



T & P P C

№ 2 February 2021

Theory & Practice of Physical Culture

Athletic
training

Sport
psychology

People's
physical activity

Sport
medicine

Key issues of the modern sports science for discussion



Digitalization of modern sports training technologies

The ongoing digitalization of sports training systems offers new technological solutions for the mass sports popularizing and support initiatives. The physical education and sports digitalization policies and practices are ranked among the top priorities by the federal government and are successfully pursued by the relevant physical education and sports organizations, sports federations and services.

Modern digital technologies have proved highly beneficial for the sports data collection, processing and distribution purposes and, consequently, for the sports training service design and management on the whole in the elite, amateur and mass health sports and for the healthy lifestyle cultivation initiatives. A wide range of mobile physical education and sports applications are increasingly popular as they effectively help the sporting groups and individuals design and manage their daily regimens, diets and individual trainings. Many physical education and sports businesses and fitness companies offer their customizable sports training systems and services online with timely updates on the novelties in the sports equipment, accessories, diets, health self-tests etc. Such modern equipment includes high-tech intelligent helmets, T-shirts, footwear and trunks to monitor health and functionality on a real-time basis so as to prevent potential overtraining and injuries. We would mention as a case in point a sailing sport digitalization technology offered

by a research team led by Professor S.E. Bakulev (Saint Petersburg) and analyzed in this issue.

The sports training service digitalization technologies with modern artificial intelligence (AI), cloud and IT/communication elements provide a sound basis for the progress test data processing and analyses and fast progress in the technical and tactical sports skills and coaching service efficiency on the whole. The ongoing sports training service digitalization process should be facilitated by the top-professional human resource training service to secure inflow of digital competencies and creativity in the physical education and sports sector and help the national sports community keep abreast with the global technological progress in the sector.

We are looking forward to new studies and analyses of the potential breakthrough ideas and technologies in the physical education and sports theory and practices from the research community.

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of Physical Culture

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Effects of stressors on punching biomechanics in boxing

UDC 796.83:012.3



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Abstract

Objective of the study was to analyze variations in the boxing punching technique biomechanics under different stressors.

Methods and structure of the study. The study and experiments were run at the Physical Education and Sports Institute of North-Eastern Federal University. We sampled for the study highly-skilled boxers ($n=25$, including 22 males and 3 females) aged 22 years and weighing in 57 kg on average with the following sport qualifications: 1 WCMS, 10 MS and 14 CMS. Prior to the stress training, the sample made test punches in a combat stance by the lead arm to the head area, with the following punching technique aspects rated: response time; maximal punching speed; and the maximal acceleration. In the stress training, the sample made 20 punches per min (60 punches for 3 min) in a combat stance by the lead arm to the head area with 1-kg dumbbell on day 1 and 2-kg dumbbell on day 2. Post-stress tests were run on the next day upon the stress trainings. We used Qualisys Medical optoelectronic computerized tests system and a set of infrared cameras to fix the 3D punching technique biomechanics, with the test data processed by Qualisys Track Manager (QTM) software toolkit.

Results and discussion. Based on the study data and analyses, we would recommend punching technique training with varied weights, with the 1-kg dumbbells most beneficial for the maximal punching speed trainings of 52-57 kg boxers. The varied-weight punching technique excellence trainings prudently customized to the boxer's weight class and actual physical fitness may be beneficial for progress as verified by the tests.

Keywords: *punch biomechanics, punching technique, stress factors (SF), stress tolerance, motor skill, boxing*

Background. Modern biomechanics offer a variety of technical skills rating tools to assess efficiency and effectiveness of one or another motor skill, with the efficiency indicative of the motor skill quality as such and effectiveness characterizing, among other things, the motor skill compliance with the standard [6, 7]. Developers of the motor skill models give special attention to the execution effectiveness, stress tolerance and motor skill biomechanics. It should be emphasized that the motor skill efficiency may be rated by a range of biomechanical, physiological, psychological, aesthetic and other test criteria, particularly in the technically intense sports with versatile technical arsenals and stressful competitive en-

vironments – like modern team sports, martial arts, etc. [2, 4]. Punching technique biomechanics in the modern boxing sport deserves a special analysis in this context.

One of the key competitive performance criteria in modern boxing is the number of high-quality power punches on target per match. Since the boxers develop extremely high punching power [8], further technical and competitive progress largely depends on the muscular effort coordination and control skill [5, 9]. It is through the persistent progress in coordination of the punching antagonist/ synergist muscles that the wrestlers excel in the speed-strength qualities today [1, 12].

Technical goals in modern boxing are attainable by harmonized efforts of the muscle groups mobilized for the movement biomechanics [3], although progress in the punching sequence coordination, accuracy and speed-strength aspects cannot be achieved unless a variety of external stress factors is taken into account – for they may distort the muscle group coordination patterns with the punching muscles mobilization sequences thereby undermining the punching technique efficiency and effectiveness [11]. One of the best sport-specific speed-strength building models is the motor skill analyzers mobilization method with application of special weights for extra excitation of the relevant nervous centers to engage extra motor elements in the punching technique. Such weights-applying stress trainings are mostly designed to simulate the punching techniques [10].

Objective of the study was to analyze variations in the boxing punching technique biomechanics under different stressors.

Methods and structure of the study. The study and experiments were run at the Institute of Physical Education and Sport of North-Eastern Federal University. We sampled for the study highly-skilled boxers ($n=25$, including 22 males and 3 females) aged 22 years and weighing in 57 kg on average with the following sport qualifications: 1 WCMS, 10 MS and 14 CMS. Prior to the stress training, the sample made test punches in a combat stance by the lead arm to the head area, with the following punching technique aspects rated: response time; maximal punching speed; and maximal acceleration. In the stress training, the sample made 20 punches per min (60 punches for 3 min) in a combat stance by the lead arm to the head area with 1-kg dumbbell on day 1 and 2-kg dumbbell on day 2. Post-stress tests were run on the next day upon the stress trainings. We used Qualisys Medical optoelectronic computerized tests system and a set of infrared cameras to fix the 3D punching technique biomechanics, with the test data processed by Qualisys Track Manager (QTM) software toolkit.

Results and discussion. Given in Table 1 hereunder are the stress test data of the sample.

The *response time* was found to change insignificantly upon the stress tests (+0% and +8% after

the 1-kg and 2-kg stress trainings, respectively. The *maximal punching speed* was found to peak after the 1-kg stress training and fall after the 2-kg stress test by +8% and -7%, respectively. We believe that the prior 1-kg stress training stimulated the extra motor skill analysis and muscle mobilizing mechanisms to achieve the best muscular tone. The -7% fall in the punching speed after the 2-kg stress training may be explained by the still incomplete muscular coordination rehab process. On the whole, the prior stress trainings of the punching muscle groups were of significant effect on the punching technique biomechanics. And the *maximal acceleration rate* of the punch (+15%) was found in the post-1kg-stress training test, versus a fall of -5% in the post-2kg-stress training test.

Conclusion. Based on the study data and analyses, we would recommend punching technique training with varied weights, with the 1-kg dumbbells most beneficial for the maximal punching speed trainings of 52-57 kg boxers. The varied-weight punching technique excellence trainings prudently customized to the boxer's weight class and actual physical fitness may be beneficial for progress as verified by the tests. The motor skill biomechanics research in sports will be advanced, particularly in the situation when the sports rules change every year and the coaches and athletes have to persistently improve the training and competitive systems based on comprehensive test data and analyses including the biomechanical ones.

References

1. Bernstein N.A. Physiology of movement and activity. Moscow: Kniga po Trebovaniyu publ., 2012. 496 p.
2. Bestinov R.V., Kolodeznikov K.S., Dmitriev O.N. Benefits of performance improvement rehabilitation model for boxing elite. *Teoriya i praktika fiz. kultury*. 2019. No. 10. 85 p.
3. Bobrova E.V. Mechanisms of sensorimotor coordination of human movements and posture. *Doct. Diss. (Biol.)*. St. Petersburg, 2010. 320 p.
4. Vasilev E.V., Kolodeznikov K.S., Kolodeznikova M.G. Analysis of competitive performance of elite boxer. *Pedagogiko-psikhologicheskie i*

Table 1. Stress test data of the sample

Test rates	Pre-stress- test	Post-1-kg stress training test		Post 2-kg stress training test	
		Rate	Δ	Rate	Δ
Response time, s	0,25	0,25	+0%	0,27	+8%
Maximal punching speed, m/s	8,67	9,43	+8%	8,11	-7%
Maximal acceleration rate, m/s	4,12	4,75	+15%	3,94	-5%

- mediko-biologicheskie problemy fizicheskoy kultury i sporta. 2018. V. 13. No. 2. pp. 18-23.
5. Verkhoshanskiy Yu.V. Fundamentals of special strength training in sports. M.: Sovetskiy sport publ., 2013. 216 p.
 6. Kolodeznikov K.S., Bestinov R.V., Kolodeznikova M.G. Research of competitive performance of WSB league boxers. Pedagogiko-psikhologicheskie i mediko-biologicheskie problemy fizicheskoy kultury i sporta. 2017. V. 12. No. 2. pp. 24-30.
 7. Krivoshapkin P.I., Podlivaev B.A., Filippov N.S. Biomechanical bases of general and special physical training of junior wrestlers. Yakutsk, 2019. 192 p.
 8. Lukyanenko V.P., Volkov R.A. Biomechanical features of boxers' strike movements. Mir nauki, kultury, obrazovaniya. 2013. No. 4 (41). 85 p.
 9. Pavlov S.E. Physiological foundations of qualified athletes training. M.: RSUPES publ., 2009. 54 p.
 10. Fileva V.V., Melnikov A.A. Restoration of vertical posture in athletes after external pushing influence. Novye podkhody k izucheniyu klassicheskikh problem. M.: AlfaPrint publ., 2015. 118 p.
 11. Krauss G. Biochemistry of Signal Transduction and Regulation. 5-th ed. Berlin: Wiley-VCH, 2014. 844 p.
 12. Rhoades R.A., Bell D.R. Medical Physiology: Principles for Clinical Medicine. Philadelphia: Lippincott Williams & Wilkins, 2008. 800 p.

Progress forecasting mathematical model for elite sports: winter sports case study

UDC 796:51-7

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Abstract

Objective of the study was to forecast an individual relative competitive progress by mathematical modeling method, with winter sports taken for the case study.

Methods and structure of the study. We sampled for the competitive progress modeling study the following elite winter sports competitors of different ages and both genders: men freestylers (ski acrobats) (n=31); women speed skaters (n=22) and men cross-country skiers (n=31). The individual relative competitive progress forecasts were made using the moving average functions to find the key relative competitive progress trends with smoothed short-term fluctuations.

Results and discussion. We qualified a part of the sample by prior checks for the relative competitive progress forecasting method with a high degree of approximation using model 1 with the second-degree polynomial and model 2 with the third-degree polynomial, and selected model 1 as the key one for the case study, albeit model 3 with the third-degree polynomial is also applicable in certain cases. We found the moving-average-based relative competitive progress forecast model fairly accurate at this juncture albeit still having certain limitations for application. More sophisticated and inclusive competitive progress forecast models need to be developed to cover a wider variety of the factors of influence on the competitive progress in elite winter sports.

Keywords: *mathematical modeling, moving average, forecast, winter sports.*

Background. Competitive performance and progress forecasts are indispensable for the modern long-term sports training systems, sports team formation, sports progress trends analyzing and many other purposes; and this is the reason why the competitive progress forecasts are critical for professional expertise and decision-making in modern physical education and sports [2, 3].

Forecasting methods and issues have long been among the priorities for many disciplines including statistics, economics, natural sciences, etc. [1, 4, 6]. One of the forecast methods is geared to analyze and profile the historical relative success rate – which may be defined as the ranking in specific sports discipline (hereinafter referred to as the ranking). One of the analytical tools used for this purpose is an array of

functions known as moving average [5, 6], with a point value of every function depending on its past values for certain period. Moving average may be applied for time series to smooth the short-term fluctuations and highlight the major cycles/ trends. Therefore, an individual sports career may be profiled by dated competitive successes to identify the key progress trend and thereby forecast further competitive progress path when designing and scheduling the long-term sports training and competitive systems.

Objective of the study was to forecast an individual relative competitive progress by the mathematical modeling method, with winter sports taken for the case study.

Methods and structure of the study. Our hypothesis assumes that an individual competitive progress

may be approximated by an alternately increasing and decreasing time series, with a polynomial moving average trend method used as the key one to forecast the competitive progress. Note that the most generalized individual competitive progress model assumes a gradual competitive progress growth till the individual best under the given conditions followed by a natural competitive progress fall thereafter. Therefore, the polynomial degree will be assumed to equal two in the case. In case of a competitive progress model with two peaks, the polynomial degree will equal three. We sampled for the competitive progress modeling study 83 elite winter sports competitors of different ages and both genders.

Results and discussion. We used for the competitive progress analysis the World Cup rankings (as of the year end) of the following sample: male freestylers (ski acrobats) (n=31); female speed skaters (n=22) and male cross-country skiers (n=31). A prior check of the sample found that the required degree of reliability/ approximation ($R^2 \geq 8$) is achievable only for 34 athletes (40.5% of the sample). Despite the fact that the negative check results may be explained by the input data shortages or inaccuracies, they still show the method having some limitations that need to be removed by further improvements. Athletes who were screened out by the second-degree polynomial were retested for compliance with the third-degree trend, and thereby we arrived to the following two possible competitive progress models: see Table 1 hereunder.

It should be noted that the forecasts were accurate in 25 individual cases (73.53% of the sample) that is indicative of a nonrandom event. For the subject sport disciplines, the average trend forecast accuracies were estimated at 71.43%, 80% and 73.33% that means that an accuracy of 70+% is quite achievable irrespective of the sports discipline. The two competi-

tive progress forecast models also showed close results in terms of the sample coverage and accuracy. Model 1 may be recognized more accessible and accurate. Model 1 with the second-degree polynomial accounted for 55.88% (n=19) of the sample and produced the trend forecast accuracy of 78.95%; whilst model 2 with the third-degree polynomial accounted for 44.12% (n=15) of the sample and yielded 66.67% trend forecast accuracy. Other assumptions on the competitive performance continuity and optimal numbers of competitions for better forecast were not proved in practice.

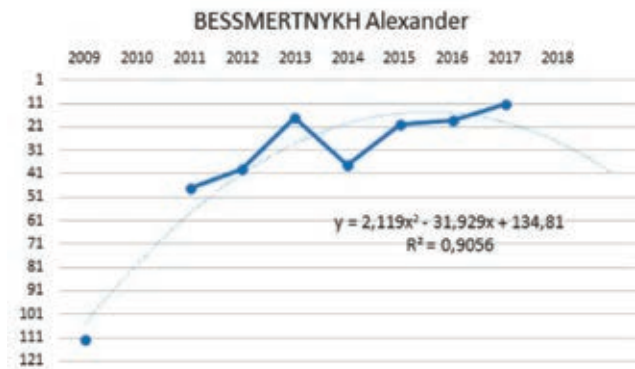


Figure 1. Trend forecast model with the second-degree polynomial: individual competitive progress forecast (first stage)

Let's consider an individual case of the relative competitive progress forecast. Given on Figure 1 is the individual relative competitive progress forecast based on the rankings of 2009 through 2017 (save for 2010). The individual competitive progress was forecast in the case to sag in 2018 to 21-31 ranking. Having matched the forecast data with the actual ones (see Figure 2 that covers 2018 as well), we found the actual performance exactly matching with the fore-

Table 1. Relative competitive progress forecast using the moving average method

Sport discipline	Freestyle (ski acrobatics)	Cross-country skiing	Speed skating	Total
<i>Sample</i>				
Total, n	31	22	31	84
Qualified by reliable approximation $R^2 \geq 8$, n/ %	14 (41,18%)	5 (22,73%)	15 (45,16%)	34 (40,45%)
Grouped for model 1, n/ %	7 (50%)	4 (80%)	8 (53,33%)	19 (55,88%)
Grouped for model 2, n/ %	7 (50%)	1 (20%)	7 (46,67%)	15 (44,12%)
<i>Trend forecast accuracy</i>				
Model 1, %	85,71	75	75	78,95.
Model 2, %	57,14	100	71,43	66,67.
Average accuracy, %	71,43	80	73,33	73,53

cast not only in the competitive progress trend but also in the actual ranking – as the athlete was ranked 27th in fact.

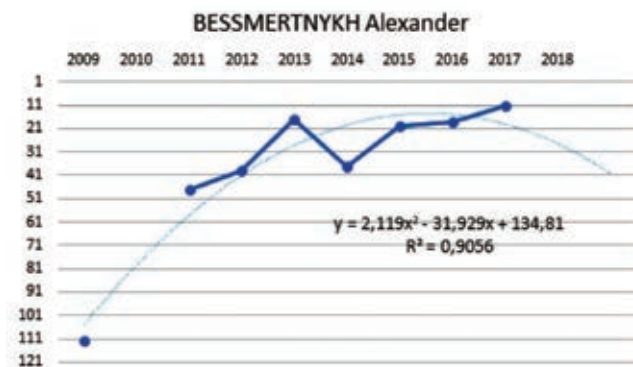


Figure 2. Trend forecast model with the second-degree polynomial: individual competitive progress forecast (first stage)

Figure 2 shows the forecast ranking of 31-41, whilst actually the athlete was ranked 40 in 2019. It should be stated, however, that we are still unprepared to fully rely on the high accuracy of the forecast method since discrepancies may be more significant. We would recommend the moving-average-based relative competitive progress forecast model as fairly accurate at this juncture albeit still having certain limitations for application. More sophisticated and inclusive competitive progress forecast models need to be developed to cover a wider variety of the factors of influence on the competitive progress in sports.

Conclusion. The study data and analyses give reasons to conclude that the moving-average-based relative competitive progress forecast model is recommendable as fairly accurate at this juncture albeit still

having certain limitations for application. We found the model producing fairly accurate competitive progress forecasts in 40% of individual cases, with sufficiently high degree of reliability/ approximation ($R^2 \geq 8$). We tested two competitive progress models with the second- and third-degree polynomials and, hence, the study cannot be considered complete. More sophisticated and inclusive competitive progress forecast models need to be developed to cover a wider variety of the factors of influence on the competitive progress in sports.

References

1. Greshilov A.A., Stakun V.A., Stakun A.A. Mathematical methods for building forecasts. M.: Radio i svyaz publ., 1997. 112 p.
2. Ermakov A.V. Methods to form private security guards' self-defense skills in cold weapon attacks. PhD diss.. Volgograd, 2005. 194 p.
3. Skarzhinskaya E.N., Sarafanova E.V. Updating integrated assessment of qualifications of physical education and sports sector experts. *Teoriya i praktika fiz. kultury*. 2019. no. 11. pp. 104-104.
4. Booth E., Mount J., Viers J. H. Hydrologic variability of the Cosumnes River floodplain. *San Francisco Estuary and Watershed Science*. 2006. v. 4. no. 2. National Institute of Standards and Technology (États-Unis). NIST/SEMATECH e-handbook of statistical methods. – National Institute of Standards and Technology, 2000.
5. Kenney J.F., Keeping E.S. *Mathematics of Statistics*, Pt. 1, 3rd ed. Princeton, NJ: Van Nostrand, p. 223, 1962.
6. Kenney J.F., D. Van Nostrand *Mathematics of statistics*. p. 259 1939, 1947, 1952.

Womens' swimming sprint elite's key anthropometrics (body mass and length) analysis by events, styles and age/ fitness periods

UDC 797.215

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Abstract

Objective of the study was to profile the age-, body-length and mass-specific variations in the women's swimming sprint elite by events, swimming styles and fitness stages.

Methods and structure of the study. The authors analyzed for the purposes of the study the relevant study reports to generalize the theoretical materials, plus reports of the top national and international swimming events, with a special analyses of the women's swimming sprint elite's anthropometrics by the swimming styles, events and fitness periods for the last few decades. Subject to analyses were also the elite swimming sprint (including the 200m event) swimmers' ages, body masses and lengths versus the competitive progresses in the top-ranking events (including the 2012/ 2016 Olympic Games finals). The latest data were compared with the relevant historical elite swimming sprint data and supported by questionnaire surveys of the top-class swimming sprint elite coaches.

Results and discussion. Modern women's swimming sprint elite was found significantly different on the active age, body length and body mass scales from their peers of the last decades. The fitness ages of the elite were found to either expand or contract depending on the styles and events. We age-grouped the 2012/ 2016 Olympic Games competitors by the performance records into the fitness peak period, fitness keeping period and fitness sagging period. The key anthropometrics of the top-16 competitors in the 2016 Olympic Games by the styles and events may be conservatively used as benchmarks for the swimming styles and events analyzing purposes.

Keywords: *swimming sprint, women, fitness peak, age, body length, body mass.*

Background. Key barriers for competitive progress in different swimming events are sensitive age periods, body lengths and masses [1, 3, 4].

Objective of the study was to profile the age-, body-length and mass-specific variations in the women's swimming sprint elite by events, swimming styles and fitness stages.

Methods and structure of the study. We analyzed for the purposes of the study the relevant study reports to generalize the theoretical materials, plus reports of the top national and international swimming events, with a special analysis of the women's swimming sprint elite's anthropometrics by the swimming styles, events and fitness periods for the last few decades. Subject to analysis were also the elite swimming sprint (including the 200m event) swimmers' ages,

body masses and lengths versus the competitive progresses in the top-ranking events (including the 2012/ 2016 Olympic Games finals). The latest data were compared with the relevant historical elite swimming sprint data and supported by questionnaire surveys of the top-class swimming sprint elite coaches.

Results and discussion. It should be noted that the 50m female freestylers are the last to enter the sport elite – normally since 18 years of age – versus, for example, the 100m female breaststrokes that come to elite since 15 years of age. As for the retirement times, the 50m freestylers and 200m butterfly/backstroke competitors are the last to retire from elite (normally by 33-39 years of age). Given in Table 1 is the age grouping of the world strongest female swimming sprint competitors in the 2012/ 2016 Olympic Games.

Based on the V.N. Platonov's [2] classification, we age-grouped the Olympic Games competitors into the fitness peak period, fitness keeping period and fitness sagging period: see Table 2.

It should be mentioned that the V.N. Platonov's fitness time groups show no clear margins for the Olympic Games elite sample [2]. For example, the three fitness stages merge for the 200m freestyle and 200m backstroke groups. It is not unusual that the fitness stages merge in different combinations for the other events as well.

Having analyzed the data, we would emphasize that lately the women's swimming sprint elite fitness periods has expanded to 15-39 years that may be due to the growing commercialization of the sport, with the financial and reputational benefits of wins and medals growing year to year to force the athletes continue their competitive careers by all means. Note that the elite entrance (fitness peak) ages for the 100m freestyle, backstroke, breaststroke, butterfly and medley have dropped by 1-2 years. Given on Figure 1 hereunder is the V.N. Platonov's fitness age periods for 1986-2011 versus the top-16 2012/ 2016 Olympic Games competitors' fitness stages.

For the last decade, as demonstrated by Table 1, the elite fitness ages have contracted for some events (save for the 200m freestyle) and grown for the oth-

ers. Given in Table 3 are the body masses and heights of the top-16 2016 Olympic Games competitors (finalists and semi-finalists). Note that the top-16 sample anthropometrics for every event is actually characteristic of the swimming sprint elite's body masses and heights.

Having analyzed the elite's anthropometric averages by events and styles, we would note the high degree of homogeneity. Thus, the variation ratios for every event never exceed 4.5%. As for the body mass, the variation is higher and comes to 11% for the 100m butterfly. Leading on the individual body length scale is the 190cm tall Victoria Andreeva, 2016 Olympic Games medley semifinalist from Russia; and the shortest on this scale is the 159cm tall 100m butterfly competitor Daniela Marsal from Brazil. On the individual body mass scale, the sample is quite consistent, without extremes. Thus the heaviest is Edlo Gustafdotir (Iceland), a 82kg heavy and 187 tall 100m backstroke competitor; and the lightest is Runa Imai (Japan), a 50kg heavy and 163cm tall 200m medley competitor. On the whole, the body masses and heights show a good correlation for the elite swimming sprint sample, i.e. the higher is the body length average for some event the heavier are the swimmers.

Leading in the average body length is the 100m backstroke group, whilst on the average body mass

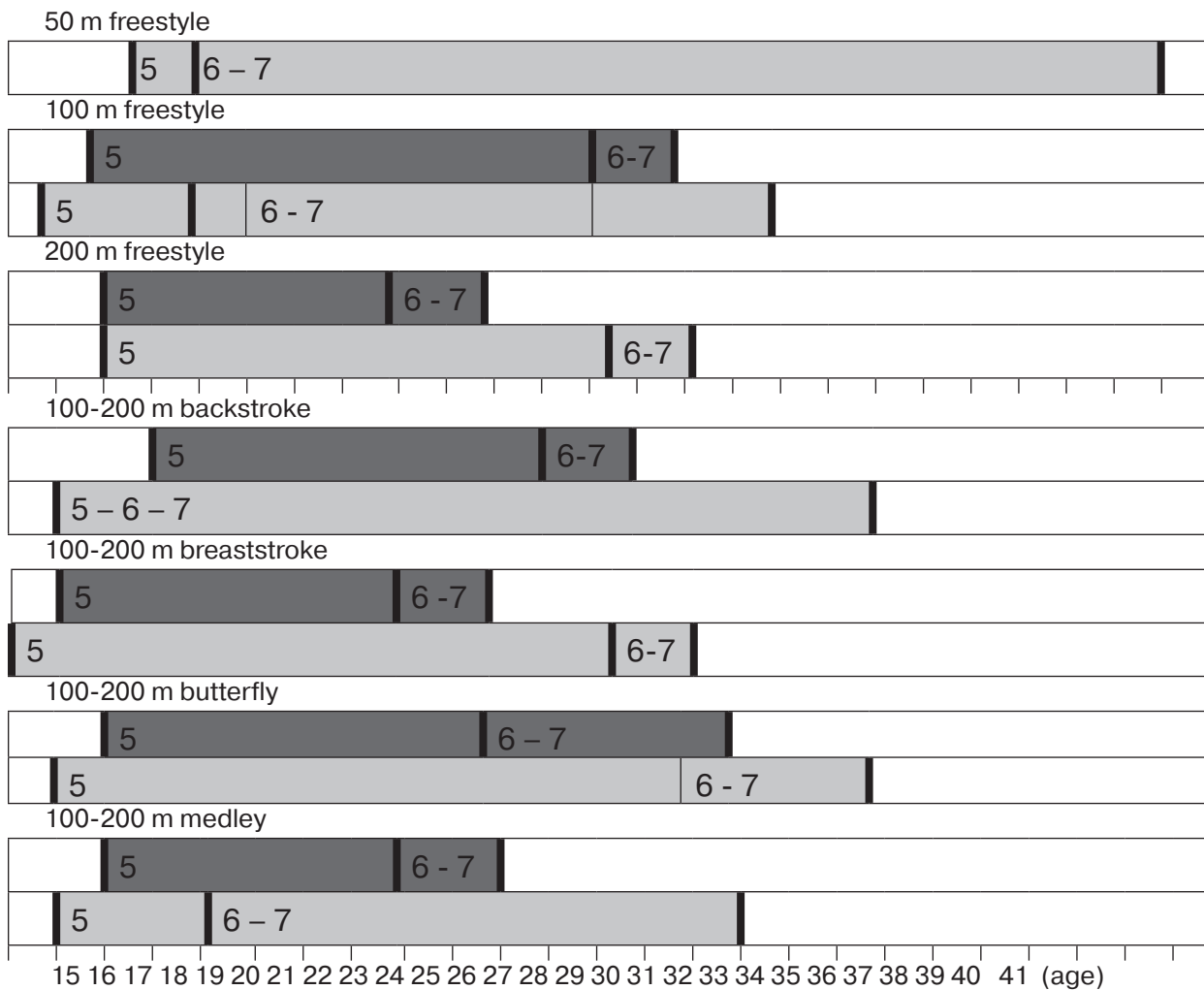
Table 1. Women's swimming sprint elite fitness age periods: top-16 competitors to the 2012/ 2016 Olympic Games

Events	2012 Olympic Games	2016 Olympic Games	Olympic Games total
50m freestyle	18-35	20-39	18-39
100m freestyle	16-29	16-31	16-31
200m freestyle	17-27	19-29	17-29
100m backstroke	16-28	18-33	16-33
200m backstroke	17-26	17-33	
100m breaststroke	15-29	18-28	15-29
200m breaststroke	16-27	18-28	16-28
100m butterfly	19-27	16-29	16-33
200m butterfly	18-29	16-33	
200m medley	16-30	16-29	16-30

Table 2. Fitness stages of the top-16 competitors to the 2012/ 2016 Olympic Games

Event	Fitness peak time	Fitness keeping time	Fitness sagging time	Active time, total
50 m freestyle	18-19	19-39		18-39
100 m freestyle	16-19	19-31		16-31
200 m freestyle	17-28		28-29	17-29
100/200 m backstroke	16-33			16-33
100/200 m breaststroke	15-28		28-29	15-29
100/200 m butterfly	16-19	19-33		16-33
200 m medley	16-29		29-30	16-30

Note: fitness periods were grouped as recommended by V.N. Platonov (2012)



Note: 50 m event is beyond the Platonov's classification; 5 – fitness peak stage; 6 – fitness keeping stage; 7 – fitness sagging stage

■ – 1986-2011 data (Platonov, 2012)

□ – top-16 2012/ 2016 Olympic Games competitors

Figure 1. V.N. Platonov's fitness age periods for 1986-2011 swimming sport elite versus the top-16 2012/ 2016 Olympic Games competitors' fitness stages

Table 3. Body masses and heights of the top-16 2016 Olympic Games female swimming sprint competitors

Event	Body length, cm	Body mass, kg
50m freestyle	177,3 ± 5,4	65,6 ± 6,2
100m freestyle	177,2 ± 5,7	65,1 ± 6,8
200m freestyle	176,5 ± 7,5	65,2 ± 7,7
100m backstroke	178,1 ± 5,2	65,8 ± 6,0
200m backstroke	178,0 ± 5,3	66,4 ± 7,4
100m breaststroke	173,0 ± 7,8	63,3 ± 5,6
200m breaststroke	173,5 ± 8,6	64,0 ± 6,8
100m butterfly	174,2 ± 8,7	63,3 ± 7,1
200m butterfly	170,0 ± 2,1	58,9 ± 4,4
200m medley	172,5 ± 7,5	61,5 ± 7,4

Note: bolded are the significantly different figures ($p < 0.05$)

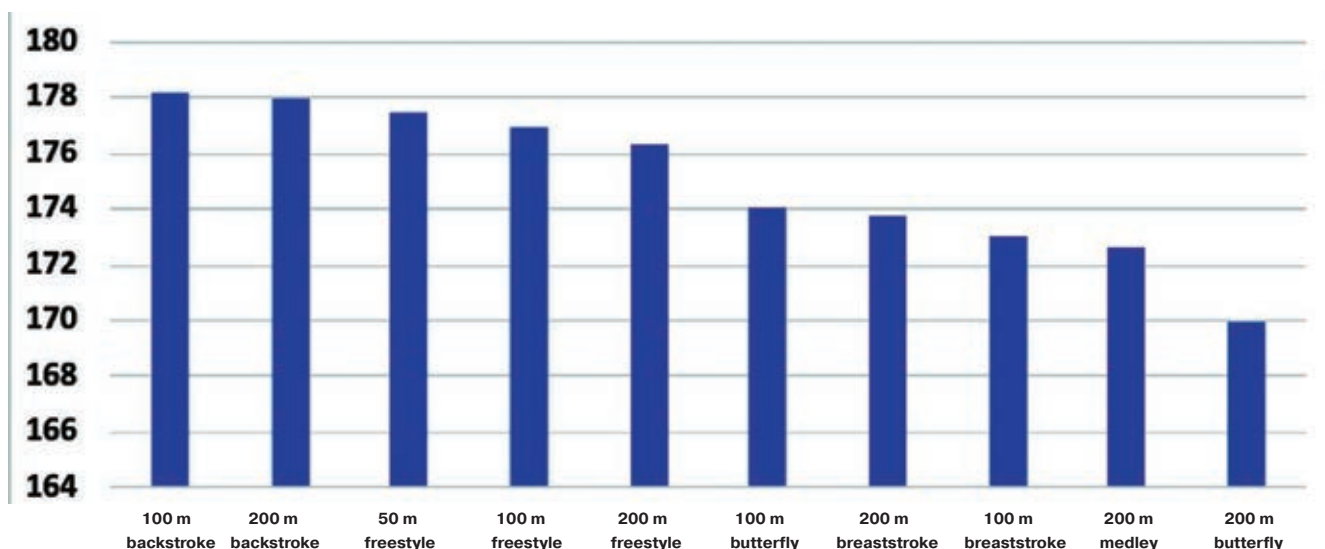


Figure 2. Women's swimming sprint elite average body lengths for the 50m to 200m events and different swimming styles

scale it is ranked second (-0.2 kg) to the 100m freestyle group. The latter is found second tallest with -0.7 cm versus the 100m backstroke group. Note that these differences are insignificant in fact. The 200m butterfly group was found significantly shortest (170cm on average) and lightest (58.9 kg) in the sample. Of particular interest was the body mass versus length analysis for the same event and style; and it showed the event/ distance groups being virtually the same on both scales.

The 100/ 200m backstroke, breaststroke and medley groups were tested with virtually the same anthropometrics; whilst the 200m butterfly group was tested significantly lighter than their 100m peers, plus some differences were noticeable albeit statistically insignificant on the body length scale. The 200m butterfly event is known to require special high endurance which appears to be easier achieved by the relatively lighter swimmers.

Given on Figure 2 are the women's swimming sprint elite's average body lengths for the 50m to 200m events and swimming styles. The data make it possible to analyze the typical specialized groups in the modern swimming sprint elite. Thus the body length averages show the sample being classifiable, on a significant basis, into group 1 including the backstroke and freestyle competitors and group 2 of the butterfly, breaststroke and medley ones. The grouping may be due to the swimmers style-specific movement hydrodynamics with the relatively smooth (freestyle and backstroke) or intermittent (breaststroke, butterfly) movements in every elementary cycle.

The same typological groups were found on the body mass scale, with the intermittent-style group 1 (breaststroke, butterfly) tested lighter than the

smooth-style group 2. Having comparing the modern body mass and length data with that of prior to 2011, we found modern group 1 being 10cm taller and 5-7kg heavier on average. Butterfly competitors were the shortest prior to 2011 irrespective of the distance, and nowadays this holds true only for the 200m butterfly competitors.

Conclusion. Based on the study data and analyses, we found and analyzed the age, body length and body mass groups in the sample of 50m, 100m and 200m female sprint swimmers versus their swimming styles. The age-, body-mass and length-group correlations of the modern swimming sprint competitors specialized in different events and swimming styles may be beneficial for designers of theoretically grounded training systems for the world-class swimming sprint elite.

References

1. Abramova T.F., Nikitina T.M., Kochetkova N.I. Labile body weight components - criteria for general physical fitness and control of current and long-term adaptation to training loads. Method. recommendations. M.: Skyprint publ., 2013. 132 p.
2. Platonov V.N. Sport swimming: way to success. M.: Sovetskiy sport publ., 2012. 480 p.
3. Platonov V.N. Sports training system in Olympic sport. General theory and its practical applications. Kiev: Olimpiyskaya literatura publ., 2004. 808 p.
4. Statkyavichene B.V. Morphological and functional characteristics of elite swimmers and their role in selection and further sports improvement (women). PhD diss. abstr. M., 1986. 202 p.

8-10 year old footballers' movement coordination skills: customizable training model

UDC 796.332



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Abstract

Objective of the study was to test theoretical and practical design and benefits of a customizable movement coordination skills training model for the 8-10 year old football players individualized for their nervous system types.

Methods and structure of the study. The new customizable movement coordination skills training model testing experiment was run at Volga Olympic Sports Reserve School of named after N.P. Starostin in Ulyanovsk in 2018-2019. We sampled the 1-2-year 8-10 years-old footballers (n=31) and split them up into Experimental Group (n=16) and Control Group (n=15). The Control Group training was traditional for the Olympic Sports Reserve School, and the Experimental Group training system was complemented by the new customizable movement coordination skills training model with account of the individual nervous system types.

Results and discussion. The study was designed to first classify the sample by the muscular and mental activity regulation types into the provisionally weak/ strong nervous system types. The nervous-system-type-specific group trainings were geared to test benefits of a customizable movement coordination skills training model on a nervous-system-type-specific basis. The new model was tested beneficial for the movement coordination skills trainings of the junior footballers as the pre- versus post-experimental tests showed meaningful progress of the Experimental Group versus Control Group in every traditional physical fitness and special movement coordination skills / motor skills test.

Keywords: customizable training model, nervous system type, movement coordination skills, junior footballers.

Background. Sports psychologists believe that the individual competitive styles and success largely depend on the key qualities of the nervous system that forms a basis for many predispositions, capacities and athletic resources [5]. As found by many studies, individuals with a strong nervous system are generally more tolerant to fatigue and stressors and, hence, more successful in competitions due to the better volitional mobilization and concentration, and more effective in the self-control and in combining hard work with relaxation. Individuals with a relatively weak nervous system better adapt to monotonous work keeping high working capacity, better in mastering difficult technologies and have good attention control qualities [3-5].

Some researchers underline that the nervous system qualities shall be taken into account by the junior (pubertal age) footballers' training systems, particularly in the speed-strength and coordination training domains, with a special attention to the game positions. Such individualized approach helps, in their opinion, speed up progress in the technical and tactical skills and performance efficiency and facilitate management of the theoretical and practical training process [2, 4]. Studies of the nervous system qualities and their effects on the key technical and tactical and movement coordination skills training process have always been of special interest for the junior (8-10 years old) footballers' training system designers. Football experts believe that the 8-10 year-olds

are most sensitive to startup speed, motor response, running speed, kinesthetic differentiation ability, body balancing, adaptability, movement control and special skills training tools [1, 6, 8].

Objective of the study was to test theoretical and practical design and benefits of a customizable movement coordination skills training model for the 8-10-year-old football players individualized for their nervous system types.

Methods and structure of the study. School experiment to test the new customizable movement coordination skills training model was run at Volga Olympic School of Sports Reserve named after N.P. Starostin in Ulyanovsk in 2018-2019. We sampled the 1-2 year 8-10 year-old footballers (n=31) and split them up into Experimental Group (EG, n=16) and Control Group (CG, n=15). The Control Group trainings were traditional for the Olympic School of Sports Reserve, and the EG training system was complemented by the new customizable movement coordination skills training model in view of the individual nervous system types.

Results and discussion. Special movement coordination skills in football may be formed and excelled by a long-term training system customizable to the natural sensitive progress periods and offering special exercises to improve the competitive movement coordination skills at every training stage [6]. Based on the motor skills classification concept by L.D. Nazarenko (2015), every motor skill quality largely depends on the relevant movement coordination skills with the sports-specific aspects critical for competitive success, and coaches, therefore, are recommended to use special movement coordination skills training tools, particularly in the sensitive periods [7].

We run a questionnaire survey of the football coaches (n=48) from Volga Olympic Sports Reserve School named after N.P. Starostin in Ulyanovsk to rank the key movement coordination skills critical for progress of the 8-10-year-old footballers and contributing to their new motor skills and special techniques mastering efforts. Knowing that the football-specific motor skills are largely interdependent and interconnected, the coaches still ranked the key movement coordination skills as follows: accuracy (21%), balance (19%), agility/ motor response (15%) and speed (14%). This ranking was found to agree with recommendations of the leading experts on the football-specific movement coordination skills training system design and management [1, 6, 8].

Accuracy may be defined as one of the key movement coordination skills that secures the spatial-temporal and spatial-strength controls being well harmonized to attain goals of the motor skills [7]. Purposeful trainings to develop kinesthetic sensations differentiation skills with special perceptions ("feel of the ball")

shall start as soon as possible, with a special priority to the footwork and ball control skills to lay a sound basis for the growing technical and tactical skills on a reasonably versatile basis [1]. Balance (static and dynamic) may be defined as the postural control or ability to keep body stable as required by every game situation. No wonder that it is ranked among the key coordination skills interconnected with and contributing to the other key motor skills in the movement coordination skills [7, 8]. And agility/ motor responsiveness may be defined as the ability to control/ maximize the movement pace/ tempo and speed for success in every technical and tactical action with/ without the ball for success of the teamwork. Individual agility in football implies, among other things, the ability to quickly master new motor skills; complex coordination movement coordination skills in standard and nonstandard match situations; and timely respond to every match situation.

The EG trainings were designed to develop the key movement coordination skills on an individualized basis, i.e. as required by the nervous system type. Based on the pre-experimental tapping test data (most popular nervous system typing express test adapted by E.P. Ilyin), we split up the EG as follows: EG-1 composed of individuals with weak (17.4%) and moderate (40.6%) nervous system types (n=9); and EG-2 of those with moderate-strong (34.8%) and strong (7.2%) nervous system types (n=7), respectively.

When planning a weekly training cycle for the EG for the basic training stage (3 months of 3 trainings per week), we gave a special priority to the speed and agility training elements; at the second stage to the accuracy and balance; and third stage to the balance and agility training elements. This combined system was designed knowing that none of the movement coordination skills may be trained separately from the others, and every training session shall be focused on no more than two motor skills [6]. The movement coordination skills training tools were selected with account of the movement coordination intensity of the preparatory and special exercises traditional for junior footballers, plus artistic gymnastics, acrobatics, athletics and active game training elements helpful for the movement coordination skills mastering and excelling purposes.

On the whole, the specific movement coordination skills trainings made up to 40% of every training session, with the movement coordination skills training elements grouped as follows depending on the training stage: basic conditioning/ special preparatory stage: 40/30%, 45/50% and 15/20% for the low, moderate and high levels, respectively. The special movement coordination skills practices were designed to complement the preparatory and beginner stages of every training session. The warm-up and final stages of

every training session were dominated by the flexibility and motility excelling practices to improve the movement amplitude and freedom, mitigate post-training pains and prevent injuries.

The nervous-system-type-specific training practices were varied in the total times; rest breaks; and intensities, i.e. repetitions/ series. The EG-1 (weak nervous system type) trainings were dominated by controlled workloads, with the training goals attained by increased repetitions/ series and rest breaks. The EG-2 (strong nervous system type) trainings were dominated by intensive workloads with stepped increase of reps and reduced rest breaks. The EG trainings were naturally complicated by the fact that children of this age are still difficult to manage and control as their self-control skills and discipline are still underdeveloped and, hence, special attention shall be paid to secure due discipline and determination in the training process, with every exercise in every subgroup strictly controlled and managed by the coach.

Despite the obvious subjective difficulties, the pre-versus post-experimental tests showed the new customizable movement coordination skills training model being beneficial. Thus the pre-experimental tests found the intergroup (CG vs. EG) physical fitness rates insignificantly ($p > 0.05$) different. The post-experimental tests found significant ($p < 0.05$) intergroup differences in the static/ dynamic balance, agility, accuracy (muscle efforts differentiation) and speed tests, with both groups found to make different progresses in these aspects.

Thus the pre- versus post-experimental dynamic balance on a gymnastics bench test found progress of 10.4% and 3.1% ($p < 0.05$) in the EG and Control Group, respectively. The pre- versus post-experimental Romberg's static balance test found progress of 24.5% and 14.7% ($p < 0.05$) in the EG and Control Group, respectively. The pre- versus post-experimental stuffed balls run test found progress of 18.2% and 9.1% ($p < 0.05$) in the EG and Control Group, respectively. The pre- versus post-experimental target shot test found progress of 13.2% and 6.9% ($p < 0.05$) in the EG and Control Group, respectively. And the pre-versus post-experimental muscular efforts differentiation accuracy (standing long jump) test found progress of 17.9% and 6.7% ($p < 0.05$) in the Experimental and Control Group, respectively. The similar significant dif-

ferences in the group progress was found by the running around sticks, dribbling slalom and ball juggling (agility and rhythm) tests. Traditional physical fitness tests also found significant ($p < 0.05$) intergroup (EG vs. CG) differences on the speed-strength and speed test scales.

Conclusion. The new customizable movement coordination skills training model testing experiment, with the training service individualized for the nervous system types, was tested beneficial for the 8-10-year-old football players, as it was found to secure, in the basic training stages, good progress in the physical fitness and special motor skills to lay a sound basis for progress in the sport-specific technical and tactical skills, physicality and functionality for competitive success.

References

1. Averyanov I.V. Methodology for improving kinesthetic coordination abilities of 10-11-year-old footballers. PhD diss.. Omsk, 2008. 240 p.;
2. Bandakov M.P., Polevoy G.G. Method of customizable development of specific coordination abilities of 11-12 year-old footballers in typological features in view of nervous system properties. Nauchnoe obozrenie. Pedagogicheskie nauki. 2015. No. 1. pp. 65-66.
3. Vyatkin B.A. Selected psychological studies of individuality: theory, experiment, practice. Knizhny mir publ.. Perm, 2005. 392 p.
4. Drandrov G.L. Building speed-strength qualities and agility in 13-16- year-old footballers based on typological features of manifestation of nervous system properties. PhD diss. Abstract. Omsk, 1989. 20 p.
5. Ilyin E.P. Psychology of individual differences. St. Petersburg: Piter publ., il. (Ser. «Masters of Psychology»), 2004. pp. 330-356.
6. Lyakh V.I., Witkowski Z. Coordination training in football. M.: Sovetsky sport publ., 2010. 216 p.
7. Nazarenko L.D. The concept of classification of motor coordination. Teoriya i praktika fiz. kultury, 2015, no. 3, pp. 99-101.
8. Shamonin A.V. Actions to improve technical training when building balancing skills in 7-11-year-old footballers. PhD thesis. Abstract. Yekaterinburg, 2010. 22 p.

Precompetitive fitness tests in youth bandy

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Abstract

Objective of the study was to offer a set of efficient precompetitive fitness rating criteria for junior bandy sport.

Methods and structure of the study. We sampled 14 young hockey players born in 2006 for the precompetitive fitness rating study run at the regional Children and Youth Olympic Reserve Sport School bandy group in Ulyanovsk. Motor skills, physicality and functionality of the sample were tested by the standard tests as provided by the valid Federal Standard for bandy sport. In addition, we mined for analysis the technical and tactical skills test data of Volga Children and Youth Olympic Reserve Sport School bandy team that competed in the regional 2019 Bandy Tournament in memory of V.S. Dorofeev, Master of Sports of the USSR.

Results and discussion. Having analyzed the actual test data of the sample, we found its overall physical fitness mostly matching with the valid standards. The special physical fitness test rates were the following: speed rating 30m ice skating sprint test was 69% successful; and coordination rating 6x9 shuttle skating test 2 was 84% successful. The technical and tactical skills of the sample were tested in practical qualification competitions of December 2019. A comparative technical and tactical skills data analysis found certain variability in the technical and tactical skills efficiency and effectiveness on every technical and tactical skills test scale. The technical and tactical skills match statistics classified by the game roles (defenders, midfielders, forwards) with the error rates (%), plus the individual overall physical fitness, special physical fitness and team fitness rates made it possible to rank the players by the precompetitive fitness prior to qualification matches for the Russian Bandy Championship.

Keywords: bandy, precompetitive training, training and competitive progress, overall physical fitness, special physical fitness, technical and tactical skills of junior bandy players.

Background. It is traditional for the bandy theory and practice to give a special priority in an annual training cycle to precompetitive (special preparatory) training stage. Modern training systems require comprehensive performance databanks being formed and processes to keep track of every player's fitness and performance so that the coach could manage and individualize the training cycles on an informative basis and, as a result, help the team reach the peak competitive fitness for success in the top-ranking bandy tournaments [1]. Functionality test rates are ranked high among the key criteria of the individual precompetitive fitness [2].

Objective of the study was to offer a set of efficient precompetitive fitness rating criteria for youth bandy sport.

Methods and structure of the study. We sampled 14 young hockey players born in 2006 for the precompetitive fitness rating study run at the regional Children and Youth Olympic Reserve Sport School (CYORSS) bandy group in Ulyanovsk. Motor skills, physicality and functionality of the sample were tested by the standard tests as provided by the valid Federal Standard for bandy sport. In addition, we mined for analysis the technical and tactical skills test data of Volga CYORSS bandy team that competed in the

regional 2019 Bandy Tournament in memory of V.S. Dorofeev, Master of Sports of the USSR. Analyses of the modern bandy sport show that fitness in youth bandy may be rated by: (1) overall physical fitness tests; (2) special physical fitness tests; (3) technical and tactical skills tests; and (4) team's pre-seasonal fitness tests. The overall physical fitness of the 2-year sample was tested in September 2019 by the scheduled progress tests.

Results and discussion. Having analyzed the actual test data of the sample, we found its overall physical fitness mostly matching with the valid standards [3]. The following overall physical fitness tests classified by tested physical qualities generated the following data: (1) Speed rating 60m sprint test 1 was 78% successful; (2) Speed endurance rating 200m running test 2 was 85% successful; (3) Coordination qualities rating 5x6m shuttle sprint test 3 was 92% successful; (4) Strength rating prone push-ups test 4 was 100% successful; and (5) speed-strength rating standing long jump test 5 was 92% successful.

Furthermore, we analyzed the special physical fitness test data of the 2-year sample as of November 2019 generated by practical tests on the ice rink. The special physical fitness test success rates were the following: (1) Speed rating 30m ice skating sprint test 1 was 69% successful; and (2) Coordination rating 6x9 shuttle skating test 2 was 84% successful.

The technical and tactical skills of the sample were tested in practical qualification competitions of December 2019. A comparative technical and tactical skills test data analysis found certain variability in the

technical and tactical skills efficiency and effectiveness on every technical and tactical skills test scale. The technical and tactical skills statistics for one of the matches classified by the game roles (defenders, midfielders, forwards) with the error rates (%) of 3 couples are given in Table 1 hereunder

As demonstrated by Table 1, records of the individual performances classified by successful and unsuccessful technical and tactical skills with the error rates are rather informative as they make it possible to rank players by every technical and tactical skills and competitive performances on the whole based on the technical and tactical skills totals. For example, forward A demonstrated technical and tactical skills = 64 (47 and 17 successful and unsuccessful ones, respectively) per match with the 26.5% error rate; versus forward B with his technical and tactical skills =66 (40 successes and 26 failures) with the 39.4% error rate.

The test data and analyses made it possible to rank the players' fitness for the upcoming qualifications for the Russian Bandy Championship, the first official tournament of the 2019/2020 season. The tests were found rather beneficial as the individual competitive technical and tactical skills totals and error rates in a few prior matches gave the coaches a sound analytical basis to form a starting line for the top-ranking event.

The study was finalized by the bandy team tests and analyses to rate the team fitness for the competitive season. Benefits of the performance testing and analyzing model were proved by the actual team's

Table 1. Match technical and tactical skills test data of the Volga CYORSS bandy team players born in 2006

Technical and tactical skills	Defenders		Midfielders		Forwards	
	A	B	A	B	A	B
Short passes	+6/-2=8	+4/-2=6	+7/-3=10	+4/-2=6	+5/-1=6	+3/-1=4
Mid passes	+3/-1=4	+5/-2=7	+5/-3=8	+3/-4=7	+4/-2=6	+5/-3=8
Long passes	+2/-2=4	+4/-2=6	+2/-1=3	+1/-2=3	+3/-1=4	+1/-1=2
Assists	0	0	1	2	1	1
Dribbling	+4/-3=7	+3/-1=4	+14/-6=20	+9/-6=15	+12/-5=17	+9/-4=13
Dribbling and pass	+1/-2=3	+2/-3=5	+5/-2=7	+3/-2=5	+6/-2=8	+5/-4=9
Goals	0	1	3 (1)	2 (0)	4 (2)	3 (1)
Misses	-2=2	-1=1	-2=2	0	-2=2	-3=3
Repossessions	+6/-4=10	+4/-8=12	+8/-4=12	+5/-3=8	+8/-4=12	+9/-7=16
Free shots	-1=1	0	+2/-1=3	+1/-1=2	+3/0=3	+2/-2=4
Corners	0	-1=1	0	+2/-1=3	+1/0=1	+2/-1=3
Penalties	0	0	0	+1	0	0
Total	+22/-17=39	+23/-20=43	+47/-22=69	+33/-21=54	+47/-17=64	+40/-26=66
Error rate, %	43,5	46,5	31,8	38,9	26,5	39,4

Note: + and – mean successful and unsuccessful technical and tactical skills, respectively

performance in the precompetitive stage when it won the regional tournament in memory of V.S. Dorofeev, plus won 4 out of 6 fitness test friendly matches with the peer teams. The precompetitive trainings with the new performance test system were crowned by the Volga CYORSS bandy team success in qualifications for the Russian Bandy Championship of the 14 year-olds in January 2020 in Kazan with the following success record: 5 matches, 4 wins, first place and a successful qualification for the Russian Junior (14 year-olds') Bandy Championship in Moscow. Therefore, the new precompetitive performance and fitness testing and analyzing model was found beneficial in practical tests of the Volga CYORSS bandy team players born in 2006.

Conclusion. The study data and analyses found the new precompetitive performance and fitness testing and analyzing model with its set of technical

and tactical skills test criteria beneficial for the precompetitive fitness ranking in youth bandy sport and precompetitive training system customization purposes.

References

1. Malofeev A.Yu., Klyuchnikova S.N., Filatov S.A. Organizational and methodological aspects of bandy training at preparatory stage. Povolzhskiy pedagogicheskiy poisk. Ulyanovsk, 2017. pp. 31-35.
2. Malofeev A.Yu., Klyuchnikova S.N., Nemytov D.N. Competitive performance rating studies in youth bandy. Teoriya i praktika fiz. kultury. 2019. No.1. pp. 102-104.
3. Fateeva O.A., Fateev G.V. Bandy. Program for CYSS and SCYSOR. Irkutsk: Papirus publ., 2008. 132 p.

Acute effects of running over different height mini-hurdles on sprint kinematics in athletes

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Abstract

The purpose of this study was to examine the influence of the height of mini-hurdles on the kinematics of sprinting in sprinters and jumpers. Twelve male athletes (mean \pm SD, age: 21.5 ± 1.9 years, height 178.4 ± 5.1 cm, body mass 74.6 ± 6.4 kg) ran maximal flying sprint under 3 different conditions: with flat, medium and high mini-hurdles (0.5, 13 and 20 cm high, respectively). The obstacles were set from 20 to 40 m. The Optojump Next (Microgate, Italy) was used to assess running velocity, stride length, stride frequency, contact time and flying time. The analysis revealed that running velocity and stride frequency were significantly greater ($p < 0.05$) in the flat mini-hurdles condition compared to the high mini-hurdles condition. Stride length significantly increased ($p < 0.05$) in the high mini-hurdles condition when compared with the flat mini-hurdles conditions. There were no significant differences ($p > 0.05$) between the medium condition and the other conditions for all sprint kinematics. We suggest that coaches and practitioners should adjust the height of sprinting obstacle depending on training needs.

Keywords: *sprint training method, hurdles, stride length, stride frequency.*

Introduction. Straight-line sprint running is an essential factor to many sports, including athletics, football, or rugby. Based on the kinematics model, effectiveness of sprint running is determined by stride length and stride frequency [1]. An increase in one parameter without decrease the second one results in an improvement in the running velocity. However, an increase in stride length often leads to a decrease in stride frequency and conversely, an increase in stride frequency reduces the length of stride. Because only the optimal values of stride length and frequency make sprinting at the fast speed possible, researchers try to find training methods that can be used to manipulate these kinematics. One of the most common ways used to lengthen running stride is resisted sprinting (e.g. pulling a sled, tire, running uphill or with resisted bands) [2]. In turn, research showed that assisted sprinting (e.g. towing using a harness or stretch elastic tubing) is an effective method to induced changes in stride frequency [3].

There is, however, little information on the third popular method to improve sprint performance through the use of sticks, marks or mini-hurdles to regulate stride kinematics. Using this method, coaches may directly influence the length and frequency of running stride. The key factor is the distance of the markers. Research by Makaruk et al. [4] demonstrated that sprint training with a lengthened distance between sticks resulted in an improvement in running velocity by an increase in stride length. On the other hand, when the distance between sticks was shortened, increasing running velocity was accompanied by an increase in stride frequency.

Objective of the study. Because the height of the training obstacle also could be a way of manipulating stride kinematics, the purpose of this study was to identify the differences in stride kinematics between sprints with increasing the height of the hurdles in sprinters and jumpers.

Research methods and organization. Twelve male athletes (mean \pm SD, age: 21.5 ± 1.9 years, height 178.4 ± 5.1 cm, body mass 74.6 ± 6.4 kg) volunteered to participate in this study. All subjects were informed about the nature of this study. Six of the 12 athletes are sprinters, 4 long jumpers and 2 high jumpers. All the procedures were approved by the Ethics Commission for Scientific Research of the University of Physical Education in Warsaw.

The testing session consisted of general warm-up (5-minute jog, 8-minute dynamic stretching) and 2 x 20 m knee lifts and heel kicks, 1 x 40 m submaximal-intensity sprint. After the warm-up, each participant performed three 20-m flying sprints [5] in a random order in the following conditions: with flat, medium and high mini-hurdles (0.5, 13 and 20 cm high, respectively). The obstacles were set from 20 to 40 m and with a 220 cm distance between mini-hurdles. The participants were asked to perform the sprint at maximum speed. The Optojump Next (Microgate, Italy) was used to assess stride kinematics. This device consists of two pairs of measurement bars (1-m length transmitters and receivers) placed parallel to each other on the sprint track and connected to a computer via a USB port. The system detected all interruptions in communication between the bars with a timing accuracy of 1 ms. Contact time was measured as the time from footstrike to toe-off of the same foot, flight time was measured as the time from foot toe-off to footstrike of the opposite foot, stride length was determined as the distance from the tip of the spike-shoe at toe-off to the tip of the opposite leg's spike-shoe at toe-off, while mean step velocity was determined as the ratio between stride length and the sum of the contact time of the pushing leg and flight time during this stride.

Descriptive statistics are presented as means \pm SD. The Shapiro-Wilk test was used to confirm whether the variables were normally distributed. A one-way analysis of variance (ANOVA) with repeated measures was used to determine if any significant differences existed between three sprint conditions. When significant effects were observed, Tukey post-hoc tests were applied. Statistical significance was set at $p < 0.05$.

Statistica v. 13.0 software was used for all statistical calculations.

Results. Mean \pm SD values of kinematic parameters are demonstrated in Table 1. The analysis revealed that running velocity and stride frequency were significantly greater ($p < 0.05$) in the flat mini-hurdles condition compared to the high mini-hurdles condition. Stride length significantly increased ($p < 0.05$) in the high mini-hurdles condition when compared with the flat mini-hurdles conditions. There were no significant differences ($p > 0.05$) between the conditions for contact time and flight time. There were also no significant differences ($p > 0.05$) between the medium condition and the other conditions for all parameters.

Discussion. Sprint running over sticks or low obstacles is a method often used by coaches and athletes attempting to improve stride kinematics. However, there is little in the way of scientific evidence to support this practice. Therefore, the purpose of this study was to examine how manipulation of the height of mini-hurdles influence kinematics of sprinting. The main findings of the study showed that an increased height of obstacles during sprint may lead to a change kinematic parameters. We found that running velocity and stride frequency decreased when the height of mini-hurdles increased from flat mini-hurdles to high mini-hurdles, but stride length increased. Additionally, our research revealed that using the medium mini-hurdles, did not change significantly running velocity, stride length and frequency, when compared to the flat mini-hurdles condition.

The previous studies only reported the effects of distance between markers on stride kinematics [4,6]. According to our knowledge, this is the first research that compares the effects of mini-hurdles with different heights on the stride kinematics in athletics athletes. The results of this study showed that running speed significantly reduced with a 19.5 cm increase of mini-hurdles (from 0.5 to 20 cm, but did not significantly change when an increase was 12.5 cm (from 0.5 to 13 cm). In examining the possible mechanism for these observations, it is logical to suggest that decreasing running speed were produced by a decrease in stride frequency resulted from an increase in stride

Table 1. Acute effects of sprint running training on sprint kinematics (mean \pm SD) through mini-hurdles with different height*

Kinematics	Flat mini-hurdles	Medium mini-hurdles	High mini-hurdles
Running velocity (m·s ⁻¹)	8.69 \pm 0.43	8.61 \pm 0.39	8.50 \pm 0.54#
Stride length(m)	2.19 \pm 0.07	2.20 \pm 0.06	2.23 \pm 0.06#
Stride frequency (HZ)	3.98 \pm 0.23	3.91 \pm 0.22	3.82 \pm 0.37#
Ground contact time (s)	0.121 \pm 0.008	0.122 \pm 0.006	0.124 \pm 0.009
Flight time (m·s ⁻¹)	0.131 \pm 0.016	0.134 \pm 0.012	0.138 \pm 0.017

#Significantly different ($p < 0.05$) from run over flat mini-hurdles.

length [4]. We assume that an increase in stride length was due to athletes raised the knees higher to overcome the higher obstacles. Thus, for coaches wishing to increase stride length, it appears that relatively high obstacles may be effective to achieve this training goal. However, it is necessary to monitor changes in the other kinematic parameters before the implementation of the higher mini-hurdles. Although contact time and flight time showed little change between all of the conditions, longer stride may demonstrate the potentially negative effect. For example, the longer horizontal distance from the centre of mass to the foot at touchdown as the result of elongated stride may implicate an increase in the braking forces and increased hamstring injury [7].

We found that using the medium height of mini-hurdles did not significantly change the stride kinematics relative to flat condition, however, there was a trend towards an increase in stride length and decrease stride frequency. It can therefore be concluded that this condition did not significantly alter the athletes' running technique and may be recommended for athletes during training periods when movement pattern should not be dramatically changed [8]. Further research is needed to examine the longer-term effects of running over mini-hurdles and other sprint training methods on sprint kinematics [9].

Practical applications. Using mini-hurdles in running sprints may change some of athlete's stride kinematics according to training needs. It needs to be highlighted that the implementation of high mini-hurdles requires carefully monitored training loads, especially during the competitive season. The current research has shown that high mini-hurdles (20 cm) may lead to unstable locomotor patterns and thus adversely affect running velocity by decreasing stride frequency and increasing stride length. Therefore, the coaches should use training obstacles for skill acquisition such as starting with sprints over flat markers or sticks, then implement a gradual increase of obstacles height.

References

1. Mero A., Komi P. V., Gregor, R. J. Biomechanics of sprint running. *Sports Medicine*, 1992, vol. 6, no. 13, pp. 376-392.
2. Petrakos G., Morin, J. B., Egan B. Resisted sled sprint training to improve sprint performance: a systematic review. *Sports Medicine*, 2016, vol. 3, no. 46, pp. 381-400.
3. Makaruk B., Stempel P., Makaruk H. The effects of assisted sprint training on sprint running performance in women. *Acta Kinesiologica*, 2019, vol. 2, no. 13, pp. 5-10.
4. Makaruk B., Makaruk H., Sacewicz T. The efficacy of speed training conducted by applying runs between guide strips. *Physical Education and Sport*, 2009, vol. 3, no. 53, pp. 167-172.
5. Makaruk B., Makaruk H., Sacewicz T., Makaruk T., Kędra S., Długolecka, B. Validity and reliability of measurement of kinematic parameters in a running speed test. *Polish Journal of Sport and Tourism*, 2009, vol. 2, no. 16, pp. 85-92.
6. Saito S., Takahashi K. Immediate effect of running over flat markers to improve stride frequency. *ISBS Proceedings Archive*, 36th Conference of the International Society of Biomechanics in Sport, Auckland, New Zealand, September, 10-14, 2018.
7. Tabor P., Mastalerz A., Iwańska D., Grabowska O. Asymmetry indices in female runners as predictors of running velocity. *Polish Journal of Sport and Tourism*, 2019, vol. 3, no. 26, pp. 3-8.
8. Young W. B., McDowell M. H., Scarlett B. J. Specificity of sprint and agility training methods. *Journal of Strength and Conditioning Research*, 2001, vol. 3, no. 15, pp. 315-319.
9. Alcaraz P. E., Carlos-Vivas J., Oponjuru B. O., Martinez-Rodriguez, A. The effectiveness of resisted sled training (RST) for sprint performance: a systematic review and meta-analysis. *Sports Medicine*, 2018, vol. 9, no. 48, pp. 2143-2165.

Academic physical education service diversification trend analysis

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Abstract

Objective of the study was to determine the vector of development of the system of training of sports personnel in terms of diversification of physical education.

Results and discussion. One of the key policies of the modern national academic physical education and sports system is the academic curriculum diversification within the multistage (bachelor-master) education service. The new curricula are designed to train management, law, IT, physical education and sports infrastructure service and diplomatic specialists for the physical education and sports industry. The efforts to expand the range of new academic curricula are largely limited, however, by a few bottlenecks including the still underdeveloped professional standards in many service fields; shortage of funding; governmental policies geared to cut down non-core academic curriculum at universities; and the need to persistently and effectively upgrade/ retrain the university faculties.

Keywords: *higher professional education, academic curriculum, physical education and sports.*

Background. The ongoing post-Soviet reforms of the national academic educational system have significantly changed the range and contents of educational services provided by the national academic physical education system. Universities are increasingly sensitive to demands from the modern labor market and offer a wide range of academic curricula in response to the new professional service realities in the sports system. These new trends have been responded by innovations in the physical education and sports specialist training service provided mostly by 14 leading national academic institutions (5 universities, 6 academies and 3 institutes). Transition of the Russian higher professional education system to a two-tier format plus the objective requirements to the modern specialist training service have resulted in a new range of academic curricula.

Objective of the study was to analyze the physical education and sports specialist training service progress trends in the national academic physical

education and sports system diversification context.

Results and discussion. Presently the national academic physical education system offers 19 bachelor and 14 master training curricula with larger groups of specialties and disciplines; with the bachelor and master student population estimated at 31.5 thousand (86.5% of the total) and 4.9 thousand (13.5%), respectively [3]. It should be mentioned that presently the physical education and sports specialist training service is dominated by physical education and sports discipline. On the whole, the student specialist population in the academic physical education system is estimated at 28.1 thousand making up above 80% of its total student population. The physical education services are dominated by the following disciplines: Physical Education Service; Adapted Physical Education Service for People with Health Limitations; Recreation and Health Sports Tourism; and Sports. The academic curricula for these disciplines make special emphases on the pedagogical,

coaching, recreational, project designing, managing, researching, culturing and elucidating aspects of the service [2].

It should be noted that the economic transformation and the market demand for the new academic curriculum has resulted in a range of new physical education service models and courses. Experts note that “the national physical education and sport sector progress trends for the last decade with the rapid expansion of the professional service fields require the new top-professional human resource being trained for the service” [1, p.52].

As provided by the national higher professional educational system statistics, the Education and Pedagogical Sciences discipline reports more than 1.5 thousand students at physical education universities that account for 0.7% of the total. Most popular specialty in this discipline is sports psychology – since presently the physical education and sports sector reports a growing demand for sports psychologists to support the training and competitive systems.

The ongoing socio-economic transformations in the Russian society have largely reformed the physical education and sports system with ‘the growing commercialization of the national physical education and sports institutions and growing role of the market management mechanisms to mobilize new funding and human resources’ [4, p.3]. These new trends, in their turn, forced the physical education university system to train specialists in sports management, economics, governmental and municipal management etc. by the relevant new academic curriculum. The academic physical education system statistics report 705 students (0.2% of the total) being trained in physical education and sports management disciplines including the sports organization management and governmental/ municipal physical education and sports system management – to meet the needs of the sector for the physical education and sports service management specialists.

One of the relatively new academic curriculum in the academic physical education service is the Service and Tourism discipline presently reporting 2.4 thousand students (7.3% of the total). The tourist service academic curriculum in the academic physical education system is increasingly popular due to the national physical education and sports sector reporting a growing need for the tourist service operation and management specialists expected to organize and manage tours with the relevant modern services and efficiently operate the growing physical education and sports, health, recreation and mass sports infrastructure in the regions.

Furthermore, the top-ranking sports event hosting experience with the so-called “Olympic legacy”

urges the local physical education and sports system take efforts to efficiently and successfully operate the sports infrastructure for the national sports and tourism promotion purposes. This is one more reason for the growing interest in top-professional specialists expected to operate and serve the sports facilities and host tourist events and multiple competitions thereby making the Olympic heritage operable and profitable. The relevant academic curricula are geared to train top-professional specialists for the event organizing, physical education and sports system managing, project design, technological, research and analytical services. Thus the universities offer a variety of new academic curriculum including Heath Sports Tourism; and Heath Sports Tourism Technologies – to meet the modern requirements to the physical education and sports and health tourist services in the sector.

It may be pertinent to mention the Mass Media and Librarianship discipline among the new academic curriculum offered by the academic physical education and sports system – to recognize the growing role played by the mass media and advertising agencies in promoting the values of the modern physical education and sports system, broadcasting sports events and competitions, and advancing healthy lifestyles in the local population groups. Such academic curricula are expected to fast expand since “the national sports sector rapidly grows with the key role played by the powerful sports industry and its progress in the global economy and global informational universe with the sports media, advertising businesses and PR sector in need of good management service in every tier” [5, p.199]. On the whole, this education service reports 0.3 thousand students at the physical education universities (0.5% of the total student population).

In addition to the above described curricula, the academic physical education system presently offers trainings in many other disciplines including Directing Theatrical Performances and Holidays; Youth Service Organization; International Relations; Social Service; Psychology; Sociology; Jurisprudence and some other. This educational service range only expands in response to the new economic challenges associated with new demands from the labor markets for the top-professional modern physical education and sports service specialists. It should be mentioned that the student population in these disciplines is dominated by those trained on a contractual basis.

Conclusion. One of the key policies of the modern national academic physical education and sports system is the academic curriculum diversification within the multistage (bachelor-master) educational service. The new curricula are designed to train man-

agement, law, IT, physical education and sports infrastructure service and diplomatic specialists for the physical education and sports industry. The efforts to expand the range of new academic curriculum are largely limited, however, by a few bottlenecks including the still underdeveloped professional standards in many service fields; shortage of funding; governmental policies geared to cut down non-core academic curriculum at universities; and the need to persistently and effectively upgrade/ retrain the university faculties.

References

1. Zakharov A.A. Problems and prospects for development of university education in physical educations and sport sector. *Teoriya i praktika fiz. kultury*. 2003. No. 5. 52 p.
2. Lubysheva L.I. Training of sports personnel: multi-skilled professional or single-discipline expert? *Teoriya i praktika fiz. kultury*. 2019. No. 2.
3. Report of the Ministry of Sports of the Russian Federation on the results of the analysis of the state and development prospects of the educational system for 2918. <https://www.minsport.gov.ru/>
4. Sereda Yu.A. Formation of key sports manager’s competences in context of socio-economic transformation. PhD diss. abstract. St. Petersburg, 2012.
5. Skotnikova A.V. Branch sports universities: development and management prospects in view of predictive dynamics of physical educations and sport sector. *Uchenye zapiski universiteta im. P.F. Lesgafta*. 2016. No. 8 (138). pp. 198-203.
6. Form N VPO-1. Information about the organization carrying out educational activities within higher education curricula - bachelor programs, specialist programs, master’s programs for 2019. <https://minobrnauki.gov.ru/ru/activity/stat/highed/index.php>

Gender-sensitivity training model for preschool physical education personnel

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Abstract

Objective of the study was to analyze benefits of gender-sensitive training models in the supplementary educational system for the preschool physical educators.

Methods and structure of the study. Ulyanovsk State Pedagogical University has made progress in finding solutions to the above challenges by new advanced training modules geared to develop gender-sensitive knowledge and competences in many education specialists including psychologists, Physical Education teachers etc.

Results and conclusions. The article underlines the need to adjust the programs of advanced training of physical education instructors in view of the introduction of the gender approach in preschool education. The potentials of the system of supplementary education of adults in the formation of the gender competency of preschool physical education instructors were examined. We identified a set of methodological and scientific-practical measures carried out during the advanced training courses and extracurricular activities, including: implementation of the training module "Gender approach in the academic physical education of preschoolers" and development of the training package; training at the Ulyanovsk experimental sites for innovative activities aimed to implement the gender approach in preschool education; holding conferences, seminars, and creative meetings on gender issues; creation of a virtual methodical piggy bank and publication of teaching aids and recommendations for preschool teachers.

Keywords: *gender approach, preschool physical education service, gender competency, physical education instructor, physical education in kindergarten, supplementary education system.*

Background. Modern gender-sensitive education models are in special priority in the national educational system, and their mission is to make the teachers knowledgeable and skillful in the gender-specific services. The national supplementary educational system takes special efforts to update its curricula and implement special training modules to emphasize the gender-sensitive training aspects in the theoretical and practical education services.

Since the individual socializing process is naturally gender-specific since a child is born, modern preschool educational institutions shall custom-

ize their training service with due respect to the individual gender specifics and roles. As provided by A.V. Mudrik, gender-sensitive training models shall encourage the positive gender socializing process so as to facilitate progress in the individual androgynous, feminine and masculine personality traits [5].

In the efforts to reform the traditional educational programs on the gender-sensitive basis, the national educational community is expected to update the training and upbringing models, tools, methods and contents so as to create comfortable training environments for both genders and the whole range

of the individual gender specifics [1]. Educational establishments including preschool educational institutions shall effectively remove contradictions between the latest social gender policies, attitudes and practices on the one hand and the femininity and masculinity standards and traditions still cultivated by inertia in the educational system on the other hand; and the need to advance new gender-sensitive models on the one hand and the traditional asexual education methods on the other hand.

We believe that the above contradictions may be removed or mitigated by the relevant training courses/ modules in the preschool personnel advancement training curricula, including the physical education instructor's ones; special theoretical and practical support materials for such courses; relevant scientific and practical events (workshops, conferences, exhibitions etc.) to analyze and advance the gender-sensitive aspects; relevant visual databanks on university websites; and practical instruction manuals and teaching aids for the preschool education specialists.

Objective of the study was to analyze benefits of gender-sensitive training models in the supplementary educational system for the preschool physical educators.

Methods and structure of the study. Ulyanovsk State Pedagogical University has made progress in finding solutions to the above challenges by new advanced training modules geared to develop gender-sensitive knowledge and competences in many education specialists including psychologists, Physical Education teachers etc. [2, 6].

Results and discussion. As required by the purposes of the study, we first defined the meaning of 'teacher's gender sensitivity' based on the E.N. Kamenskaya's interpretation – as "the ability to harmonize the gender-sensitive psychological and pedagogical knowledge in the training service to efficiently solve every practical training/upbringing issue based on professional gender-sensitive service standards' [3]. To facilitate the physical education instructor's gender-sensitive competency building in the modern gender-sensitive pedagogy and psychology, it may be beneficial to introduce the new 'Gender sensitive preschool physical education service' module in the traditional physical education instructor training curriculum. The module shall be designed to give basics of gender-sensitive training competences to the students and help them further excel these competences in extracurricular periods. Upon completion of the gender-sensitive trainings, the students' gender stereotypes will be corrected and neutralized, with their competences enriched with special knowledge and skills in the new gender-sensitive

pedagogy and psychology for a high quality education service to trainees with different gender identities.

This gender-sensitive training course is supported by the relevant theoretical and practical learning materials with progress tests for preschool educational institutions including the test/ survey cards; observation logs; family questionnaire survey forms; gender stereotypes analyzing guidelines; gender domination surveys for the preschool service personnel; gender situation examination and preschool education institutions gender-sensitive climate survey cards etc. [7, 8].

Practical experience of the Innovative Processes Development Program implemented in the Ulyanovsk Oblast with its gender-sensitive education modules has been beneficial for the gender-sensitive training of preschool physical education specialists. Thus, the service personnel of Kindergarten No. 52 "Rosinka" in Dimitrovgrad has made progress in implementing the gender-sensitive training modules, with the relevant benefits for the children's gender identity formation process. And the service staff of Kindergarten "Skazka" in New Malykla village of the Ulyanovsk Oblast has implemented innovative gender-sensitive training methods and tools of special benefits both for the gender-sensitive socialization of preschoolers and gender sensitivity of their families [4].

Gender-sensitive trainings of the preschool physical education personnel on an extracurricular basis are facilitated by the virtual practical database on the university website that offers sample gender-sensitive training sessions; theoretical and practical workshops and conferences to analyze gender sensitivity issues; practical guidelines and instructions published by the university faculty; and the teaching aids and learning materials available on a few gender-sensitive websites including 'Physical education, 'I'm going to physical education class' etc.

Having outlined the supplementary educational system resources for the modern gender-sensitive trainings of physical education specialists, we would underline the issues in need of further solutions. First of all, the system needs modern test tools to rate and analyze progress and deficiencies in the physical education specialist knowledge and competences in modern gender-sensitive pedagogy and psychology. And second, the preschool system shall be equipped with modern material and technical assets for the gender-sensitive physical education service.

Conclusion. The theoretical and practical provisions outlined herein plus special scientific and practical events in the supplementary educational

system for preschool physical education specialists will facilitate progress in the gender-sensitive trainings of the preschool physical education personnel.

References

1. Dyuldina Zh.N., Shustova L.P. Gender issue in pedagogical research. *Sovremennye naukoemkie tekhnologii*. 2016. No. 5-3. pp. 629-633.
2. Zarubina V.V., Lukyanova M.I., Fakhretdinova M.A. Acmeological stand shaping service to physical education specialists in advanced education system. *Teoriya i praktika fiz. kultury*. 2018, no. 2. pp. 24-26.
3. Kamenskaya E.N. *Pedagogy: Lecture notes*. Rostov-on-Don: Fenix publ., 2005. P. 365.
4. Klyuchnikova E.A. *World of childhood: boys and girls (formation of gender identity in 3-8 year-olds based on individually differentiated approach in conditions of preschool education)*. Ulyanovsk: A.V. Kachalin publ., 2018. 240 p.
5. Mudrik A.V. Gender-role (gender) approach in social education. *Vospitatelnaya rabota v shkole*. 2003. No. 5. pp. 9-15.
6. Shustova L.P., Danilov S.V. Competency of physical education teachers in gender approach in education: development potential in career development system. *Teoriya i praktika fiz. kultury*. 2020. No. 7. p. 32.
7. Shustova L.P. *Gender research in education. Teaching aid*. Ulyanovsk: UIPKPRO publ., 2011. 156 p.
8. Shustova L.P., Anokhina I.A. *Gender approach in preschool education. Teaching aid*. Ulyanovsk: UIPKPRO publ., 2010. 111 p.

Safety of physical education lessons according to teachers

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Abstract

Safety of physical education (PE) lessons poses a serious challenge to the functioning of the contemporary educational system. Research shows that there are numerous causes of accidents that result in injuries. This study sought to analyse PE teachers' opinions regarding safety during lessons and potential risks associated with it. The analysis included 79 PE teachers employed in 17 schools. The author's own questionnaire was used as the research tool. Prior to the research, the questionnaire was checked in terms of reliability. Over 67% of the respondents stated that students' low physical fitness level was the main cause of accidents during PE lessons, while 58% of the study participants pointed to poor condition of sports facilities. It leads to a variety of injuries such as bruises, head and face injuries or sprains.

Keywords: *injuries, school accidents, student, physical fitness level.*

Background. Physical education (PE) plays an immensely important educational and health-promoting role. It is an indispensable part of the health education system that is gaining significance due to numerous lifestyle diseases that already affect young generations. PE lessons are distinctive because of a higher risk of dangerous situations which may lead to injuries or even death. Statistical data show that accidents during PE lessons account for over 50% of all the accidents that take place in schools, and their number reaches tens of thousands. Therefore, safety of students during PE lessons constitutes schools' primary responsibility, and it mainly falls on PE teachers.

This study sought to analyse PE teachers' opinions regarding safety during lessons and potential risks associated with it.

Research methods and organisation. Seventy-nine PE teachers from 9 primary and 8 secondary schools from Lublin region participated in this anonymous study. The author's own questionnaire was used as the research tool. Personal data collected

in the course of the study included the length of professional experience and the type of school the teacher was employed in. The respondents were divided into 4 groups depending on the length of their professional experience. The division corresponded to the duration of particular stages of the professional promotion process. The questions included in the questionnaire concerned aspects of safety during PE lessons, causes of accidents and dangerous situations as well as professional skills of teachers.

Results and discussion. The reliability score for all the analysed variables (expressed with Kappa coefficient) was equal to or higher than 0.93. The questionnaire was completed twice with a one month interval. No significant differences between the results obtained in the two tests were revealed ($p < 0.05$).

Out of 79 respondents, 53 teachers (67.1%) claimed that low physical fitness level was the main cause of accidents during PE lessons. This view was expressed by teachers with the longest and the shortest professional experience. Poor condition of sports facilities was the second most common cause

Table 1. The most common causes of accidents and injuries during PE lessons according to teachers, with regard to the length of their professional experience (n=79)

	Experience								Total (n=79)	
	< 3 years (n=16)		4 to 6 years (n=20)		7 to 10 years (n=20)		> 10 years (n=23)			
	n	%	n	%	n	%	n	%	n	%
Causes of accidents during PE lessons*										
faulty equipment	5	31.3	7	35.0	7	35.0	8	34.8	27	34.2
poor condition of sports facilities	10	62.5	11	55.0	9	45.0	16	69.6	46	58.2
lessons conducted in school corridor	4	25.0	3	15.0	5	25.0	2	8.7	14	17.7
large number of students	8	50.0	7	35.0	8	40.0	9	39.1	32	40.5
large number of groups in one place	7	43.8	4	20.0	5	25.0	4	17.4	20	25.3
no discipline on the part of students	10	62.5	10	50.0	9	45.0	9	39.1	38	48.1
low physical fitness level of students	12	75.0	14	70.0	13	65.0	14	60.9	53	67.1
teacher's organisational errors	2	12.5	4	20.0	6	30.0	5	21.7	17	21.5
students left without supervision	2	12.5	3	15.0	3	15.0	4	17.4	12	15.2
overestimation of one's skills	4	25.0	2	10.0	3	15.0	6	26.1	15	19.0
participation of students who report feeling unwell	3	18.8	5	25.0	3	15.0	2	8.7	13	16.5
lack of knowledge about students' health status others	3	18.8	1	5.0	0	0.0	2	8.7	6	7.6
	0	0.0	0	0.0	1	0.5	0	0.0	1	1.3
Most common injuries picked up during PE lessons*										
lower limb bruises	8	50.0	7	35.0	9	45.0	9	39.1	33	41.8
upper limb bruises	4	25.0	5	25.0	6	30.0	9	39.1	24	30.4
lower limb fractures	1	6.3	2	10.0	2	10.0	3	13.0	8	10.1
upper limb fractures	1	6.3	1	5.0	4	20.0	4	17.4	10	12.7
knee sprains	3	18.8	2	10.0	3	15.0	4	17.4	12	15.2
wrist sprains	3	18.8	4	20.0	3	15.0	5	21.7	15	19.0
ankle sprains	5	31.3	6	30.0	5	25.0	6	26.1	22	27.8
head and face injuries	7	43.8	5	25.0	6	30.0	9	39.1	27	34.2
others	6	37.5	4	20.0	6	30.0	5	21.7	21	26.6

* it does not add up to 100% because more than one response could be provided

indicated by the study participants (58.2%). Too many students attending PE lessons was another frequent reason they reported (40.5%). It can be noted that together with an increase in the length of professional experience, there occurs a decrease in the number of teachers claiming that the lack of discipline on the part of students is the main cause of accidents (62.5 % vs. 50.0% vs. 45.0% vs. 39.1%) (Tab. 1).

Afterwards, teachers were asked about the most common injuries picked up during PE lessons. In their opinion, students most frequently experienced lower limb bruises (41.8%), head and face injuries (34.2%) as well as upper limb bruises (30.4%). Other injuries that teachers mentioned were skin abrasions and wounds (26.6%). Lower and upper limb fractures were indicated as the least common injuries (Tab. 1).

Table 2. Assessment of sports facilities, knowledge of safety rules and fears of teachers, with regard to the length of their professional experience

	Experience								Total	
	< 3 years		4 to 6 years		7 to 10 years		> 10 years		n (79)	%
	n (16)	%	n (20)	%	n (20)	%	n (23)	%		
Condition of sports facilities in terms of safety										
very good	1	6.3	2	10.0	2	10.0	3	13.0	8	10.1
good	4	25.0	7	35.0	9	45.0	11	47.8	31	39.2
satisfactory	10	62.5	10	50.0	9	45.0	8	34.8	37	46.8
poor	0	0.0	0	0.0	0	0.0	1	4.3	1	1.3
no opinion	1	6.3	1	5.0	0	0.0	0	0.0	2	2.5
PE teachers' knowledge of safety rules										
very good	4	25.0	8	40.0	8	40.0	11	47.8	31	39.2
good	4	25.0	6	30.0	8	40.0	7	30.4	25	31.6
satisfactory	3	18.8	4	20.0	2	10.0	2	8.7	11	13.9
poor	2	12.5	1	5.0	0	0.0	0	0.0	3	3.8
no opinion	3	18.8	1	5.0	2	10.0	3	13.0	9	11.4
Sources of knowledge of safety rules*										
university studies	13	81.3	10	50.0	7	35.0	8	34.8	38	48.1
professional experience	1	6.3	5	25.0	10	50.0	13	56.5	29	36.7
Internet	6	37.5	3	15.0	3	15.0	0	0.0	12	15.2
courses/training	0	0.0	8	40.0	5	25.0	8	34.8	21	26.6
professional literature	2	12.5	1	5.0	0	0.0	1	4.3	4	5.1
Fear of accidents during PE lessons										
I am not afraid	6	37.5	6	30.0	4	20.0	2	8.7	18	22.8
accident due to my negligence	1	6.3	0	0.0	2	10.0	2	8.7	5	6.3
accident due to student's negligence	5	31.3	8	40.0	6	30.0	9	39.1	28	35.4
random event	4	25.0	6	30.0	8	40.0	10	43.5	28	35.4

* it does not add up to 100% because more than one response could be provided

Almost 47% of the respondents stated that in terms of safety, sports facilities available at school were satisfactory, while over 39% of the teachers considered them to be good. Only one in ten study participants claimed the facilities were very good, while very few of them (1.3%) were convinced they were in poor condition. Similar responses were provided by teachers with the shortest and the longest professional experience (Tab. 2).

Moreover, teachers were asked to self-assess their knowledge of legal regulations concerning safety. The largest group consisted of teachers who believed their knowledge was very good (39.2%) and good (31.6%). Only a few respondents stated their knowledge in this field was poor (3.8%) (Tab.2).

More than 81% of the teachers with professional experience of less than 3 years and 50% of the teachers

with experience of 4 to 6 years indicated that university studies were their main source of knowledge of safety regulations. In the group of respondents with 7 to 10 years of teaching experience as well as in those who had been working in this area for more than 10 years, the sources of knowledge included professional experience (50.0% vs. 56.5%, respectively), followed by courses and training completed during their professional careers (25.0% vs. 34.8%, respectively) (Tab. 2).

Teachers were most often afraid that accidents during PE lessons would be caused by students themselves or would occur as a result of a random event (35.4%). It can be noted that with an increase in the length of professional experience, the percentage of teachers who claimed they felt no concern about potential injuries and accidents decreased (37.5% vs. 30.0% vs. 20.0% vs. 8.7%) (Tab. 2).

Summary and conclusions

1. The findings of the present study revealed numerous causes of accidents during PE lessons. They are associated with students' low levels of physical fitness, the lack of discipline, poor condition of sports facilities as well as faulty sports equipment at school. Only one in ten study participants considered their sports facilities to be very good. Another problem is constituted by large numbers of students in groups. Every fifth respondent also stated that the causes include teachers' organisational errors.

2. Accidents that occur during PE lessons cause a lot of injuries, both serious ones, such as fractures or sprains, and minor ones, e.g. bruises or abrasions.

3. PE teachers consider their knowledge of safety rules to be very good. Only one in four respondents acquired this knowledge through participating in professional courses and training.

4. More than 75% of the study participants were afraid that accidents might take place during their lessons. It concerned both random events and students' negligence.

Practical applications

The results of the study show that educational bodies should pay close attention to the issue of safety during PE classes. The specificity of the subject indicates that it is inextricably linked to a variety of dangerous situations that cannot be eliminated entirely; however, every effort ought to be made to reduce these risks. It often requires considerable investments in sports facilities and equipment. Too large groups and working in crowded places significantly increase the risk of accidents and other perilous situations. PE teachers point to the need for changes, as they are afraid accidents will take place during their lessons. Therefore, educational institutions should offer regular courses that would equip teachers with necessary knowledge regarding legal responsibility. Without the above-mentioned changes, PE lessons will still rank highest when it comes to accidents.

References

1. Babalola A. (2012) Sources of Legal Liability among Physical Education Teachers. *International Education Studies*, 5,3:193-198.
2. Caine D., Maffulli N., Caine C. (2007) Injury rate, risk factors, and prevention. *Clinics in Sports Medicine*, 27,1: 19-50.
3. Capel S. (2000) Re-reflecting on priorities for physical education: now and in the twenty-first century. In S. Capel, and S. Piotrowski (Eds.), *Issues in Physical Education*. London Routledge: 209-220.
4. Finn D.M., Ammon R., Mahoney K., Fried G. B., Al Arkoubi K. (2015) Killer Jobs: The dark side of being a Physical Education Teacher. *Strategies*, 28,3: 34-39.
5. Hutton T., Bailey K. (2008) School Policies and Legal Issues Supporting Safe Schools. The George Washington University: 1-54.
6. Micheli L.J., Glassman R., Klein M. (2000) The prevention of sports injuries in children, *Clinics in Sports Medicine*, 19,4: 821-834.
7. Park Y. (2018) How do specialist teachers practice safety lessons? Exploring the aspects of physical education safety lessons in Elementary Schools. *International Electronic Journal of Elementary Education* 10,4: 457-461.
8. Podstawski R., Zwolińska D., Nowosielska-Swadźba D. (2015) Problems of safety and risk in physical education. *Pedagogics psychology medical-biological problems of physical training and sports*, 19,10: 82-89.
9. Saczuk J., Wasiluk A. (2019) Secular trends in the physical fitness of underweight, overweight, and obese girls. *Polish Journal of Sport and Tourism*, 26,1: 28-32.
10. Sanders H. (2008) School Liability: The danger of mandatory physical education Classes. *Journal of Law Education*, 37,3: 443-451.

Psychological service model for skilled boxers

UDC 796.01:159.9

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Abstract

Objective of the study was to test benefits of an experimental psychological-service-prioritizing training model for skilled boxers.

Methods and structure of the study. Benefits of the new psychological-service-prioritizing training model were tested on a sample of 15-17-year-old Class I-II boxers (n=28) from the Youth Olympic Reserve Sport School in Ulyanovsk. The sample was split up into Experimental and Reference Groups (EG, RG) of 14 people each. Individual physical fitness prior to the experiment was tested by the 30m sprint; 100m sprint; 3000m race; standing long jump; right/left hand shot put (4kg); and pull-ups tests. Technical fitness was tested by the reps of accurate power punches landed and eaten; distance control actions and their quality; defense actions and their quality; punch faking actions etc. – rated by a group of top-skilled experienced coaches on a 5-point scale.

Results and conclusions. The pre- versus post experimental physical fitness tests found progress in both groups, with the EG progress tested significantly higher on every test scale. Thus the 30m sprint test found the RG making progress from 14.53±87min to 14.17±69min (p>0.05) versus the EG progress from 14.55±1.03min to 13.51±1.12min (p<0.05). The pre- versus post experimental shot put test data were the following: RG made progress in the right-/ left hand tests from 6.71±0.56m/ 5.83±0.47m to 7.12±0.45m/ 6.93±0.59m (p>0.05), respectively; versus the EG progress from 6.73±0.61m to 8.21±0.53m (p<0.05) in the right-hand tests; and progress up to 7.62±0.35m (p<0.05) in the left-hand test. The group progress was virtually the same in the other physical fitness tests.

The pre- versus post experimental technical fitness tests found the following group progress. Accurate attacking punches per round in the RG were tested to grow from 4.0±0.17 to 6.0±0.21 (p>0.05); versus the EG progress from 3.0±0.22 to 8.0±0.27 (p<0.05). On the eaten punches counting scale, the RG made progress from 7.0±0.2 to 5.0±0.17 (p>0.05); versus the EG progress from 6.0±0.19 to 3.0±0.21 (p<0.05). In the defense actions counting test, the RG made progress from 11.0±0.24 to 14.0±0.27 (p>0.05); versus the EG progress from 12.0±1.17 to 19.0±0.27 (p<0.05). The group progress was virtually the same in the other technical fitness tests.

Keywords: boxing sport, sports training, psychological service.

Background. Modern elite sports training and competitive systems, particularly the elite ones, give a growing priority to high-quality psychological service albeit the national boxing community still tends to underestimate the importance of an individualized special psychological service sensitive to personality traits and progress needs. Individual mental activity, mental control and functional motili-

ty are known to be genetically predetermined. Mental stresses in modern boxing sport are extremely high due to the sport-specific challenges, fight situations, powerful punches, high risks of injuries, and special concentration and attention control required for success. These challenges require special individualized psychological service for competitive progress.

Objective of the study was to test benefits of an experimental psychological-service-prioritizing training model for skilled boxers.

Methods and structure of the study. We used the following psychological service tools in the experimental psychological-service-prioritizing training model:

- Distract the fighter's thoughts from challenges of the upcoming fight with a skilled opponent, and focus them on own strengths;

- Make sure the fighter is perfectly fit for the match in the response speed, punching power, movement coordination and other qualities; and fully relying on his experience, competitive power and success record;

- Good emotional/ mental conditioning sessions with vivid metaphors like “your muscles are springs-strong, just hit the target and win”;

- Efficient inspirational statements from the coaches like “we can!”, “you are fit!”, “stop fearing the foe – he fears you more”;

- Modern self-suggestion training elements;

- Special focus on the fast decision-making in attacks, counterattacks, defenses, distance controls, etc;

- Strong reliance on own fitness and superiority;

- Strong affirmations like “non but the brave deserves the fair!”

Benefits of the new psychological-service-prioritizing training model were tested on a sample of 15-17 -year-old Class I-II boxers (n=28) from the Youth Olympic Reserve Sport School in Ulyanovsk. The sample was split up into Experimental and Reference Groups (EG, RG) of 14 people each. Individual physical fitness prior to the experiment was tested by the 30m sprint; 100m sprint; 3000m race; standing long jump; right/left hand shot put (4kg); and pull-ups tests. Technical fitness was tested by the reps of accurate power punches landed and eaten; distance control actions and their quality; defense actions and their quality; punch faking actions etc. – rated by a group of top-skilled experienced coaches on a 5-point scale. The pre-experimental physical fitness / technical fitness tests found the EG and RG being insignificantly ($p>0.05$) different in both of the aspects.

The RG trainings were compliant with the traditional skills-specific training system recommended by the Boxing Federation of the Russian Federation; and the EG training was complemented by the psychological-service-prioritizing training model. The group physical / technical fitness progresses were tested by the same post-experimental tests.

Results and discussion. The pre- versus post experimental physical fitness tests found progress in both groups, with the EG progress tested significantly higher on every test scale. Thus the *30m sprint* test found the RG making progress from 14.53 ± 87 min to

14.17 ± 69 min ($p>0.05$) versus the EG progress from 14.55 ± 1.03 min to 13.51 ± 1.12 min ($p<0.05$). The pre-versus post experimental *shot put test* data were the following: RG made progress in the right-/ left hand tests from 6.71 ± 0.56 m/ 5.83 ± 0.47 m to 7.12 ± 0.45 m/ 6.93 ± 0.59 m ($p>0.05$), respectively; versus the EG progress from 6.73 ± 0.61 m to 8.21 ± 0.53 m ($p<0.05$) in the right-hand tests; and progress up to 7.62 ± 0.35 m ($p<0.05$) in the left-hand test. The group progress was virtually the same in the other physical fitness tests.

The pre- versus post experimental technical fitness tests found the following group progress. *Accurate attacking punches* per round in the RG were tested to grow from 4.0 ± 0.17 to 6.0 ± 0.21 ($p>0.05$); versus the EG progress from 3.0 ± 0.22 to 8.0 ± 0.27 ($p<0.05$). On the *eaten punches* counting scale, the RG made progress from 7.0 ± 0.2 to 5.0 ± 0.17 ($p>0.05$); versus the EG progress from 6.0 ± 0.19 to 3.0 ± 0.21 ($p<0.05$). In the *defense actions* counting test, the RG made progress from 11.0 ± 0.24 to 14.0 ± 0.27 ($p>0.05$); versus the EG progress from 12.0 ± 1.17 to 19.0 ± 0.27 ($p<0.05$). The group progress was virtually the same in the other technical fitness tests.

Conclusion. The new psychological-service-prioritizing training model for skilled boxers was tested beneficial by the pre- versus post-experimental tests of the EG and RG due to its special focuses on the willpower and moral qualities; self-confidence; determination in the technical and tactical skills excellence trainings; and the precompetitive mental conditioning tools to encourage attacking fight styles, initiative and pressure in every bout.

References

1. Bal'sevich V.K. Individualization technology in physical education and sports. *Teoriya i praktika fiz. kultury*, 2007, no. 6, P. 74.
2. Vyzova V.M. Athlete's attitude to manifestation of aggression. *Anan'ev readings – 2010. Proc.. St. Petersburg: SPbSU publ.*, 2010. pp. 14-16.
3. Dementev V.L., Gozhin V.V., Lushnikov A.Yu. Relationship of theoretical and practical skills of conflict interaction with opponent by means of ideomotorics. *Teoriya i praktika fiz. Kultury*. 2009. No. 3. pp. 49-51.
4. Erokhin A.N., Sharapov L.V., Kadochkin A.N. Anti-stress relaxation in training system of Greco-Roman wrestlers. *Teoriya i praktika fiz. kultury*. 2011. No. 1. pp. 98-100.
5. Kolesnik I.S. Boxer's personality. *Moscow: Teoriya i praktika fizicheskoy kultury i sporta publ.*, 2007. 202 p. il.
6. Nazarenko L.D., Anisimova E.A. Education in sports. *Moscow: Teoriya i praktika fizicheskoy kultury i sporta publ.*, 2015. 80 p.
7. Ozerov V.P. Psychomotor abilities in man. *Dubna: Feniks publ.*, 2012. 320 p.

Personal reflection training model for teenage martial arts

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Abstract

Objective of the study was to analyze the teenage personal reflection formation logics and offer new personal reflection training model for teenage martial arts.

Methods and structure of the study. The study was run at Children and Youth Sport School in Yakutsk, with its teenage boxing, freestyle wrestling, judo, taekwondo and kickboxing groups sampled ($n=80$) for the study. The following methods were applied to analyze the adolescent combat athletes' personal reflection: observation, interview, and questionnaire survey. The personal reflection of the sample was rated by expert observations, interviews and questionnaire surveys to profile the individual self-analyzing and reflection skills and growth on the intellectual, ethical and physical progress test scales.

Based on the questionnaire survey results, we elaborated a personal reflection development program that was implemented in a system of body-oriented psychotherapy and physical exercises during the training sessions. As part of the experiment, we conducted group discussions, mini-lectures, games accompanied with a lot of physical activity, organized work in pairs and triples, formed the trainees' motor skills. Particular attention was paid to the formation of awareness of individual physical sensations, conscious self-control to develop reasonable self-esteem using the practical skills of body self-regulation and self-control, as well as awareness of different components of personal reflection.

Results and conclusions. The new personal reflection training model for teenage martial artists was proved beneficial, with most of the sample tested with progress on the personal reflection rating scales. The sports were found to facilitate their physical progress, body shaping, self-control and willpower building agendas. Well-designed and purposeful personal reflection training service with the relevant progress encouragement psychological provisions may be recommended for special physical and mental conditioning practices in youth sports.

Keywords: *personal reflection, adolescent, psychological conditions, martial arts practices, self-exploration.*

Background. Many sports psychologists believe that modern sports heavily contribute to the teenage personality formation with the individual resources being efficiently mobilized to form multiple sport-specific individual skills [3, 4]. Lately some analysts have underlined social contradictions in modern sports to emphasize the need for special theoretical, practical and ethical elements reinforcement in sports trainings [2]. These and other considerations urge the sport community to give more attention to

the teenage personal reflection studies to find the personal reflection progress factors and facilitation provisions and methods [1].

Objective of the study was to analyze the teenage personal reflection formation logics and offer new personal reflection training model for teenage martial arts.

Methods and structure of the study. The study was run at Children and Youth Sport School in Yakutsk, with its teenage boxing, freestyle wrestling,

judo, taekwondo and kickboxing groups sampled (n=80) for the study. The personal reflection of the sample was rated by expert observations, interviews and questionnaire surveys to profile the individual self-analyzing and reflection skills and growth on the intellectual, ethical and physical progress test scales.

Based on the questionnaire survey data, we split up the sample into the following three personal reflection groups. Ranked with the Low personal reflection group were the subjects reporting passive emotions in the conflict situation like “feel offended”, “upset”; and prone to uncompromising stubborn solutions like “will never contact him again”, “no friendship with him any more”; plus inclined to aggressive “tough” solutions with force and pressure and no attempts to realize the roots of the conflict and find constructive ways out: “if I am hit, I’ll hit back much stronger”; or opting for conflict avoiding strategies at sacrifice of own interests: “if they are unhappy with me, will try make them happy.”

Ranked with the Moderate personal reflection group were the subjects inclined to one-sided reflexive analysis of the problem with attempted manipulations geared to use or remove the opponent on the way to an individual goal: “If they unfairly reproach or criticize me, I don’t care when the criticism is unfair”; “if I am hit, I’ll pay back later in a different way”; with elements of one-sided constructivism in settling conflicts: “if my best friend forgets inviting me to his birthday, I’ll feel offended but still invite him to my own”.

Ranked with the High personal reflection group were the subjects tested prepared to solve problematic/ conflict situations using personal reflection and exploring options; highly active, responsible and open-minded to consider the counterpart interests and keep up respectful relationships: “if my best friend fails to invite me to his birthday party, he could have some reasons for that, so I’ll visit him with congrats anyway”, “if the folks laugh at me, I’ll find reasons to check if they are fair enough”. This personal reflection level facilitates a constructive dialogue as the best way to settle disputes/ conflicts, with the communication model equally fair for both sides and encouraging mutual openness, whilst the result may be unknown before the sides jointly settle the conflict [1].

The new personal reflection training model prioritized the following personal reflection skills: (1) Attention focusing skills; (2) Communication skills in contacts with adults and peers; (3) Progress in the stepped-difficulty willpower-intensive tests; and (4). Progress in physical/ mental control and personal reflection skills building. Based on the questionnaire survey data, the personal reflection

training model was customized to facilitate progress in the physical trainings and mental conditioning practices in the theoretical and practical training course.

The personal reflection progress was facilitated by group discussions; mini-lectures; physical teamwork developing games; couple/ triplet exercises; and motor skills excellence training elements. Special attention was paid to the individual physical sensations and conscious self-controls to develop adequate practical self-rating and analyzing skills in every personal reflection aspect.

Results and discussion. The expert observations found the subjects being quite active and interested in the questionnaire process, open-minded and eager to explore and analyze themselves. In classes the sample was somewhat restrained, with occasional emotions or lapses in concentration. With progress in their sport disciplines, the subjects were tested with growth in self-confidence, self-control, purposefulness, respect to the coach and friendliness to the teammates; plus improvements in the postural controls, movement coordination and satisfaction with their own body shape and appearance.

Our analyses found progress on every test scale including physical qualities; body shaping agendas; endurance, patience, determination; intellect, ingenuity; mental performance; attention focusing and observation qualities; purposefulness; self-management; self-reliant training skills when required; and teamwork skills with mutual help and sensitivity.

With progress in their martial arts, the subjects were tested with improvements in the following: self-control on the visual, tactile, physical and vestibular/ perceptive control test scales; memorizing, thinking capacities, mental self-control; and practical solution finding and decision-making abilities. On the whole, the teenage sample showed progress in the self-control, introspection and self-rating domains. Given in Figure 1 hereunder are the pre- versus post- experimental test data.

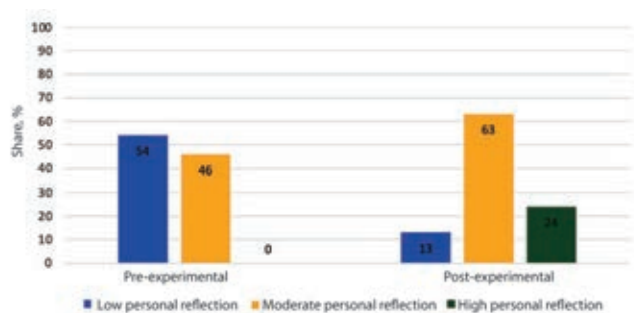


Figure 1. Pre- versus post-experimental personal reflection test data

The new personal reflection training model was tested beneficial as verified by the progress test data. Many subjects reported improvements in the character, confidence, self-control, determination and concentration; albeit there are reasons to believe that some subjects are highly determined only within their fields of interests. Therefore, the study demonstrated that teenage martial arts encourage progress in the personal reflection and willpower building.

Conclusion. The new personal reflection training model for teenage martial artists was proved beneficial, with most of the sample tested with progress on the personal reflection rating scales. The sports were found to facilitate their physical progress, body shaping, self-control and willpower building agendas. Well-designed and purposeful personal reflection training service with the relevant progress encouragement psychological provisions may be recom-

mended for special physical and mental conditioning practices in youth sports.

References

1. Kolodeznikova M.G. Professional self-determination of future physical education and sports specialists at university study stage. *Teoriya i praktika fiz. kultury*. 2012. no. 10. pp. 14-17.
2. Lubysheva L.I. Modern sport: problems and solutions. *Vestnik YuUrGU*. 2014. no.1. pp. 12-13.
3. Nakhodkin V.V., Kolodeznikova M.G., Semenov A.N. Ideomotor trainings for competitive success in wrestling. *Teoriya i praktika fiz. Kultury*, 2019. No. 10. pp. 27-28.
4. Platonov D.N., Platonova Z.N. Junior female athletes' competitive fitness analysis. *Teoriya i praktika fiz. kultury*. 2019. No. 10. p. 20-21.

Ice hockey elite: post-retirement psychosocial health analysis

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Abstract

Objective of the study was to test and analyze the post-retirement psychosocial health of the national elite ice hockey players and offer recommendations on how their social health disorders and early passing away could be prevented.

Methods and structure of the study. We sampled for our post-retirement psychosocial health analysis an Experimental Group (EG, n=20) of retired 32-42 year-old elite ice hockey players who competed in the top-ranking professional hockey clubs in the KHL and NHL – 38.14 years old on the average (quartiles: 32.10; 42.21) free of chronic diseases. We screened out of the EG the 32-/ 40+ year-old elite players diagnosed with chronic diseases and/ or non-retired. Sampled for the Reference Group (RG, n=20) were non-sporting males aged 35.5 years on average (quartiles: 31.20; 39.51) and free of chronic diseases. Standardized psychological techniques were used during the ascertaining experiment.

Results and conclusions. The experiment made it possible to identify a certain psychological type of the elite hockey players was identified, with their biological age exceeding the chronological one by an average of 10 years ($p < 0.05$); difficulties with social functioning encountered by the professional hockey players in the post-career period. The "SF-36 Health Status Survey" method was applied for this purpose. The major problems encountered by elite hockey players are associated with social functioning - 50.3% of 100%, namely with the restriction of social activity (communication).

Keywords: psychosocial health analysis, ice hockey elite, post-retirement period, life quality, biological age, psychological type.

Background. Modern professional sports with their rather specific and challenging environments are known to greatly transform the athletes' lifestyles, individual values and priorities, social wellbeing and physical and mental health ratable by the relevant biological criteria [3, 6, 9]. Comprehensive analysis of the sport professionals' post-retirement psychosocial health is indispensable for the medical, psychological and social support, rehabilitation and transformational stress mitigation systems. Methodologically, the study was designed based on the modern psychosocial paradigm with its integrative approach common for the modern medicine and psychology. This approach has been pursued by a pool of the leading researchers

including Herbert Weiner in his psychobiological studies [10]; George Engel in his psychosocial model, [8]; Ananyev [1] who considers humans both as natural and social beings; etc.

Objective of the study was to test and analyze the post-retirement psychosocial health of the national elite ice hockey players and offer recommendations on how their social health disorders and early passing away could be prevented.

Methods and structure of the study. We sampled for our post-retirement psychosocial health analysis an Experimental Group (EG, n=20) of retired 32-42 year-old elite ice hockey players who competed in the top-ranking professional hockey clubs in the KHL

and NHL – 38.14 years old on the average (quartiles: 32.10; 42.21) free of chronic diseases. We screened out of the EG the 32-/ 40+ year-old elite players diagnosed with chronic diseases and/ or non-retired. Sampled for the Reference Group (RG, n=20) were non-sporting males aged 35.5 years on average (quartiles: 31.20; 39.51) and free of chronic diseases. We screened out of the RG the 32-/ 40+ year-old males diagnosed with chronic diseases and/or actively sporting.

We used the following test methods to rate the psychosocial health of the sample: biological age test [5]; Shmishek character accentuation typing (psychotyping) method [4]; Bass-Darki Personality Aggression and Hostility test [4]; life quality and social functioning rating SF-36 Health Status Survey recommended by the World Health Organization (WHO), with its data processing toolkit [11]; and STATISTICA v.7 software for the mathematical statistical analyses.

Results and discussion. We found the biological age in the EG 10 years higher on average than the passport one, with the difference rated statistically significant; that means that the professional sport fast wears many bodily organs and systems due to its high stressors. The situation was surprisingly much the same for the unsporting RG, however.

Aggression as a personality trait may be interpreted as a preference for violent methods on the way to some personal goals and needs. As far as the modern professional ice hockey sport is concerned, healthy/ reasonable aggression is deemed important for success [6], conditional on the athletes being able to effectively control it and vent only when the game situation requires. When the individual aggression spirals beyond control, it often provokes a variety of deviant behaviors and, hence, social health disorders/ maladjustments.

The Bass-Darki test method found the EG prone to verbal aggression. The neuroticism typical of the retired elite hockey players is associated with rather high feel-of-guilt rates close to the top limit, $Me = 6.51$. Such intrapersonal situation develops neurotic conflicts associated with the growing stress intolerance, hampered personality progress, psychosomatic diseases, obsessions and addictive disorders including alcoholism etc. [2]. Analysis of the Bass-Darki test data including the hostility indices (median: 8.57; quartiles: 4.21; 15.10) and personality aggression indices (median: 16.5; quartiles 5.11; 29.10) found them excessive in the EG i.e. indicative of a predisposition for social health disorders/ maladjustments.

The tests found the following character accentuation types in the EG, in a descending order: hyperthymic type, exalted type and emotive type. This hierarchy explains why characters of professional players are normally dominated by optimism, sociability and

talkativeness and they always need appreciation and attention from the surrounding. The RG was tested with smoother accentuation profiles with some emphasis on the inhibitive personality traits peaking in the stuck, pedantic types.

Furthermore, we rated life quality in EG and RG by the health and social functionality self-rates, with special attention to the social adaptation in the EG.

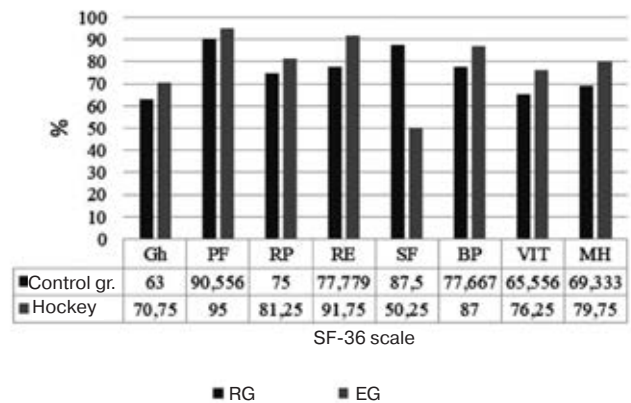


Figure 1. Life quality/ social functionality rates in the EG and RG, %

Our analysis of the test data found the greatest problems faced by a professional hockey player in the social functionality falls tested in 50.3% of the EG – due to the social activity limitations (see Figure 1) – versus the RG with its relatively high social functionality rate (88%). Around 30% of the EG was tested with sags in the perceived overall vitality. Partially these sags may be associated with the falls in the perceived general health reported by 70.8% of the EG, plus depression, anxiety and shortages of positive emotions found in 20% of the EG and summarized in the mental health issues tested in 79% of the EG. It should be mentioned that the EG subjects tend to associate their general physical fitness with the role-driven social functioning (work, everyday chores), i.e. role-physical rate estimated at 81% for the group.

Conclusion. The fact that the biological age of the retired elite hockey players was tested on average 10 years higher than the actual one was interpreted as indicative of the physiological and physiological wear – that needs to be addressed by a special rehabilitation service. The dominant psychotyping and aggression tests and analyses give a sound basis for the mental conditioning and disease prevention service with efficient post-retirement guidance to help the retired hockey players to effectively socialize, with the socializing service customizable to the individual psychotypes. The life quality rating tests and psychological profiling studies of the EG supported

by objective medical tests and examinations are recommended as a basis for the medical and psychosocial support service to athletes in the post-retirement period.

References

1. Ananov B.G. Problems of modern human science. Academy of Sciences of the USSR, Institute of Psychology. Moscow: Nauka publ., 1977. 379 p. Ref.: 373-378 p.
2. Zagaynov R.M. Psychology of elite sports. Moscow: Sovetskiy sport publ. 2012. 292 p.
3. Ilyin E.P. Psychophysiology of human states. St. Petersburg: Piter publ., 2005. 415 p.
4. Marishchuk V.L., Bludov Yu.M., Serova L.K. Psychodiagnosics in sports. Moscow: Prosveshchenie publ., 2005. 349 p.
5. Markina L.D. Rating biological age of man by V.P. Voitenko. Study guide for independent work of medical and psychology students. Vladivostok: VSMU publ., 2001 29 p.
6. Mikhno L.V. [ed.] Russian hockey in changing world: from present through past to future. St. Petersburg: Aleteyya publ., 2016. 384 p.: il.
7. Safonov V.K. Aggression in sports. St. Petersburg: SpBSU publ., 2003 – 159 p.
8. Engel G.L. The clinical application of the biopsychosocial model. American Journal of Psychiatry. 1980. Vol. 137.
9. Stambulova N.B., Ryba T.V. Athletes' Careers Across Cultures. Routledge. 2013, 288 p.
10. Weiner H.: Graves' disease. In: Psychobiology and Human Disease. Elsevier, New York Engel, 1977 (pp. 319-414).
11. Ware J.E., Snow K.K., Kosinski M., Gandek B. SF-36 Health Survey. Manual and interpretation guide. The Health Institute, New England Medical Center. Boston, Mass.-1993.

University athletes' stress tolerance and conscious self-control: questionnaire survey

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Abstract

Objective of the study was to rate and profile the key self-control versus the stress tolerance in university athletes as the basic components of a personality resource for progress and success in academic sports.

Methods and structure of the study. We sampled for the Experimental Group (EG) systemically sporting university athletes (n=41, including 23 males and 18 females) qualified Class III to CMS; and for the Reference Group (RG) their unsporting peers (n=40, including 20 males and 20 females); with both groups aged 19 years on average.

The subjects' stress tolerance was assessed in Y.V. Shcherbatykh's stress tolerance test. The general self-regulation level as an indicator of the degree of formation of the individual system of conscious self-regulation of arbitrary activity was studied using the methodology "Style of behavior self-regulation – 98" (V. Morosanov).

Results and conclusions. The study found that habitual university sports significantly improve the individual self-control and stress tolerance. The university athletes were tested significantly higher on virtually every self-control scale and more independent, with their stress sensitivity test rates being significantly lower than in the unsporting RG. Stress tolerance was found in the highest correlations with a few self-control abilities including the result-valuation, goal setting and self-control independence ones.

Keywords: *stress sensitivity, stress tolerance, conscious self-control, sporting activity, skilled athletes, students.*

Background. Modern sports are rather challenging in many aspects with athletes facing multiple stressful situations of high demand for their individual self-control and stress tolerance. These challenges in academic sports are complicated by the daily learning activities with their additional physical and emotional stressors and, hence, student athletes need to design and manage their lifestyles in the most efficient manners with a special role played by good self-control and stress tolerance [3].

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sporting university athletes (n=41, including 23 males and 18 females) qualified Class III to CMS; and for the Reference Group (RG) their unsporting peers (n=40, including 20 males and 20 females); with both groups aged 19 years on average.

The sample was tested for the stress tolerance by the Y.V. Shcherbatykh questionnaire survey with its inversely related stress tolerance and stress sensitivity categories [4] and five test scales to rate: sensitivity to situations beyond control; proneness to complicating things; predisposition to psychosomatic diseases; and destructive stress coping; and constructive stress coping strategies. Note that the key stress tolerance index is assumed as inverse to the specific stress sensitivity index or general stress sensitivity. We computed a dynamic stress sensitivity index as aggregating the above four ones save for the general stress sensitivity.

Furthermore, we tested the general self-control using the V.I. Morosanova "Behavioral Self-control Style - 98" questionnaire survey [2]. The questionnaire survey rates the planning ability i.e. goal setting with realistic and sustainable plans; forecasting ability to design the plans implementation ways; modeling ability to take into account the external and internal conditions; results valuation ability – to adequately assess own self and accomplishments; plus two scales to rate the personality control qualities: flexibility as the ability to adjust to changing conditions; and independence as the autonomy in activity planning and control.

Results and discussion. Given in Table 1 hereunder are the stress tolerance test rates of the sample.

Statistical analysis found the stress tolerance in EG significantly higher for both gender subgroups on the general and dynamic stress sensitivity scales than in the RG. The RG were tested more prone to excessive responses to situations beyond control and things complicating responses. The RG (f) subgroup was tested more predisposed to psychosomatic diseases and destructive stress coping behavior – and this appears to be the prime reason for the intergroup differences on the stress sensitivity scale. However, the RG was tested as high as the EG on the constructive stress coping scale.

It should be mentioned in this context that the RG and EG males were found equally prone to destructive

stress coping behavior albeit the constructive stress coping rates were still within the moderate range. The destructive stress coping behavior was also found gender-specific, with the females more prone to over-eating, and males to aggression. As for the constructive coping strategies analyses, the RG and EG behavior was found dominated by communication and physical activity, respectively. Given in Table 2 hereunder are the test rates yielded by the V.I. Morosanova "Behavioral Self-control Style questionnaire survey.

We used the Mann-Whitney U-criterion to fix significant differences in the general self-control, responses to situations beyond control, results valuation and independence in the EG versus RG. Advantages of the EG on these test scales were explained by more developed self-rating and results valuation abilities, and better planning and management on the way to preset goal, i.e. more mature self-controls in the sporting EG.

Correlation analysis of the self-control and stress tolerance found significant negative correlations of the general stress tolerance, flexibility and independence with every stress sensitivity test rate: see Table 3. This finding gives grounds to conclude that the self-rating and result-valuation abilities associated with good goal setting and achieving ones – heavily contribute to the individual stress tolerance. When these abilities and qualities are well developed, the individual better assesses and controls every situation, avoids drama-

Table 1. Group averages on the stress tolerance test scales, with significant intergroup differences

Group	RG (m) (n=20)	EG(m) (n=23)	RG (f) (n=20)	EG(f) (n=18)	RG (n=40)	EG (n=41)
Responses to situations beyond control	22,65	18,4*	30,85	22,83**	26,25	20,4**
Stress tolerance	16,65	11,1*	30,6	21,7*	32,2	15,8**
Psychosomatic diseases	13,8	13,1	24	19,6**	18,9	16,0*
Destructive stress coping	16,6	16,3	22,05	16,9**	19,3	16,6**
Constructive stress coping	30,95	30,8	30,3	30,55	30,6	30,7
Dynamic stress sensitivity	38,75	28,1**	77,2	50,48**	57,05	38,1**
General stress sensitivity	69,7	58,9**	107,5	81,03**	87,65	68,8**

Note: * $p \leq 0.05$; ** $p \leq 0.01$; m - males, f - females

Table 2. Group averages on the self-control test scales, with significant intergroup differences

Group	RG (m) (n=20)	EG(m) (n=23)	RG (f) (n=20)	EG(f) (n=18)	RG (n=40)	EG (n=41)
General self-control	28,95	32,4**	25,55	27,4**	27,25	30,22**
Planning ability	6,05	6,35	5,9	6,83	5,975	6,56*
Responses to situations beyond control	5,65	6,3*	5,0	6,4*	5,325	6,32*
Forecasting ability	4,95	5,5	5,8	6,2	5,375	5,83
Modeling	5,75	6,3	5,6	6,2	5,675	6,23**
Flexibility	6,8	6,4	6,75	7,7	6,75	6,8
Independence	5,95	6,6*	5,05	5,9**	5,5	6,27**

Note: * $p \leq 0.05$; ** $p \leq 0.01$; m - males, f - females

Table 3. Spearman correlation indices r_s for the stress control test rates in the EG

Stress sensitivity	Responses to situations beyond control	Stress tolerance	Psychosomatic diseases	Destructive stress coping	Constructive stress coping	Dynamic stress sensitivity
Self-control						
General self-control	-,623**	-,427**	-,412**	-,672**	,617**	-,626**
Planning ability	-,316*	-,178	-,143	-,342*	,608**	-,348*
Responses to situations beyond control						
Forecasting ability	-,477**	-,508**	-,583**	-,652**	,336*	-,629**
Modeling	-,025	,063	,036	-,172	,350*	-,073
Flexibility	-,200	-,142	-,176	-,215	,317*	-,231
Independence	-,056	,123	,090	-,409**	,017	,060
	-,717**	-,506**	-,427**	-,506**	,309*	-,592**

Note: * $p \leq 0.05$; ** $p \leq 0.01$

tizing it and, hence, prevents/ mitigates the situation-specific stresses and the associating negative psychosomatic responses. Note that the EG was tested significantly higher than the RG on these self-control scales: see Table 3.

The responses to situations beyond control rate was found in significant negative correlation with the planning ability – that means that the well-developed goal-setting and planning skills mitigate sensitivity of responses to situations beyond control thereby making an individual more realistic and balanced in assessments.

Every self-control component, save for the flexibility index, was found significantly correlating with the constructive coping index. Knowing that the questionnaire was designed to rate the individual proneness to destructive or constructive stress coping strategies rather than identify the specific ones among them, we would conclude that this finding agrees with the prior study that found no significant correlations between the key stress coping strategies and the general self-control [1].

The self-control flexibility index was found in significant negative correlation with the destructive stress coping index (see Table 3). This means that the self-control flexibility contributes to constructive behavior and safeguards people from addictions to destructive stress coping models. In other words, the self-control flexibility paves the way to different stress-mitigation

options to find the most efficient ones rather than sets the individual constructive stress coping strategies.

Conclusion. The study found that habitual university sports significantly improve the individual self-control and stress tolerance. The university athletes were tested significantly higher on virtually every self-control scale and more independent, with their stress sensitivity test rates being significantly lower than in the unisporting RG. Stress tolerance was found in the highest correlations with a few self-control abilities including the result-valuation, goal setting and self-control independence ones.

References

1. Belozerova L.A., Bragina E.A., Semenova I.A. et al. Self-control and stress-coping strategies in sports. *Teoriya i praktika fiz. kultury*, 2018. no 3, pp. 15-17. *Teoriya i praktika fiz. kultury*. 2018. No. 3. pp. 15-17.
2. Morosanova V.I., Konoz E.M. Style self-regulation of human behavior. *Voprosy psikhologii*, 2000, no. 2, pp. 118-127.
3. Povzun V.D., Povzun A.A., Apokin V.V. et al. University sport department students' stress tolerance analysis. *Teoriya i praktika fiz. kultury*. 2016. No.9. pp. 89-91.
4. Scherbatykh Y.V. Psychology of stress and methods of correction. St. Petersburg: Piter publ., 2006. 256 p.

Benefits of specific goals setting for punching speed training in boxing

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Abstract

Objective of the study was to analyze benefits of the specific goals setting for punching speed training in boxing sport.

Methods and structure of the study. We used in the study Qualisys Movement Test System equipped with Oqus high-speed video cameras, with the test data processed by Qualisys Track Manager (QTM) video motion analysis software that effectively simplifies the 3D video motion analysis and generates, on a real-time basis, clear images and movement profiles of the analyzed objects. The tests were designed to profile the left- / right-hand punching skills of the Russian national boxing team members. We set the following specific goals in trainings: (1) Top power; (2) Top speed; (3) Top speed and power; (4) Input legs and torso; (5) Input torso only; and (6) Arms only. Every punch was executed strictly on a signal from a standard standing fighting stance, without prior swings and settings.

Results and discussion. The punching speed to dynamics ratios for the punching sequences – from the start to the target contact point – were found specific goals dependent. Thus the highest punching speed was achieved in case of the ‘top speed and power’ goal. It should be noted that the ‘top speed’ case generated a lower absolute speed albeit in most cases faster in the total punching time. This means that the fastest punch is achieved in case of the ‘top speed and power’ goal rather than the ‘top speed’ one – i.e. when the individual explosive force is mobilized in full. Therefore, the top punching speed is largely associated with the top punching power developed for the shortest time.

Keywords: *punching speed, boxing, punching power, target.*

Background. Progress in boxing techniques will be based on good understanding of the movement biomechanics. Subject to traditional analyses of the punching biomechanics with coordination specifics are the following well-known three phases of a punch: (1) leg repulsion move; (2) rotation of the pelvis; and (3) arm straightening towards the target; with the boxer’s body mass center moved up vertically during this combination [2, 3]; and with the body mass center movement time matching with the arm straightening phase time [1]. The traditional punching technique training method is designed to develop the following three punching styles: (1) ballistic; (2) non-ballistic; and (3) power punches. They differ in their technical and tactical biodynamics and are trained by multiple controlled-intensity tools and methods [4].

Goals in the training process will be set for specific performance improvement missions although actual progresses shall be rated by the relevant modern test systems otherwise they are never assessed fairly. With the latest scientific and technical progress, the sports science and practitioners have received modern training/ competitive progress testing and analyzing tools using innovative technologies.

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It should be mentioned that for experiment standardizing purposes we required the punches being made from stationary identical standing positions, whilst in actual fight situations the individual punching techniques may be wider different. Actual punches may be made with jumps, dips etc., with their speed often dictated by the individual punching skills and synergized actions of the limbs in every punching sequence; i.e. actual techniques in elite boxing sport are rather individual.

Punch accuracy is known to depend on the movement speed and time: the higher is the speed, the more difficult is the movement control, the shorter is the punching move and more challenging for correction. Therefore, the punching efficiency largely depends on the high-speed movement control skills. The punching biomechanics was found virtually independent on the target position (head or torso) and dependent instead on the specific goal – ‘top power’ or ‘top speed’ – as required by the specific tactical missions in response to the fight situations.

The top power goal was found to generate the

maximal shock impulse, albeit the punching time was also maximal – i.e. gains in power are actually offset by losses in speed. In case of the ‘top speed’ goal, both the shock impulses and punching times were the lowest – that means that power limitation generally improves the punching speed. On the whole, the punching biomechanics are dictated by the punching speed or power control within a specific timeframe.

Conclusion. The punching power and speed profiling Qualisys Movement Test System was found to generate fairly objective data on the punch biomechanics and dynamics depending on specific goals; and, therefore, may be recommended for application in the punching technique excellence systems. As demonstrated by the study data and analyses, when the goal sets ‘top punching power’, such punches are never the fastest ones. The best speed is secured by the ‘top power and speed’ goal in trainings. Findings of the study and the test technology may be recommended for application for the boxers’ technical and tactical skills excellence purposes. Absolute punching power in case of the ‘hands only’ goal was tested lower than in the other cases - apparently due to the fact the highest speed in this case is limited by the short distance, whilst the distance control is critical for success in boxing. Therefore, innovative testing and analytical technologies studied herein may be recommended for the technical-tactical skills excellence trainings in the movement coordination intensive sports disciplines.

References

1. Volkov A.N., Smirnov M.A. Stabilometry to study coordination structure of boxers’ punching actions. *Vestnik sportivnoy nauki*. 2011. No. 3. pp 87-91.
2. Malinovskiy B.V., Saar D. Collection of training materials for Olympic boxing trainers. Textbook. Tallinn: Sunprintinvest, 2008. 149 p.
3. Neupokoev S.N., Kapilevich L.V., Pavlov N.Z. Ways of Enhancement of Efficiency of Motor Actions in the Final Phase of Impact Motion in Qualified Boxers. *Teoriya i praktika fiz. kultury*. 2013. No. 7. pp. 44-48.
4. Yakupov A.M., Stepanov M.Yu. Methodology of Formation of Strike Action in Boxing. *Teoriya i praktika fiz. kultury*, 2014, no. 9, pp. 77-79.

Specific features of athletes' recovery after sub-maximal physical loads

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Abstract

Objective of the study was to identify the specific features of recovery of the functional status of a person under rest conditions and using the local rhythmic thermal effects after performing sub-maximal physical loads to failure.

Methods and structure of the study. The study involved 19 male amateur athletes aged 18-20 years. Each testee was examined twice, when they were to do physical exercise to failure on a cycle ergometer. During the first examination, the athletes recovered after the exercise in a state of rest (passive recovery), and during the second – against the local rhythmic thermal effects synchronized with the respiratory rhythm. The athletes' functional status was evaluated based on the ECG and pneumogram data, external respiration rates, and level of subjective well-being. Before and after the examination, we measured the subjects' arterial blood pressure and hemodynamic indices.

Results and conclusions. The local rhythmic thermal effects synchronized with the respiratory rhythm activated the vasomotor center in the medulla oblongata and shifted the autonomic balance towards the parasympathetic nervous system. As a result, the vessel lumen increased, which led to a decrease in the cardiac output and contributed to the normalization of hemodynamics. With the increase in the parasympathetic effects, there occurred a bronchial narrowing, which led to a downward trend in lung ventilation. As a result, there were fewer shifts in the vegetative values relative to their initial background, which suggested an almost complete recovery of the functional status of the testees. This clearly proves the effectiveness of recovery based on the local rhythmic thermal effects.

Keywords: *sub-maximal physical load to failure, recovery, local rhythmic thermal effects.*

Background. Local rhythmic thermal effects are a non-medicated method of influence on the functional state of the human body. It is shown that human reaction to the rhythmic thermal exposures depends both on the intensity of the thermal stimulus and frequency of stimulation [4]. The wide range of the stimulus exposure parameters arises the interest of researchers in this method.

Objective of the study was to identify the specific features of recovery of the functional status of a person at rest and using the local rhythmic thermal effects after performing sub-maximal physical loads to failure.

Methods and structure of the study. The study involved 19 male skilled athletes aged 18-20 years

doing sports on a regular basis. Each testee was examined twice with a 2 week interval, when they were to exercise to failure on a cycle ergometer. During the first examination, the athletes recovered after the exercise in a state of rest (passive recovery), and during the second – against the local rhythmic thermal effects synchronized with the respiratory rhythm. Rhythmic thermal exposures were carried out by means of the “Vita-Therm” device (“Neuro-soft”, Ivanovo city, Russia), the thermal element of which was fastened in the nasolabial triangle of the testees. The temperature of the thermal stimulus was 30 oC, and the heat exposure to the skin was regulated by the testees themselves by changing their breathing patterns.

During the examination the testees were in the following functional states: "initial state" (2.5 min), "warming up" (1 min), "step load test to failure" at the load power of 160W and constant pedaling speed of 60 rpm, "recovery" (6 min), "final state" (2.5 min). For load testing the cycle ergometer "SportsArt 5005" was used, and the test was run under the control of electrocardiography (ECG) and pneumography (PG) using a computer complex "Poly-Spectrum-8" ("Neurosoft", Ivanovo city, Russia). The real pedaling speed was registered using "SIGMA – bc-509" (Germany) equipment, with its sensor being attached to a pedal of the cycle ergometer.

Electrocardiography and pneumography were recorded throughout the study. Based on the ECG and pneumography rates, we evaluated the athletes' heart rate (HR, bpm) and respiratory rhythm (RR, 1/min), spectral power of the ECG waves (VLF-, LF-, HF-waves) [1], as well as the subjective well-being level on a five-point scale (SAM, points). The testees' subjective complaints were registered. In the initial and final states, systolic (SBP, mmHg) and diastolic (DBP, mmHg) blood pressure were measured using the Korotkov method, and vital capacity (VC, l) was measured using the spirometer "SP-1".

The central hemodynamic indices were estimated by means of a calculation: stroke volume ($SV, ml = 100 + 0.5 \cdot PP - 0.6 \cdot DBP - 0.6 \cdot A$), where PP is pulse pressure, A is the age of the tested in years; minute blood volume ($MBV, l/min = HR \cdot SV / 1000$) [6] and respiratory minute volume ($RMV, l/min = RR \cdot TV$) [2], where $TV = 0.12 \cdot VC$ (l) [7]. After recovery, the shifts in these indicators (shift, %) relative to their initial background was calculated.

Results and discussion. Strenuous exercise to failure in the sub-maximal power zone requires from an athlete a high energy input, and therefore is accompanied by a sharp increase in the circulatory and respiratory system performance [5].

In both surveys, the workload was accompanied by a significant increase in HR ($p < 0.05$), while after recovery, on the contrary, HR decreased significantly ($p < 0.05$). Moreover, after recovery in the first examination, HR was found to be significantly higher than in the second examination ($p < 0.05$). It follows that the level of parasympathetic effects on the heart was statistically significantly higher after the recovery with the use of rhythmic thermal exposures. *Therefore, local rhythmic thermal effects can be attributed to the effective means of reduction of the activity of the sympathetic regulation unit after strenuous exercise to failure.*

The spectral analysis of HR made it possible to evaluate changes in the work of the vegetative systems of the human body [8]. The comparative analysis of the physiological indicators in the initial (background-1)

and final (background-2) backgrounds helped evaluate the effectiveness of the recovery means and methods.

During the recovery without rhythmic thermal exposures, a statistically significant decrease was observed in the total spectral power (TP) of HR ($p < 0.05$), power of VLF-waves ($p < 0.05$), LF-waves ($p < 0.05$), and HF-waves ($p < 0.05$), as well as the reduction of SDNN ($p < 0.05$) relative to their initial background, which is a clear evidence of the strengthening of the sympathetic effects on the heart. This was also confirmed by the changes in the hemodynamic and respiratory indices. Thus, after recovery, there was a decrease in SBP from 132.5 to 122.4 mmHg ($p < 0.05$, SBP shift = -7.6%), increase in HR from 82.8 bpm to 106.8 bpm ($p < 0.05$, HR shift = 28.9%) and increase in MBV from 5.6 to 7.3 l/min. ($p < 0.05$, MBV shift = 30.3%) relative to their initial background. We assume that the significant increase of HR and MBV after recovery without rhythmic thermal exposures indicated incomplete recovery of the indicators and preservation of sympathetic influences on the heart of the testees. In addition, their RR increased from 15.1 to 18.5 1/min ($p < 0.05$, RR shift = 22.5%), which led to an increase in RMV from 8.2 to 10.2 l/min ($p < 0.05$, RMV shift = 24.3%). The high level of lung ventilation after recovery was a consequence of post-load hypoxia. As a result, the mean values of the testees' subjective well-being level decreased from 4.6 to 4.3. Therefore, *recovery without rhythmic thermal exposures takes place against the preservation of sympathetic effects on the heart, there is no complete recovery.*

During the recovery with rhythmic thermal exposures, the total spectral power (TP) of HR decreased too ($p < 0.05$). So did VLF ($p < 0.05$), LF ($p < 0.05$), and HF ($p < 0.05$); however, it should be emphasized that after this kind of recovery VLF- and LF-waves normalized. As a result, the VLF-wave power increased by 50.3%, and that of LF-waves - by 131.1% ($p < 0.05$) compared to the recovery against the rhythmic thermal exposures background. We believe that such changes reflect not only the strengthening of the humoral-metabolic effects aimed to normalize the O_2 - CO_2 balance in the blood but also the inclusion in the recovery process of the vasomotor center of the oblongata brain, owing to which the vascular tone was weakened. It resulted in a significant decrease in SBP from 131.2 to 115.1 mmHg ($p < 0.05$, SBP shift = -12.3%) and a tendency towards a slight increase in HR from 82.6 to 88.9 bpm (HR shift = 7.6%) and MBV from 5.7 to 6.3 l/min (MBV shift = 10.5%). The decrease in the shift values suggested weakening of the initial sympathetic tone and a shift of the vegetative balance towards strengthening of the parasympathetic effects, which led to *the normalization of the hemodynamic indices after recovery against the rhythmic thermal exposures background.*

It is known that, against the background of increased parasympathetic effects, bronchial contraction [3] occurs, which eventually leads to the suppression of lung ventilation. Thus, in our study, RR and RMV virtually reduced to the initial level, which made the differences insignificant. In addition, after recovery against the rhythmic thermal exposures background, the subjects' subjective well-being level changed. So, according to the testees' self-reports, immediately after recovery with rhythmic thermal exposures, they felt a "pleasant warm, lightness in the whole body, relaxation, feeling of rest and peace". Only 2 subjects felt "sleepy" after recovery. Compared to the initial background, the athletes' well-being level increased from 4.6 to 4.7 points. The comparative analysis of the subjective well-being level after recovery without rhythmic thermal exposures (4.3 points) and with rhythmic thermal exposures (4.7 points) showed that in the latter case the testees' subjective well-being level was statistically significantly higher ($p < 0.05$).

Conclusion. The local rhythmic thermal effects synchronized with the respiratory rhythm activated the vasomotor center in the medulla oblongata and shifted the autonomic balance towards the parasympathetic nervous system. As a result, the vessel lumen increased, which led to a decrease in the cardiac output and contributed to the normalization of hemodynamics. With the increase in the parasympathetic effects, a bronchial narrowing occurred, which led to a downward trend in lung ventilation. As a result, there were fewer shifts in the vegetative values relative to their initial background, which suggested an almost complete recovery of the functional status of the testees. This clearly proves the effectiveness of recovery based on the local rhythmic thermal effects.

References

1. Bayevskiy R.M., Ivanov G.G., Gavrilushkin A.P. et al. Analysis of heart rate variability using various electrocardiographic systems (part 1). *Vestnik aritmologii*. 2002. No. 24. pp. 65-68.
2. Breslav I.S. Breathing patterns: Physiology, extreme conditions, pathology. Leningrad: Nauka publ., 1984. 206 p.
3. Influence of the parasympathetic system on the bronchi. <https://circas.ru/vlijanie-parasimpaticheskoy-sistemy-na-bronhi>.
4. Glazachev O.S., Klassina S.Ya. Correlates of human perception of local rhythmic thermal effects of varying intensity. *Human physiology*. 2004. V. 30. No. 6. pp. 36-43.
5. Zemtsova I.I. *Sports physiology*. Kiev: Olimpiyskaya lit publ., 2010. 219 p.
6. Karpman V.L., Lyubina B.G. Dynamics of blood circulation in athletes. Moscow: Fizkultura i sport publ., 1982. 135 p.
7. Otsenka funktsiy dykhaniya [Respiratory function assessment]. [/https://sport-51.ru/article/physiology/1068-ocenka-funkciy-dyhaniya.html](https://sport-51.ru/article/physiology/1068-ocenka-funkciy-dyhaniya.html)
8. Khodyrev G.N., Khlybova S.V., Tsirkin V.I. et al. Methodological aspects of analysis of temporal and spectral indicators of heart rate variability (literature review). *Vyatskiy meditsinskiy vestnik*. 2011. no 3-4. pp. 60-70.
9. Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology. Heart Rate Variability. Standards of Measurements, Physiological Interpretation, and Clinical Use. *Circulation*. 1996. V. 87. pp. 1043-1047.

Functional reserves of external respiration system and overall physical working capacity of students

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Abstract

Objective of the study was to determine the ways to increase the functional reserves of the external respiration system and overall physical working capacity by means of intense dynamic exercises of different sports orientations.

Methods and structure of the study. The study involved 146 male students aged 16-25 years, including 113 athletes of different sports specializations and qualifications (long-distance runners and sprinters, swimmers, weight-lifters) and 33 non-sporting students. The following methods were applied for the study purposes: PWC170 cycle ergometer test - to assess the subjects' overall physical working capacity; "Cardio+" diagnostic automated complex (Russia) - to measure their heart rate (HR); expiratory pneumotometry (mmHg) - to evaluate the functional reserves of the external respiration system and respiratory muscle strength; inspiratory and expiratory pneumotachometry (l/s), spirometry - to determine the vital capacity. Mercury pneumotometer and "Spiro-Test PC" (Russia) device with the computer data processing were used. We also determined the birth-death ratio in the subjects as the ratio of vital capacity to the body mass.

Results and conclusions. The data obtained showed that the functional reserves of the external respiration system and overall physical working capacity rates in the student increased significantly under the cyclic (aerobic) training loads - running and swimming. At the same time, swimming practices have a more pronounced positive effect on the increase of the functional reserves of the respiratory system. The findings can be used in sports physiology, physical rehabilitation, and sports medicine.

Keywords: *students, athletes, functional reserves of respiratory system, physical working capacity.*

Background. Physical working capacity is among the main criteria that characterize the students' health level. On the other hand, physical working capacity is closely associated with the functional state of the external respiration system (functional reserve) [1, 4-7].

The body's functional reserves are rated by the magnitude of the functional shifts caused by extreme conditions and factors or physical exercises. The functional reserves are the difference between the ultimate manifestation of individual functions and their minimum values in a state of relative rest [1, 3, 8].

There are usually hidden reserves in terms of gas exchange, cardiovascular system, metabolism, and

energy that can be detected by means of experiments using stress tests [1, 3-5, 8].

One of the most relevant research areas, which is well-founded in modern sports science, is an ontokinological approach that consists in the conformity of training loads to the current functional state of those engaged and natural development of their motor functions [2, 8].

Objective of the study was to determine the ways to increase the functional reserves of the external respiration system and overall physical working capacity by means of intense dynamic exercises of different sports orientations.

Methods and structure of the study. The study involved 146 male students aged 16-25 years, includ-

ing 113 athletes of different sports specializations and qualifications (long-distance runners and sprinters, swimmers, weightlifters) and 33 non-sporting students. PWC_{170} cycle ergometer test was applied to assess the subjects' overall physical working capacity. The testees were to perform two stress tests on the cycle ergometer "VE-02" (Russia) at the pedaling speed of 60-80 rpm for 5 min, with 3-min rest breaks, during which we measured the testees' heart rate for 30 s. The test results were evaluated using the following formula [3]:

$$PWC_{170} = W_1 + (W_2 - W_1) \frac{170 - f_1}{f_2 - f_1},$$

where W_1 and W_2 – first and second stress test results, f_1 and f_2 – heart rate at the end of the first and second stress tests.

"Cardio+" diagnostic automated complex (Russia) was used to measure their heart rate (HR). The functional reserves of the external respiration system and respiratory muscle strength were assessed using expiratory pneumotometry (mmHg); inspiratory and expiratory pneumotachometry (l/s), spirometry (determines the vital capacity (VC)). Mercury pneumotometer and "Spiro-Test PC" (Russia) device with the computer data processing were used. We also determined the birth-death ratio (BDR) in the subjects as the ratio of VC to the body mass.

Results and discussion. It is shown that the functional reserves of the respiratory system and overall physical working capacity of the students increased significantly during cyclic activities (see Table 1).

Student-athletes' specializations influenced the level of the functional reserves of the external respiration system, contractile function of the respiratory muscles, and the level of tolerance to physical loads. At the same time, the greatest increase was

observed in the swimmers and long-distance runners, the smallest - in the sprinters. The weightlifters did not differ from the non-athletes in terms of the level of development of the functional reserves of the external respiration system and overall physical working capacity level. Thus, the pneumotometric test rates were as follows: non-athletes - 80.0 ± 10.3 mmHg, swimmers - 125.0 ± 9.4 mmHg ($p < 0.001$), long-distance runners - 112.6 ± 8.8 ($p < 0.001$), sprinters - 94.8 ± 10.2 mmHg, weightlifters - 84.7 ± 10 mmHg. As a result of the training process, the vital capacity and pneumotachometric test rates also changed statistically significantly.

Vital capacity reached its highest values in the track and field athletes and swimmers, and the lowest ones - in the non-athletes and weightlifters. Thus, vital capacity in the swimmers was 6.2 ± 0.3 l ($p < 0.001$), long-distance runners - 5.6 ± 0.2 l ($p < 0.001$), sprinters - 5.2 ± 0.2 l ($p < 0.01$), weightlifters - 4.6 ± 0.2 l, and main health group students - 4.1 ± 0.2 l.

At the same time, there were significant differences in the physical working capacity rates. PWC_{170} was the highest in the swimmers (4.4 ± 0.09 W/kg ($p < 0.001$)), long-distance runners (4.8 ± 0.10 W/kg ($p < 0.001$)), and sprinters (3.8 ± 0.10 W/kg ($p < 0.001$)), while in the weightlifters and non-athletes it was the lowest: 1.8 ± 0.09 W/kg and 1.8 ± 0.12 W/kg, respectively.

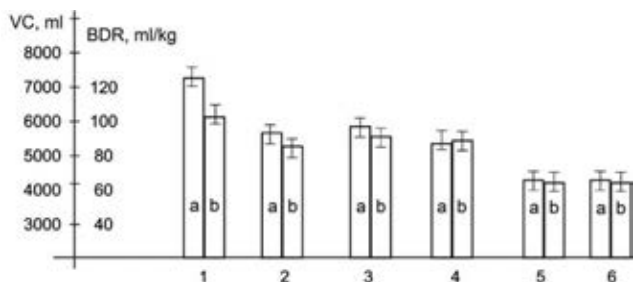
However, it should be emphasized that, compared to other athletes, the swimmers had the highest vital capacity rates - 6.2 ± 0.3 l ($p < 0.001$), pneumotometric rates - 125 mmHg on average ($p < 0.001$), inspiratory pneumotachometric rates - 5.7 ± 0.2 l/s ($p < 0.001$) and expiratory pneumotachometric rates - 6.2 ± 0.2 l/s ($p < 0.001$), which reflected the increased contractility of the respiratory muscles and the high degree of bronchial patency of the swimmers. Consequently, regular trainings promote the most effective development of their respiratory muscles.

Table 1. Spirometric, pneumotometric, pneumotachometric and PWC_{170} test rates in athletes of different specializations, $M \pm m$

Specialization	Indicators				
	PWC_{170} , W/kg	Vital capacity, l	Pneumotometry, mmHg	Pneumotachometry, l/s	
				inspiratory	expiratory
Swimmers (n=35)	$4.4 \pm 0.09^{***}$	$6.2 \pm 0.3^{***}$	$125.0 \pm 9.4^{***}$	$5.7 \pm 0.2^{**}$	$6.2 \pm 0.2^{***}$
Long-distance runners (n=28)	$4.8 \pm 0.10^{***}$	$5.6 \pm 0.2^{***}$	$112.6 \pm 8.8^{***}$	$5.6 \pm 0.2^{**}$	$5.4 \pm 0.3^{**}$
Sprinters (n=25)	$3.8 \pm 0.10^{***}$	$5.2 \pm 0.2^{**}$	94.8 ± 10.2	5.0 ± 0.3	4.7 ± 0.3
Weightlifters (n=25)	1.8 ± 0.09	4.6 ± 0.2	84.7 ± 10.0	4.3 ± 0.3	4.3 ± 0.3
Non-athletes (n=33)	1.8 ± 0.12	4.1 ± 0.2	80.6 ± 0.7	4.1 ± 0.7	4.4 ± 0.3

* – $p < 0.05$, ** – $p < 0.01$, *** – $p < 0.001$ – significance of differences compared to the group of non-athletes (main health group students).

The figure illustrates the data obtained on vital capacity and BDR. These indicators were tested in the student-athletes with different specializations and qualifications. The Control Group (CG) was made of the non-athletes.



Vital capacity (a) and BDR (b) rates in highly- (1) and low-skilled swimmers (2); highly- (3) and low-skilled (4) long-distance runners; weightlifters (5); non-athletes, main health group students (6)

As seen from the figure, the highest increase in the vital capacity and BDR under the training loads was observed in the highly-skilled swimmers and long-distance runners, with the smaller increase observed in the low-skilled student-athletes, and no increase in these indicators in the weightlifters.

Conclusions. The highest levels of the functional reserves of the respiratory system and overall physical working capacity were found in the swimmers and long-distance runners, while in the weightlifters and non-athletes these indicators did not differ statistically significantly.

The degree of improvement in the levels of the functional reserves of the respiratory system and overall physical working capacity of the student-athletes during cyclic activities depended on their qualification: in the highly-skilled swimmers and long-distance

runners, these indicators were higher than in the low-skilled athletes.

References

1. Bobrik Yu.V. Ethnic features of level of functional reserves of cardiorespiratory system, general physical work capacity in domestic and foreign students. *Krymskiy zhurnal eksperimentalnoy i klinicheskoy meditsiny*. 2016. No. 2. pp. 57-59.
2. Zagrevskaya A.I., Lubysheva L.I. Ontokinological approach for sportization of physical education within national education system. *Teoriya i praktika fiz. kultury*, 2017, no. 6, pp. 6-8.
3. Karpman V.L., Belotserkovskiy Z.B., Gudnov I.A. *Testing in sports medicine*. Moscow: Fizkultura i sport, 1988. 208 p.
4. Korepanov A.L. Rating heart rate variability in boys and young men of Sevastopol. *Teoriya i praktika fiz. kultury*. 2019. No. 9. pp. 26-28.
5. Korepanov A.L., Golovko O.N., Motornaya S.E. Aerobic potential in adolescents with different physical development rates. *Teoriya i praktika fiz. kultury*. 2020. No. 2. pp. 39-41.
6. Mametova O.B., Titarenko A.A., Lukavenko A.V. et al. Features of functional state of respiratory system in foreign first year students. *Krymskiy zhurnal eksperimentalnoy i klinicheskoy meditsiny*. 2018. No. 1 (8). pp. 43-48.
7. Mametova O.B., Moroz G.A. Effect of paravertebral muscle relaxation on forced breathing in athletes. *Sportivnaya meditsina: nauka i praktika*. 2015. No. 4 (21). pp. 26-30.
8. Minina E.N., Lastovetskiy A.G., Bobrik Y.V. et al. Benefits of prognostic ratings of cardiac activity in modern football. *Teoriya i praktika fiz. kultury*. No. 9. 2018. pp. 78-82.

Informative criteria for assessing vestibular system functionality in university students

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Abstract

Objective of the study was to identify an informative criterion for assessing the functional state of the vestibular system of university students.

Methods and structure of the study. The experiment was run at the premises of the FSBEI of HE "Chuvash State Agricultural Academy" from September through October 2019. Sampled for the study were the 1st-2nd-year (18-20 years old) students (n=58) attributed to the main health group. Each subject gave a pre-experimental written informed consent for the study. The subjects were tested during the physical education classes right after the introductory part.

The functional state of the vestibular apparatus was rated in the common tests of Yarotsky, Bondarevsky, and Romberg.

Results and conclusions. The mathematical processing of the data obtained in the Romberg's, Bondarevsky's, and Yarotsky's tests revealed that it is the Romberg's test that yields the most informative results. This was evidenced by the comparative analysis of the test results by the normal distribution law (Gaussian distribution), which makes it possible to recommend this test for the practical use in physical education of students when assessing their functional state.

Proceeding from the study findings, in assessing the success of the sports competences mastering process, it is recommended to focus not only on the physical fitness of students but also on the dynamics of the functional test rates. Firstly, this will make it possible to timely adjust the educational process of sports training. Secondly, this will contribute to the successful development of the psychophysical qualities required for the relevant professions.

Keywords: *students, experiment, vestibular stability, sensory system, normal distribution law, coefficient of variation.*

Background. Nowadays, special attention is to be paid to the fact that the vast majority of students are unable to master the physical education and sports discipline programs for a range of reasons (heredity, ecology, ever-increasing intellectualization of the training process, etc.). Given the situation, teachers of the relevant departments have to assess the level of development of the necessary competences in students based on good standing and accomplishment of additional tasks: reference papers, participation in various sporting and mass participation events, etc. At the same time, upon

personal pedagogical experience and taking into account the opinion of a number of researchers [2, 4, 7, 9], we recommend using different functional test results as a criterion of effectiveness of mastering the physical education and sports discipline programs. Therefore, it remains a burning issue to choose the most informative functional tests that would be simple and easy to use, would not require complex instrumentation, and would be distinct in the quick calculation of the results.

The data presented in the research papers [1, 3, 6-8] demonstrate that although the selection of

Ratio between functional test results in students of Chuvash State Agricultural Academy (n=58)

Indicators	Functional tests, sec		
	Bondarevsky's test	Romberg's test	Yarotsky's test
μ	10.10	5.84	40.27
δ	± 11.12	± 3.16	± 41.82
Coefficient of variation	110.20%	54.14%	103.87%

tests to assess the functional state of the cardiovascular (Ruffier test, Martine-Kushelevsky test, etc.) and respiratory systems (Stange's test, Genche's test, Rosental's test, Skibinskaya's test, Shafransky's test, Serkin's test, etc.) creates no problems, the tests to assess the functional state of the sensory systems, in particular, vestibular one, as well as the options as how to carry them out, recommended in the scientific and methodological literature, differ, which prevents from their effective implementation in the educational process.

The vestibular system functionality is traditionally rated based on the results of such functional tests as Bondarevsky's, Yarotsky's, and Romberg's tests. However, the most common variant of Romberg's test is its complex variant that consists in balancing on one leg [5, 6]. For students, the normal value of Yarotsky's test is 28 sec, Bondarevsky's and Romberg's test - 15 sec.

Vestibular stability is a very important indicator that not only makes it possible to timely determine the onset of fatigue and functional state of the vestibular system but also identify possible ataxia (lack of muscle coordination provided there is no muscle weakness), which is often mistaken for a lack of agility.

Objective of the study was to identify an informative criterion for assessing the functional state of the vestibular system of university students.

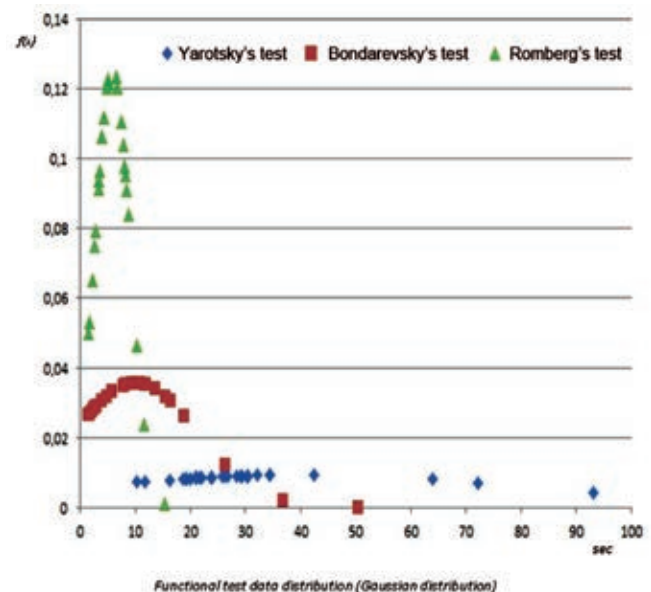
Methods and structure of the study. The main research methods applied were analysis and generalization of scientific and methodological literature, ascertaining experiment, mathematical data processing, interpretation of the results obtained by the law of normal distribution (Gaussian distribution ($f(x)$)). The mathematical statistics methods were applied to calculate mean value (μ), standard deviation (σ), and coefficient of variation (CV); the significance of differences between the measured indicators was determined using the Student t-criterion, with the significance level of $p < 0.05$.

The experiment was run at the premises of the FSBEI of HE "Chuvash State Agricultural Academy" from September through October 2019. Sampled for the study were the 1st-2nd-year (18-20 years old) students (n=58) attributed to the main health

group. Each subject gave a pre-experimental written informed consent for the study. The subjects were tested during the physical education classes right after the introductory part.

Results and discussion. To select the most informative test of the above, which would makes it possible to adequately assess the functional state of students' vestibular system, we conducted an ascertaining experiment, the results of which are presented in the table. Thus, according to the Yarotsky's test results, the subjects had a well developed vestibular system: the arithmetic mean of the indicators exceeded the normal value by almost one and a half times. However, the Bondarevsky's and Romberg's test results suggest otherwise. In the first case, the arithmetic mean was almost one and a half times lower than the normal value, while in the second case it was almost three times lower. And according to the Student t-criterion, the Bondarevsky's and Romberg's test results differed statistically significantly ($p > 0.05$), even though at first glance the environment differed insignificantly.

Based on the data obtained, we tried to match them by the normal distribution law. As can be seen from the figure, according to the Yarotsky's test results, the arch of the Gaussian curve is overstretched horizontally (X-axis); moreover, the standard deviation is 41.82, which indicates a large scatter in the data.



The minimum standard deviation was found in Romberg's test (3.16): the arch of the Gaussian curve was overstretched vertically (Y-axis); which indicated the smallest scatter in the data as compared to the results obtained in other functional tests. The coefficient of variation in Romberg's test was only half the coefficient of variation in the Yarotsky's and Bondarevsky's test results. The analysis of the Bondarevsky's test results revealed that the Gaussian curve was more pronounced in his case, but just like in the case of the Yarotsky's test, the standard deviation identified indicated a considerable scatter in the studied indicators (11, 12).

We believe that a relatively large range of the Yarotsky's and Bondarevsky's functional test results was due to the difficulty experienced by the testees in the first test. Practice shows that the amplitude and pace of circular head movements vary significantly. This specific feature of test execution does not allow recommending its wide application at universities.

While holding their hands on the hips in Bondarevsky's test, the testees' common center of mass was slightly lower than in Romberg's test. This led to a slight increase in the stability angle and created the most favorable conditions for the test execution, and as a result prevented us from identifying and assessing the degree of deviation in the nervous system functionality and the state of vestibular system. In other words, Bondarevsky's test did not present any challenges to the university students, and only the relatively difficult conditions of Romberg's test provided exhaustive information on the functional state of the subjects' vestibular system.

Conclusions. When assessing the success of the sports competences mastering process, it is recommended to focus not only on the physical fitness of the students but also on the dynamics of the functional test rates. Firstly, this will make it possible to timely adjust the educational process of sports training. Secondly, this will contribute to the successful development of the psychophysical qualities required for the relevant professions. At the same time, although the selection of tests to assess the state of the functional systems of the body creates no problems, it is Romberg's test consisting in balancing on one leg that yield the most informative results when assessing the vestibular system func-

tionality in university students, as suggested by the experimental data.

References

1. Altynova N.V., Talantseva V.K., Pyanzina N.N. Ways to improve students' physical training for forthcoming professional activity. *Problemy sovremennogo pedagogicheskogo obrazovaniya*. 2019. no. 63-2. pp. 26-30.
2. Parygina O.V., Matveev Yu.A. Assessment of balance function among students of higher educational institutions of water transport in educational process practice. *Fizicheskaya kultura. Sport. Turizm. Dvigatel'naya rekreatsiya*. 2017. V. 2. No. 4. pp. 81-86.
3. Pyanzin A.I. Formation of functional systems as basis for adaptation of athlete's body to physiological stress. *Nauka i sport: sovremennye tendentsii*. 2014. V. 2. No. 1 (2). pp. 33-45.
4. Skidan M.N., Porubayko L.N. Effect of physical exercise on students' central nervous system. [Electronic resource] *Mezhdunarodny zhurnal eksperimental'nogo obrazovaniya*. 2015. No. 4. pp. 225-227; Available at: <http://expeducation.ru/ru/article/view?id=6971> (Date of access: 24.03.2020).
5. Iagotin R., Dehtiarenko T., Bosenko A. Complex Examination of University Students' Psychosomatic Health. *Ukrainian Journal of Medicine biology and sports*. 2017. No. 4(6). pp. 223-228.
6. Mantrova I. *Methodical guide on psychophysiological and psychological diagnosis*. Ivanovo: Neurosoft. 2007.
7. Sergiienko L, Sharij D. Methodological bases of complex tests in physical education and sport. *Teoriia ta metodika fizichnogo vikhovannia*, 2010. No. 5. pp. 3-12.
8. Sergiienko V.M. *The system of motor abilities control of student youth: the theory and methodology of physical education*. Sumy: Sumy Condition University; 2015.
9. Sutula V. Peculiarities of the use of statistical methods in scientific research in the field of physical culture and sports. *Teoriia i metodika fizichnogo vikhovannia i sportu*. 2014. No.1. pp. 82-86.

Sleep disorders of professional athletes and methods of their correction (review)

UDC 796.01:61



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Abstract

Professional athletes are more organized and committed to a healthy lifestyle, which in turn contributes to the observance of work and rest, including sleep hygiene.

Objective of the study was to analyze the literature devoted to the study of the role of sleep for athletes, scientific information about the representation, nature and consequences of its violations, to summarize and structure data related to the strategy for optimizing sleep in this population group. The analysis of literature data was carried out using the following methods: descriptive (descriptive), systematization, visualization (representation in the form of diagrams, tables).

The results of a number of studies show that sleep is extremely important for restoring the brain's energy expenditure, as well as for the normal functioning of memory and attention, which contributes to achieving high sports results. In this regard, sleep disorders in athletes are fraught with a number of negative consequences, including deterioration of health and an increase in the frequency of injuries, which indicates the need to take a set of measures aimed at improving the quality of sleep. The article presents data demonstrating the prerequisites, main manifestations, methods of drug and non-drug correction of sleep disorders in professional athletes.

Keywords: professional athletes, sleep disorders, pharmacotherapy, melatonin, non-medical methods of correction.

Introduction. Modern science convincingly proves that sleep is not a rest, but an active, complex, multifunctional process that performs many vital functions and is one of the most important aspects of human life. It contributes to the strengthening and preservation of health, psychophysical condition and performance. Representatives of certain types of professional activities in connection with high energy costs need more than a person needs on average, the amount of sleep. This type of activity includes professional sports. Modern sports are characterized by large loads that place high demands on the body of athletes. In order to increase the productivity of your workout, you need to choose the best recovery methods. Among them an important place is occupied by healthy sleep [9, 10, 12, 23, 24, 28], re-

storing energy costs and contributing to high sports results [11, 16].

Objective of the article is to analyze the literature devoted to the study of the role of sleep for athletes, scientific information about the representation, nature and consequences of its violations, to summarize and structure data related to the strategy for optimizing sleep in this population group. The analysis of literature data was carried out using the following **methods:** descriptive (descriptive), systematization, visualization (representation in the form of diagrams, tables).

The importance of healthy sleep for achieving good sports results is confirmed by the results of a number of scientific studies. So, in a survey of almost 900 professional athletes, sleep was named by the

vast majority as the most important means of recovery, regardless of gender, sport and success [29].

Sleep disturbance reduces the level of testosterone and insulin-like growth factor 1, and therefore glycogen synthesis, which prevents muscle recovery after damage [7]. Improved sleep allows athletes to demonstrate a greater speed of starting reaction, less sprint time, greater accuracy and speed of movement. A study of the Stanford University men's basketball team on the background of an increase in the sleep duration to 10 hours showed a faster sprint and greater shooting accuracy. The free throw percentage increased by 9%, and the 3-point field goal percentage increased by 9.2% [17].

The influence of sleep disorders on cognitive functions, such as concentration, memory, and learning ability, has been proven. Sleep loss impairs the functional state of the frontal lobes of the brain and, as a result, has a negative impact on programming and decision-making [6].

As a result of the above-mentioned consequences of sleep disorders, one can see an increase in injuries [21, 26]. For example, teenagers who sleep less than 8 hours a day are more likely (1.7 times) to suffer significant injuries than those who sleep more than 8 hours a day. Data presented at the American Academy of Pediatrics (AAP) National Conference shows that young athletes who sleep for at least 8 hours a day are 68% less likely, and according to

other researchers, 1.7 times less likely to get injured than others. The authors consider the amount of sleep as the strongest predictor of injuries [21]. Sleep disorders negatively affect the overall physical and mental well-being of athletes, worsen the immune status, and lead to the formation of "cumulative fatigue" [14].

Thus, sleep becomes a crucial factor for success for professional athletes. Sleep disorders eventually lead to a decrease in athletic performance and a shortened athletic career (see figure 2).

Prerequisites and variants of sleep disorders in professional athletes. Despite the observance of a sports regime and adherence to a healthy lifestyle, sleep disorders are also found in athletes. The following main factors may contribute to sleep disorders [5, 9, 10, 13, 22, 25, 28]: production of adrenaline, which leads to hyperactivation and disrupts the process of falling asleep; increased body temperature; release of energy intended for physical activity during training; fatigue caused by too much work; excessive muscle tension after a workout that was not completed by stretching; unused energy when the load is reduced for some reason after a long period of intensive training; exercise less than 4 hours before bedtime; late dinner; frequent foreign travel and sleep in various conditions; emotional stress; use of stimulants; excessive hydration or dehydration before bedtime.

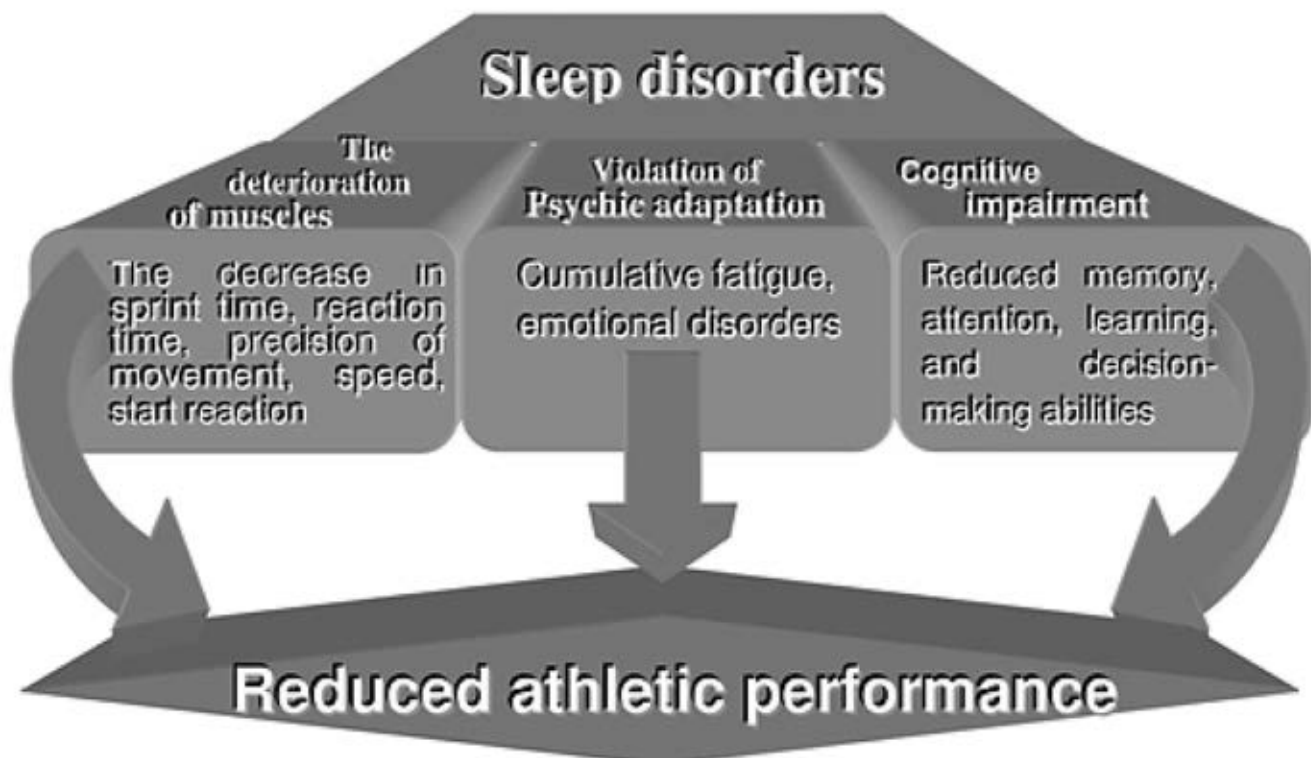


Figure 2. Mechanisms of influence of sleep disorders on sports results.

Table 1. *The main ways of non-drug optimization of sleep in professional athletes*

The direction of impact	Method of exposure
Sleep hygiene	<ul style="list-style-type: none"> • using the bed only for sleeping; • stacking at the same time; • avoiding excitatory activity and, if possible, negative emotions before going to; • formation of the ritual of falling asleep; • control of emotional state, prevention of stressful situations; • restriction of alcohol and caffeinated beverages, including coffee and cola; • short-term (up to 30 min.) daytime sleep, but no later than 15-00; • visualization and relaxation methods before going to bed.
Sport mode	<ul style="list-style-type: none"> • it is advisable to move the evening workout to an earlier time, train no later than 4 hours before bedtime; • adequately assess the capabilities of your body, do not work on wear and tear • start the workout with a warm-up and finish it with stretching; • do not reduce the load too drastically; • recreational (compensatory) training in the form of evening cross-country runs.
General health measures	<ul style="list-style-type: none"> • relaxing bath; • walking in the fresh air; • healthy diet

Paradoxically, many athletes sleep less during intense exercise, when they need sleep most. The total sleep time for elite athletes can often fall below the minimum 7 hours recommended for optimal health, especially during periods of high physical activity [18]. In the survey, 42% of college athletes reported poor sleep, as evidenced by a score of more than 5 points on the Pittsburgh sleep quality Index (PSQI). In Addition, 38% of athletes slept less than 7 hours a day, and more than 50% had symptoms of excessive daytime sleepiness, as measured by the Epworth sleepiness scale [18]. It is shown that every fourth athlete suffers from respiratory disorders during sleep, and every sixth uses sleeping pills during the playing season [3]. A survey of 256 students athletes (sambo, weightlifting, basketball, track and field, skiing and strength training), showed that only 54% of them have incomplete sleep, i.e. for various reasons they have not always explicable awakenings. Due to sleep disorders, 37% of the subjects had reduced performance in training and sports activities, and 21% of the respondents could miss training sessions or lectures because they wanted to sleep. Some of them had respiratory disorders during sleep, leading to hypoxia, which disrupts the work of the entire body and reduces physical performance [1].

Currently, in professional sports, there is a tendency to increase the number of competitions in different geographical locations, which requires from athletes to make frequent long transmeridional flights. A sharp change in standard time is accompanied by a number of physiological reactions of the body, in particular, violation of circadian rhythms, which adversely affects the functional fitness and physical performance of athletes [2].

Psychological conditioning of the quality of night sleep of athletes has been confirmed by a number of studies [1, 4, 28]. Cases of insomnia on the eve of competitions and the associated state of overtraining are described [4]. Sleep may be disturbed in athletes with anxiety-depressive disorders [25].

A sleep optimization strategy for athletes.

Sleep disorders in athletes can be easily corrected if a number of rules and recommendations are followed [26]. The main principles and approaches of non-drug correction of sleep disorders are shown in table 1.

Pharmacological correction of sleep disorders in the population of healthy athletes is used less often in order to avoid side effects in the form of a violation of morning well-being, influence on the motor and cognitive sphere in subsequent wakefulness. Practitioners of sports medicine use various classes of sleeping medications: GABA agonists, melatonin receptor agonists, antihistamines, and benzodiazepine derivatives (less frequently) [27]. Pharmacological effects on athletes' sleep are used to reduce overexcitation after training, to correct the sleep-wake cycle during transcontinental flights, and to treat insomnia.

Among the pharmacological drugs used to correct sleep disorders in athletes, the most popular are those that solve all of the above tasks and at the same time are as safe as possible and do not affect subsequent wakefulness. These drugs include melatonin-containing drugs, which is figuratively called "the hormone of the night", "Dracula-hormone". As a hormone of the pineal gland, it is involved in maintaining a normal circadian rhythm in humans. Drugs-synthetic analogues of melatonin allow us to normalize the level of this hormone in the central nervous

system. They are quite effective and safe sleeping pills that can be recommended in all cases of sleep disorders in athletes of any age without any visible negative consequences and with a high degree of tolerance [23].

An important effect of melatonin is the maintenance of circadian rhythms, which is especially important for athletes who make frequent transcontinental flights. It is shown that the introduction of exogenous melatonin in the afternoon and evening hours of the daily cycle contributes to the phase shift to an earlier time in the circadian rhythm, which contributes to the sleep onset [4]. When taken in the early morning, exogenous melatonin contributes to the “delay” of the current circadian phase in the daily rhythm. This stimulation of phase shift and inducing sleep by administering melatonin during the daytime and evening hours can be used to alleviate the symptoms of desynchronization (jet lag syndrome). Linking the time of melatonin administration to the new time zone can help overcome the symptoms of desynchronization [2]. There is evidence that exogenous melatonin improves the condition of skeletal muscles [8], accelerates regeneration when they are damaged [20], increases their metabolism, strength and tone [19], and also affects physical endurance by preserving muscle and liver glycogen [15] and, as a result, sports results.

Conclusions

1. Sleep of professional athletes directly affects sports results.
2. The sleep of athletes is influenced by a number of factors, both external (external circumstances and sports environment) and internal (personality characteristics, health conditions, sleep-wake cycle).
3. Sleep disorders of athletes lead to deterioration of physical, cognitive, and mental indicators, which in turn impairs their professional performance.
4. Taking measures of medical and non-medical effects that can improve the sleep of athletes is recognized as the most important tool for improving their performance and recovery.

Summary. Thus, a healthy sleep is the key to the success of successful professional athletes. Despite the commitment to a healthy lifestyle, professional athletes are often found to be impaired, which is associated with a number of external as well as internal (individual) factors. Sleep disorders in athletes are fraught with a number of negative consequences, including deterioration of health and an increase in the frequency of injuries, which indicates the need to take a set of measures aimed at improving the quality of sleep.

References

1. Bumarskova N.N., Kalinkin A.L. Study of student athletes' sleep. *Sportivnaya meditsina*. 2010. No. 4. pp. 30-34.
2. Zholinskiy A.V., Kavelina V.S., Komarevtsev V.N. et al. Desynchronization (jet lag, jet lag syndrome). Features of modern methods of treatment in athletes. *Meditsina ekstremalnykh situatsiy*. 2017. No. 3(61). pp. 150-159.
3. Kalinkin A.L. Somnological problems in elite sports. Simulation of human sports activity in artificially created environment. Proc. research-practical conference. Moscow, 1999.
4. Korabelnikova E.A. Sleep and professional sports: mutual influence, problems and methods of their correction. *Meditsinskiy alfavit*. 2020. No. 22. pp. 30-34. <https://doi.org/10.33667/2078-5631-2020-22-30-34>
5. Pavlova E.A. Study of the psychological conditionality of quality of athletes' night sleep before competition. *Uchenye zapiski universiteta im. P.F. Lesgafta*. 2007. pp. 59-64.
6. Bird S.P. Sleep, recovery, and athletic performance: a brief review and recommendations. *Strength Cond J*. 2013. Vol.35(5). pp. 43-7. DOI: <http://dx.doi.org/10.1519/SSC.0b013e3182a62e2f>
7. Bobić T.T., A. Šečić, Zavoreo I., Matijević V., Filipović B., Kolak Ž., Kes V.B., Ciliga D., Sajković D. The Impact of Sleep Deprivation on the Brain. *Acta Clinica Croatica*. 2016. Vol. 55(3). pp. 469-473. doi:10.20471/acc.2016.
8. Dattilo M., Antunes H.K.M., Medeiros A., Neto M.M., Souza H.S., Tufik S., de Mello M.T. Sleep and muscles recovery: endocrinological and molecular basis for anew and promising hypothesis. *Med. Hypotheses*. 2011. Vol. 77(2). pp. 220-2.
9. Stacchiotti A., Favero G., Rodella L.F. Cells Impact of Melatonin on Skeletal Muscle and Exercise. 2020. Vol. 9. P. 288. Doi: 10.3390/cells9020288
10. Fowler P., Duffield R., Vaile J. Effects of simulated domestic and international air travel on sleep, performance, and recovery for team sports. *Scand J Med Sci Sports*. 2015. Vol. 25(3). pp. 441-51. DOI: <http://dx.doi.org/10.1111/sms.12227>.
11. Fullagar H.H., Duffield R., Skorski S., Coutts A.J., Julian R., Meyer T. Sleep and Recovery in Team Sport: Current Sleep-Related Issues Facing Professional Team-Sport Athletes. *Int J Sports Physiol Perform*. 2015. Vol. 10(8). pp. 950-7. DOI: <http://dx.doi.org/10.1123/ijssp.2014-0565>
12. Fullagar H.H., Skorski S., Duffield R., Hammes

- D., Coutts A.J., Meyer T. Sleep and athletic performance: the effects of sleep loss on exercise performance, and physiological and cognitive responses to exercise. *Sports Med.* 2015. Vol. 45. pp. 161–186. Doi: 10.1007/s40279-014-0260-0
13. Halson S.L. Sleep and the elite athlete. *Sports Sci Exch.* 2013. Vol.26(113).–P.1-4.
 14. Halson S.L. Sleep in elite athletes and nutritional interventions to enhance sleep. *Sports Med.* 2014. Vol. 44(1). pp. 13-23. DOI: <http://dx.doi.org/10.1007/s40279-014-0147-0>
 15. Knufinke M., Nieuwenhus A., Geurts S.A.E., Coenen A.M.L., Kompier M.A.J. Self-reported sleep quantity, quality and sleep hygiene in elite athletes. *J Sleep Res.*-2018.- 27(1). pp. 78-85.
 16. Mah C.D., Mah K.E., Kezirian E.J., Dement W.C. The effects of sleep extension on the athletic performance of collegiate basketball players. *Sleep.* 2011. Vol. 34(7). pp. 943-50. Doi: <http://dx.doi.org/10.5665/SLEEP.1132>
 17. Mah C.D., Kezirian E.J., Marcello B.M., Dement W.C. Poor sleep quality and insufficient sleep of a collegiate student-athlete population. *Sleep Health.* 2018. Vol. 4(3). pp. 251-257.
 18. Mc Cormick R., Vasilaki A. Age-related changes in skeletal muscle: Changes to life-style as a therapy. *Biogerontology.* 2018. Vol. 19. pp. 519–536.
 19. Mehanna R., Soliman G., Hassaan P., Sharara G. Abdel-Moneim R. Protective role of melatonin on skeletal muscle injury in rats. *Int. J. Clin.Exp.Med.* 2017. Vol. 10. pp. 1490-501.
 20. Milewski M.D., Skaggs D.L., Bishop G.A., Pace J.L., Ibrahim D.A., Wren T.A., Barzdukas A. Chronic lack of sleep is associated with increased sports injuries in adolescent athletes. *J.Pediatr.Orthop.* 2014.Vol. 34(2). pp.129–133. Doi: 10.1097/BPO.000000000000151.
 21. Nédélec M., Halson S., Abaidia A.E., Ahmaidi S., Dupont G. Stress, Sleep and Recovery in Elite Soccer: A Critical Review of the Literature. *Sports Med.* 2015. Vol. 45(10). pp. 1387-400. DOI: <http://dx.doi.org/10.1007/s40279-015-0358-z>.
 22. Olde-Rikkert M.C. Melatonin in elderly patients with insomnia: a systematic review *Z. Gerontol. Geriatr.* 2001. Vol. 34(6). pp. 491–497.
 23. Taylor L., Christmas B.C.R., Dascombe B., Chamari K., Fowler P.M. Front. Sleep Medication and Athletic Performance - The Evidence for Practitioners and Future Research Directions. Front Physiol.≥.2016. Vol. 7. P. 83. Doi: 10.3389/fphys.2016.00083
 24. Venter R.E. Perceptions of team athletes on the importance of recovery modalities. *Eur J Sports Sci.* 2014. Vol. 14(S1). pp. S69-S76.

Rhythmic music facilitated training model for university female health aerobics groups

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Abstract

Objective of the study was to test benefits of a rhythmic music facilitated training model for the 1-2-year female health aerobics groups trained on an elective basis under the academic physical education and sports curriculum.

Methods and structure of the study. We sampled for the rhythmic music facilitated training model testing experiment the 1-2-year female students (n=50) from Ulyanovsk State Pedagogical University trained in the elective health aerobics groups under the academic physical education and sports curriculum and split them up into Experimental and Reference Groups. Both of the groups were tested equally fit by pre-experimental tests and trained as required by the physical education and sports curriculum of the Sports Disciplines and Physical Education Department of Ulyanovsk State Pedagogical University. The Experimental group trainings were complemented by the new rhythmic music facilitated training model.

Results and discussion. Post-experimental tests (after the 6-month model piloting experiment) found the both groups making progress in the rhythmic music facilitated training tests, although the Experimental group progress was meaningfully higher in every test ($p < 0.05$). Thus the progresses in the leg swings test were rated at 14.9% and 1.83%; in the squats test at 15.0% and 5.2%; and the in the arms swing test at 27.5% and 10.1% in the Experimental and Reference groups, respectively. Therefore, the new rhythmic music facilitated training model was proved efficient and may be recommended for application in the academic physical education and sports service on the whole and musical illustration applying health aerobics trainings in particular.

Keywords: health aerobics, rhythmic music facilitated training, educational experiment, musical tempo, musical illustration.

Background. Modern athletic aerobics training methods widely use background music to harmonize repeated standard movement sequences by emotional stimulants, clear rhythm and controlled monotony – to keep the trainees' attention focused on the strength exercises [1, 4]. Musical illustrations need to be well designed and managed in the training process to keep the moves and musical accents well timed and harmonized.

It is believed that the athletics focused trainings are well facilitated by the musical tempo of 90-130 beats/min since this pace is not too fast and gives time to the trainees to control every move and correct every execution error [3, 5]. The tempo of 130-145 beats/min is considered most suitable for dance trainings since this tempo is dictated by the modern dynamic high-amplitude dancing standards [1, 3, 5]. And the

musical tempo of 40-60 beats/min is recommendable for the training session cool down part dominated by breathing, muscle stretching and relaxation exercises to help restore the heart rate.

We would list requirements to musical illustrations in aerobic classes as follows: music shall motivate both the trainer and trainees; the musical illustrations shall be age-group-specific; they shall be refreshed as often as reasonable to meet the trainees' musical tastes; they shall facilitate the training goals being attained; and they shall well match with the movement styles and types [2, 3, 6].

Objective of the study was to test benefits of the rhythmic music facilitated training model for the 1-2-year female health aerobics groups trained on an elective basis under the academic physical education and sports curriculum.

Methods and structure of the study. We sampled for the rhythmic music facilitated training model testing experiment the 1-2-year female students (n=50) from Ulyanovsk State Pedagogical University trained in the elective aerobics groups under the academic physical education and sports curriculum and split them up into Experimental and Reference Groups (EG, RG). Both of the groups were tested equally fit by pre-experimental tests and trained as required by the physical education and sports curriculum of the Ulyanovsk State Pedagogical University Sports Disciplines and Physical Education Department. The EG trainings were complemented by the rhythmic music facilitated training model with combinations of classical and dance aerobics, step aerobics, yoga and Pilates with apparatuses and equipment including body bars, resistance bands, dumbbells, balls, gymnastic sticks etc.

We used mostly the non-stop, single-pace, clear-rhythm and modern-styled music in the special musical illustrations for the EG, with the trainings designed to master basic aerobics steps and dance sequences with the musical tempo kept at 130-145 beats/ min. Special attention was paid to the step-by-step highly-coordinated motor skills mastered in different starting positions combined with rotations and versatile footwork. The musical illustrations tempo was gradually increased with progress in the dancing skills and combinations, with the trainees encouraged to make their own combinations on 8/ 16/ 32 counts and select musical illustrations for them. This degree of freedom was found of a great encouragement effect for their creativity, enthusiasm, progress in aesthetic tastes and modern health aerobics trends on the whole [1, 2, 4]. Progress in the new rhythmic music facilitated training model piloting process was rated by the following tests:

Test 1: leg swings. Stand with your legs apart and arms stretched to the sides. Swing the right leg forward and then to the left hand, and swing the left leg forward and then to the right hand – on 8 counts, with a musical rhythm of 125-130 beats/ min. The test rates the execution technique and amplitude, plus the body balancing skills.

Test 2: squats. Stand with your legs and toes apart and arms half-bent above the head, and on 4 counts: (1) squat with the arms touching shoulders; (2) lift the heels keeping position 1; (3) keeping position 2, touch floor with your heels; (4) move to the startup position. The test rates the execution technique, posture, breathing rhythm and rate.

Test 3: arm swings. Stand with your legs apart and make the following combination on 8 counts: (1) touch the left shoulder with the right arm and the left hip with your right arm; (2) touch the right shoulder with the left arm and the left hip with the right arm; (3) touch the right shoulder with the right arm and the left thigh with

the left arm; (4) rise your hands in front of the chest with the right on the left; (5) stretch the arms to the sides; (6) rise your arms in front of the chest with the right on the left; (7, 8) take the startup position. The test versions are rated for the following musical tempo: 1) 90 beats/ min; 2) 120 beats/ min; and 3) 145 beats/ min. The test rates the execution technique and amplitude and movement harmony with the musical illustration [4].

Results and discussion. The post-experimental tests (after a 6-month model piloting experiment) found both groups making progress in the rhythmic music facilitated training tests, although the EG progress was significantly higher in every test ($p < 0.05$). Thus the progress in the leg swings test was estimated at 14.9% and 1.83%; in the squats test at 15.0% and 5.2%; and the in the arms swing test at 27.5% and 10.1% in the EG and RG, respectively.

Conclusion. The university gives a high priority to the 1-2-year female health aerobics group progress on the whole and on the rhythmic music facilitated training testing scales in particular in the elective academic physical education and sports service. Good musical illustration makes the classes emotionally appealing, improves moods, facilitates progress in motor skills, excels the movement culture and develops feels of music and aesthetic tastes. Positive emotions contribute to the training process efficiency as the trainees feel energized, active and focused, with every bodily system mobilized for improved performance in trainings and a healthier lifestyle on the whole.

References

1. Aleksandrova V.A. Fitness aerobics to build physical qualities in female students of non-sports university. Students' motivation for physical education and sports activities. Proc. national scientific internet-conference. 2018. pp. 60-63.
2. Astafyev V.S., Borisov V.V. Formation of need for independent physical exercises in structure of person's physical culture. *Teoriya i praktika fiz. kultury*. 2008. No. 8. pp. 11-14.
3. Valkina N.V., Panova E.O. Recreational aerobics: theory and techniques. Teaching aid. Ulyanovsk, 2015. 76 p.
4. Krasnikova N.V. Formation of aesthetic component of motional activity of those engaged in fitness aerobics. PhD diss abstract. Naberezhnye Chelny, 2009. 22 p.
5. Nazarenko L.D. Means and methods for development of motor coordination. Moscow: *Teoriya i praktika fiz. kultury*, 2003, 259 p. il
6. Trofimova O.V. Improvement of female students' physical education based on in-depth study of fitness-aerobics. PhD diss abstract. Cheboksary, 2010. 23 p.

Academic physical education theory: distance learning related sensory fatigue control methods

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Abstract

Objective of the study was to conduct a theoretical analysis to identify the peculiarities of development of sensory fatigue in university students and ways to overcome it during distance learning in academic physical education.

Methods and structure of the study. The theoretical approaches to the problem were based on the legislative and regulatory documents and materials in the field of sensory fatigue research and prevention. The research problem was addressed through a comparative analysis and synthesis of scientific and methodological literature and attitudes of different scientists to the problem.

Results and conclusions. The theoretical analysis of the works devoted to sensory fatigue revealed the following:

- a fatigue feeling is "a normal functional state arising during physical activity and characterized by the onset of fatigue, changes in the physiological functions, moderate decrease of working capacity";
- a number of works indicate that sensory fatigue, being a psychophysical response of human perceptual systems to external stimuli, the degree and duration of its exposure does not affect man's health, but its onset depends on his physical state, co-morbidity and psychoemotional stability;
- sensory fatigue can be classified by the type of sensory channel, force of the stimulus, amount of overloaded sensory channels, and development time.

The authors note that the development of sensory fatigue in the course of distance learning should be studied using the diagnostic tools characterizing psychophysical disorders, visual and auditory impairments. The data obtained will help adjust the ways of representing information and visual row during the academic physical education classes at universities and ease or redistribute the burden on the sensory channels of students during studies.

Keywords: *distance learning, sensory fatigue, visual analyzer, auditory analyzer, kinesthetic tension, adaptation.*

Background. Modern studies give a special priority to sensory fatigue viewed as a specific dysfunction developed under growing informational pressure and stressors in the context of the working capacity protection, improvement and rehabilitation issues. The sensory fatigue has been proved detrimental to the individual physical and mental performance, self-rated well-being and objectively tested life quality aspects.

The growing technological intensity of the modern education service with its increased information flows needs to be processed and digested by

students using computers or other personal digital gadgets to interact with the relevant training platforms (Blackboard Learn, EIOSMoodle etc.) applied by their universities – urge the education communities looking for the best theoretical and practical sensory fatigue control methods to effectively prevent/mitigate fatigue and accompanying psychophysical dysfunctions and improve the students' adaptation to the rapidly changing educational environments and standards.

Objective of the study was to theoretically analyze the factors of influence on the distance-learning-

specific sensory fatigue and offer sensory fatigue control methods for the academic Physical Education theory course.

Methods and structure of the study. We collected for the theoretical analysis the relevant legal and regulatory provisions, studies of sensory fatigue issues and sensory fatigue control models; and run a comparative analysis to generalize the relevant theoretical and practical research findings and expert analyses of the issues.

Results and discussion. Based on the theoretical analysis of the distance-learning-related sensory fatigue related study reports, we found the following:

- Fatigue is perceived and interpreted as “the normal individual functionality sag in any activity with the associating feel of draining, changes in the key physiological functions and falls in the working capacity” [4, p. 36];

- A few studies underline that the sensory fatigue as a natural psychophysical response of individual perceptive systems to external stressors – dependent on their degrees and duration – is basically harmless for individual health standards, conditional on the actual physical fitness, health issues and psycho-emotional control qualities [1, 5];

- Sensory fatigue may be classified by the dominant sensory channels (visual, auditory, vestibular, motor, etc.); degrees (weak, moderate, excessive sensory fatigue etc.); numbers of the sensory channels involved (mono-sensory, partial, poly-sensory sensory fatigue); and sensory fatigue action time (short-, mid- and long-term sensory fatigue).

Knowing that the actual daily learning workloads (i.e. the standard academic hours of lectures, workshop and practical trainings, as specified by the relevant legal and regulatory provisions and university regulations in application to the Physical Education service) have not changed in the curricula; and the changes relate only to the education service formats – we have reasons to assume that students' exposure to sensory fatigue is dominated by fatigues of the visual and auditory analyzers and, to a lesser extent, kinesthetic analyzer. The external and internal stressors on the visual analyzer contributing to the distance-learning-related sensory fatigue include:

- Flashing/ flickering light;
- Too bright/ contrasting colors of the presentations and/or contrasting fonts, images etc.
- High-pressure 3D images, videos and TV programs;
- Psychophysical dysfunctions; and
- Visual analyzer dysfunctions.

The external and internal stressors on the auditory analyzer contributing to the distance-learning-related sensory fatigue include:

- Calls and other signals from digital gadgets;
- Verbal information perception/ understanding challenges in training;
- Psychophysical dysfunctions; and
- Auditory analyzer dysfunctions.

And the external and internal stressors on the kinesthetic analyzer contributing to the distance-learning-related sensory fatigue include:

- Postural control issues due to the habitual static postures when using personal computers/ gadgets; and
- Kinesthetic stress related issues.

Having summarized the above, we should mention that most effective for the distance-learning-related sensory fatigue test and analysis are the psychophysical functions and visual/ auditory analyzer functionality tests. Such test data will make it possible to effectively customize the visual/ auditory information flows in the academic Physical Education theory studies, i.e. facilitate the learning process by the income data being redistributed so as to avoid excessive stresses on the sensory channels in training. The tests will also help single out the risk groups in need of a special sensory fatigue control service geared to help them process the information flow without overloads on the visual, auditory and kinesthetic analyzers in the distance learning formats.

Special psychological and educational services (trainings, special exercises, art therapy etc.) are recommended for the above risk groups to effectively control/ mitigate the sensory fatigue and improve the group adaptation, with complexes of physical exercises to improve vision, relax the visual system muscles, improve the physical fitness and postural control, relax etc.; with such trainings geared to build up the group tolerance to the sensory-fatigue-related external stressors. Of special benefits for the risk group trainings may be special mental conditioning methods complemented by eye exercises, visual analyzer stress-relieving self-massages of the cervical-collar zone [2, 5, 6] etc.

Conclusion. Theoretical analyses of the modern sensory fatigue types, forms, mechanisms and growth patterns will make it possible to offer the sensory fatigue control strategies, methods and toolkits so as to prevent potential sensory-fatigue-related health issues and keep up good working capacity in the academic Physical Education theory distance learning process.

References

1. Galimova A.G., Fedoseenko V.E. Fatigue during physical and mental work. *NovaUm.ru*. 2019. No. 19. pp. 239-243.
2. Kolmykov A.V., Kolmykova M.A. Physical education in prevention of fatigue. *National devel-*

- opment. Proc. scient. conf. GNII. St Petersburg., 2019. pp. 193-195.
3. On organization of educational activities in organizations implementing higher education programs and corresponding additional professional programs, in the context of preventing the spread of a new coronavirus infection in the Russian Federation.” Order of the Ministry of Science and Higher Education of the Russian Federation of March 14, 2020 No. 397. website: https://www.minobrnauki.gov.ru/ru/documents/card/?id_4=1064, date of access: 3.10.2020.
 4. Redko A.V., Bacherikov E.L., Kamskova Yu.G. Research on student fatigue in learning process. Vestnik YuUrGU. 2008. No. 19. pp. 36-37.
 5. Khalfina R.R. Psychophysiological features of increased visual performance in visual fatigue in PC users. Vestnik psikhofiziologii. 2018. No. 1. pp. 123-125.
 6. Shuvalova I.N. Educational experiment to reduce fatigue of visual analyzer in students in the course of training. Gumanitarnye nauki. 2019. no 1 (45). pp. 90-95.

University students' motivations for physical education and sports: questionnaire survey

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Abstract

Objective of the study was to rate and analyze the metropolitan university students' motivations for physical education and sports by a questionnaire survey.

Methods and structure of the study. The authors analyzed for the purposes of the study findings of the physical education and sports in Metropolitan University Students' Lifestyles: Questionnaire Survey by E.V. Kargapolova in October 2019. We sampled for the online questionnaire survey the Moscow student population ($n=2503$), with the sample being 41% male and 59% female. It cannot be rated representative although the coverage still gives reasons for meaningful conclusions. The questionnaire survey form tested, among other things, the university students' motivations for physical education and sports as recommended by the Sample Questionnaire Survey Form 'Physical education in healthy lifestyle: priorities and actualization ways' by Professor L.I. Lubysheva.

Results and discussion. The analysis found most of the metropolitan student sample being driven by the aesthetic, competitive, health-improving, disciplining and time management motivations in their physical education and sports agendas. Ranking barriers for the fully-fledged physical education and sports activity, the students were fairly self-critical to mention, among other things, shortage of leisure time for practices, plus shortage of willpower and determination. Therefore, the questionnaire survey clearly showed the students appreciating modern physical education and sports / health service for not only its healthy lifestyle, health/ appearance improvement and body shaping benefits but also its personal growth and career-building aspects.

Keywords: *motivation, physical education and sports, healthy lifestyle, university students.*

Background. Population group physical education and sports motivations are ranked among the priority subjects for research by the modern sports science, with the analysts equally interested in the physical education and sports motivations as such and barriers for progress in physical education and sports. Thus V.N. Kremnev and N.V. Solovyova argue that "modern people are motivated for physical education and sports predominantly by the health issues" [5, p. 293], with "poor motivations and laziness" considered the key barriers for physical progress [5, p.294]. V.V. Kalyanov, N.N. Korolev and M.G. Shorsheva prioritize a few external (appreciation and rewards) and internal factors (need for recognition

and assertion) among the key physical education and sports motivations [4, p. 919]. I.G. Khairullin, R.R. Galiev, E.R. Shaikhev reasonably argue that "it is the personal needs with awareness of the physical education and sports benefits for health that are the key drivers for the university students' physical activity" [10, p. 406]. O.N. Usachev and N.I. Ponomareva believe that mass university sports events notably spur up the university students' motivations for physical education and sports [9, p. 357]. E.G. Ermakova emphasizes the communicative aspects of the "group sports including tourism, health jogging and cycling" among the university students' physical education and sports motivations [2, p.100]. I.V. Zaporozhskaya,

A.I. Lytov, S.V. Levitskaya, L.D. Kalashnikova consider “mitigation of nervous tension and mental fatigue after classes” among the key physical education and sports goals and motivations [3, p. 496], and underline the after-class fatigue as the key barrier for the students’ physical education and sports [3, p. 495]. Considering the physical education and sports motivating factors, A.A. Valebnaya, A.A. Makarova, L.V. Kumm emphasize “the physical education and sports service locations, modern equipment and appliances, range of physical education and sports groups/teams and sports achievements praising materials” [1, p. 248]. E.A. Mitrokhin makes an emphasis on the self-expression and assertion among the physical education and sports motivations [7, p. 17]. D.A. Mikheeva focuses on barriers for the student physical education and sports to classify them into subjective (including the “individual qualities and lack of family role models for a healthy lifestyle”) and objective reasons including the “poor physical education and sports infrastructure, multiple contraindications for physical activity, physical education-and-sports-discouraging curricula and skeptical communal and individual attitudes to sports” [8, p. 44].

Objective of the study was to rate and analyze the metropolitan university students’ motivations for physical education and sports by a questionnaire survey.

Methods and structure of the study. We analyzed for the purposes of the study findings of the physical education and sports in Metropolitan University Students’ Lifestyles: Questionnaire Survey by E.V. Kargapolova of October 2019. We sampled for the online questionnaire survey the 17-20 years old Moscow student population (n=2503), with the sample estimated 41% male and 59% female. It was rated formally non-representative although its extensive coverage still gives good reasons for meaningful conclusions. The questionnaire survey form probed, among other things, the university students’ motivations for physical education and sports as recommended by the Sample Questionnaire Survey Form ‘Physical education in healthy lifestyle: priorities and actualization ways’ by Professor L.I. Lubysheva, Philosophy and Sociology Department Head at Russian State University of Physical Education, Sports, Youth and Tourism (SCOLIPE) [6, pp. 204-211].

Results and discussion. The analysis found most of the sample driven by the aesthetic, competitive and health-improving motivations in their physical education and sports agendas. Thus two or three (66.7%) reported the weight control and shaping motivation as dominant for their physical education and sports activity; and one of five (20.9%) underlined that physical education and sports is needed to ‘form a good movement culture and manners’. These views

may be due to the healthy lifestyle promotion campaigns with a special emphasis on the body shaping and weight control aspects that have been run in our country for the last few years.

The analysis made it clear that the young people consider excellent physical fitness an important condition for individual success in every life domain. That is why the finding comes as no surprise. 58.9% of the sample emphasized the physical fitness building motivation; and 14% prioritized the competitive success motivation for physical education and sports. No wonder that the competitive motivation is one of the key ones among the physical education and sports drivers, since the factor of competition in the young communities is known to greatly encourage the individual progress. One of two (51.7%) in the sample also mentioned the health protection/ improvement needs, and this factor was ranked meaningful albeit non-decisive – for it can be explained, as we believe, by some immaturity of the 17-20 year-olds that have unlikely have faced serious health issues and therefore tend to underestimate the importance of health for life and progress.

Of special interest was the finding that many in the sample give a high priority to the time management benefits of their physical education and sports agendas. Thus more than one of three reported ‘disciplining and efficiency improvement benefits of sports in life’; 30.4% emphasized the performance improvement benefits; and one of four mentioned that physical education and sports ‘helps manage time more efficiently’. The time control management skills are ranked nowadays among the key qualities of a successful person focused on career-building. The fact that the students understand benefits of modern physical education and sports for progress, time control and management skills shows that the modern student communities are well aware of the role of time management for success and eager to develop the relevant skill sets. Furthermore, more than a third of the sample underlined the relaxation benefits of modern physical education and sports service; with 33.3% reporting its ‘fatigue mitigation’ aspect. And virtually the same share (33.4%) reported that physical education and sports ‘cultivates willpower, character and determination’. About one of three (29.5%) reported their physical education and sports motivations dominated only by the academic progress reasons, i.e. ‘getting the physical education credits’. This result seems of special interest since the sample was offered a few options to check, and only a third checked this one. It may mean that the modern student population is driven in their physical education and sports agendas not only by the academic progress reasons as such but primarily by the self-improvement and growth ones.

Having profiled the students' physical education and sports motivations, we were further interested to analyze the barriers for academic physical education and sports. Most of the sample (72.9%) complained shortage of leisure time for physical education and sports and believed that the standard academic physical education service fails to meet their physical education and sports needs and, hence, must be complemented with special trainings in gyms and sports groups. Some respondents (36.8%) were self-critical enough to confess they 'do not have enough willpower and determination' and 'unprepared for the self-reliant physical education and sports practices' (11.4%). Some of the respondents were unsatisfied by the academic physical education service quality or management. Thus 13.7% reportedly 'failed to find a favorite sport service in the university'; and one out of ten mentioned the 'poor physical education and sports promotion and management service that fails luring students' (10.8%); plus some mentioned 'shortage of the sports equipment and outfits' (10.1%).

Conclusion. The survey data and analyses showed that the metropolitan university students are aware of how important the modern physical education and sports is for progress and healthy lifestyle, with their physical education and sports agendas dominated by the body shaping, physical fitness building and health motivations. They also were found appreciating the cultural and time management aspects of the modern physical education and sports activity. Ranking the barriers for a fully-fledged physical education and sports activity, the students were fairly self-critical to mention, among other things, shortage of leisure time for practices, plus shortage of willpower and determination. Therefore, the questionnaire survey clearly showed the students appreciating modern physical education and sports / health service for not only its health/ appearance improvement and body shaping benefits but also its personal growth and career-building aspects.

References

1. Valebnaya A.A., Makarova A.A., Kumm L.V. MStudents' motivation for physical education and sports activities. *Scientific electronic journal Meridian*. 2019. no. 13 (31). pp. 246-248.
2. Ermakova E.G. Building motivation for physical education and sports activities in students. *Mezhdunarodny zhurnal gumanitarnykh i estestvennykh nauk*. 2019. No. 12-1 (39). pp. 100-102.
3. Zaporozhskaya I.V., Lytov A.I., Levitskaya S.V. et al. Research of motivation of KhSUEL students for education and sports activities. *Evraziyskoe Nauchnoe Ob'edinenie*. 2019. No. 5-7 (51). pp. 495-497.
4. Kalyanov V.V., Koroleva N.N., Shorshneva M.G. Motivating students for physical education and sports activities. *Alleya nauki*. 2019. V. 3. No. 1 (28). pp. 917-922.
5. Kremneva V.N., Solovyeva N.V. Students' motivation for physical education and sports. *E-Scio*. 2018. No. 5 (20). pp. 289-296.
6. Lubysheva L.I. *Sociology of physical culture and sports*. Moscow: Akademiya publ., 2001. 240 p.
7. Mitrokhin E.A. Motivation of students of Siberian Institute of Management, branch of Russian Presidential Academy of National Economy and Public Administration, to engage in physical education and sports as a component of personal physical development. *Fizkulturnoe obrazovanie Sibiri*. 2019. No. 1 (41). pp. 16-18.
8. Mikheeva D.A. Motivation of students for sports and physical education. *Science and education: preserving the past, creating the future. Proc. XXV International research-practical conference: in 2 vol.*. Penza, 2019. pp. 43-45.
9. Usachev N.A., Ponomareva N.I. Motivation of students for independent physical exercises and sports. *Uchenye zapiski universiteta im. P.F. Lesgafta*. 2019. No. 5 (171). pp. 357-359.
10. Khayrullin I.T., Galiev R.R., Shaykhiev E.R. Students' motivation for independent physical exercises and sports. *Nauka i obrazovanie: novoe vremya*. 2019. No. 2 (31). pp. 405-410.
11. Davydova S.A., Dulina N.V., Ikingrin E.N., KorichkoYu.V. 2018 FIFA World cup: Russian students expectations and viewpoints. *Theory and Practice of Physical Culture*. 2018. no 6. P. 24.
12. Kokoulina O., Simina T., Tatarova S. Problems and challenges of modern sports. *Journal of Physical Education and Sport*. 2019. V. 19. No. 1. pp. 208-213.
13. Koshkin A.P., Novikov A.V., Abramov R.A., Rozhina E.Y. Role of social representations in student motivation for acquiring further education. *Interchange*. 2018. pp. 313-341.

Sport climbing in the far east: regional socio-economic progress factors

UDC 796.006



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Abstract

Objective of the study was to analyze the sport climbing growth rates and progress factors in the Far Eastern Federal District of the Russian Federation.

Methods and structure of the study. The study analyzes the sport climbing progress for the last few years in the Far Eastern Federal District of the Russian Federation on the whole and the Sakha Republic (Yakutia), Republic of Buryatia and Khabarovsk Territory in particular, with a special analyses of the coaching/ refereeing service, sport climbing assets, funding, sport climbing community, competitions and popularity.

Results and discussion. The local sport climbing coaching community was reported to grow for the period of 2015-2018 in the Far Eastern Federal District by 64%. On the whole, the Khabarovsk Territory and Republic of Buryatia reported 8 and 3 climbing structures in operation for the period; and the Sakha Republic (Yakutia), reported only one of five climbing structures being in operation. The District reported little if any financial support for the sport climbing, with the athletes and coaches having to cover the competitive costs on their own. The Khabarovsk Territory sport climbing Federation has trained one MS, 15 CMS and dozens of the Class-I-III athletes for 13 years of its operations. The Republic of Buryatia and Sakha Republic (Yakutia) reported growths of the sport climbing communities for the period as well. The Republic of Buryatia and Khabarovsk Territory athletes were reported to compete mostly in the national cups and regional events in the neighboring areas. Due to the climbing space limitations, the Sakha Republic (Yakutia) Cups and Championships have been held separately. On the whole, the sport climbing popularity in the District has been on the rise, with notable progresses in the three regions under analysis despite the still limited funding and shortage of modern sport climbing facilities. A comparative analysis of the sport climbing progress in the Sakha Republic (Yakutia), Republic of Buryatia and Khabarovsk Territory found the following three key progress aspects need to be addressed: shortage of the sport climbing groups in the local sports centers; shortage of modern sport climbing assets (walls, equipment, services); and, as a result, still modest competitive accomplishments in the national events.

Keywords: *sport climbing, climbing progress factors, Sakha Republic (Yakutia), Republic of Buryatia, Khabarovsk Territory.*

Background. Modern sport climbing may be defined as the active recreation sport discipline (recently formally listed with the Olympic sports) with the competitors climbing natural rocks or artificial wall with anchors. Presently the global climbing community is estimated at 30 million in 150 countries; it is 23 years old on average, with 40% of climbing population reportedly under 20 years old. Despite the high popularity of the sport the world over and its 70-year progress history, the sport is

still making its first steps in Sakha Republic (Yakutia), with the regional Sport Climbing Federation established only in 2015.

Objective of the study was to analyze the sport climbing growth rates and progress factors in the Far Eastern Federal District of the Russian Federation.

Methods and structure of the study. The study methods were dominated by the reporting data analysis to profile the sport climbing growth rates and progress factors in the Far Eastern Federal District of

the Russian Federation including the Sakha Republic (Yakutia), Republic of Buryatia and Khabarovsk Territory.

Results and discussion

Sport climbing coaches

The local sport climbing coaching community was reported to grow for the period of 2015-2018 in the Far Eastern Federal District from 16 to 25 people (64% growth). Position-wise, 100% of the Sakha Republic (Yakutia), coaches serve in the local education system versus only 12.5% in the Khabarovsk Territory where most (56.25%) of the coaches serve on a commercial basis. The local sport climbing refereeing community in the Far Eastern Federal District was reported to grow for the same period from 20 to 94 people (450% growth). However, the Sakha Republic (Yakutia), is still in need of Class I referees, as it takes time for them to qualify for every next class.

Sport climbing assets

On the whole, the Khabarovsk Territory reports 8 climbing structures in operation for the period including the most popular climbing walls at Skala Center that is 750 square meters large, with the walls up to 12.5 m high. The Republic of Buryatia reported 3 climbing structures for the period. And the Sakha Republic (Yakutia) reported, as of 2018, only one of five climbing structures being in operation (for both adults and children) in the city of Yakutsk. It was put in operation in October 2015 at Secondary School No. 2 and is about 75 square meters large (with service buildings), with the 5.8 m high climbing wall.

Sport climbing financing

In 2017, the Sakha Republic (Yakutia) Government assigned RR90 thousand for the Republican sport climbing competitions with the prize fund, including RR 25 thousand for the Republican Sport Climbing Cup in Neryungri city in June 2017. The Khabarovsk Territory Government in 2018 supported the local sport climbing by RR120 thousand to cover the competitive expenses of the municipal sport climbing team. No other finance has been reportedly provided by the other municipal governments of the Far Eastern Federal District for the period. Therefore, the Sakha Republic (Yakutia) competitors have to cover their competitive costs on their own. The only finance provided to the children's sport climbing events at Secondary School No.2 is designated to fully or partially cover the air flight costs for the sport climbing coaches and teachers.

Sport climbing community

Progress of the Khabarovsk Territory climbers has been verified by a few medals of the National sport climbing finals for the period. The Khabarovsk Territory sport climbing Federation has trained one MS, 15 CMS and dozens of the Class-I-III athletes for 13 years of its operations. In the adult classes, Alexan-

der Shilov from Khabarovsk won a bronze medal of the National Sport Climbing Championship. He is a Russian national team member, winner and medalist of a few Russian and international competitions. The Far Eastern Federal District regions have reported growth of the school sport climbing population, although the still limited sport climbing assets and financial support in the Sakha Republic (Yakutia) force the local school athletes stop trainings upon graduation from schools.

Competitions

On the whole, the Republic of Buryatia and Khabarovsk Territory athletes have been more active in competitions, particularly in the Sport Climbing Cups and other events (mostly in the neighboring regions). It should be noted that the valid CYSS curriculum for the 3-5-year trainees requires from the young athletes to compete in 9-15 events per year. Due to the climbing space limitations, the Sakha Republic (Yakutia) Cups and Championships are held separately.

Popularity

For 8 years of operations, Skala sport climbing Center in Khabarovsk has served 20 thousand local residents on a visiting and subscription basis; plus more than 600 people completed the sport climbing equipment and safety course, according to the attendance cards: see the Figure 1 hereunder. The TOP Sport Climbing Club, for 5 years in operation, has served 1200 Komsomolsk city residents on a visiting basis. And the Khabarovsk and Komsomolsk sports schools reported 1500 people being served since 2008 till now. The Khabarovsk Territory Sport Climbing Federation reports 280-300 athletes being trained on a regular (at least once a week) basis in the local sport climbing centers.

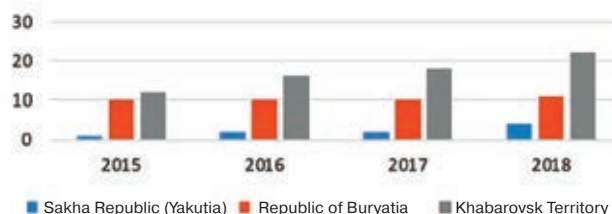


Figure 1. Growth of the sport climbing groups in the Sakha Republic (Yakutia), Republic of Buryatia and Khabarovsk Territory for the period

Progress of the sport climbing in Sakha Republic (Yakutia) was spurred up when climbing walls were constructed at Secondary Schools #2 and #24 in Yakutsk and new coaches were recruited for the sport climbing centers. For 4 years in operation, the SS #2 sport climbing Center has served about 8,000 Sakha Republic (Yakutia) residents. School population at SS #3 is reported at 1800 children, with the sport climb-

ing Center serving around 240 children per day at the physical education lessons (8 lessons per day on average). In every physical education lesson, children would master sport climbing basics (like a traverse on a wall with length up to 20 m).

The Sakha Republic (Yakutia) sport climbing Federation reports about 150 regular (at least once a week) trainees, with the local interest to the sport climbing somewhat naturally sagging in the summer (holiday) time and peaking during the winter sport climbing promotion/ advertising campaigns. The Federation reports 189 new cards being issued per the peak month on average - versus only 158 cards in the summer time (83%). The call center reports 35 calls per the peak month on average versus 19 calls in the summer time (54%) – i.e. the local demand for climbing is clearly seasonal with winter peaks.

Conclusion. The sport climbing in the subject tree regions of Far Eastern Federal District reports progress that is still limited by the shortage of finance and modern sport climbing assets. A comparative analysis of the sport climbing progress in the Sakha Republic (Yakutia), Republic of Buryatia and

Khabarovsk Territory found the following three key progress aspects need to be addressed: shortage of the sport climbing groups in the local sports centers; shortage of modern sport climbing assets (walls, equipment, services); and, as a result, still modest competitive accomplishments in the national events. The sport climbing progress and popularity in the area may be given a boost by the following: new sport climbing groups at the local CYSS; new modern high-wall sport climbing center in the Far Eastern Federal District; financial support from the local governments for the sport climbing system; and support for the local sport climbing competitors in every event. Municipal governments and local sport climbing enthusiasts need to take harmonized efforts to encourage and support the local sport climbing community.

References

1. Antonovich I.I. Sport climbing. Moscow: Fizkultura i sport publ., 1978. 128 p.
2. Baykovskiy Yu.V. Features of formation and classification of mountain non-Olympic sports. Moscow: Vertikal publ., 2005. 112 p.

Gender limitations in women's boxing sport

UDC 796.01

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Abstract

Objective of the study was to theoretically analyze coverage of gender limitations in modern women's boxing sport by the sports science.

Methods and structure of the study. We used, for the purposes of the study, some materials of the relevant Research Project Progress Report, and analyzed the gender limitations coverage by the research publications (scientific articles, abstracts, books and dissertations) in the Google Scholar database for the period of 2016-2020. We found and analyzed the relevant materials by a few keywords including "female", "boxing", "gender". Of special interest were the studies with concern to the women's boxing training specifics, their socialization and self-awareness issues, gender equality, attitudes to women athletes and other relevant topics. We screened out of the database for analysis the women's training issues as such since they will be covered by our upcoming study of the women's training system improvement methods.

Results and discussion. Having analyzed the mostly foreign study report on the issue, we found the key barriers for progress of the modern women's boxing, including the self-identification disorders, gender inequality in progress opportunities; environmental pressure, prejudice and biased perceptions; and shortages of the women-needs-sensitive training and competitive models. We have demonstrated that, despite the large-scale and often politically biased contradictions in these issues, there are a few objective problems that need to be solved to facilitate progress of the women's boxing sport – including the traditional conservatism of the sport management policies and multiple social prejudices against women athletes.

Keywords: *women's boxing, research publications, gender limitations.*

Background. Gender limitations of the modern women's martial arts are ranked among the most relevant topics in sports psychology and sociology. Despite the fact that these issues often fall under heavy political pressures and, therefore, some publications may be biased and not scientific enough, the issues are still highly relevant and, when neglected or underexplored, may be of hampering effect on the competitive performance [1]. We believe that these issues deserve special attention of the sport science, particularly in the context of the growing popularity of the women's Olympic sports on the whole and women's boxing in particular.

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Methods and structure of the study. We used, for the purposes of the study, some materials of the relevant Research Project Progress Report, and analyzed the gender limitations coverage by the research publications (scientific articles, abstracts, books and dissertations) in the Google Scholar database for the period of 2016-2020. We found and analyzed the relevant materials by a few keywords including "female", "boxing", "gender" etc. Of special interest were the studies with concern to the women's boxing

training specifics, their socialization and self-awareness and assertion issues, gender equality, attitudes to female athletes and other key topics. We screened out of the database for analysis the women's training issues as such since they will be covered by our upcoming study of the women's training system improvement methods.

Results and discussion. We first selected 182 study reports related to the women's boxing sport, and found 62 (75.6%) addressing the gender limitations issues. Of special interest for the sport specialists are self-identification issues of women in sports and gender equality issues in the context of the progress opportunities. We found the discussions often dictated by the political biases and using rather popular sociological than purely scientific terms and meanings. We should also mention the high degree of conservatism in the relevant sports organizations and their policies when it comes to support and expansion of the women's Olympic sports; although recently the global sports have made good progress in this area. Some analysts [7] are concerned by the shortage of the relevant studies. Having surveyed and interviewed the female boxers, we found the key barriers for progress of the modern women's boxing, i.e. a wide range of conflicting motivations for the athlete's progress agenda (including the self-assertion and growth ones) on the one hand, and the gender limitations with gender identity insults on the other hand.

Thus Jennings G., Velázquez B.C. (2015) remind that the women's boxing has a long history, although the major women's boxing competitions were subject to multiple bans and restrictions prior to the 2012 Olympic Games [6]. It should be mentioned in this context that the women's boxing weight classes and qualifications are still shorter than in the men's boxing. The issues of gender equality in sports are being discussed and defended by many movements including some specialized online communities, and it is not improbable that this active advocacy will sooner or later urge the relevant global organizations (IOC and AIBA) to take necessary efforts.

It should be emphasized, however, that expansion of weight classes in boxing may require extra funding for the Olympic Games. A solution is still to be found, and one of the potential options is to cut down the men's weight classes to give room for the women; although this solution is actively opposed by conservatives in the key international sports organizations. However, the IOC has still decided to change the gender shares in the 2020 Olympic Games in Tokyo (IOC, 2020). Male boxers will compete in 8 weight classes (52 kg, 57 kg, 63 kg, 69 kg, 75 kg, 81 kg, 91 kg, and 91+ kg); and female boxers in 5 weight classes (51 kg, 57 kg, 60 kg, 69 kg, and 75 kg).

A dissertation of a Chinese graduate student from Laurentien University, Canada (Ge, Y., 2018) analyzes psychological profiles of the Canada women's boxing team members [4]. The author used a social structuring method to highlight the personality factors most typical for the top-ranking female boxers, including: versatility, strong socializing skills, well-balanced character, some contradiction between the identity and behavior, devotion to the sporting sub-culture etc.

Graham M.R., Gu Y. and Baker J.S. (2017) analyzed studies of the attitudes to female boxers [3]. They found the attitudes being mostly positive, although the existing prejudices still create multiple psychological limitations for women. The female martial artists are often perceived as "unfeminine", "transvestites", "mutants" etc., and have to oppose these biases in sports and private lives. They report facing multiple insults and all kinds of violence (including sexual), plus serious barriers for progress and financial support.

Canadian researchers Schinke R.J., et al. (2019) analyzed influences of the individual identities of the national women's boxing team members on their wellbeing and performance [8]. They found a range of specific challenges faced by the sample including: pressure from the genuinely men's sport on the women's identity; prejudices with associating negativism from the social environment; "otherness" much similar to the one reported by the racial and sexual minorities, etc. The analysts recommend a culturally inclusive environment being cultivated for the athletes by cooperative efforts of the coaches, physicians, psychologists and other specialists serving the team.

And a research team from the Netherlands [2] discussed the gender equality assurance challenges in the amateur boxing clubs, with a special analysis of the positive experiences in this domain reported by a few Dutch sports clubs. The authors recommend the club management taking decisions on these sensitive issues so as to remove contradictions between the individual sporting agendas of the trainees and limitations of the valid requirements for sporting services to different population groups.

Conclusion. Discussions of the gender equality issues in sports are often influenced by other than purely scientific aspects and reasoning. It should be acknowledged, however, that women still face a wide range of problems in the attempts to progress in the traditionally men's sports. First of all, these problems are due to the sport management conservatism, shortage of funding, plus certain prejudices against female martial artists still perceived as "deviations from the norm" by some population groups. Solutions

to these problems may be facilitated by the efforts to create theoretically grounded training and competitive environments for women with highest sensitivity to their natural physiological and psychological limitations, needs and specifics.

References

1. Damadaeva A.S. Psychology of gender development of athlete's personality. Doct. Diss. Abstr. (Psychology). Moscow, 2013. 54 p.
2. Dortants M., Knoppers A. (2016) The organization of diversity in a boxing club: Governmentality and entangled rationalities, *Culture and Organization*, 22:3, 245-261, DOI: 10.1080/14759551.2016.1157804
3. Graham M.R., Gu Y., Baker J.S. (2017) Women, Boxing & Prejudice, the Fact. *Dual Diagn Open Acc* 2:31. DOI: 10.21767/2472-5048.100031
4. Ge Y. The intersecting social identities of Canadian national team female boxers. A thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy (PHD) in Human Studies. Laurentian University, 2018. – 260 p.
5. IOC news. Women gaining ground on the field of play and at the top table [Electronic resource]. Available at: <https://www.olympic.org/news/women-gaining-ground-on-the-field-of-play-and-at-the-top-table>, accessed 17.03.2020
6. Jennings G., Velázquez B.C. Gender Inequality in Olympic Boxing: Exploring Structuration through Online Resistance against Weight Category Restrictions. *Global Perspectives on Women in Combat Sports: Women Warriors around the World*. Springer, 2015, pp.89-103
7. Mcgannon K.R., Schinke R.J., Ge Y., Blodgett A.T. Negotiating Gender and Sexuality: A Qualitative Study of Elite Women Boxer Intersecting Identities and Sport Psychology Implications. *Journal of Applied Sport Psychology*, 2018: 1–19
8. Schinke R.J., Ge Y., Petersen B., Blodgett A.T., Dupuis-Latour J., Coholic D. Building a national team context based upon the identity challenges and intervention strategies of elite female boxers in their home training environments. *Journal of Sport Psychology in Action*, 2019, Volume 10, Issue 2, Pp.94-105

Transformations of popular terms and meanings in sports-specific contexts: opinion poll

UDC 796:81

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Abstract

Objective of the study was to analyze meanings of the term 'sports aggression' in the sporting young people's communities.

Methods and structure of the study. The authors run an opinion poll of the Lesgaft National State University full-time sporting students' (n=180) groups to analyze the modern semantic field of the term sports aggression, with the students sampled from the Russian Language and Speech Culture course under 49.03.01 Physical Education discipline. We sampled the academic boxing, kickboxing, taekwondo, athletics, sport dance and figure skating groups.

Results and discussion. Linguistic and stylistic analyses of the Lesgaft National State University students' opinion poll data give reasons to conclude that the term sports aggression traditionally perceived as negative undergoes semantic transformations in the national mass media and sports communities. Growing use of this term in sports media and communities has transformed its perceived meaning into positive. A special role has been played in this process by mass culture that promoted and consolidated positive connotations of the term sports aggression. This means that language of the national mass media naturally transforms with the ongoing socio-cultural transformations with the relevant implications for the modern colloquial and literate Russian language.

Keywords: *sports media, sports aggression, synonymic array, polysemy, psycholinguistics, emotionality linguistics.*

Background. Modern literary Russian undergoes transformations that affect the meaning-forming lexical units and their connotations [5, 6]. For example, such words as 'dashing' and 'monster' have acquired new colloquial and public meanings equivalent of 'brave, courageous, daring' etc. [3, 7]. The national physical education and sports terminology is not immune to such modern semantic transformations – as demonstrated, among other things, by the term 'sports aggression'. Traditionally, 'aggression' and 'aggressor' were applied mostly in the Soviet political contexts and media. In terms of the international law, aggression means "using armed forces of some state against sovereignty, territorial inviolability or political independence of

another state" with "open hostility that triggers hostility in response" [1].

It should be mentioned that the national and foreign sport science gives a high priority to the sports aggression related issues in studies [2, 8, 9]. Is it appropriate to use the terms 'sports aggression' or 'sports fury' in modern sports contexts knowing their traditional meanings related to evil, cruelty, hostility? As provided by E.P. Ilyin, "sports aggression means the emotional state dominated by hostile irritation with a tinge of aggressiveness to own self (including annoyance by own failure, oversight, wrong decision etc.) or some other (like the referee's unfair penalizing decision; fans who curse the athlete or team; coach who "pickles" the athlete on the bench, etc.)"

[4, p. 7]. The author reminds that “some athletes deliberately wind up their anger before match notwithstanding the fact that they may be in rather friendly relations with the opponent in non-competitive settings”. In the emotional control domain, such spurred up sports aggression may help athletes mobilize and concentrate, although it is not unusual that it “somewhat blinds the athlete at detriment to the competitive techniques, tactics and versatility as the actions become stereotyped and stubborn when the athlete strive to stick to and prove own role model”.

These terms are widely circulating in the colloquial and media contexts – with sports aggression increasingly used in positive connotations. We would give, for example, a few headlines: Salakhov about football: ‘sports aggression is always helpful (amfr.ru, 13.02.2019); Valery Muratov about skating: ‘sports aggression and passion helped Kulizhnikov make the world record’ (matchtv.ru, 03/10/2019); ‘sports aggression or insult? What will work out in the Spartak Football Club vs. Zenith Football Club clash?’ (Sportbox.ru, 1.09.2019). Linguistic analysis of the above shows that meanings and semantics of sports aggression and associating terms have made transformations in the emotional and apprehensive domains.

Objective of the study was to analyze the meanings of the term ‘sports aggression’ in the sporting young people’s communities.

Methods and structure of the study. We run an opinion poll of the Lesgaft National State University full-time sporting students’ (n=180) groups to analyze the modern semantic field of the term sports aggression, with the students sampled from the Russian Language and Speech Culture course under 49.03.01 Physical Education discipline. We sampled the academic boxing, kickboxing, taekwondo, athletics, sport dance and figure skating groups.

Results and discussion. Given on Figures 1 and 2 are the Lesgaft National State University students’ opinion poll data on their perceived meanings of the term sports aggression as neutral, acceptable, positive, unacceptable or negative.

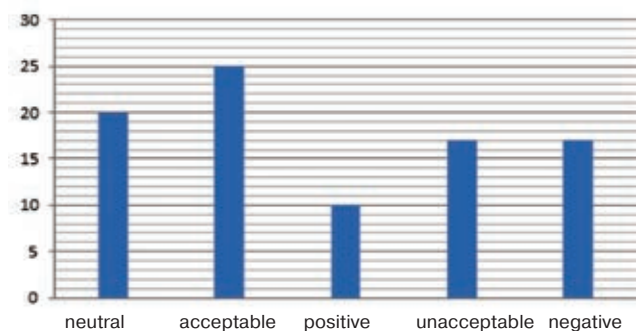


Figure 1. Perceived meanings of sports aggression: boxing, kickboxing and taekwondo groups

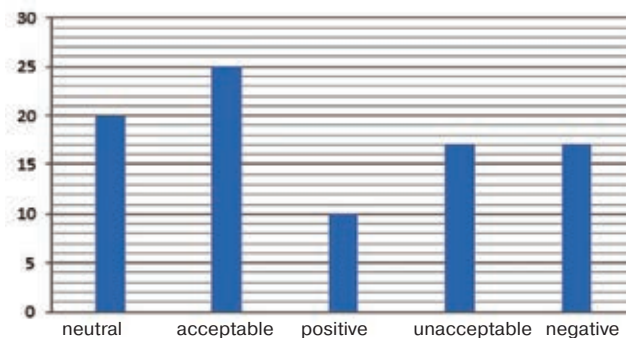


Figure 2. Perceived meanings of sports aggression: athletics, dance sport and figure skating groups

The above data demonstrate the difference in the perceived meanings of sports aggression by the boxing, kickboxing and taekwondo groups – versus the athletics, sport dance and figure skating groups. Most of the sample perceives sports aggression as a necessary component of the competitive spirit. About half of the sample feels reference to the athlete’s negative emotions due to own failures, opponent’s actions or ref service. 100% of the sample reported facing such perceptions in trainings or media comments on sports competitions.

When surveyed on acceptability of verbal aggression in sports comments and media, the different sports groups were of different opinions. It is important that students understand that journalists make resort to verbal aggression deliberately to spice up some competitive moments and interest of the audience. The poll data on perceptions of sports aggression and analyses found the following opposite connotations.

Positive connotations: excitement, clash, struggle, indignation, willpower, charge, courage, motivation, mind-setting, overcoming, rage, self-criticism, strength, composure, stamina, rivalry, aspiration, fight, firmness, confidence, stubbornness, perseverance, extreme effort, emotional peak, energy peak, energy, cool mind.

Negative connotations: aggression, fury, hostility, anger, annoyance, anger, revenge, discontent, resentment, hatred, intolerance, failure, resentment, despair, bitterness, hindrance, failure, irritation, ferocity, rage.

Final question of the opinion poll on perception of the term sports aggression in public speech as normal, neutral, acceptable, positive, unacceptable or negative - found a unanimous perception of the term as normal and acceptable in mass media and communities for its special expressiveness.

Conclusion. Linguistic and stylistic analyses of the Lesgaft National State University students’ opinion poll data give reasons to conclude that the

term sports aggression traditionally perceived as negative undergoes semantic transformations in the national mass media and sports communities. Growing use of this term in sports media and communities has transformed its perceived meaning into positive. A special role has been played in this process by mass culture that promoted and consolidated positive connotations of the term sports aggression. This means that language of the national mass media naturally transforms with the ongoing socio-cultural transformations with the relevant implications for the modern colloquial and literate Russian language.

References

1. Kuznetsov S.A. Great Dictionary of Russian language. St Petersburg: Norint publ., 2000. 1536 p.
2. Zakamornyiy S.O. Formation of physical education university students' competence in prevention and correction of athletes' aggression. PhD diss.. Siberian state un-ty of physical culture and sports. Omsk, 2012. 192 p.
3. Ilyin D.N. Development of lexical semantics. Positive processes. Negative meaning of the word in Russia. Rostov-on-Don; Taganrog: Southern Federal University publ., 2018. 150 p.
4. Ilyin E.P. Sports Psychology. St. Petersburg: Piter publ., 2008, 590 p.
5. Kirillova N.B. Medialogy. Moscow: Akademicheskiiy proekt publ., 2015. 424 p.
6. Murtazina G.Kh., Boykova N.G., Berdysheva N.Yu. et al. Precedent phenomenon in sport toponymy. *Teoriya i praktika fiz. kultury*. 2019. No. 9. pp. 50-52.
7. Pankratova O.A. Linguosemiotic characteristics of sports discourse. PhD diss.. Volgograd, 2005. 204 p.
8. Smirnova V.V. Dynamics of personal characteristics of athletes in psychological support process (case study of elite wrestlers). PhD diss.. St Petersburg, 2012. 252 p.
9. Kavussanu M. Moral behaviour in sport: A critical review of the literature. *International Review of Sport and Exercise Psychology*, 2008. No. 1, pp. 24–138.