In this context the aim of the research is to examine physical education and sport school students’ shyness levels in terms of exercise behavior levels. Method: The sample group of the study consists of 122 women and 190 men as a total 312 university students. Exercise Stages of Change Questionnaire (ESOCQ) and the Shyness Scale (SS) were used as data collection tools. The Kruskal-Wallis H and Mann Whitney U test were used to analyse data. Results: While the shyness levels of male university students in the study were found to vary depending on their stages of exercise behavior, it is appeared that similar differences have not been found among female students. It was determined that the shyness levels of the male students in the preparation stages of exercise behavior were higher than the shyness levels of male students in the passive and active stages of exercise behavior. The lowest level of shyness was determined by the university students in the active stage of exercise behavior. Conclusion: As a result of the research, it can be said that participation in physical activity helps male students to decrease their shyness levels. The male students’ behaviours in the passive stage of exercise behavior are lower than the male students in the shyness levels of preparation. Keywords: Exercise, shyness, university student

Introduction

Physical inactivity among young and adult people is a serious cause for concern[1].Physically inactive individuals stay away from many health-related benefits than physically fit ones[2,3].In order to increase these health benefits individuals should be physically active by doing 20 minutes or more exertion per day or some bodily movement produced by skeletal muscles that result in energy expenditure. While there are many factors that enable individuals to participate in physical activity (being healthy, losing weight, looking good, social interaction, being popular,etc.) [4,5], it is possible to talk about the factors that prevent them from participating in physical activity (economic situation of the family, sports environment, income situation, time, preparation for exams, etc.) [6,7]. It is possible to increase them, but with the numbers being limited, there are also studies showing that shyness affects this process [1,8–10].

As a social entity, each individual diversifies his or her life experiences through interpersonal relationships. One of the important factors affecting the relationship between persons is the shyness that can be defined as the feeling of apprehension and
restraint in the place where others are present[11]. However, establishing positive interpersonal relationships may not be an easy process for every individual. When the literature is examined, shyness seems to make this process difficult [12–20]. Shy individuals are characterized by reluctance to talk, avoidance of eye contact, excessive boredom, avoidance from the social environment, thinking that others do not care about their own opinions, and fear of being subjected to negative judgments by others [21,22]. Participation in physical activity has an important place in studies to facilitate the execution of this process in a healthier way [8,23]. For example, studies in the literature suggest that individuals participating in physical activity at an insufficient level are shier than individuals participating in regular physical activity[1,9]. Additionally, Bandura (1993) notes that being physically active has a positive effect on overcoming psychological and social problems. It is clear that it is necessary to conduct studies in order to minimize the shyness as a psychological problem.

From this point of view, the aim of this study is to determine the shyness levels of university students in Turkey according to their participation in physical activity.

**Method**

**Participants.** The study group of the research consisted of 122 women 190 men, with a total number of 312 physical education and sport school students who completed a questionnaire package that included Exercise Stages of Change Questionnaire (ESOCQ) and the Shyness Scale (SS). The sample group was just randomly selected from Karadeniz Technical University in Northeast Turkey.

**Procedures.** A questionnaire was used as a data collection method. The questionnaire is a commonly utilized data collection tool in quantitative research(25). The questionnaires were distributed after obtaining the necessary permits from university administration. The participation in the survey was voluntary.

**Instrument.** Exercise Stages of Change Questionnaire (ESOCQ); is four items measure which is developed by Marcus and Lewis (2003) to determine stage of exercise behavior of individual. ESOCQ is a binary type (yes/no) questionnaire. Based on their responses, they classified in five different stages by using a scoring algorithm. These are Precontemplation, Contemplation, Preparation, Action, and Maintenance. Among them, precontemplators and contemplators are physically inactive/passive, preparers are physically active but not at the recommended levels and individuals in the action and maintenance stages physically active. ESOCQ has been translated from English to Turkish and psychometric properties examined by Cengiz, Aşçı and İnce[27]. In this study, Turkish version of the ESOCQ was used for the Turkish students.

Shyness Scale (SS); first developed by Cheek and Briggs(1990)and then turned into Turkish in 2001 by Güngör. The scale in terms of retest reliability, the coefficient was calculated as .83 and the Cronbach Alpha coefficient regarding the internal reliability consistency as .91. Shyness scale items composed of 5-point Likert-type measure of 20 questions about how often individuals perceive themselves as shy. The highest score that can be taken from the scale is 100, the lowest score is 20. The high score indicates that the individual perceives himself as "shy"

**Statistical analysis.** The data was analysed using the Statistical Package for Social Sciences (SPSS) Statistics (Version 23.0 for Windows; IBM). Kruskal-Wallis H and Mann-Whitney U test were used to determine whether there were any significant differences between the means of independent/unrelated groups.

**Results**

When participation rates of physical activity are examined, it is seen that 40% of female students are not yet participating in physical activity (passive), 19% are in the preparation stage of exercise behavior and 41% are active stage of exercise behavior [Figure 1].
The Kruskal-Wallis test results of female students' shyness scale scores participating in physical activity at different levels are given in Table 1. The results of the analysis show that the scores of female students' shyness scale do not differ according to their level of participation in physical activity $\chi^2 (sd = 2, n = 122) = .31, p = .86$.

Table 1: The distribution of the SS scores according to stage of exercise behavior (Female)

<table>
<thead>
<tr>
<th>Stages of Exercise Behavior</th>
<th>n</th>
<th>Mean Rank</th>
<th>df</th>
<th>$\chi^2$</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passive</td>
<td>49</td>
<td>63.66</td>
<td>2</td>
<td>.31</td>
<td>.86</td>
</tr>
<tr>
<td>Preparation</td>
<td>23</td>
<td>60.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>50</td>
<td>59.98</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When participation rates of physical activity were examined 28% of male students were not yet participating in physical activity (passive), 17% were in preparation stage of exercise behavior and 55% were active stage of exercise behavior [Figure 2].

Figure 1. The distribution of exercise behavior stages (female)

Figure 2. The distribution of exercise behavior (male) stages
The Kruskal Wallis test results of male students scores participating in physical activity at different levels on the shyness scale are given in Table 2. The results of the analysis show that the scores of male students' shyness scale differ according to their level of participation in physical activity $\chi^2$ (sd = 2, n = 190) = 8.15, $p=.02$. This finding suggests that participation at different levels in physical activity has different effects on shyness levels of male students. Taking into account the average of the groups, the highest level of shyness is seen among male students who are in the preparatory stage of participation in physical activity and passive and active stages of participants follow subsequently. According to the Mann Whitney U tests for this example, it is found that male students, who were in the preparation stage of exercise behavior were higher shyness average scores than male students in active stage of exercise behavior. The differences between the averages are statistically significant.

Table 2: The distribution of the SS scores according to stage of exercise behavior (male)

<table>
<thead>
<tr>
<th>Stages of Exercise Behavior</th>
<th>n</th>
<th>Mean Rank</th>
<th>df</th>
<th>$\chi^2$</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passive</td>
<td>53</td>
<td>101.69</td>
<td>2</td>
<td>8.15</td>
<td>.02</td>
</tr>
<tr>
<td>Preparation</td>
<td>33</td>
<td>115.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>104</td>
<td>86</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion

In the study to determine shyness levels according to students' participation in physical activity, male students were more likely to participate in physical activity than female students. This result is similar to the results of previous studies and reports in this area [30–34]. Because of this situation of the girls, there are studies where only girls are investigated [35,36].

When we look at other results obtained from the research, it was found that the shyness levels of male students differ according to their exercise behavior levels. It was determined that the shyness levels of the male students in the preparation stage of exercise behavior were higher than the shyness levels of male students in the passive and active stages of exercise behavior. In order to makethis difference, the persons in the preparation phase of exercise behavior should prepare themselves for interacting with the environment, this preparation makes them uneasy and in this process the thought of exposure to the negative judgments of others can be interpreted as the reason why their exercise behavior is shier in the preparation phase. The level of female students shyness found higher in the passive phase of exercise behavior, while the level of shyness decreased in preparation and active phase. However, this difference was not statistically significant.

Finally a clear relationship between physical activity and shyness was found in this study. Moreover, Turkish physical education and sport school students are also consistent with the previous research among adolescents in the United States [8,37] and the Philippine [1] as well as among children [10] and college students [9] in the United States.

Conclusion

As a result of the research, it can be said that participation in physical activity helps male students to decrease shyness levels. In other words, the current study suggest that physically active Turkish students tend to feel less shy than their less physically active peers. Besides, the shyness level of male students in the passive stage of exercise behavior are lower than the shyness level of male students in the preparation stage of exercise behavior, but not participating in physical activity is not desirable.

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DECLARED BY THE STUDENTS OF THE TECHNICAL UNIVERSITY MOTIVES OF ATTENDANCE IN PHYSICAL EDUCATION

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Annotation. Physical education as a subject in high schools is undergoing a number of changes in accordance with the introduction of bachelor and modifications to state standards. Students have their own point of view on how should look like physical culture as a subject. Improving the system of physical education at technical University should take into account the opinion of students as direct participants in the educational process. Materials. The study of students motives can serve as a first step to understanding problems and defects in the system of physical education at the technical University. This article discusses the problems that impede the students to fully engage in sports activities, and motivations that contribute to their active and conscious attend classes in physical culture. Methods. Analysis of literature, anonymous written survey, mathematical and statistical processing of the obtained results. Results. Improvement of skills to perform a variety of physical exercises contributes to the development of intellectual, moral and volitional and motor skills, increasing physical fitness, good health, versatile, harmonious development. In the author's opinion, an important condition for improving the effectiveness of physical education teaching is the use of emotional tools, which are national, popular, outdoor, sports games, most available for dealing with average and below average levels of physical fitness. Conclusion. The results showed that the conditions of physical training in a technical University are not satisfied with more than a third of the students boys. But, at the same time, all the students (male) state that physical culture cannot be a full life. The fourth part of students is not satisfied with the lack of diversity and freedom of activities choice, interesting exercises in the classroom and modern sports facilities. While 16% of students think that physical culture is quite possible to live. The most significant problems that hinder active visits to the classroom for physical education, how girls and boys are called after a difficult couple of physical culture and just laziness.

Keywords: motives, physical culture, students of technical University.

Relevance. Higher education is one of the most powerful systems of the individual cultural formation and lifestyle. The so-called "healthy lifestyle" among students of the technical University is the result of the cumulative impacts of many factors: various health activities of physical education Department, physical activity of the student, individual personality characteristics, the processes of socialization and self-education, lifestyle and behavior, educational interventions, etc. Physical culture as a subject of higher school is involved in the formation of students healthy lifestyle through the creation of conditions for optimal motor activity and the education of valuable attitude to physical culture. In the system of technical higher education the student is simultaneously integrated into training and professional, scientific, sports and other activities. Professional competence, high level of University student professional competence, its ability to self-development and self-improvement as the idea of modern higher school should connect with the idea of personality quality living in the students.
Organization of the study. The study took place on the basis of the Bryansk state engineering and technological University (BGAU) from October 2016 to April 2017. Written anonymous survey covered 123 students (62 boys (men) and 61 female (wives)) of 1-2 courses.

Methodology of the study. An anonymous written survey of students attending only the academic lessons of physical culture (not engaged in sports sections) was conducted:

Question 1. What are you missing during classes in the section or group sport? Suggested answers:
1. interesting exercises;
2. interesting theoretical topics;
3. elements of interesting outdoor and sports games;
4. elements of the modern sports directions;
5. the diversity of activities;
6. time for qualitative development of the program sections;
7. the ability to choose what to do;
8. attention of the coach;
9. clear explanation of material;
10. modern sports facilities;
11. I am happy with everything.

Question 2. What's stopping you to do physical training? Suggested answers:
1. I get tired after lessons, so it's hard for me to go in for sports;
2. after physical education classes I have to go on difficult pairs (other lessons);
3. the gym has little space;
4. for training there is lack of sports equipment;
5. all equipment is worn and unattractive unpleasant to deal with it;
6. the gym is too stuffy, too hot or too cold;
7. near the gym there is no convenient changing rooms and showers;
8. some lessons are in a different place (not in my school building), they are inconvenient to reach;
9. I don't have a good sports form;
10. I find it difficult to interact in a team;

period. In the absence of the individual physical culture proper level development regardless of the particular future practice oriented subjective educational student demand, the subjective usefulness of physical culture (and, within its framework, and motor activity) for the acquired profession and obtaining a diploma is not enough relevant. Student participation in sports activities, in accordance with his standard of health, the desire to improve his own culture, is one of the student life quality conditions. Unfortunately, attendance in physical education is not for all University students an internal necessity, there are many reasons that allegedly prevent the student to attend academic classes on physical culture.

As known, motives are a powerful regulator of human behavior. Motivation is one of the basic concepts that are used to explain the driving forces of behavior and activities and takes a leading place in the structure of personality (S. L. Rubinstein, 1976; A. N. Leontiev, 1977; K. A. Abulkhanova, 1989; A. G. Asmolov, 1979). Repeatedly proved that the correction of motives is possible, that allows to optimize the process of students physical education (M. Y. Vilensky, 1984; A. A. Kasatkin, 1992; L. I. Aleshin, 1998, V. Pyatkov, 1999; Legotkin A. N., Legotkina L. R., 2001; Parkhomchik V. I., 2002; Pochatkova O. N., 2003; O. N. Stepanova, 2005). The first step to understanding and solving the existing problems of improving the system of physical education in high school may be the analysis of the declared motivations that encourage students to classes or prevent their active and, most importantly, conscious participation in the improvement of their physical culture.

The aim of the study is to identify declared students’ motivation to physical culture lessons at a technical University.

Tasks:
1. To determine declared by students reasons for lack of motivation to physical culture lessons.
2. To identify the motivation of students to physical culture lessons at a technical University.

Materials.
11. I disliked the coach;
12. I have health problems;
13. I'm too lazy;
14. Nothing interfere with me.

Question 3. What for do you visit classes in physical culture? Suggested answers:
1. to move, to stretch;
2. to develop strength, endurance and other physical qualities;
3. to be beautiful and fit;
4. to be healthy, not sick;
5. to gain new knowledge and expand horizons;
6. to acquire physical skills that are useful in life (running, swimming, skiing);
7. to develop positive personal qualities (determination, endurance, ability to cope with difficulties);
8. to get positive emotions;
9. to communicate, to be in the team;
10. to demonstrate my physical ability and dignity;
11. to receive credit/evaluation;
12. not to upset my parents;
13. to avoid problems with teachers, administration;
14. something more.

Question 4. Is it possible to live a full life without physical training? Answer: can, not.

When answering to any other question, student is entitled to select multiple response options.

Results and their discussion. On the basis of an anonymous survey it was revealed that 60.7% of girls and 97.8% of male students state that they are satisfied with the organization of physical culture classes. However, lack of modern sports facilities noted 42.3% of students (men) and 26.2% of students (female). The ability to choose what to do at the physical training lessons was important for 39.7% of students (men) and 24.6% of female students (female).

A variety of sports activities is not enough for 19.7% of women and 31.7% men. Approximately the same number of students noted the lack of interesting exercises (21.3% of women and 34.4% men). Much smaller number of students (13.1% of women and 21.2% men) noted lack of the physical training elements of the modern sports directions. The attention of trainers is significant for even smaller number of students (9.8% of women and 15.9% men).

About the qualitative development of the physical culture program sections worried only 1.6% of women and 2.6% men. Lack of interesting theoretical topics, not enough for slightly larger number of students (4.9% of women and 7.9% of men). Clear explanation of the material was not marked by any student in answering to the first question (Fig.1).

As the interference with students physical education lessons the following factors were called: fatigue after couples of lessons as a factor of physical training interference called, respectively, 24.6% of women and 12.9% men; lessons were difficult after gym – noted (23.0% of women and 32.3% men); inconvenient location of physical education place - noted (13.1% of women and 9.7% men); laziness -(13.1% of women and 21.0% of men).

The lack of convenient changing rooms and showers as a disturbance factor for the lessons of physical culture is of greater importance for women than for men (respectively 14.8% of women and 3.2% men).

The remaining factors are of importance for the much smaller number of students. So for women and men matter: the deterioration of the equipment, health problems (respectively 6.6% and 3.2%).

Only students- girls noted the lack of equipment (3.3%) and the complexity of interactions in the team (of 3.3%). On the other hand, only the students-men note the lack of space in the hall (3.2%), and the lack of good sports form (6.5 per cent ).

Overall, 55.7% of women and 43.5% of men said that nothing interferes with them (Fig.2).
Fig. 1. Results of answering to the question “What interferes with the students at a technical University physical culture lessons?“.

Fig. 2. There is not enough students in the classroom for physical education.
On the question about the motives of students attendance the following answers were given. Significant differences (at 5% level of significance) were identified in frequency of a number of motives for girls and boys use. So, significantly more physical education classes were visited by students for the preservation and maintenance of health, to be fitter, for the sake of positive emotions, socializing, for the sake of expanding horizons, and showcase their abilities and also with the purpose of development of physical qualities (Fig.3).

Students significantly less likely to mention the above reasons. Almost half of the students (52,38%) indicates the motive for the development of various physical qualities. Not significantly differ in the frequency of stating reasons for the grade, the desire to avoid problems with administration, simply to move (about one-third of students).

In connection with the above, optimization of educational process on physical culture will allow more students to focus on physical activity and a healthy lifestyle.

Fig.3. The motives of attendance in physical education students (male and women.) at the technical University (in %).
Adequate share of the encouraging response to the fourth question: "Is it possible to live a full life without physical training?". Students (men), 100% answered that this is impossible. Among girls the situation is more alarming: 16% of students believe that it is possible. It should be recalled that at the present stage about 20-30% of the students have help, with recommendations to be engaged in a preparatory or special medical groups. Then, there is a small part of the students, who do not interfere with exercise because of small problems with health.

Fig.4. The students' answers to the question: "Is it possible to live a full life without physical training?"

Conclusions.
The results showed that the conditions of physical training in a technical University are not satisfied with more than a third of the students— boys. But, at the same time, all the students (male) state that physical culture cannot be a full life. The fourth part of students is not satisfied with the lack of diversity and freedom of activities choice, interesting exercises in the classroom and modern sports facilities. While 16% of students think that without physical culture it is quite possible to live. The most significant problems that hinder active visits to the classroom for physical education, girls and boys called after a difficult couple of other lessons and just laziness.

The main interference of visits to the lessons of physical culture are difficult after a couple of other lessons and laziness. The main motives of visiting physical culture for girls are issues of appearance and health and for students (men) is the development of physical qualities.

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TO THE QUESTION ABOUT THE DIAGNOSTICS OF PSYCHOEMOTIONAL STATE OF YOUNG BOXERS

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Annotation. Boxing demands sportsmen’s high degree of physical and mental development. Materials. A positive dynamics of psychoemotional diagnostics results in the experimental group is conditioned by timely suitability determination of children for systematic boxing lessons. Research methods: literature sources analysis, description, modeling, methods of mathematical-statistical analysis. Results. The results, received during young boxer’s psychoemotional state diagnostics, prove that the complex selection use has a positive influence on physical, functional and psychic state of young boxers’ organism and on sports activity effectiveness. Conclusion. A positive dynamics of psychoemotional diagnostics results in the experimental group is conditioned by timely suitability determination of children for systematic boxing lessons.

Keywords: young boxers, complex selection, psychoemotional state, competitive combat, diagnostics.

The resistance of the organism to overloads is the most important factor success during competitive combats. In modern boxing technical-tactical training of the opponents in top ten is practically the same and the 1st place takes tactical struggle – the ability to control own psychic state.

Boxing demands sportsmen’s high degree of physical and mental development. During the combat “quick thinking” sportsman becomes the 1st, as he is able to cope with constantly changing situations on boxing ring and is well-trained technically and tactically. Emotional factors play great role in sports activity, in the training process of boxers. The
increased level of competitive struggle during the biggest competitions, International tournaments causes the necessity to improve not only training means, but also more gifted, promising candidates selection, who would be able to present themselves during the competitions of any level. The demands, placed upon optimal sports fitness, increase during off-season and while training boxers for competitions. Nowadays there is the necessity to have new methods of sportsmen examination, which help to fulfill a regular effective monitoring at a modern stage of training sportsmen.

We studied psychoemotional state of young boxers, fulfilled the diagnostics of reaction to a moving object, which was realized with the help of “ATS-9K” device.

Reaction is the act of behavior, autokinetic movement, which appears in response to signal. One of the most important characteristics of reaction are speed and accuracy. The index of speed is time of reaction, the interval form the moment of signal giving till motional response beginning.

E.P. Ilin (1987, 2008) showed and analyzed the fact, that during different states appearance, which accompany the work of a person (warming-up, monotony, psychic satiety, tiredness), time of simple reaction is different. During warming-up time of simple reaction shortens, during the state of monotony decreases or doesn’t change, during psychic satiety it increases.

Boxers act in terms of powerful psychic tension, which is typical for any single combat. Threat of a strong strike makes boxing especially sharp and makes great demands on several psychic processes, quality and boxer’s state. That is why a complex approach to selection at early stages of training helps to select children, who are ready to percept great amount of information, consider situation. Purely susceptible type of combat environment perception is brought up among them.

Analyzing the indices dynamics of psychoemotional state diagnostics among young boxers during the studied period, we can state that there were considerable changes in the experimental group of young boxers from the beginning to the end of the experiment. The results, received by us during the experiment, show that there is a positive dynamics and psychoemotional state improvement in the studied indices of young boxers from the experimental group. In the experimental group there is a considerable change of the index, which characterizes accuracy of reaction to a moving object (RMO), during the research.

At the beginning of the experiment the accuracy of reaction to RMO was 31,50±2,32 c.u., at the end of the experiment it was 16,70±1,43 c.u., the improvement was 46,9%. In the control group this index was 35,91±3,27 c.u., and it is validly lower than in the experimental group.

The volume of power coefficient of nervous system (PcNS) at the beginning of the experiment was 19,46±5,21%, at the end of the experiment was 10,88±1,73%. There is self-regulation improvement as a result of young boxers’ organism resistance to changing situations increase. At the same time, young boxers from the control group have lower indices, than in the experimental group to the end of the season - 13,94±1,75%. In the experimental group there is some tension decrease during the period of the experiment – 44,09%.

In coordination of movement (CooM) diagnostics there is a valid change in the EG of young boxers. At the beginning of the experiment CooD index in the EG was 29,21±0,84%, to the end of the experiment - 38,32±0,76%. The change during the experiment was 31,18%. In the control group of young boxers to the end of the experiment validly lower values, than among young boxers of the EG were revealed (31,95±0,54%).

The indices of flexor and extensor muscles coefficient in the EG of young boxers are validly higher at the end of our research work: at the beginning - 9,87±1,76%, 12,89±2,08%, at the end - 6,38±1,11%, 9,40±1,34 (improvement 35,35%). In the CG these indices to the end of the season turned out to be validly lower, than among the boxers from the EG - 10,54±1,63%, 13,21±1,45%.
Calculating the difference between the coordination of young boxers’ flexor and extensor muscles, we determined delta between the coordination of flexor and extensor muscles. This index diagnostics according to diagnostic scale helped to reveal that in the EG coordination of flexor muscles changes for the better with “+”, in the CG with “-”, it means that coordination of flexor muscles is worse.

The index of attention selectiveness level (ASL) also changed depending on the use of different selection procedures in the training process of young boxers. ASL in the experimental group at the beginning of the experiment was $8.47 \pm 0.83$ mistakes, at the end of the experiment was $4.89 \pm 0.30$ mistakes. This index improvement in the EG was 42,26%. During the methodology use of young boxers complex selection into educational-training groups there is considerable improvement of general state of motor memory and functional state improvement. In the CG the level of attention selectiveness was $9.21 \pm 0.30$ mistakes and it is a very low level.

Determination of time of diagnostics among young boxers showed, that the experimental group excels the control group in this index 44,37%.

Sense of tempo coefficient (STC) diagnostics among young boxers also proved the effectiveness of complex selection methodology of young boxers: valid changes are demonstrated. It is vividly seen among young boxers from the EG. At the beginning of the experiment in the EG STC was $2.65 \pm 0.40$ c.u., at the end - $0.93 \pm 0.12$ c.u., the increase was 64,9%. In the CG the indices were lower the average level - $2.72 \pm 0.29$ c.u.. The degree of sense of tempo change among boxers from the EG is validly higher, than among the boxers from the CG at the end of the experiment. Hence rehabilitation measures, used after the training lessons, have a positive influence on psychoemotional state of boxers and on this depends whether they fit for single combat or not.

Thus, a positive dynamics of psychoemotional diagnostics results in the experimental group is conditioned by timely suitability determination of children for systematic boxing lessons. The results, received during young boxer’s psychoemotional state diagnostics, prove that the complex selection use has a positive influence on physical, functional and psychic state of young boxers’ organism and on sports activity effectiveness.

**References**

ANXIETY AS READINESS CRITERION OF YOUNG ATHLETES, SPECIALIZING IN MIDDLE DISTANCE RUNNING, FOR COMPETITIVE ACTIVITY

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Annotation. In sports activity the most general, integral index of an athlete’s readiness is sports result. Competitive activity success is mostly conditioned by the stability of an athlete’s performances. Nowadays in the sphere of training athletes, specializing in middle distance running, conditions, means and methods of physical and technical-tactical training are approximately equal. Hence, the main component of competitive activity becomes psychological training. Material. Theoretical analysis and experimental study of anxiety problem as one of the criteria, which influence readiness of young athletes, specializing in middle distance running, for competitive activity. Research methods: scientific literature analysis and summarizing, anxiety state estimation with the help of modified scale of personal competitive anxiety R. Martens (Y.L. Khanin), experiment, methods of mathematical statistics. Results. The effectiveness of psychological training at the stage of initial specialization is shown. There is some correlation between the level of anxiety and pre-start states of sportsmen in the experimental work. The offered methods of psychological training approbation among athletes showed positive result. During the use of the offered by us methodology two sportsmen improved their qualification from the 1st junior category to the 3rd adult category, 4 sportsmen changed their categories from the second junior to the 1st junior category. The trainer underlined considerable improvement of the results among 5 respondents, who didn’t manage to improve their sports category. Conclusion. During the research work the problems, concerning anxiety state study as the factor, which influences readiness of young athletes, specializing in middle distance running, for competitive activity were successfully solved. Keywords: psychological training, psychological readiness, anxiety.
Introduction. According to the content of sports training Federal standard in athletics, minimal adoption age at the stage of sports specialization starts from the age of 12 and it underlines the problem of sport juvenation. In this connection increases the number of held competitions at the initial stages of training. It leads to the volume of competitive experience increase and can have positive, as well as negative influence on young runners, specializing in middle distance running. Its negative or positive influence depends, first of all, on readiness of sportsman for competitive activity.

The aim of the research: to determine the effectiveness of psychological training methods on one of the readiness criteria for competitive activity among sportsmen—anxiety level.

Research methods and research organization. As it is known, young runners training is a difficult multicomponent process. One of the components of successful training is psychological training, which is an important condition for an effective performance of a sportsman. Psychological training, according to L.P. Matveev, is a range of actions directed to a sportsman’s psyche, which provide psychological readiness formation for the result achievement [5, p. 189]. G.D. Gorbunov understands this kind of training as psychological-pedagogical process of important for sport personality traits and psychic qualities formation and development [3, p. 107]. Thus, psychological training is the process of influencing on a sportsman’s personality in order to help him to achieve the best sports result.

This kind of training is an integral part of a sportsman’s potential realization and its earlier and qualitative organization leads to educational-training and competitive processes effectiveness increase. Mentioned above position is conditioned by the fact that competitions always create stress conditions, which demand either competitive help of a specialist, or athlete’s formed skills of self-regulation. 14-15 year-old respondents took part in our research work. The presented age range is critical from the position of physiology and psychology and it underlines the need for this kind of training during the mentioned period.

It is common practice to divide psychological training into general and special one. According to E.P. Ilin, general psychological training among young runners is directed to sportsmen’s psychological functions and qualities development, which are necessary for the highest level of sportsmanship achievement [4, p. 25]. At the same time, general psychology is directed to mastering the main mechanisms and regulations of own psyche by a sportsman, which provide latent resources and the diversity of opportunities of an organism realization. Special psychological training is understood by E.P. Ilin as training for the definite competitions [4, p. 21]. The main aim of such kind of training will be creation of psychological readiness optimal state in order to take part in competitions, which reflects the range of conditions, indices and criteria during a definite time period directly influencing the results of a sportsman.

The notion “readiness” can be considered as multicomponent structure, which is characterized by the definite range of features for each activity. As M.M. Bogen mentions, readiness for a competition is a state of a sportsman in this moment, which provides full realization of his readiness (all his opportunities realization in the definite competition). It forms the unity of physical, tactical, theoretical, functional and psychological readiness [1, p. 63]. Psychological readiness is a dynamic system, its components are connected and mobile at the same time and it happens because of inner and external factors influence.

Taking into consideration all mentioned above, we can distinguish criteria of psychological readiness for competitive activity: motivation to competitive activity, self-rating, anxiety, self-regulation, performance in terms of error probability.

For sportsmen, who specialize in middle distance running, the following
qualities are typical: activity, ability to bear great loads, ability to bend in one's will personal interests for the sake of social interests, absence of suspiciousness. However, very often they are not sure in own abilities, prone to peculiar actions and ideas.

One of the psychological readiness criteria is anxiety. B.G. Meshcheryakov and V.P. Zinchenko give the following definition of anxiety: it is an individual psychological peculiarity, which is realized in a person’s propensity for more often and intensive anxiety state and a low threshold of its appearance [2, p. 673]. The following forms of anxiety are defined: personal and situational anxiety.

E.P. Ilin presents personal anxiety as the base trait of personality, which is formed and developed in early childhood. It appears irrespective of the definite social environment as a reaction to dangerous for personality situation or situation, which seems dangerous and is demonstrated in the state of increased anxiety. Personal anxiety usually doesn’t exist as a separate trait of character: it has a negative influence on other features and person’s characteristics formation and development, such as the motive of failures avoidance, tendency to avoid responsibility, fear of expressing own opinion [4, p. 59]. Situational anxiety is understood by the author as an expressive symbol of an individual’s anxious behavior in a definite situation, which is not connected with the presence of his personal anxiety [4, p. 60].

Anxiety criterion attracts attention of trainers and sports psychologists during a long time period and it is connected with the opportunity of this state level regulation, which helps to control pre-start state of a sportsman.

During the research three levels of competitive anxiety were determined: low, moderate and high, which correspond with pre-start states of pre-start apathy, tactical efficiency and pre-start fever. State of anxiety was estimated with the help of Modified scale of personal competitive anxiety R. Martens (Y.L. Khanin). It helps to reveal individual differences in emotional reaction to the future competition. This psychognostic methodology was held a day before the competitions.

14-15 year-old athletes, specializing in middle distance running, took part in the experiment. According to the results of Modified scale of personal competitive anxiety the respondents were divided into three groups: 8 people (40% from the group) formed the group of sportsmen with a high level of competitive anxiety, 11 people (55% from the group) formed the group of sportsmen with a moderate level of competitive anxiety and 1 person (5% from the group) had a low level of competitive anxiety. All participants of the experiment have junior categories.

For each formed group its own methodical complex was used. Also individual characteristics of the sportsmen, revealed during the experiment, were taken into consideration. The sportsmen with a high level of competitive anxiety were offered respiratory exercises and autogenic training, directed to neuromuscular apparatus relaxation.

In the group of sportsmen with a low level of competitive anxiety respiratory exercises and autogenic training were used, which provided neuropsychic processes activation. Ideomotor training, directed to an active realization and presentation of the competition itself, was used.

Sportsmen with moderate indices of competitive anxiety also were offered some methodologies in order to support and preserve the diagnosed level.

The next stage of the research presented systematic mastering respiratory exercises, autogenic training and ideomotor training. These methods and techniques were used during the training process in order to train sportsmen for the future loads. After mastering the methods of self-regulation competitive anxiety was studied one more time, a day before the competitions.

After the 2nd use of the modified scale of personal competitive anxiety the following results were received: one person (5% from the group) had a high level of competitive anxiety, 17 people (85% from the group) had moderate level of competitive anxiety and 2 people (15%
from the group) had a low level of competitive anxiety.

**Results and their discussion.** The received during the experiment results were checked with the help of the mathematical statistics method - Student t-test. In this research work the case of linked samples was used.

The results of “Modified scale of personal competitive anxiety” methodology and their handling with the help of the mathematical statistics methods are presented in the table.

Table – The results of indices handling according to “Modified scale of personal competitive anxiety” methodology

<table>
<thead>
<tr>
<th>X1</th>
<th>X2</th>
<th>d</th>
<th>(d_i-\bar{d})</th>
<th>(d_i-\bar{d})^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>21</td>
<td>4</td>
<td>1,4</td>
<td>1,96</td>
</tr>
<tr>
<td>24</td>
<td>20</td>
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<tr>
<td>27</td>
<td>22</td>
<td>5</td>
<td>2,4</td>
<td>5,76</td>
</tr>
<tr>
<td>15</td>
<td>14</td>
<td>1</td>
<td>-1,6</td>
<td>2,56</td>
</tr>
<tr>
<td>26</td>
<td>24</td>
<td>2</td>
<td>-0,6</td>
<td>0,36</td>
</tr>
<tr>
<td>23</td>
<td>20</td>
<td>3</td>
<td>0,4</td>
<td>0,16</td>
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<tr>
<td>26</td>
<td>23</td>
<td>3</td>
<td>0,4</td>
<td>0,16</td>
</tr>
<tr>
<td>21</td>
<td>17</td>
<td>4</td>
<td>1,4</td>
<td>1,96</td>
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<tr>
<td>24</td>
<td>21</td>
<td>3</td>
<td>0,4</td>
<td>0,16</td>
</tr>
<tr>
<td>20</td>
<td>19</td>
<td>1</td>
<td>-1,6</td>
<td>2,56</td>
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<td>18</td>
<td>16</td>
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<td>-0,6</td>
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<td>0,36</td>
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<td>17</td>
<td>4</td>
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<td>1,96</td>
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<td>24</td>
<td>23</td>
<td>1</td>
<td>-1,6</td>
<td>2,56</td>
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<tr>
<td>19</td>
<td>16</td>
<td>3</td>
<td>0,4</td>
<td>0,16</td>
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<tr>
<td>20</td>
<td>18</td>
<td>2</td>
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<td>0,36</td>
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<tr>
<td>14</td>
<td>15</td>
<td>-1</td>
<td>-3,6</td>
<td>12,96</td>
</tr>
<tr>
<td>16</td>
<td>14</td>
<td>2</td>
<td>-0,6</td>
<td>0,36</td>
</tr>
</tbody>
</table>

\[\bar{d}=2,6; \sigma_d=1,5; m_d=0.33; t_p=7,9; t_t=2,09\]

As it is shown in the table, t-rating value (7,9) is higher than t-table (2,09) and it helps to make the following conclusion. The results of Modified scale of personal competitive anxiety methodology changed greatly and it proves the effectiveness of the experimental methodology, which influenced the success of a sportsman’s performances.

The received results prove that the most part of the respondents moved to the group of moderate competitive anxiety. There is the dynamics of the results change in general. It also should be noted that all sportmen, who took part in the experiment, improved their personal competitive results.

**Conclusion.** During the research work the problems, concerning anxiety state study as the factor, which influences readiness of young athletes, specializing in middle distance running, for competitive activity were successfully solved.

There is some correlation between the level of anxiety and pre-start states of sportmen in the experimental work. The offered methods of psychological training approbation among athletes showed positive result. During the use of the offered by us
methodology two sportsmen improved their qualification from the 1st junior category to the 3rd adult category, 4 sportsmen changed their categories from the second junior to the 1st junior category. The trainer underlined considerable improvement of the results among 5 respondents, who didn’t manage to improve their sports category.

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MOTIVATION FORMATION FOR PHYSICAL-HEALTH-IMPROVING LESSONS

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Annotation. Correct physical upbringing at a higher educational establishment demands knowledge and taking into consideration age-related peculiarities of students’ organism development. In accordance with these peculiarities physical upbringing objectives are concretized, means and methods of their solution are specified, the degree of load on the organism is determined. Material. The article is about different techniques and ways of motivation formation among students for physical culture and sport and also about the reasons why students are unsatisfied with physical culture lessons at a higher educational establishment. Research methods: literature analysis and summarizing; observation; survey; questioning; mathematical statistics. Results. The main role in personality orientation formation belongs to realize motives, which are formed from a person’s needs. The research results proved that motivational interest of students from building faculty of Brest State Technical University at physical culture lessons isn’t high and it influences their health and working capacity. After studying students’ preferences and desires, the conclusion was made concerning the necessity to change physical culture lessons organization in order to increase students’ motivation. Conclusion. Students lead sedentary lifestyle, face the problems, connected with educational load increase, relative freedom of students life, the problems in social and interpersonal communication. These problems lead to motivation decrease among students for physical culture and sport lessons, the level of their individual health, mental and physical working capacity, physical development and physical readiness decrease. In this connection, great importance gains the structure of motivational interest in physical culture lessons among students, the search for the ways of its increase. Keywords: questioning, motives, health, young people.

Introduction. In the system of young people education physical upbringing plays a great role. Physical culture as the part of general culture is directed at a person’s physical and psychophysiological potential development, his working capacity, social and creative activity increase. The role of physical culture in social health-improvement increases as there is the tendency of the level of health and physical readiness decrease among students, the increasing threat of taking drugs and alcohol among young people, their interests transfer from spiritual values to material ones, their excessive enthusiasm about computer games with the elements of aggression, cruelty and low-grade culture.

The aim of the research is to determine the forms and methods of students’ motivation formation for physical culture lessons.

Objectives:
1) to define life values of students;
2) to characterize the motives for physical and sports activity;
3) to reveal the main directions of physical culture, which attract students to go in for lessons.

Research methods: 1) literature analysis and summarizing; 2) observation; 3) questioning; 4) mathematical statistics.

Materials. Healthy life style notion is mainly connected with physical-mass events, but real health improvement demands constant self-discipline, self-actualization, concern to have balanced mental and physical activity.

Special place in psychological support of sports activity plays motivation, which stimulates a person to go in for physical culture and sport. It is known that physical culture and sport have much in common with the notion “game”. Motives for a game are in a game itself. A person is attracted not only by some outer for a game circumstances like, for example, in labor activity, when very often fulfilled by a person work only indirectly satisfies his life needs, giving him means, which he can use, but direct sense of satisfaction, connected with participation in a game. A person feels need for physical culture and sport, which is conditioned by satisfaction, caused by sports activity itself and by success achieved in it [7].

The motives, which stimulate a person to go in for physical culture and sport, have their structure. Direct motives of sports activity are the following: need for the sense of satisfaction, received from muscular activity; need for
aesthetic pleasure, received from own beauty, power, endurance, quickness, flexibility, dexterity; desire to show oneself in difficult, even extreme situations; desire to achieve the best results, prove own sportsmanship and win; need for self-expression, self-affirmation, aspiration for social recognition, fame. Indirect motives of sports activity are the following: desire to become strong, healthy; desire to train oneself for practical life through sports activity; sense of duty; need for sport through social importance of sports activity realization.

Motives of sports activity are characterized by dynamic character. We define several main functions of motives:

1) stimulating, which means activation of an individual, interest formation and support and also the aims of an individual realization;

2) directing, which provides the choice and the definite strategy and tactics of behavior and activity realization;

3) controlling, which provides individual’s behavior and activity control and correction through the dominating motivators, connecting his activity with the received results thinking over and critical analysis [3].

The need for movement is the base, inborn need of a man and animals. Different individuals have different degree of this need, which depends on genetic and social factors. Students’ daily activity can differ in 2 and 3 times because of genetically predetermined need for activity in general and for movements in particular. Great need for motional activity have people with a strong nervous system, when irritation prevails according to “inner” balance. Such people are more active at physical culture lessons and during trainings. That is why they are more successful in motional skills mastering and motional qualities development and teachers say about their great working capacity. However, greater activity of one student in comparison with other students doesn’t mean that he is more responsible. He needs bigger volume of movements, in order to satisfy the need for motional activity. For students with low motional activity additional outer stimulation is necessary: constant attention of a teacher and friends, encouragement, inclusion into mutual work with highly-active students.

Psychological (subjective) reasons for missing physical culture lessons are the following: no interest in physical culture lessons because the needs and skills of students are not satisfied at these lessons; strained relations with physical culture teacher; shyness of students, conditioned by low level of physical development and backbreaking tasks (which can cause mockery).

According to the data received by V.I. Ilinich [5], the results of the survey among students of different years of study, concerning the influence of subjective factors on motives formation, which stimulate students for independent physical activity, are presented in the following table:

Table – Subjective factors influence on motives formation, which stimulate students to independent activity, %

<table>
<thead>
<tr>
<th>Subjective factors</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>57,8</td>
</tr>
<tr>
<td>Correspondence with aesthetic sense</td>
<td>51,7</td>
</tr>
<tr>
<td>Personal importance of the lessons understanding</td>
<td>37,6</td>
</tr>
<tr>
<td>The importance of the lessons for collective understanding</td>
<td>34,0</td>
</tr>
</tbody>
</table>
These results prove regular influence decrease of all factors in motivational sphere of students from junior to senior courses. An important reason for psychological reorientation of students is requirements increase for physical-sports activity. It is sad that students underestimate such factors as spiritual enrichment and cognitive abilities development, which influence axiological-motivational mindsets of a personality. It is connected, to some extent, with educational-upbringing potential of the lessons and events decrease, with much attention paid to normative indices of physical-sports activity, restricted range of pedagogical influences.

**Results and their discussion.** In order to reveal the motivation for physical-health-improving lessons among students a questioner survey was held. 82 students of the 2nd course from Industrial and civil engineering specialty took part in the survey (40 girls and 42 boys).

The results of the survey were the following:
- 57,8% of students (47 people) live in dormitory, 35% (29 people) live at home, 7,2% of students (6 people) rent the apartment;
- most second-year students estimate own health state as good - 65% (53 people), 35% of students consider their health state normal (29 people).

Answering the question “Do you have any bad habits?” only 35% of students (29 people) said “No”, 65% of students said “Yes, I smoke/drink alcohol” (53 people).

Another question was about food and it included several variants of answer. 21% of respondents (17 people) called their nutrition high-grade, 24% (20 people) called their nutrition balanced. 42,2% (25 people) have regular meals; 66,3% (54 people) think that they eat rationally.

The question about the sources and the degree of awareness, concerning the influence of physical culture on an organism, also had several variants of answers. 71% of students (58 people) mentioned, that they know about the influence of physical culture on an organism of a person owing to the Internet, 29% of students (24 people) said that the source of information were the teachers. It is connected, first of all, with the lack of information concerning the question of physical upbringing at an educational establishment. Students have to search for information in additional literature.

Answering the question “Are you satisfied with Physical culture lessons at a higher educational establishment?” 24,6% of the respondents (20 people) mentioned, that they were fully satisfied with physical culture lessons, however, most students(76%) said, that they were only partially satisfied with the lessons (62 people).

30% of students go in for physical culture during their free time (25 people), 12% of students do it independently (10 people), 24% of students (20 people) don’t see any necessity to go in for physical exercises, 34% (27 people) don’t go in for physical culture because of subjective reasons, but realize the importance of the lessons. These results show that students are not satisfied with the lessons at a higher educational establishment and that is why most students prefer to train independently or additionally.

Most students, who don’t go in for physical culture systematically (47 people), mentioned as the main reason for it lack of money and material-technical support - 40% (19 people) and tiredness, 30% of students (14 people) mentioned the absence of desire to go in for sports. Also 30% (14 people) mentioned the absence of skills and habit to train. The results say about general commitment of
students and lack of money for additional training in a gym. It is connected, first of all, with the absence of free lessons in different sports sections.

Answering the question “What additional health-improving activity do you prefer?” (the question also had several variants of answers) most girls said, that they prefer non-traditional kinds of physical culture exercises - 80% (32 people). Boys prefer power athletics - 71% (30 people). Students were also very interested in camping trips and camps 40% (33 people).

The results of this question correspond with the questions concerning satisfaction with the lessons at a higher educational establishment and the reasons why students refuse additional activity.

Dominating motivation of going in for physical culture girls consider the desire to improve body, bearing, lose weight - 70% (28 people); among secondary motivations the leading place takes the desire to improve health - 20% (8 people) and “motional hunger” satisfaction, desire to play, move - 10% (4 people) (picture 1).

Among boys dominating motivation is also body shape improvement and muscle mass increase - 57% (24 people). Among secondary motivations was “motional hunger” satisfaction and desire to move 43% (18 people) (picture 2).

Answering the question about the attitude to extracurricular forms of activity most students were “positive” - 82% (67 people) or “rather positive” – 18% (15 people) and it shows students’ desire to broaden their motional experience by means of new, non-traditional forms of physical activity. There were no students, who were negative about camping trips.
**Results.** According to the research results study and handling it turned out that motivational interest of students from building faculty of Brest State Technical University in physical culture lessons is at a very low level, as girls prefer going in for non-traditional kinds of physical activity, which are not included into the program of a higher educational establishment and demand great financial investment. Boys prefer power athletics, but there are no free sections. It directly influences health state and working capacity of students. However, most students go in for physical culture out of higher educational establishment, others would like to do it, but can’t afford it and it proves insufficient physical work organization at a higher educational establishment which doesn’t satisfy the interests and demands of students and is not able to support motivational interest. Having studied students’ preferences and demands we came to the conclusion that it is necessary to change the organization of physical culture lessons in order to increase students’ motivation for them.

First of all, it is necessary to mention, that motivational orientation and interests in the sphere of physical culture and sport among girls and boys differ, that is why they should train separately. They should have different normatives, different orientation of lessons, as the theme selection is not limited by the definite kind of sport because of no strict sports orientation. It is also possible to choose kinds of sport according to the interests, forms, means and methods of lessons organization. On the basis of our University it is possible to organize training at the gym, in the swimming pool, going in for different sport games for boys and non-traditional kinds of sport for girls in a gymnasium. It is also possible to organize excursions to ice arena, athletics hall, walking tours and running in the park.

Moreover, students demonstrated great interest in such forms of lessons organization, as camping trips and camps. They have a complex influence on an organism, provide physical, psychic and moral-volitional qualities, endurance, team spirit development, influence aesthetic sphere of a student, form the notion of beauty, provide healthy lifestyle values popularization. That is why they are the alternative for ordinary physical culture lessons and stimulate the interest in physical culture and an active lifestyle.

**Conclusion.** Students lead sedentary lifestyle, face the problems, connected with educational load increase, relative freedom of students life, the problems in social and interpersonal communication. Students have no need for independent physical activity. It leads to motivation decrease among students for physical culture and sport lessons, the level
of their individual health, mental and physical working capacity, physical development and physical readiness decrease. In this connection, great importance gains the structure of motivational interest in physical culture lessons among students, the search for the ways of its increase.

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LIFESTYLE AND ITS RELATIONSHIP WITH THE INCREASE IN WEIGHT AND THE PREVALENCE OF OBESITY AMONG HIGH SCHOOL STUDENTS

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Objective: The aim of this study was to find out the prevalence of overweight and obesity among adolescents in Algerian high school students using similar reference standard. Methods: A school-based cross-sectional study was carried out in 7 secondary schools in the state of Mostaganem, including girls and boys whose ages range between 15 and 19. The total sample included was 98 adolescents: 34 boys and 64 girls; their average age ≈18 years classified based on their BMI. Results: The family contributes greatly to the rise in the average index of body mass which reveals an increase of weight and obesity. The lack of food balance in terms of quantity and quality, and not following a correct food system, in addition to bad food habits in terms of the way and situation of eating lead to weight increase or obesity. The lack of balance between daily or habitual physical activity and the consumed energy lead to a weight increase or obesity. Abstinence from practicing physical and sporting activities regularly contributes greatly to weight increase or obesity. Conclusion: There is an urgent need to establish a plan of action to combat obesity in Algerian high school students.

Introduction: Adolescents often get confronted with lots of changes at this stage of their lives, as their balance gets disrupted, mainly at the level of their foodbehaviours and physical activity (George A. Bray, Claude Bouchard, 2014), due to the huge and continuous development in technology which has made our lives more comfortable, but, in some cases, have also increased pathogenic factors (E. Paul Cherniack, Neil Cherniack, 2003), in addition to the non-balanced nutrition which is based on food that is rich in calories and which has alarmingly prevailed that it was classified as one of the main reasons of nowadays diseases (Mokkedes Moulay Idris, Zerf Mohammed, 2016).

The international obesity work group mentioned in its report published in 2004 about kids’ obesity that the latter is considered as one of the main health problems of this era, as there are disturbing numbers of the adolescent that suffer it (Chris Kelnar, Martin Savage, Paul Saenger, Chris Cowell, 2007). Several scientific studies were conducted and confirmed the development of diseases due to obesity; these studies recommended the regulation of the style of living of this age category, mainly at the level of food behaviours and lack of physical movement (Mohammed Z, Ali B, Idris MM, Hamzaoui H, Messaliti L, 2016)(D. Jimenez-Pavon, J. Kelly, J.J. Reilly, 2010).

In the light of this proposal the following problematic seized our attention: “What is the relation between the style of living, weight increase and the spread of obesity among secondary school pupils?" Thus, it is possible to ask the following subsidiary questions: Is there a relation between the financial condition of the family and weight increase and the spread of obesity among secondary school pupils? Is there a relation between weight increase and the spread of obesity among secondary school pupils? Is there a relation between the lack of daily physical activity and weight increase and the spread of obesity among secondary school pupils? Is there a relation between the lack of regular physical activity and weight increase and the spread of obesity among secondary school pupils?

Objectives: - Defining the nature of the relation between the financial condition of the family and weight increase and obesity spread among secondary school pupils. - Defining the nature of the relation between bad food habits and weight increase
and obesity spread among secondary school pupils.

- Defining the nature of the relation between the lack of physical activity and weight increase and obesity spread among secondary school pupils.

**Hypotheses:**
- There is a relation between the good financial condition of the family and weight increase and obesity spread among secondary school pupils.
- There is a relation between bad food habits and weight increase and obesity spread among secondary school pupils.
- There is a relation between the lack of physical activity and weight increase and obesity spread among secondary school pupils.

**Methods**

The descriptive method was used as it fits for solving this research problematic, as the study describes and analyses the life’s pattern at the level of the food behaviour and the physical activity and its relation to weight increase and the emergence of obesity among secondary school pupils.

The members of the sample were chosen from 7 secondary schools in the state of Mostaganem, including girls and boys whose ages range between 15 and 19.

The research sample includes 98 pupils from 6 secondary schools from the state of Mostaganem suffering weight increase and obesity. The sample was chosen deliberately as it was meant to include pupils who suffer weight increase or obesity.

**Table 01**

<table>
<thead>
<tr>
<th>Sample</th>
<th>number</th>
<th>Average age</th>
<th>Average weight</th>
<th>Average height</th>
<th>weight increase</th>
<th>obesity</th>
</tr>
</thead>
<tbody>
<tr>
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<td>18</td>
<td>75</td>
<td>1.67</td>
<td>22</td>
<td>12</td>
</tr>
<tr>
<td>girls</td>
<td>64</td>
<td></td>
<td></td>
<td></td>
<td>44</td>
<td>20</td>
</tr>
</tbody>
</table>

This research required the use of the following instruments:

- The questionnaire is one of the important tools of the survey research that serve for the collection of data related to a given topic, through the preparation of a set of written questions that the investigated person answers personally.

- Thus, the researchers assessed the form objectively on the basis of a set of sources and references, and it was destined to secondary school pupils who suffer overweight or obesity, as the questionnaire included close questions which were answered by “Yes”, “No” or choice and without giving details, it was as follows:
  - **a)** includes personal information of the sample and the financial situation.
  - **b)** shows the sample’s bad food habits at the level of the quantity the way they eat.
  - **c)** includes the usual daily physical effort and the regular physical movement during the day or the week. The questionnaire was suggested to experts in order to have their scientific opinion and guidance about the purposes from the questions in addition to their formulation in a clear scientific style, and after changing and correcting some questions in a way that they became clearer, the questionnaires were distributed to the 98 pupils at the 7 secondary schools of the Wilaya of Mostaganem.

In addition to that, the body mass index (BMI) equation was used, as it is the best method through which we can define whether the weight of the body is natural or contains extra weight and obesity with its degree. In order to calculate body weight index, we apply the following equation (weight in kilogrammes divided by the height in meter square). Table 2
below demonstrates the BMI interpreted for adults in different weight situations.

<table>
<thead>
<tr>
<th>BMI =weightkg/(heightm)^2</th>
<th>interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 20</td>
<td>thinnest</td>
</tr>
<tr>
<td>20-25</td>
<td>Ideal weight</td>
</tr>
<tr>
<td>25-30</td>
<td>weight increase</td>
</tr>
<tr>
<td>30-35</td>
<td>obesity</td>
</tr>
<tr>
<td>35-40</td>
<td>Severe obesity</td>
</tr>
</tbody>
</table>

Table 2

the BMI interpreted for adults in different weight situations (Jay Hoffman, 2006).

To assure the authenticity of the selection of those secondary school pupils we added another measurement using the waist’ circumference measuring tape because the fats accumulated around the waist are more dangerous than those in the surroundings of the buttocks. The table below is an important guide in this regard (Joseph Robert Weinstein, Bob Weinstein, 2009).

Table 03

the Waist Sise interpreted for adults (Marcia Nelms, Kathryn P. Sucher, 2015)

<table>
<thead>
<tr>
<th>gender</th>
<th>weight increase</th>
<th>obesity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>More than 94 cm</td>
<td>More than 102 cm</td>
</tr>
<tr>
<td>girls</td>
<td>More than 80 cm</td>
<td>More than 88 cm</td>
</tr>
</tbody>
</table>

Results:

results of the quantity and quality of food consumed per day

<table>
<thead>
<tr>
<th>N°</th>
<th>quantity and quality of food</th>
<th>answers</th>
<th>once</th>
<th>twice</th>
<th>More than three times</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Number of basic meals and nuts</td>
<td>00</td>
<td>00</td>
<td>80</td>
<td>81.61</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>2</td>
<td>Number of kick snack</td>
<td>02</td>
<td>2.04</td>
<td>11</td>
<td>11.22</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>85</td>
</tr>
<tr>
<td>3</td>
<td>I eat sweets</td>
<td>10</td>
<td>10.20</td>
<td>24</td>
<td>24.48</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>64</td>
</tr>
<tr>
<td>4</td>
<td>I take a cup of soft drinks</td>
<td>56</td>
<td>57.14</td>
<td>27</td>
<td>27.55</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>I drink a cup of milk</td>
<td>77</td>
<td>78.57</td>
<td>13</td>
<td>13.26</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>08</td>
</tr>
</tbody>
</table>

Table 03
I drink a cup of juice

<table>
<thead>
<tr>
<th>N°</th>
<th>I drink a cup of water</th>
<th>0047</th>
<th>47.95</th>
<th>32</th>
<th>32.65</th>
<th>19</th>
<th>19.38</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>I drink a cup of juice</td>
<td>00</td>
<td>00</td>
<td>00</td>
<td>00</td>
<td>98</td>
<td>100</td>
</tr>
</tbody>
</table>

Overall percentage

|                | %27.98 | 27.25 % | 44.75 % |

According to the results of the table (03), 44.59% of the sample members answered by "more than three times" in most of the expressions, as the highest rate appeared in expressions (7,3,2). The rate of those who answered by "twice" was 27.25%, and the highest rate appeared in expression (1). The rate of those who answered by “one time” was 27.98 %, and the highest rate appeared in expressions (6,5,4).

Hence we conclude that the members of the research’ sample have a bad and non-balanced food behaviour and this is one of the factors that lead to the increase of weight or the spread of obesity.

Table 03
results of the quantity and quality of food consumed during the week.

<table>
<thead>
<tr>
<th>N°</th>
<th>quantity and quality of food</th>
<th>answers</th>
<th>once</th>
<th>twice</th>
<th>More than three times</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>1</td>
<td>I eat meat of all types</td>
<td>18</td>
<td>18.36</td>
<td>37</td>
<td>37.75</td>
</tr>
<tr>
<td>2</td>
<td>I eat pasta</td>
<td>07</td>
<td>7.34</td>
<td>15</td>
<td>15.30</td>
</tr>
<tr>
<td>3</td>
<td>I eat vegetables</td>
<td>32</td>
<td>32.65</td>
<td>35</td>
<td>35.71</td>
</tr>
<tr>
<td>4</td>
<td>I eat fried potatoes</td>
<td>10</td>
<td>10.20</td>
<td>12</td>
<td>12.24</td>
</tr>
<tr>
<td>5</td>
<td>I eat fresh fruit</td>
<td>27</td>
<td>27.55</td>
<td>42</td>
<td>42.85</td>
</tr>
<tr>
<td>6</td>
<td>I eat cakes and biscuits</td>
<td>03</td>
<td>3.06</td>
<td>15</td>
<td>15.30</td>
</tr>
<tr>
<td>7</td>
<td>I drink energy drinks</td>
<td>65</td>
<td>66.32</td>
<td>33</td>
<td>33.67</td>
</tr>
</tbody>
</table>

Overall percentage

|                | %23.61 | %27.55 | %60.49 |

According to the results shown in the table 60.49% of the sample members answered by “more than three times”, as the highest rates appeared in expressions (6,4,2,1). As for the rate of those who answered by “two times” was 27.55%, and the highest rates appeared in expressions (5 and 3). As for the answer by “once”, it was given by 23.61% of the sample members, and the highest rate appeared in expression (7).

Hence, we conclude from the results shown in table (3) that the members of the research sample have a food behaviour that is not balanced in terms of food quality and quantity and therefore this can be considered as a major factor in the increase of weight or the spread of obesity.

Table 06
results of how to deal with the food.

<table>
<thead>
<tr>
<th>N°</th>
<th>answers</th>
<th>once</th>
<th>twice</th>
<th>More than three times</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>how to deal with the food</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>1</td>
<td>I eat fast</td>
<td>13</td>
<td>13.26</td>
<td>47</td>
</tr>
<tr>
<td>2</td>
<td>I leave the fork between one chew and the other</td>
<td>40</td>
<td>40.81</td>
<td>51</td>
</tr>
<tr>
<td>3</td>
<td>I talk while eat</td>
<td>22</td>
<td>22.44</td>
<td>17</td>
</tr>
<tr>
<td>4</td>
<td>I eat in standing position</td>
<td>16</td>
<td>16.32</td>
<td>22</td>
</tr>
<tr>
<td>5</td>
<td>I eat reclining</td>
<td>02</td>
<td>2.04</td>
<td>33</td>
</tr>
<tr>
<td>6</td>
<td>I eat while I watch TV</td>
<td>71</td>
<td>72.44</td>
<td>17</td>
</tr>
<tr>
<td>7</td>
<td>I eat fast food while I use the computer</td>
<td>68</td>
<td>69.38</td>
<td>20</td>
</tr>
<tr>
<td>8</td>
<td>I devour all that is in front of me</td>
<td>43</td>
<td>43.87</td>
<td>27</td>
</tr>
<tr>
<td>9</td>
<td>I sink in dinner</td>
<td>29</td>
<td>29.59</td>
<td>42</td>
</tr>
<tr>
<td>10</td>
<td>I sleep immediately after dinner</td>
<td>20</td>
<td>20.40</td>
<td>45</td>
</tr>
</tbody>
</table>

Overall percentage  %42.34  %32.75  %33.41

According to the results shown in table (06) the rate of the sample members’ answers about the way they consume food relating to the answer “always” was estimated at 42.34%, the highest rate appeared in expressions (6,7,8), then comes the answers relating to “never” with a rate estimated at 33.41%, and the highest rate appeared in expressions (1,2,9,10), while the rate of the answers relating to “sometimes” was estimated at 32.75%, and the highest rate appeared in expressions (3,4,5).

Hence, we conclude from these data that having bad habits in the way of consuming food is considered as one of the factors that lead to the increase of weight or obesity.

results of the level of physical activity daily

<table>
<thead>
<tr>
<th>N°</th>
<th>answers</th>
<th>once</th>
<th>twice</th>
<th>More than three times</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>the level of physical activity daily</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>1</td>
<td>I wake up early</td>
<td>27</td>
<td>27.55</td>
<td>43</td>
</tr>
<tr>
<td>2</td>
<td>I arrange my room</td>
<td>36</td>
<td>36.73</td>
<td>26</td>
</tr>
<tr>
<td>3</td>
<td>I go to school on foot</td>
<td>33</td>
<td>33.67</td>
<td>43</td>
</tr>
<tr>
<td>4</td>
<td>I climb more than 4 floors stairs per day</td>
<td>30</td>
<td>30.61</td>
<td>60</td>
</tr>
<tr>
<td>5</td>
<td>I do housework</td>
<td>35</td>
<td>35.71</td>
<td>53</td>
</tr>
</tbody>
</table>

Table 07
I sit in front of TV for long periods  | 29  | 29.59 | 71  | 72.44 | 08  | 8.16  
I spend more than two hours in front of computer every day | 35  | 35.71 | 33  | 33.67 | 30  | 30.61  
I sleep for long hours during the weekend | 13  | 13.26 | 35  | 35.71 | 50  | 51.02  
Overall percentage                             | %30.35 | %46.42 | %24.48  

According to the results of table (07), 46.11% of the sample’ members answered with "sometimes", and the highest rates appeared in expressions (1, 3, 4, 5, 6). The rate of those who answered with “always” was estimated at 30.35%, and that appeared in expressions (7,2), while the rate of those who answered with “never” was estimated at 24.48%, and the highest rate appeared in expression (8).

Table 08

<table>
<thead>
<tr>
<th>N°</th>
<th>level of regular physical activity</th>
<th>answers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>once</td>
<td>twice</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>1</td>
<td>Participate in a lesson of physical education</td>
<td>44</td>
</tr>
<tr>
<td>2</td>
<td>There is in our neighbourhood playground for sport</td>
<td>29</td>
</tr>
<tr>
<td>3</td>
<td>I have some sports equipment</td>
<td>27</td>
</tr>
<tr>
<td>4</td>
<td>I do some physical exercises at home</td>
<td>17</td>
</tr>
<tr>
<td>5</td>
<td>I practice sport with the children of the neighbourhood</td>
<td>22</td>
</tr>
<tr>
<td>6</td>
<td>Participate in school sports</td>
<td>19</td>
</tr>
<tr>
<td>7</td>
<td>I prefer running outdoors</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>I practice sports activity in the weekend</td>
<td>14</td>
</tr>
<tr>
<td>8</td>
<td>I feel tired when I walk quickly for more than 5 minutes</td>
<td>51</td>
</tr>
<tr>
<td>Overall percentage</td>
<td>%26.53</td>
<td>%16.89</td>
</tr>
</tbody>
</table>

According to the results of table (08), 56.57% of the sample members answered with “No”, and the highest rate appeared in expressions (2, 3, 4, 5, 6, 7, and 8), while 26.53% answered with “Yes”, and the highest rate appeared in expression (1). 16.89 % of the members answered with “Sometimes” and that was the least rate recorded.

Discussion:

Our study showed:

- Ease in the financial conditions of the family contributes greatly to the rise in the average index of body mass which reveals an increase of weight and obesity. Where our results line with Individual, Family, and Community Environmental Correlates of Obesity Given the prevalence of obesity and its economic consequences, community health initiatives have shifted toward primary prevention at younger ages (John P. Elder, PhD, MPH, Elva M. Arredondo, PhD, Nadia

The lack of food balance in terms of quantity and quality, and not following a correct food system, in addition to bad food habits in terms of the way and situation of eating lead to weight increase or obesity. Where our funds support the results of Americans multi-ethnic longitudinal study, that eating disorder in the nutrition habits and the decreases in physical activity case the Algerian students conducted to obesity according to (Mohammed Z, Ali B, Idris MM, Hamzaoui H, Messali L, 2016) (Zerf M, 2016) and (Kamel K, Zerf M, 2016)

The lack of balance between daily or habitual physical activity and the consumed energy lead to a weight increase or obesity. While our results are in conformity with the recommendation listed by (Damon L. Swift, PhD, Neil M Johannsen, PhD, Catrine Tudor-Locke, PhD, Conrad P. Earnest, PhD, William D. Johnson, PhD, Steven N. Blair, PED, Martin Sénéchal, MSc, and Timothy S. Church, MD, PhD, 2012) that higher habitual physical activity while participating in aerobic training was associated with greater reductions in central adiposity, and was supportive of weight loss compared to lower levels.

Abstinence from practising physical and sporting activities regularly contributes greatly to weight increase or obesity. Our result confirms the finds reported by (Klaas R. Westerterp, 2015) that optimal performance and health require prevention of excess body fat and maintenance of energy balance, where energy balance determines physical activity rather than physical activity affecting energy balance.

Conclusion:

Our study evaluated the impact of lifestyle and its relationship with the increase in weight and the prevalence of obesity among high school students. Where our background confirms that A better understanding of the relationships between obesity and lifestyle factors is necessary for effective prevention and management of obesity in youth (Hazzaa M Al-Hazzaa, Nada A Abahussain, Hana I Al-Sobayel, Dina M Qahwaji, Abdurahman O Musaige, 2012). The case of the Metabolic syndrome report in Algerian studies (Houti L, Hamani-Medjaoui I, Lardjam-Hetraf SA, Ouhaibi-Djellouli H, Chougani S, Goumidi L, Mediene-Benchekor S, 2016), where similar confirms the need for prevention strategies involving promotion of physical activity related to family behaviors contributes greatly to eating disorders (Marcia Stanhope, Jeannette Lancaster, 2016) of the obese in young people (Benmohammed K, Valensi P, Benlatreche M, Nguyen MT, Benmohammed F, Pariés J, Khensal S, Benlatreche C, Lezzar A, 2015). However, the larger food culture and environment contributes greatly to the weight problems (Alexandra Kazaks, Judith S. Stern, 2013) the case of the actual study, confirmed by similar that the Nutrition education programs case of our community should also encourage physical activity for overall wellbeing (Zerf M, 2016), seen body fat gain and body fat loss are a function of energy balance based on energy intake (Westerterp KR, 2009). To conclude we agree that the cross-sectional nature of many of the association studies has meant that there is the strong possibility of reverse causality, i.e., obesity leading to lower PA levels, as opposed to physical inactivity leading to obesity (B.S. Metcalf, J. Hosking, A.N. Jeffery, L.D. Voss, W. Henley, T.J. Wilkin, 2011). Whereas our results support the results of the meta-analysis, which examined objectively measured PA and changes in body fatness over time, appear to support the premise that excessive fatness leads to inactivity in high school.
students (Alison M. McManus, Robin R. Mellecker, 2012). While the Primary prevention of obesity by promoting active lifestyles and healthy diets should be a national public health priority (Hazzaa M Al-Hazzaa, Nada A Abahussain, Hana I Al-Sobayel, Dina M Qahwaji, Abdurrahman O Musaige, 2012).

References


27. Martijn van Hasselt Ph.D., Nancy McCall Sc.D., Vince Keyes M.A., Suzanne G. Wensky Ph.D., Kevin W. Smith M.A. Total Cost of Care Lower among Medicare Fee-for-Service Beneficiaries Receiving Care from Patient-Centered Medical Homes. *Nauchnye issledovaniya v oblasti zdravookhraneniya* [Health services Research]. 30 July 2014, DOI: 10.1111/1475-6773.12217 (Scopus)


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**MUSCLES OF RESPIRATION IN PROFESSIONAL HOCKEY**

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Annotation. Most sportsmen direct their efforts to different groups of muscles development and don’t pay much attention to muscles of respiration. In this case muscles of respiration become limitative factor for further results improvement. Nowadays many specialists in sport pay attention to muscles of respiration training. It is conditioned by the phenomenon, which was called “metaboreflex of respiration muscles”. Its essence is in the fact that muscles of respiration in the state of tiredness cause oxygen decrease in an extremity, brain and heart. Material. Experimental check of an additional inhalation resistance methodology application at the training process of highly-qualified hockey players. Research methods: scientific literature analysis and summarizing, experiment, testing, methods of mathematical statistics. Results. The methodology of respiration muscles purposeful training is created and experimentally checked. The article considers the notion “metaboreflex”, describes the importance of respiration muscles for sports activity and gives the results of their purposeful training. Conclusion. The experiment clearly proves a positive influence of purposeful training loads on strength, power and volume of sportsmen’s inhalation. Keywords: function of breathing, training, functional state, hockey.

Introduction

Nowadays many specialists in sport pay attention to muscles of respiration training. It is conditioned by the phenomenon, which was called “metaboreflex of respiration muscles” [18]. Its essence is in the fact that muscles of respiration in the state of tiredness cause oxygen decrease in an extremity, brain and heart [4, 5]. According to the research works of Mishchenko V.S. and Andersson P. with other authors, there is some inverse relation between respiratory lungs capacity and the volume of oxygen delivery into functioning muscles [3, 9]. It means that insufficiently trained respiration muscles can be a stimulating factor for muscles blood supply and as a result make working capacity worse [5].

The mass of breathing muscles is on the average 10-12% from a sportsman’s weight and it is a considerable index [4]. At the same time, the research works of McConnell A.K. and Sheel W. together with other authors, during physical load of maximum intensity, revealed oxygen consumption by inspiratory breathing muscles at the level of 16% from the general available volume of oxygen [16, 18]. It shows metabolic cost of an organism concerning breathing muscles functioning.

Taking into consideration the information we have, we can suppose that purposeful muscles of respiration training will help to prevent blood supply decrease of working muscles, substratum removal slowing-down will help to decrease the speed of lactic acid accumulation and increase working capacity of a person.

Validity of such kind of hypothesis is proved by several scientific research works in sport.

Great amount of experimental material concerning additional inhalation resistance was accumulated by native [1, 3, 6, 8] and foreign specialists [10, 11, 13, 14, 19]. McConnell A.K. and Kurashvili V.A. showed that muscles of respiration training leads to their functioning effectiveness increase and as a result, helps to increase working time with a standard power to more than 30% [2, 15].

Romer L.M. and Volianitis S. together with other authors stated the increase of sports working capacity among high-class rowers [20] and cyclists [17] to 4.6% owing to systematic inspiratory muscles training.

In the experimental research with the control group of highly-qualified sportsmen McConnell A.K. showed similar effect of everyday 5-minute training of respiration muscles during 5 weeks and an interval training, directed at aerobic endurance development, which was fulfilled also during 5 weeks [16].

Shamardin A.A. stated valid increase of physical readiness and functional abilities of football players (15-16 years-old) from the experimental group to 12,5% in comparison with the control group, where respiratory training wasn’t used [7]. More impressive results were received by Suslina I.V. with the group of 13-14-year-old football players,
where the increase of inspiratory muscles power to 28.2% was stated, maximum oxygen consumption (MOC) to 10.5% and the results of Cooper's test to 15.9%, in comparison with the results in the control group of sportsmen, where there were no additional respiratory loads [5].

Taking into consideration all mentioned above, it is obvious that a purposeful strength, power and endurance of respiration muscles development in hockey is prospective as a reserve of sportsmen’s working capacity increase [11-13].

**The aim of the research:** experimental check of an additional inhalation resistance methodology application at the training process of highly-qualified hockey players.

**Research methods and research organization**

The research works were held since January, 7, 2017 till February, 20, 2017 on the basis of hockey club KHL “Barys” Astana (6 weeks). 29 highly-qualified hockey players took part in the experiment. 17 players had the position of a forward, 9 players had the position of a defender and 3 players had the position of a goalkeeper.

Training lessons were held every day (except 6 rest days) with the help of individual training simulators Power Breathe Fitness Plus Medium. The training effect was achieved by means of inhalation resistance progressive increase. A training simulator helps to vary the load within the range of 23-186 cmH₂O • l • sec.⁻¹, which corresponds to 11 levels of difficulty (table 1.1):

**Table 1.1 – Comparative table of the load level**

<table>
<thead>
<tr>
<th>Level 0</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
<th>Level 6</th>
<th>Level 7</th>
<th>Level 8</th>
<th>Level 9</th>
<th>Level 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>39</td>
<td>55</td>
<td>72</td>
<td>88</td>
<td>104</td>
<td>121</td>
<td>137</td>
<td>153</td>
<td>170</td>
<td>186</td>
</tr>
</tbody>
</table>

During the experiment three tests of respiration muscles were held: 7.01.2017, 20.01.2017 and 20.02.2017. The control was fulfilled with the help of special respiratory equipment Power Breathe K5. The essence of test was in one maximum powerful and at the same time maximum deep inhalation. The apparatus stated the following indices: index of strength, power (l/sec.), volume of inhalation (l).

Since January, 1 till January, 20 11 training lessons were held, which were directed at respiration muscles development (table 1.2):

**Table 1.2 – Training lessons since January, 1, 2017 till January, 20, 2017**

<table>
<thead>
<tr>
<th>Date</th>
<th>07.01</th>
<th>08.01</th>
<th>09.01</th>
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Since January, 20 till February, 20 27 training lessons were held, which were directed at muscles of respiration development (table 1.3):
Table 1.3 – Training lessons since January, 20, 2017 till February, 20, 2017

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Research results

The following results were received during the test among KHL hockey players (table 1.4):

Table 1.4 – Results of tests

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<tr>
<td>Index of strength</td>
<td>129,59 (± 28,59)</td>
<td>147,93 (± 26,09)</td>
<td>153,62 (± 30,25)</td>
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<tr>
<td>Power (l/sec.)</td>
<td>7,15 (± 1,40)</td>
<td>8,04 (± 1,28)</td>
<td>8,21 (± 1,51)</td>
</tr>
<tr>
<td>Volume (l)</td>
<td>4,10 (± 0,78)</td>
<td>4,29 (± 0,57)</td>
<td>4,30 (± 0,59)</td>
</tr>
</tbody>
</table>

The results in table 1.4 show the effectiveness of the created program of respiration muscles training. Purposeful training during 2 weeks with two rest days at the load 0 level helped to achieve on the average 13.84% of progress in the index of strength, 11.73% in power and 6.03% in the volume of inhalation. Further 27 trainings during a month with three rest days provided increase of strength index on the average to 10.35%, power to 9.31%, volume of inhalation to 1.28%.

According to the theory of adaptation an intensive increase of indices was after the first two weeks. Then the results progress became slower, however, during 6 weeks of the training lessons a positive dynamics of indices preserves.

Direction of further research works

Positive influence of purposeful training loads on strength, power and volume of inhalation is shown by the described above experiment. Further it is interesting to study the influence of respiration muscles on hockey players’ working capacity and on the speed of an urgent and delayed rehabilitation.

References


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5. Suslina I. V. Dynamics of functional opportunities of sportsmen’s respiratory muscles under the influence of the increased loads on breathing. Fizicheskoe vospitanie i sportivnaya trenirovka [Physical upbringing and sports training], 2012, No. 1, pp. 147-154. (in Russian).


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PEDAGOGICAL AND MEDICAL-BILOGICAL METHODS OF HEALTH CORRECTION AMONG STUDENTS IN TERMS OF COMPLEX INFLUENCE OF MENTAL AND PHYSICAL LOADS

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Eugene V. Bykov – doctor of medical sciences, professor
Olga A. Makunina – candidate of biological sciences, associate professor
Olga I. Kolomiets – candidate of biological sciences associate professor
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Annotation. Students are considered a population resource, which is not only the factor of well-being, but also the factor of country and its regions safety. In terms of ecological situation worsening, when the principles of healthy life style are not followed, the reserves of nervous, endocrine, immune systems are exhausted there is sickness rate (with temporary disability) increase among students of higher educational establishments. Considerable difference between the information about students’ health state and their sickness rate is the result, why there are no integrated unified approaches to the received information gathering, analysis and interpretation. Taking into account the peculiarities of studying at physical culture higher educational establishment, the influence of complex mental and physical loads and also the fact, that students are not only professional sportsmen, but also people, who don’t go in for sport and physical culture and even young disabled people, it is necessary to create a special health monitoring program, which is based on a system approach to the following characteristics estimation: educational environment conditions, students’ life style and social status, individual morphofunctional characteristics of students’ organism development, typological peculiarities of nervous system, mental working capacity, physical qualities and it gives an opportunity to realize in practice individual approach to educational process and students’ behavior organization.

Material. Students’ sickness rate study (with temporary disability) at Ural State University of Physical Culture during the following period: 2014-2016 and pedagogical and medical-biological health-improving correctional programs creation. Research methods: Sickness rate indices with temporary disability (TD) study, severity of diseases, the structure and main reasons of diseases study among students of the leading higher educational establishments in Chelyabinsk according to the rate of medical aid appealability during 2014-2016 on the basis of the state statistical observation form №12, an official form of account №16BH; comparative analysis of sickness rate among the students of three leading higher educational establishments of Chelyabinsk during three years, their dynamics and structure; different methods of correctional programs
organization, created by the authors of the article, are offered. **Results.** Complex analysis of sickness rate with temporary disability among the students of the Ural State University of Physical Culture reflect its increase during the following period: 2014-2016 to 35,3%. The sickness rate with TD in 2016 was 185,4 to 1000 students, which is considerably higher the level of the same sickness rate among students of the Chelyabinsk State University and the South-Ural State Medical University. In the structure of sickness rate with TD among students of Ural State University of Physical Culture the 1st place take respiratory diseases, the 2nd place take injuries and intoxication, the 3rd place take digestive apparatus diseases. During 2014-2016 there was the increase of respiratory and digestive apparatus diseases. There is a high level of sickness rate according to “injuries and intoxication” index, mainly because of a high level of injuries among sportsmen-students of Ural State University of Physical Culture. On the basis of the received results it is supposed to introduce the program of students’ health monitoring, use pedagogical and medical-biological programs of health state correction- aerobic loads depending on tolerance to physical loads, aerobics and body-oriented influences, synchronized musical impact, procedures of superficial reflexotherapy and “external” massage, information magnetotherapy. **Conclusion.** Taking into account the peculiarities of studying at physical culture higher educational establishment, the influence of complex mental and physical loads and also the fact, that students are not only professional sportsmen, but also people, who don’t go in for sport and physical culture and even young disabled people, it is necessary to introduce a differentiated approach to drug-free pedagogical and medical-biological health state correction programs creation and realization. For sportsmen these are correction-rehabilitation events, for students with health problems recreation-rehabilitation events.

**Keywords:** students, sickness rate with temporary disability, severity of diseases, structure of sickness rate, correction methods.

**Introduction.** Students’ health state is one of the most important resumptive parameters of nation health, high status of which, among other indices, is determined according to the following reasons: students present the potential of qualified country labor force and also is intellectual potential of society. Students are considered a population resource, which is not only the factor of well-being, but also the factor of country and its regions safety [20]. Successful training of highly-qualified personnel, who provide economic steadiness of state development, is closely connected with oncoming generation’s (including students) health preservation and strengthening [3, 17, 18]. At the same time, in terms of ecological situation worsening, when the principles of healthy life style are not followed, the reserves of nervous, endocrine, immune systems are exhausted, sickness rate among students increases [13]. In many regions of the Russian Federation there is the increase of sickness rate among students of higher educational establishments (with temporary disability), higher sickness rate is in industrial cities [4].

According to the results of held by us earlier questionnaire survey nearly 32% of the respondents showed irresponsibility concerning their health: 38% of the respondents of time to time drink alcohol, smoke. According to health groups the situation was the following: 22,8% (the 1st health group); 23,7% (the 2nd health group); 28,8% (the 3rd health group) [6]. 31,4% of students had prevailing low indices according to “perseverance” scale – people with increased lability, lack of confidence, impulsive, with inconsistent behavior and hypersensibility [11]; P.A. Bayguzhin (2012) revealed general tension of regulatory mechanisms among 50% of female students of “labile” group[2, p. 33.]. Considerable discrepancy of information about students’ health state at higher educational establishments and their sickness rate is the result of integrated unified approaches absence to the received information gathering, analysis and interpretation.

In order to improve the situation it is necessary to carry complex systematic work, directed at healthy life style, health values,
responsible attitude to health formation and also the system of health monitoring creation for qualitative information base and further creation of program and other events at a separate higher educational establishment and in a region in general [1, 5, 10, 16]. V.S. Stepanov and other authors (2017) offer to divide students into clusters according to physical readiness, as it helps a teacher to set objective aims of educational-training process at physical culture lessons, select exercises and the methodology of training process organization for each group, in accordance with the level of each student readiness, realizing the principle of availability and loads correspondence with the readiness level of students [19].

Taking into account the peculiarities of studying at physical culture higher educational establishment, the influence of complex mental and physical loads and also the fact, that students are not only professional sportsmen, but also people, who don’t go in for sport and physical culture and even young disabled people, we created a special health monitoring program for students of physical culture Universities, which includes the following blocks: theoretical questions, motional abilities and skills, tests for physical readiness determination, physical development harmonicity, health and functional state indices, physical activity level and healthy life style criteria [12]. The peculiarity of the offered monitoring program is a system approach to the following characteristics estimation: educational environment conditions, students’ life style and social status, individual morphofunctional characteristics of students’ organism development, typological peculiarities of nervous system, mental working capacity, physical qualities and it gives an opportunity to realize in practice individual approach to educational process and students’ behavior organization.

The aim of the research: students’ sickness rate study (with temporary disability) at Ural State University of Physical Culture during the following period: 2014-2016 and pedagogical and medical-biological health-improving- correctional programs creation.

Materials and research methods. Sickness rate indices with temporary disability (TD) study, severity of diseases, the structure and main reasons of diseases study among students of the leading higher educational establishments in Chelyabinsk according to the rate of medical aid appealability during 2014-2016 on the basis of form №12 of the state statistical observation, an official form of account №16ВН. Comparative analysis of sickness rate among the students of three leading higher educational establishments of Chelyabinsk during 2014-2016 is fulfilled. The dynamics and structure of sickness rate with TD during 2014-2016 is studied and different methods of correctional programs organization, created by the authors of the article, are offered.

Results and their discussion. It was stated that during 2014-2016 sickness rate with TD among students of Ural State University of Physical Culture had the tendency to increase and in 2016 was 185,4 cases to 1000 students (picture 1). The sickness rate with TD in 2016 increased to 35,3% - of 137 in 2014 till 185,4 to 1000 students in 2016 (picture 1).

The level of sickness rate with TD among students of Ural State University of Physical Culture (UralSUPC) in 2016 was 185,4%, and it is 2,6 higher than the level of the same indices in Chelyabinsk State University(ChelSU) and 44,9% higher than the level of sickness rate with TD among students of South-Ural State Medical University(SUSMU). The tendency of sickness rate with TD decrease is revealed among students of Chelyabinsk State University of 76,1 in 2014 till 71,2 to 1000 students in 2016. Also there is sickness rate with TD decrease among students of South-Ural State Medical University during the same period- of 134,7 till 127, to 1000 students.
The held analysis of diseases severity indices with TD during 2014-2016 showed, that its level in all three higher educational establishments had the tendency to increase (picture 2).

The highest level of diseases severity was among the students of Ural SUPC in 2016 – 1552‰. Diseases severity increase among the students of the Ural SUPC during 2014-2016 was 11.2%. In 2016 diseases severity among students of Ural SUPC was three times higher than the level of the same index in ChelSU and twice higher than the level of diseases severity among students of SUSMU. During the reasons of sickness rate with TD analysis among the students of Ural SUPC, it was stated that in the structure of sickness in 2016 the 1st place (50%) took respiratory diseases, the 2nd place (25%) took injuries and intoxication, the 3rd place (10%) took digestive apparatus diseases.

During the period 2014-2016 in the structure of sickness rate with TD in UralSUPC the 1st place take respiratory diseases. There is sickness rate increase of respiratory organs within three years to 38.4% – of 75 till 103.8 to 1000 students (picture 3).

There is the tendency of digestive apparatus diseases increase within three years to 25.3% – of 13.8 till 17.3 to 1000 students. The indices of sickness rate with TD because of injuries and intoxication still remain high. In 2014 this index was 21.9, in 2016 – 21.6 to 1000 students.
The level of diseases severity among the students of the leading higher educational establishments in Chelyabinsk during 2014-2016 (to 1000 students)

For comparative characteristic of several sickness rate indices with TD we also present the results of sickness rate among students of the leading higher educational establishments.
establishments in Chelyabinsk during 2014-2016 according to the classes of diseases (table 1).

The indices analysis revealed, that in the structure of sickness rate with TD in ChelSU and in SUSMU, as in Ural SUPC, the 1\textsuperscript{st} place take respiratory organs diseases. In SUSMU there is insignificant increase of respiratory organs sickness rate. In 2014-109,8, in 2016 – 112,9 to 1000 students. In ChelSU respiratory organs sickness rate in 2014 was 65,5, in 2016 – 64,7 to 1000 students, and it is lower than the indices in UralSUPC (table 1).

Injuries and intoxications take the 2\textsuperscript{nd} place in the structure of sickness rate with TD in UralSUPC during 2014-2016. In 2014 the index of injuries and intoxications was 21,9, in 2016 – 21,6 to 1000 students. In ChelSU and in SUSMS injuries and intoxications have almost zero indices.

Digestive apparatus diseases take the 3\textsuperscript{rd} place in the structure of sickness rate with TD in Ural SUPC during 2014-2016 (2014-13,8, in 2016 – 17,3 to 1000 students (25,3% increase)). In ChelSU digestive apparatus diseases during the period 2014-2016 have the tendency to decrease and in 2016 their index was 2,6 to 1000 cases and it is almost 6 times less than the level of the same sickness rate in UralSUPC. In SUSMU digestive apparatus diseases also have the tendency to decrease (2016 – 5,0 to 1000 students) and it is 3 times higher than the level of the same sickness rate in UralSUPC.

The received results correspond with the received earlier (1992-1997) results according to the sickness rate among students of UralSUPC (163-197 to 1000).

Table 1 – Sickness rate with TD according to the classes of diseases among students of the leading higher educational establishments in Chelyabinsk during 2014-2016

<table>
<thead>
<tr>
<th>Class of diseases</th>
<th>Educational establishment</th>
<th>Sickness rate indices with TD according to years</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Number of cases</td>
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<td>Respiratory diseases</td>
<td>UralSUPC</td>
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<td></td>
<td>ChelSU</td>
<td>f 9  f 3,3</td>
</tr>
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<td></td>
<td>SUSMU</td>
<td>m 0  m 3,9</td>
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<td></td>
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<td>f 66  f 7,8</td>
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<td>Injuries, intoxication</td>
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<td>ChelSU</td>
<td>f 47  f 9,8</td>
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<td></td>
<td>SUSMU</td>
<td>f 0  f 0</td>
</tr>
<tr>
<td>Digestive apparatus diseases</td>
<td>UralSUPC</td>
<td>m 9  m 0,4</td>
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<tr>
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<td>f 20  f 0,9</td>
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<td>SUSMU</td>
<td>m 5  m 0,2</td>
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Taking into account the peculiarities of studying at physical culture higher educational establishment, the influence of complex mental and physical loads and also the fact, that students are not only professional sportsmen, but also people, who don’t go in for sport and physical culture and even young disabled people, it is necessary to introduce a differentiated approach to drug-free pedagogical and medical-biological health state correction programs creation and realization. For sportsmen these are correction-rehabilitation events, for students with health problems recreation-rehabilitation events.

It is generally recognized, that aerobic loads form an obligatory element of health-improving activity. For students with health problems “Aerobics with psychological relief” is recommended. It includes body-oriented methodologies, which give female students notion of somatic and psychic components unity and interaction [8].

We also created pedagogical program of training for students depending on the level of their physical conditions, the degree of tolerance to the load: training regimen №1 for people with tolerance to physical load 100-125W (low level of tolerance), №2 – in case of tolerance to physical load 125-150 W (below the average), №3 – in case of tolerance to physical load 150 W and higher (average) [21].

It is shown, that cluster-discriminant analysis with distribution of students at physical culture lessons according to clusters, helped to differentiate objective aims of physical training, create the methodologies of educational-training process, taking into account correspondence of the loads to the level of their readiness [19]. Such kind of educational-training process individualization at physical culture lessons helped to increase the effectiveness of students’ physical development: during education those, who had a low level of physical condition, transferred to the group of students with higher level. The level of physical development in the experimental group was considerably higher than in the control group, also increased the motivation to physical culture.

Music in sport is one of the effective instruments of teaching and motional skills and abilities development. The results of held by us research, concerning the estimation of synchronized musical influence effectiveness during training, prove its positive influence on a sportsman’s rehabilitation [14]. Mainly monodirectional differences of the studied indices in the main and the control group were registered and it positively characterizes training process organization. Though in both groups rehabilitation processes were prevailing during the slip, the quality of organism rehabilitation during the slip in the main group turned out to be validly better, than in the control group. More distinct vagal influence in the main group is proved by the following factors: high index of rehabilitation, low values of minimal and maximum heart rate, oxygen consumption indices and the peculiarities of energy exchange, stated during the slip.

Great attention is given to physical methods of sportsmen’s rehabilitation. The results of “REDOKS” applicators use showed, that it provides subjective health improvement, working capacity increase, the processes of rehabilitation intensification, depends on methodology of application [7]. There is sympathetic section of vegetative nervous system activation when the applicator (with needles angle 90°) influences feet and back during 7-10 minutes. Relaxing influence is more evident during applicator with needles angle 60° use during 25-30 minutes. At the same time, the effectiveness of cardiovascular system activity increases: heart rate decreases, peripheral blood flow increases, there is the tendency for arterial pressure decrease. The mechanism of vertebrogenic and muscular pain decrease and disappearance is
proprioception increase of the zones, which are influenced by the pressure while using the methodologies of superficial reflexotherapy, the same as reflex-segmental and point massage, with activating the mechanisms of antipain structures of this segment. It is recommended to use applicators independently and also together with the means, directed at rehabilitation processes intensification during physical loads. Applicator with needles angle 45° can be recommended to people with the increased pain sensitivity threshold.

“ARMOS” device is recommended during rehabilitation among sportsmen with musculoskeletal system disorders, myofascial pain of vertebragenous origin.

S.N. Darovskikh and other authors (2015) offer to use information electromagnetic therapy devices [9]. The effect in case of their use is based on creation of necessary evolutionally based conditions for the organism with the help of natural electromagnetic interference, when there is neuro-humoral regulation mechanisms activation for an autonomous rehabilitation of the violated homeostasis or in the complex with medicinal preparations, depending on the type of disease. This device can become very popular in sport as drug-free means of rehabilitation and the way of sports working capacity increase.

A new approach to physical methods of rehabilitation use among sportsmen is “external” massage [15]. Massage provided importance increase of humoral-metabolic regulation factors according to the results of heart rate variability analysis (power increase of very low-frequency oscillations) and parasympathetic segment of vegetative nervous system (high-frequency oscillations) in case of tendency to sympathetic character decrease in lying position and in case of an active orthostasis. After massage relative power of low-frequency oscillations decrease was10%, and LF/HF ratio decrease (vagosympathetic interaction index) to 12,8% lying and to 23,7% standing shows activity redistribution of vegetative nervous system segments in favor of parasympathetics; also in the position of an active orthostasis index of centralization is 20,7% lower. The used method of massage influences the system of tonic balance by means of predominance of proprioreceptor signaling over vegetative one. It is explained by the fact, that in contrast to classical massage there are no techniques of tissues compression and no influence on vascular bed, no influence on hemodynamics change by means of pressosensitive mechanisms. The importance ratio change of different neurovegetative factors of heart rate regulation (on the basis of ratio analysis of spectrum relative power within three ranges) reflect the influence of the method on hormonal-metabolic regulation mechanisms activation and suprasegmental structures of vegetative nervous system – suprasegmental sections (hypothalamic and limbic segments of central nervous system), which was seen in the dynamics of very low-frequency oscillations. This methodology use can considerably improve the quality of muscular locomotor act, influence statokinetic steadiness and coordination characteristics of sportsmen and it is not only very important for the quality of rehabilitation improvement, but it also gives new opportunities during the period of competitions.

**Conclusion.**

Complex analysis of sickness rate with temporary disability among the students of Ural State University of Physical Culture reflect its increase during the following period: 2014-2016 to 35,3%. The sickness rate with TD in 2016 was 185,4 to 1000 students, which is considerably higher the level of the same sickness rate among students of Chelyabinsk State University and South-Ural State Medical University.

The severity of illnesses with TD among students of UralSUPC has the indices increase and it is higher than the level of the same results in ChelSU and in SUSMU.

In the structure of sickness rate with TD among students form Ural State University of Physical Culture the 1st place take respiratory diseases, the 2nd place take injuries and intoxication, the 3rd place take digestive apparatus diseases. During 2014-2016 there
was the increase of respiratory and digestive apparatus diseases. There is a high level of sickness rate according to “injuries and intoxication” index, mainly because of a high level of injuries among sportsmen-students of Ural State University of Physical Culture.

Summing up all mentioned above, we offer to use differentiated approach to drug-free pedagogical and medical-biological health state correction programs creation and realization.

On the basis of the received results it is supposed to introduce the program of students’ health monitoring, use author’s pedagogical and medical-biological programs of health state correction: For sportsmen these are author’s correction-rehabilitation events, for students with health problems recreation-rehabilitation events. The programs of aerobic loads are presented depending on tolerance to physical loads, aerobics and body-oriented influences, synchronized musical impact, procedures of superficial reflexotherapy and “external” massage, information magnetotherapy.

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FUNCTIONAL STATE CHARACTERISTICS OF CENTRAL NERVOUS SYSTEM AMONG SPORTSMEN WITH DIFFERENT ORIENTATION OF THE TRAINING PROCESS

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Annotation. The problem of physical loads influence on functional state of sportsmen’s nervous system is still urgent. From the point of view of the theory of functional systems, in adaptation provision, the main role plays central nervous system. The main characteristics of nervous system determine functional and psychological readiness of sportsmen, which is responsible for sports effectiveness, especially in situational kinds of sport (sports games and combat sports). Material. The strategy estimation of adaptation to physical load on the basis of nervous system characteristics diagnostics, which determine speed qualities of a sportsman. Research methods: scientific literature analysis and summarizing, tapping test, tiredness coefficient determination, methods of mathematical statistics. Results. The characteristics of nervous system were studied, which determine speed qualities of a sportsman and the strategy of adaptation to physical load; two groups of sportsmen (age, anthropometric indices, qualifications and the period of going in for sports almost identical) were examined. In order to estimate the main characteristics of nervous system, which condition speed qualities of a sportsman, tapping test was used. Calculated on the basis of tapping test results tiredness coefficient helped to estimate the variant of adaptation strategy to physical load. Most qualified sportsmen had a strong type of nervous system and a high level of the studied characteristics. Sportsmen from both groups had tiredness coefficient lower than 0,25 and it proves high level of resistance to tiredness and tolerant strategy of adaptation to loads. Conclusion. Examination of qualified sportsmen, who go in for acyclic kinds of sport (ice hockey and taekwondo), using tapping test helped to give a complex estimation of the functional state of sportsmen’s nervous system and determine the strategy of adaptation to maximum intensity work.

Keywords: sportmen, tapping-test, nervous system, strength, mobility, lability, endurance, adaptation strategy.

The problem of physical loads influence on functional state of sportsmen’s nervous system is still urgent. From the point of view of functional systems theory, in adaptation provision, the main role plays central nervous system. The main characteristics of nervous system determine functional and psychological readiness of sportsmen, which is responsible for sports effectiveness, especially in situational kinds of sport (sports games and combat sports).

Speed indices, or the quickness quality, necessary in these kinds of sport, in physiology are determined as the ability to fulfill different actions with maximum tempo. Quickness is characterized by the duration of motional...
reactions and it is conditioned by the ability to start maximum quickly and fulfill a single movement and also by the ability to fulfill movements with maximum frequency. These quickness aspects are connected [1-2].

An integral index of quickness is maximum frequency of movements. The ability to fulfill quick movements is genetically determined (morphofunctional characteristics of muscular apparatus, mobility and lability of nervous processes) and is conditioned by many factors: age and sex, weight and the amplitude of the object movement, motion plane, the level of training and interference of nervous centers. However, the speed of movements fulfillment is mainly conditioned by central nervous processes.

For the main characteristics of nervous system diagnostics, which determine speed qualities of a sportsman, including his mobility, lability and endurance, corresponding equipment is effectively used [3].

At the same time, very often a sportsman’s state in extreme conditions is necessary. In this case simple methodologies application is effective (available in fulfillment and estimation). The base of these methodologies is speed qualities of an individual determination. Thus, solving the problems of a sportsman’s functional state diagnostics and the characteristics of adaptation to stress factors it is reasonable to use as the indicator maximum tempo of movements (tapping test). Functional state estimation of nervous system according to the range of different its characteristics helps to define the strategy of the definite sportsman adaptation and then estimate the effectiveness of the training process, determine timely tiredness and take rehabilitation measures.

The aim of the research work: the strategy of adaptation to physical load estimation on the basis of nervous system characteristics diagnostics, which determine speed qualities of a sportsman.

Material and methods. The research was held in accordance with the items of Helsinki Declaration of ethical principles for the research works, where people are involved.

Ethical permission was received in the Ural State University of Physical Culture ethics Committee. The examined sportsmen gave their written informed consent to take part in the research. They were informed about the aim of the research and the peculiarities of the used methodologies.

In order to estimate the strategy of adaptation to physical load and diagnose the main characteristics of nervous system, which determine speed qualities of a sportsman, two groups of sportsmen were formed from the students of the Ural State University of Physical Culture. They were of the same age range and had similar anthropometric indices (body length – 177,3±6,2 cm, weight – 66,1±2,11 kg), qualification and the period of going in for sports.

The first group included 20 sportsmen, who played ice hockey. The second group included 20 sportsmen, who went in for taekwondo.

In order to reveal the characteristics of nervous processes classical tapping test was used. A sportsman tapped on the sheet of paper with the pencil making dots with maximum speed (letter size). The sheet of paper was divided into 6 squares. Movement from square to square was fulfilled each 5 seconds from left to right in a clockwise direction on command. After 30 seconds, when the work was over, the sum of dots in each square was calculated.

During the dynamics of maximum tempo of movement analysis several types were defined, which corresponded to the strength of nervous processes: strong, average, weak, medium-weak [4]. For this purpose the difference between the number of movements fulfilled each 5 seconds and the number of movements which were registered during the first 5 seconds of work, was determined. Nervous system was estimated as strong if the indices were higher than the initial level and the sum of deviations had the sigh "±". If the indices didn't change, the strength of nervous processes was estimated as the average and in case of considerable decrease during the work – as weak one.

Further in order to estimate the characteristics of nervous system and the
degree of tiredness calculations were fulfilled according to corresponding formulae [4-5]. The value of tiredness coefficient helped to estimate the variant of adaptation strategy to physical load [5-6]. Tiredness index lower than 0,25 showed tolerant variant and a high index (more than 0,5) showed resistant variant.

The received results according to each group of students were handled with the help of methods of traditional biostatistics [7]. Mean values calculation and mistakes of the average and distribution of the examined students in percentage. As the values distribution inside each group was estimated as normal, validity of differences according to average group values was determined according to Student criterion (t) and in characteristics distribution –according to Fisher's ratio test (F). 95% level of validity was adopted (t≥1,96 и F≥4,09).

Results and their discussion. During the strength of nervous processes estimation most sportsmen had strong and the average type, 75% and 25% in the group of hockey players and 80% and 20% – in the group of those, who go in for taekwondo. The sum of strikes, fulfilled during the test, characterizes dynamic muscular working capacity. It turned out to be high enough and almost the same in the group of hockey players and those, who go in for taekwondo, 151,7±2,52 and 149,6±3,18 (t=0,55). The absence of differences between the groups according to the value of maximum frequency of movements is conditioned by the same level of qualification and training of sportsmen in both groups.

The same results were received during other characteristics of nervous processes estimation among the examined sportsmen. Mean values of such kind of indices, as endurance, mobility and lability are presented in table 1. Mean values of these indices had no valid differences. Calculated level of endurance among hockey players was 108±4,41, among those, who go in for taekwondo - 110±1,56 (t=0,43); The level of nervous system mobility - 119±4,22 and 112±1,85 (t=1,52); the level of lability – 105±1,21 and 106±1,47 (t=0,74).

Table 1 – Mean values of the studied indices (M±m) in the examined groups of sportsmen

<table>
<thead>
<tr>
<th>Indices</th>
<th>Variation-statistical indices</th>
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<tbody>
<tr>
<td></td>
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</tr>
<tr>
<td>The level of endurance, c.u.</td>
<td>108±4,41</td>
</tr>
<tr>
<td>The level of mobility, c.u.</td>
<td>119±4,22</td>
</tr>
<tr>
<td>The level of lability, і c.u.</td>
<td>105±1,21</td>
</tr>
</tbody>
</table>

According to the results of endurance individual estimation, mobility and lability of their nervous system level was estimated (high, average and low) and then – distribution of the respondents according to these estimations. As it is seen from the results presented in table 2 no statistically valid differences between the groups of sportsmen were revealed.

Table 2 – Distribution of sportsmen according to the levels of the studied characteristics, in %

<table>
<thead>
<tr>
<th>Level</th>
<th>Feature, groups, percentage, Fisher's test value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>endurance</td>
</tr>
<tr>
<td></td>
<td>hockey</td>
</tr>
<tr>
<td>High</td>
<td>75</td>
</tr>
<tr>
<td>Average</td>
<td>25</td>
</tr>
<tr>
<td>Low</td>
<td>0</td>
</tr>
</tbody>
</table>
Most sportsmen had a high level of the studied characteristics. It is obvious, that among the sportsmen with strong nervous system the tempo of movements increase during tapping-test is connected with the high level of ability of nerve centers to liability and nerve cells to sum up stimulation.

A low level of nervous system mobility had one hockey player and one sportsman, who went in for taekwondo, a low level of mobility had two hockey players and one sportsman, who went in for taekwondo.

In order to define the strategy of adaptation to physical load the value of tiredness coefficient was calculated for each sportsman. Most sportsmen from both groups had tiredness coefficient lower than 0,25 and it proves a high level of resistance to tiredness and reflects a tolerant strategy of adaptation to loads.

The results of tapping-test give an integral estimation of nervous system and reflect a functional state of a respondent [3]. The results of tapping-test analysis and interpretation help to estimate the power of nervous processes and working capacity of nervous system. Only strong nervous system is able to bear the load, which is stronger than weak one.

Among people with a strong nervous system the increase of movements tempo during tapping-test is connected with the ability of their nerve cells to sum up stimulation and their nerve centers to increase lability in terms of volitional mobilization. As expected, most examined sportsmen had a strong and average type of nervous system, a weak and average–weak types were not stated and it is conditioned by a high level of hockey players and those, who go in for taekwondo qualification.

All actions in situational kinds of sport are determined by the mechanisms of difficult reactions, such as reaction of choice, reaction to a moving object, anticipation reaction and others. At the same time, these reactions depend on quickness and accuracy of perception and timely fulfilled reciprocal movements. The main role here play the characteristics of nervous system. The level of excitability determines the speed of a sportsman reaction during current moment; mobility determines the speed of switching from one tactical action to another, tranquility and endurance determine accuracy and adequacy of technical-tactical actions choice during current competitive moment [1-2]. In this connection, the level of sportsmen’s (players and combatants) central nervous system functional state estimation is very important.

The held study of nervous system power, endurance, mobility and lability proved a high level of the studied characteristics among the examined sportsmen. It is obvious, that among sportsmen with a strong nervous system the tempo increase of movements during tapping-test fulfillment is connected with a high level of nerve centers ability to lability and nerve cells to sum up stimulation. A low level of nervous system mobility had one hockey player and one person, who went in for taekwondo, a low level of mobility had two hockey players and one athlete, who went in for taekwondo. This fact proves the necessity of an individual approach to athlete’s functional state estimation, which will help to reconstruct the training process and improve each characteristic of nervous system and motional qualities, which are under their control.

The problems solution of stress resistance diagnostics is provided by the knowledge of different adaptive changes regularities formation, which condition tolerant or resistant scenario of adaptation.

It is known, that during moderate and intensive work the main reasons for tiredness are connected with visceral systems and vegetative regulation of their functioning [8-10]. During maximum intensity load (as during tapping-test fulfillment) tiredness is conditioned by out-of-limit inhibition development, which appears in nerve centers [1-2].

It should be noted that high tiredness coefficient was among the same athletes, who had a low level of nervous system mobility.
(two hockey players and one person, who went in for taekwondo) and it proves resistant strategy of adaptation among them. As tapping-test reflects endurance of nervous system (but not organism endurance in general) this factor can be explained, not by tiredness development among the individuals, but mostly by other factors influence, it means that the reason of the revealed disorders specification and the corresponding measures realization is necessary.

**Conclusion.** Thus, examination of qualified athletes, who go in for acyclic kinds of sport (ice hockey and taekwondo), using tapping test helped to give a complex estimation of the functional state of athlete’s nervous system and determine the strategy of adaptation to maximum intensity work. There were no valid differences between the groups according to the studied indices and it is conditioned by high qualification of athletes and by the peculiarities of sports activity, which demands a high level of indices, characterizing nerve processes: strength, mobility, endurance, lability. Most athletes showed high level of resistance to tiredness and tolerant strategy of adaptation to loads.

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FACTOR STRUCTURE OF SPORTSMEN ENGAGED IN APPLIED UNIFORM SPECIES LIMBONS MOTOR DICHOTOMY

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Annotation. The article reveals the problem of extremities motor dichotomy among sportsmen, which is the regulator of tactical-technical actions fulfillment in terms of competitive activity. Materials. Sportsmen, who go in for applied kinds of single combats (judo, karate, sambo-wrestling, kickboxing, hand-to-hand fighting and others) took part in the research. In order to study the components of extremities motor dichotomy structure among sportsmen the method of open questioning according to 10-points scale was used. The received marks were handled with the help of factorial analysis method with the main components rotation according to varimax criterion. Research methods: pedagogical literature analysis, questionnaire, interpretation. Results. In the factorial structure of sportsmen’s extremities motor dichotomy 8 orthogonal factors were defined with 76.33% of general sampling variance. In particular, the defined components in the structure of motor dichotomy show monodirectional right-side asymmetry of the upper and lower right extremities during throws fulfillment from the right stand. The following components are defined: preference to strike a blow with the left hand during the combat, preference to fulfill throws over the left shoulder, with the left
hand, kick with the left leg, to fulfill throws with the left leg, preference to choose the left stand while throws fulfillment. It should be noted that sportsmanship is mainly conditioned by the choice of left-side throws and kicks from the left stand and in case of less right-side throws and kicks. **Conclusion.** The revealed structure will help to determine the orientation of pedagogical influences in the methodology of tactical-technical sports training of sportsmen depending on intensity of extremities motor dichotomy. **Keywords:** motor symmetry, asymmetry, lower, upper extremities, wrestling, single combats.

**Introduction.** Extremities motor dichotomy among sportsmen is a kind of regulator of tactical-technical actions fulfillment in experimental terms of competitive activity and defines its success and is an independent parameter of motional activity, which characterizes bilateral functions.

The reason for motor dichotomy in movements control of extremities is different role of the right and the left cerebral hemispheres and the specificity of activity itself [1, 11]. In many publications it is mentioned that extremities motor dichotomy influences sports result, the reliability of the attacking and defensive actions fulfillment [4, 5], system-synergetic integrations in a person’s homeostasis self-regulation in sport [10], motor skills formation of spatial parameters of technical actions control [2], physical development in three-dimensional space depending on morphological features for the lower and the upper extremities muscles [6]. At the same time, taking into consideration motor asymmetries in conflict situations of competitive activity in single combats provides correct choice of an individual manner of interaction with the opponent, the direction identification of the techniques at the stand fulfillment [7], the use of corresponding tactics of actions [9]. As it is mentioned in some works [4, 8], ambidexters and left-handed have technical and tactical advantage over right-handed.

Great positive experience is accumulated in the sphere of theory and practice of control organization over the process of motor dichotomy of sportsmen, who go in for applied kinds of single combats. These questions are reflected in the works by E.M. Berdichevskaya, A.S. Gronskaya [1]; V.A. Eganov [5], K.D. Chermit [9] and others.

However, in spite of the held research works and a lot of publications, the structure of extremities motor dichotomy among sportsmen, who go in for applied kinds of single combats, still stays insufficiently studied. It is especially important to study the influence of symmetry-asymmetry of the upper and lower extremities on the choice of motional preferences, stand, rational direction of extremity movement, on sports result. In particular, A.S. Kuznetsov mentions, that in long-term training management among wrestlers there is still great potential in reliability increase of technical-tactical training, which can be provided by means of technical-tactical activity model. In a base fundamental technical training the definite stand predisposition relative to the projection onto a horizontal plane should be revealed and learn how to fulfill the throws from right-side, left-side stands, in case of dissimilar mutual stands [7].

The necessity of the chosen research nowadays is the most urgent in the training process management among those, who go in for applied kinds of single combats, in order to achieve maximum sportsmanship.

**Aim:** to study the structure of extremities motor dichotomy among sportsmen in applied kinds of single combats.

**Objectives:** to reveal the orientation of pedagogical interactions in the methodology of tactical-technical sports training among sportsmen, who go in for applied kinds of single combats, depending on the intensity of extremities motor dichotomy.

**Research methods and research organization.** The research aim realization was fulfilled by means of the methods of pedagogical literature analysis, questionnaire,
factorial analysis, interpretation. 51 sportsmen, who go in for applied kinds of single combats (judo, karate, sambo-wrestling, kickboxing, hand-to-hand fighting and others) took part in the research (age-range 18-24). In order to study the components of extremities motor dichotomy structure among sportsmen the method of open questioning according to specially created methodology, offered by A.V. Eganov with other authors [3] was used. The received marks were handled with the help of factorial analysis method with the main components rotation according to varimax criterion with their further interpretation. Factorial analysis was held in order to reveal latent studied variables, the least number of factors, which explain the most dependable variables, which explain the structure of correlation inside a factor. Correlations study between the indices, which were defined in one factor, explains their direct or inverse relation between each other. Maximum according to absolute value correlation coefficients, defined in the factor, were analyzed. Statistic system IBM SPSS Statistics was used for calculation.

**Results and their discussion.** In accordance with the content of the article it is necessary to give the definition of some notions, as we understand them in this work.

**Motor dichotomy** (dichotomia) – correlation or counter-correlation of two parts of one unity, a pair of interconnected elements of motional action with division into two disjoint parts. In this work extremities motor dichotomy is considered concerning sagittal plane, which “dividing” body into the right and the left parts and concerning transversal one-into the upper and the lower parts.

**Motor asymmetry** is understood as preferential participation of one of pair organs of the upper and lower extremities in fulfilling motional actions in case of equally possible choice between them.

**Ambidexterity** – the ability to fulfill technical actions (throws, strikes) with the right, left upper and lower extremities equally.

**Motor preferences**- the ability of sportsmen to fulfill technical actions depending on motor dominance of one of extremities.

One-sided monodirectional dichotomy of the upper and lower extremities is reflected in fulfillment by a sportsman attacking actions predominantly with the right (left) upper extremity and the right (left) lower extremity.

**Right-hand** (left-hand) stand in single combats reflects individual peculiarities of lateral organization of cerebrum, at the same time, the right (left) leg is before the left (right) one.

Research results and their discussion. The results of components factorial analysis of extremities dichotomy among sportsmen, who go in for applied kinds of single combats, revealed the structure of 8 orthogonally factors with general sampling variance (GSV)76,33% (table 1).

The first factor with contribution into GSV 14,1% revealed the following structure of extremities motor dichotomy: preference to strike a blow with the right hand during the combat, preference to fulfill throws over the right shoulder and with the right hand, kick with the right leg and to fulfill throws with the right leg, preference to choose the right stand while throws fulfillment (with the corresponding numbers: 1, 2, 3, 4, 14). The defined parameters prove monodirectional right-hand asymmetry of the upper and lower right extremities of throws fulfillment from the right stand. The following components have the greatest correlations with the opposite sign: preference to strike a blow with the left hand during the combat, preference to fulfill throws over the right shoulder and with the right hand, kick with the right leg and to fulfill throws with the right leg, preference to choose the right stand while throws fulfillment (with the corresponding numbers: 9, 10, 11, 12, 16).

Correlations results, which were defined in the first factor, helped to come to the following conclusion. First, right-side monodirectional, one-sided asymmetry of the
upper and lower extremities is obvious. It is proved by a positive sign of these parameters in the factor. Pedagogical essence of the defined correlations is in the following: if a sportsman fulfills technical actions with the right upper extremity, technical actions with the lower extremity also fulfills predominantly with the right extremity, at the same time prefers to fulfill throws from the right stand.

Table 1 – Factorial structure matrix of extremities motor dichotomy components among sportsmen, who go in for applied kinds of single combats (n=51)

<table>
<thead>
<tr>
<th>Extremities motor dichotomy components</th>
<th>Numbers of factors and correlation coefficients of motor dichotomy components</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1. Preference to strike a blow with the right hand during the combat</td>
<td>843</td>
</tr>
<tr>
<td>2. Preference to fulfill throws over the right shoulder and with the right hand</td>
<td>752</td>
</tr>
<tr>
<td>3. Preference to kick with the right leg and to fulfill throws with the right leg</td>
<td>345</td>
</tr>
<tr>
<td>4. Preference to fulfill throws with the right leg</td>
<td>513</td>
</tr>
<tr>
<td>5. Preference to strike blows with both hands</td>
<td>235</td>
</tr>
<tr>
<td>6. Preference to fulfill throws over the right and the left shoulder (both hands)</td>
<td>151</td>
</tr>
<tr>
<td>7. Preference to kick with both legs</td>
<td>-158</td>
</tr>
<tr>
<td>8. Preference to fulfill throws with both legs</td>
<td>130</td>
</tr>
<tr>
<td>9. Preference to strike a blow with the left hand</td>
<td>-743</td>
</tr>
<tr>
<td>10. Preference to fulfill throws over the left shoulder and with the left hand</td>
<td>-345</td>
</tr>
<tr>
<td>11. Preference to kick with the left leg</td>
<td>-341</td>
</tr>
<tr>
<td>12. Preference to fulfill throws with the left leg</td>
<td>-336</td>
</tr>
<tr>
<td>13. Preference to choose the right stand during kicks fulfillment</td>
<td>255</td>
</tr>
<tr>
<td>14. Preference to choose the right stand during throws fulfillment</td>
<td>694</td>
</tr>
<tr>
<td>15. Preference to choose the left stand during kicks fulfillment</td>
<td>-224</td>
</tr>
<tr>
<td>16. Preference to choose the left stand during throws fulfillment</td>
<td>-310</td>
</tr>
</tbody>
</table>
Secondly, multidirectional asymmetry of the upper and lower extremities is obvious. It is proved by negative sign between the preference to fulfill technical actions with the upper and lower extremities. Pedagogical interpretation is in the following: more frequently a sportsman fulfills technical actions with the right extremities, less frequently he fulfills them with the left extremities, at the same time, fulfilling the throws he prefers to choose the left stand.

The defined components are one of the main in the structure of extremities motor dichotomy. In accordance with its content the factor can be interpreted as “dichotomy of one-sided and many-sided asymmetry of the upper and lower extremities of those, who go in for applied kinds of single combats”.

The second factor with GSV 12.4%, defined with the highest correlation coefficients, having positive sign, the following components of extremities dichotomy: preference to fulfill throws over the left shoulder and with the left hand, preference to fulfill throws with the left leg, sportsmanship, period of going in for sports and age (with the corresponding numbers: 10, 12, 18, 20, 21). The essence of these correlations is in the fact, that a sportsman has a high level of sportsmanship, as a rule, he has a greater period of going in for sports and is older. At the same time, he prefers to fulfill throws over the left shoulder, with the help of the left hand, more often throws with the left leg.

With the greatest correlations with the opposite sign the factor defined two components of dichotomy 2 and 15: preference to fulfill throws over the right shoulder in a combat, with the right hand and to fulfill kicks from the left stand.

Pedagogical essence of the defined dichotomy parameters proves the fact, that sportsmanship is mainly conditioned by the choice of left-side direction of throws and kicks from the left stand and in case of their less fulfillment in right-side direction. The factor is called “Sportsmanship, which determines the choice of left-side asymmetry of extremities”.

The third factor with GSV 10.2%. It included the following components of dichotomy: 5, 7, 17 (preference to fulfill blows with both hands, both legs and integral index of motor-coordinating skills). The defined parameters are connected with the symmetry of motor actions.

With the greatest correlations with the opposite sign in the factor two components of dichotomy were defined: 15, 21(preference to choose the left stand while fulfilling the kicks and age). The factor is called “Motor-coordinating skills, which determine motor symmetry of extremities”.

The 4th factor with GSV 9.23%. With the greatest correlations with the positive sign the following motor components of dichotomy were defined: 11, 15, 19, which characterize preference to kick with the left leg, preference to choose the left stand while fulfilling kicking and body weight. Mostly components connected with body weight.

With the greatest correlations with the opposite sign five components of dichotomy were defined: 3, 4, 6, 13, 14. It proves preference to fulfill kicks and throws with the right leg, throws with both hands, the choice of

| Contribution of the factor into GSV, % | 14.1 | 12.4 | 10.2 | 9.23 | 8.27 | 7.60 | 7.37 | 7.16 |
| Sum of GSV, % | 76.33 |

Notes: the method of the main components with axes rotation according to varimax criterion was used. Correlation coefficients values in the factor are multiplied by 1000 and typed bold, GSV-general sampling variance.
the right stand while kicking and the right stand while fulfilling the throws.

The defined in the factor components prove the following: more frequently a sportsman with higher weight prefers kicks with the left leg, the choice of the left stand while fulfilling the kicks, less frequently he fulfills kicks and throws with the right leg, throws with both hands, kicks from the right stand, at the same time, fulfilling the throws prefer to choose the right stand. The factor in interpreted as “Body weight influence on motor preferences of extremities movements direction and a comfortable stand choice”.

**The 5th factor** contributed into GSV 8.27%. With positive greatest correlations the following components were defined: 6, 10, 12, 15, 16 (preference to fulfill throws over the right and left shoulder (both hands), to fulfill throws over the left shoulder, with the left hand, to fulfill throws with the left leg during the combat, preference to choose the left stand while fulfilling kicks, preference to choose the left stand during the combat while fulfilling the throws, characterizing mainly left-side asymmetry of extremities).

With the opposite sign with the greatest correlations two components were defined: 13 and 14 (preference to choose the right stand while fulfilling the kicks and the right stand while fulfilling the throws).

It proves that in case of symmetric (equally possible) fulfillment of throws direction with both hands or over the left shoulder, with the left leg sportsmen prefer to fulfill kicks and the throws from the left stand, but at the same time, less frequently fulfill kicks and throws from the right stand. In accordance with the content the factor is interpreted as “Symmetry-asymmetry of throws fulfillment in the direction of both sides, with both hands, with an equal ability to choose the right or the left stands”.

**In the 6th factor** with contribution into GSV 7.60% with the positive greatest correlation component number 5 was defined: preference to strike blows with both hands during the combat. The factor is interpreted by us as “Symmetry of strikes of the upper extremities”.

**In the 7th factor** with contribution into GSV 7.37% with the positive correlations 2 parameters were defined: 7, 8 (preference to kick with both hands and throw with both legs). Included into the factor parameter should be interpreted as “Symmetry of the lower extremities”.

**The 8th factor** with GSV 7.16% with the greatest negative correlations determined two parameters of extremities motor dichotomy among sportsmen, which reflect right-side asymmetry: kicks with the right leg and throws fulfillment with the right leg (components 5, 4).

With the positive (opposite) sign the following correlations were defined in the factor: preference to fulfill throws over the left shoulder, with the left hand, preference to kick with the left leg, preference to fulfill the throws with the left leg during the combat (components – 10, 11, 12).

The essence of correlations with the opposite signs in the factor is in the fact, that less frequently sportsmen kick with the right leg and fulfill the throws with the right leg, more frequently they prefer to fulfill the throws over the left shoulder and with the left hand, kick with the left leg, fulfill throws with the left leg. Many-sided asymmetry of the lower extremities is obvious. The factor is called “Many-sided asymmetry of the lower extremities”.

Thus, factorial analysis revealed the structure of extremities motor dichotomy among sportsmen, who go in for applied kinds of single combats.

**Conclusion.** In the factorial structure of sportsmen’s extremities motor dichotomy 8 orthogonal factors were defined with 76.33% of general sampling variance and the contribution of each factor from 14.1 to 7.16%. The revealed structure will help to determine the orientation of pedagogical influences in the methodology of tactical-technical sports training of sportsmen, going in for applied
kinds of single combats, depending on intensity of extremities motor dichotomy.

In accordance with the revealed structure and the regularities, further research can be directed at the methodology creation of influence on extremities motor dichotomy parameters while going in for applied kinds of single combats.

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QUALITATIVE CHARACTERISTICS OF FUNCTIONAL READINESS AMONG FEMALE ATHLETES OF DIFFERENT SPORTS QUALIFICATION, WHO SPECIALIZE IN ATHLETE ALL-ROUND COMPETITIONS

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Annotation. Functional potential of an organism among sportsmen is mainly conditioned by the following features: power, mobilization, efficiency and steadiness and they are considered the main characteristics of physiological systems activity, which determine and limit a high level of special sports physical working capacity, which is an integral index of functional readiness. Material. Comparative analysis of the development level of the main qualitative characteristics of functional readiness among female athletes of different qualification, who specialize in athlete all-round competitions. Research methods: scientific literature analysis and summarizing, testing, comparative analysis, methods of mathematical statistics. Results. For the set objective realization, the research work was held among two groups of female athletes, who specialize in athlete all-round competitions. At rest and in case of physical loads the indices, which reflect qualitative characteristics (functional qualities) – power, mobilization, efficiency and steadiness of organism functioning were determined. It was revealed that the parameters of morpho-functional power have bigger values among more qualified female athletes. At the same time, this advantage is not so significant and is within the range of 1,0 - 10,7%. It is shown, that the parameters, which reflect mobilization and utilization opportunities of an organism among the female athletes of different qualification on the average
differed insignificantly in both groups of female athletes. At the same time, the indices of functional steadiness in the groups of female athletes of different qualification differed significantly: more qualified athletes validly exceeded qualified ones – to 9.0-14.3%. Also more significant and mainly statistically valid was the preponderance of the qualified female athletes concerning the indices of functional efficiency (to 6.4-16.4%). **Conclusion.** The received results lead to the conclusion that the level of the organism functional readiness in general (in integrative expression) and its different qualitative characteristics is considerably higher among highly-qualified female athletes, who specialize in athlete all-round competitions, in comparison to qualified ones. The greatest differences between highly-qualified and qualified female athletes are in the parameters of functional steadiness and functional efficiency.

**Keywords:** functional readiness, qualitative characteristics, physiological indices, female athletes, athlete all-round competitions.

**Urgency.** Functional potential of an organism among sportsmen is mainly conditioned by the following features: power, mobilization, efficiency and steadiness and they are considered the main characteristics of physiological systems activity, which determine and limit a high level of special sports physical working capacity, which is an integral index of functional readiness [1, 5, 10, 16, 17, 21, 22, 23].

The effectiveness of physiological mechanisms, which condition functional abilities of an organism mainly depend on the level of qualitative characteristics (functional qualities) – power, mobilization, efficiency and steadiness of functioning [5, 16]. Qualitative characteristics of functional abilities of an organism to a large extent condition the effectiveness and the result of a person’s specific sports activity, at the same time, their role in physical working capacity provision changes considerably depending on qualification of athletes [3, 17, 20].

That is why it is very important to reveal the regularities of different qualitative characteristics demonstration of an organism functional abilities, as it will help to receive the results, which can be the base for the strategy of a long-term training determination and tactics of development process control of athletes’ adaptedness. Moreover, this information can be used for the objectiveness improvement in the system of functional readiness diagnostics and estimation among the athletes of different adaptedness level to physical loads. All mentioned above will help to realize an effective individualization of the training process and considerably increase its effectiveness [12, 14].

On the basis of all mentioned above, the objective of our research work is the current qualitative characteristics level revelation and comparison of an organism functioning among female athletes of different qualification, who specialize in athlete all-round competitions.

**Methodology.** In order to solve this objective complex research works were held among two groups of female athletes, who specialize in athlete all-round competitions. The first group included female athletes, who had the qualification of the 1st category and candidate master (n =18), the second group included the athletes with the qualification of master of sports and World-class athlete (n =7).

At the beginning of the research the following indices were measured at rest among female athletes, who took part in the research: body length (L) and weight (P), vital capacity (VC), maximal voluntary ventilation (MMV) and heart rate (HRrest). Moreover, at rest hypoxic steadiness was revealed, which was estimated according to the time of maximum breath holding while inhalation (TA in.) and exhalation (TA ex.).

Further determination of the main indices, which form different categories of qualitative characteristics of female athletes’ functional abilities, was realized during a specialized test fulfillment with muscular loads of different power. The fulfilled test was a modification and integration of two generally adopted tests: general physical working
capacity test - PWC$_{170}$, and maximum aerobic capacity for work determination test. Physical load in this modified test was in a form of three-stage physical loads fulfillment, the power of which was dosed in accordance with individual volume of heart rate (HR) so as at the first stage it was within the range of 120-150 beats per minute, at the second stage within the range of 150-170 beats per minute. These two loads were fulfilled within 5 minutes with 5 minutes interval for rest between them. The third load was fulfilled with the maximum for each female athlete power during maximum available time period (but not less than a minute).

The degrees of power of the first two loads and corresponding to them values of heart rate were used for PWC$_{170}$ degree calculation. The power of the third load was considered as maximum ($W_{\text{max}}$). During this load oxygen consumption, which was the index of aerobic capacity of an organism during a short-term load of maximum power ($V\text{O}_2\text{max}$), and heart rate (HR$_{\text{max}}$) were measured.

Other indices were received by means of calculation. Mobilization abilities of the functional systems of an organism were estimated according to the indices of heart rate increase during muscular load fulfillment of a standard and maximum power relative to the state of rest (HR$_{\text{WI}}$/HR$_{\text{rest}}$ and HR$_{\text{max}}$/HR$_{\text{rest}}$) and according to the volume of own vital capacity and maximum ventilation potential use, calculated as the ratio of the values of a working breathing volume and a working ventilation, stated during maximum power physical load fulfillment to VC (VT$_{\text{max}}$/VC) and to MMV (VE$_{\text{max}}$/MMV) in percentage.

As the parameters, which reflect the effectiveness of physiological systems functioning, we analyzed the following indices: watt-pulse ($W_{\text{max}}$/HR$_{\text{max}}$), oxygen pulse ($V\text{O}_2\text{max}/HR_{\text{max}}$), oxygen effect of a breathing cycle ($V\text{O}_2\text{max}/f\text{b}_{\text{max}}$) and an oxygen value of the working unit ($V\text{O}_{2\text{max}}$/W$_{\text{max}}$).

With the help of calculations the value of the coefficient of volume and time parameters ratio of external respiration was received (VT$_{\text{max}}$/f\text{b}_{\text{max}}), which was used as the effectiveness index of the breathing function [12].

**Research results:** Mean values of the analyzed indices, which characterize morphological-functional status and reflect power of physiological systems functioning, among female athletes, who specialize in athlete all-round competitions and have different level of sports qualification, are presented in table 1.

Comparative analysis of the mean values of morphological development indices among female athletes of the examined qualification groups showed, that according to these parameters they don’t differ from each other considerably. At the same time, according to the value of body length and weight more qualified female athletes have some advantage (within the range 1,0-6,7%, P>0,05).

The situation is different if we compare functional indices of power. Mean value of the maximum ventilation potential among female athletes, who belong to the group of masters of sports and World-class athletes, was higher than the same index among the female athletes from the group of the 1$^{\text{st}}$ category and candidate masters to 7,9% (P<0,05). Maximum power of a short-term muscular work and maximum oxygen consumption also were statistically higher among more qualified female athletes to 6,2 and 10,7% (P<0,05).

Table 1 – Mean values of functional power indices among female athletes of different qualification level, who specialize in athlete all-round competitions (X ± m)

<table>
<thead>
<tr>
<th>Indices</th>
<th>Sports qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Candidate master- I category (n = 18)</td>
</tr>
<tr>
<td>L, cm</td>
<td>173,0 ± 1,6</td>
</tr>
<tr>
<td>P, kg</td>
<td>58,2 ± 1,9</td>
</tr>
</tbody>
</table>
It is known that adaptedness increase to physical loads is accompanied by functional potential of an organism increase, readiness to its mobilization and is seen in physical working capacity level increase among sportsmen [4, 9, 11, 12, 17, 18].

That is why further we fulfilled comparative analysis of functional mobilization parameters among female athletes of different level of special readiness.

The indices, which reflect mobilization abilities of an organism, were compared. These indices are the following: the value of heart rate increase during physical load of a standard power (HR\textsubscript{W1}/HR\textsubscript{rest}, %) and during maximum power work (HR\textsubscript{max}/HR\textsubscript{rest}, %) in terms of the same indices, set at rest; the value of own maximum ventilation potential use in case W\textsubscript{max} (VE\textsubscript{max}/MMV, %), the value of own vital capacity use in case W\textsubscript{max} (V\textsubscript{Tmax}/VC, %); heart rate during physical load of maximum power (HR\textsubscript{max}).

Mean values of the analyzed indices, which characterize mobilization abilities of functional systems, among female athletes, who specialize in athlete all-round competitions and have different level of sports qualification, are presented in table 2.

Parameters comparison, which reflect functional mobilization of female athletes’ cardiovascular system, showed that the values of heart rate increase index during the work relative to it at rest, while a standard and maximum power work fulfillment among female athletes from both groups were almost the same (differences were ±3,8-3,9%, P>0,05), according to an absolute value being considerably high and corresponding to the level of these indices among female athletes of high qualification.

Table 2 – Mean values of functional mobilization indices among female athletes of different qualification level, who specialize in athlete all-round competitions (X ± m)

<table>
<thead>
<tr>
<th>Indices</th>
<th>Sports qualification</th>
<th>Candidate master- I category (n = 18)</th>
<th>World-class athlete - master of sports (n = 7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR\textsubscript{W1}/HR\textsubscript{rest}, %</td>
<td>210,5 ± 7,7</td>
<td>202,5 ± 4,8</td>
<td></td>
</tr>
<tr>
<td>HR\textsubscript{max}/HR\textsubscript{rest}, %</td>
<td>283,1 ± 11,7</td>
<td>294,2 ± 5,9</td>
<td></td>
</tr>
<tr>
<td>VE\textsubscript{max}/MMV, %</td>
<td>65,9 ± 1,8</td>
<td>63,9 ± 2,1</td>
<td></td>
</tr>
<tr>
<td>V\textsubscript{Tmax}/VC, %</td>
<td>56,5 ± 3,9</td>
<td>66,4 ± 5,9</td>
<td></td>
</tr>
<tr>
<td>HR\textsubscript{max}, beats per minute</td>
<td>187,9 ± 1,1</td>
<td>185,3 ± 1,6</td>
<td></td>
</tr>
</tbody>
</table>

During mean values of ventilation capacity realization indices comparison – the degree of maximum ventilation potential use (VE\textsubscript{max}/MMV, %) and the degree of individual vital capacity use during the maximum load (V\textsubscript{Tmax}/VC, %), stated among female athletes of different qualification level, the following results were received.

In both groups the values of VE\textsubscript{max}/MMV index in case of maximum load in the average didn’t differ statistically (P>0,05). At the same time mean value of individual vital capacity use index (V\textsubscript{Tmax}/VC) in case maximum power load in the group of more qualified female athletes was considerably higher (to 17,5%, P<0,05), than in the group of candidate masters and the 1\textsuperscript{st} category athletes.

Then we fulfilled comparative analysis of functional steadiness and functional efficiency parameters.

Mean values of the indices, which
reflect the level of functional steadiness and functional efficiency, stated among female athletes of different qualification at rest and during maximum muscular load, are presented in table 3.

Table 3 – Mean values of functional steadiness and efficiency indices among female athletes of different qualification level, who specialize in athlete all-round competitions (X ± m)

<table>
<thead>
<tr>
<th>Indices</th>
<th>Sports qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Candidate master - I category (n = 18)</td>
</tr>
<tr>
<td>TA in., s</td>
<td>103,7 ± 7,2</td>
</tr>
<tr>
<td>TA ex., s</td>
<td>46,9 ± 3,7</td>
</tr>
<tr>
<td>HRrest, beats/min</td>
<td>67,4 ± 2,5</td>
</tr>
<tr>
<td>Wmax/HRmax, kGm/beats/min</td>
<td>6,2 ± 0,2</td>
</tr>
<tr>
<td>VO2max/HRmax, ml/beats/min</td>
<td>17,3 ± 0,3</td>
</tr>
<tr>
<td>VO2max/fbmax, ml/cycle/min</td>
<td>80,6 ± 1,8</td>
</tr>
<tr>
<td>VO2max/Wmax, ml/kGm/min</td>
<td>2,8 ± 0,1</td>
</tr>
<tr>
<td>VTmax/fbmax, c.u.</td>
<td>49,8 ± 2,2</td>
</tr>
</tbody>
</table>

Steadiness of functioning was estimated by us according to the indices of induced apnea holding, which reflects hypoxic resistance of an organism, measured according to the time of breath holding after a full inhalation and after full exhalation (TAin., TAex.). The studied indices comparison showed, that more qualified female athletes had higher values of breath holding time after a full inhalation (to 9,0%, P>0,05) and after a full exhalation (to 14,3%, P>0,05). It fully corresponds with the information in the literature, where hypoxic resistance is understood as an important and integrative index of functioning steadiness of an organism [5].

In physiology of sport efficiency is understood as a functional and metabolic rate of a high power of the fulfilled muscular work [5, 7]. In order to estimate the efficiency of physiological systems functioning the following indices are determined: energy expenditure per unit of the fulfilled work, regulatory mechanisms tension and the ratio optimality of volume and time parameters of oxygen supply system.

When female athletes were fulfilling a short-term muscular work of maximum power we determined the following indices: watt-pulse (Wmax/HRmax), oxygen pulse (VO2max/HRmax), oxygen effect of a breathing cycle (VO2max/fbmax), value of an energy expenditure per unit of the fulfilled work (VO2max/Wmax), the coefficient of volume and time parameters ratio of external respiration was received (VTmax/fbmax).

Mean values of heart rate, stated at muscular rest, in both groups of female athletes with different qualification level were almost the same (P>0,05). At the same time, in a group of more qualified female athletes this index was lower (to 6,4%), than in a group of candidate masters and the 1st category athletes.

For a high level of physical working capacity and sports effectiveness great importance have the processes of economization, which this or that way are seen at all levels of organism functioning. These processes are also important while muscular loads of maximum power fulfillment. Also for physical working capacity demonstration it is very important to have consistency of vegetative and motional systems and especially during maximum power physical loads [7, 8, 16]. On the basis of this we fulfilled a comparative analysis of the indices, which characterize these parameters of functioning among the studied qualification groups of female athletes.
Mean values of watt-pulse (W_{max}/HR_{max}) comparison in two groups showed its great values among female athletes, who have special training of World-class athlete and master of sports, in comparison with the group of candidate masters and the 1st category athletes (to 8.1%, P<0.05).

Another index of functioning effectiveness and efficiency is “oxygen pulse” (VO_{2max}/HR_{max}) also was considerably higher among more qualified female athletes (to 12.1%, P<0.05).

Mean value of “oxygen effect of a breathing cycle” (VO_{2max}/fb_{max}) in the group of more qualified female athletes also exceeds the index in the group of candidate masters and the 1st category athletes (to 16.4%, P<0.05).

Mean values of muscular working oxygen value (the value of energy expenditure (in oxygen equivalent) per unit of the fulfilled work - VO_{2max}/W_{max}) turned out to be almost equal in both groups of female athletes (more qualified female athletes had advantage according to this parameter to 3.6%, P>0.05).

Respiratory system efficiency estimation in the groups of female athletes with different qualification, was realized in a form of mean values comparison of external respiration volume coefficient and time parameters ratio, which was calculated as the ratio of respiratory capacity volume to the volume of breathing frequency – Vr/fb. It is mentioned in the literature, that the effectiveness-efficiency of respiratory system functioning is also reflected in the definite ratio of volume and time parameters of external respiration [15]. Some authors show that in case of a slower and deeper breathing the most favorable conditions for gas exchange appear, with a considerable decrease of energy expenditures for the work of respiratory muscles [2, 19].

This index comparison among female athletes of different special training level showed its considerable increase from 49.8±2.2 c.u. among candidate masters and the 1st category athletes till 57.5±2.4 c.u. among World-class athletes and masters of sports (the difference was 15.5%, P<0.05).

In order to present the differences in functional readiness level among female athletes of different qualification in an integrative terms, we created graphic “functional readiness profiles” for each examined group. In order to provide the opportunity to compare the indices of different size, they were normalized (brought to a single scale). The studied indices normalization was fulfilled by means of the estimation scale of “the chosen points” creation [6, 16].

“Profiles” of the functional abilities (functional readiness) among the female athletes of different qualification, created on the basis of normalized mean values of the studied parameters, are presented in picture 1.

From the presented graphic “profiles” it is seen, that the total “area”, an integrative index, which reflects the level of female athletes functional readiness - candidate masters and the 1st category athletes, is smaller (to 10.9%), than among World-class athletes and masters of sports. In figures the “area” of female athletes’ functional abilities (received by means of all studied indices (normalized) values summing in the first group was 6.95 c.u., in the second group - 7.71 c.u.).

**Conclusion.** It was revealed that the parameters of morpho-functional power have bigger values among more qualified female athletes. At the same time, this advantage is not so significant and is within the range of 1.0 - 10.7%. Comparison showed, that the parameters, which reflect mobilization and utilization opportunities of an organism among the female athletes of different qualification on the average differed insignificantly in both groups of female athletes. At the same time, the indices of functional steadiness in the groups of different qualification female athletes differed significantly: more qualified athletes validly exceeded qualified ones – to 9.0-14.3%. Also more significant and mainly statistically valid was the preponderance of the qualified female athletes concerning the indices of functional efficiency (to 6.4-16.4%).
A – (candidate masters and the 1st category athletes), B – (World-class athletes and masters of sports)

1 – L; 2 – P; 3 – VC; 4 – MMV; 5 – $W_{\text{max}}$; 6 – $HR_{\text{max}}$; 7 – $VO_{2\text{max}}$; 8 – $HR_{W1}/HR_{\text{rest}}$; 9 – $HR_{\text{max}}/HR_{\text{rest}}$; 10 – $VE_{\text{max}}/MMV$; 11 – $V_{O2}\text{max}/VC$; 12 – TA in.; 13 – TAex.; 14 – $HR_{\text{rest}}$; 15 – $W_{\text{max}}/HR_{\text{max}}$; 16 – $VO_{2\text{max}}/HR_{\text{max}}$; 17 – $VO_{2\text{max}}/fb_{\text{max}}$; 18 – $VO_{2\text{max}}/W_{\text{max}}$; 19 – $V_{\text{t}}/fb_{\text{max}}$.

The received results lead to the conclusion that the level of the organism functional readiness in general (in integrative expression) and its different qualitative characteristics is considerably higher among highly-qualified female athletes, who specialize in athlete all-round competitions, in comparison to qualified ones. The greatest differences between highly-qualified and qualified female athletes are in the parameters of functional steadiness and functional efficiency.

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Extended Abstract Submission June 30, 2017
Authors Notification: July 24, 2017
Extended Abstract Authors Notification: August 4, 2017
Camera Ready and Registration: September 1, 2017
Extended Abstract Camera Ready and Registration: September 8, 2017

Most human activities, including sports, are becoming more and more technological. Engineering in general and Information Technology in particular are important in the support for many activities directly or indirectly related to sport sciences, including improvement of physical activities, sports medicine, biotechnology and nutrition, sports management, and all other application areas in sports. This congress intends to be a meeting point for both academics, sport professionals and practitioners to exchange ideas and develop synergies.

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1. Computer Systems in Sports
2. Health and Support Technology
3. Signal Processing in Human Movement
4. Sport Performance and Support Technology

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