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Theory & Practice of Physical Culture

Athletic training | Sport psychology | Academic physical education | Sport physiology

EDITORIAL

Key issues of the modern sports science for discussion

Modern modality of kinesiological knowledge

Interest in kinesiology has been actively developing in recent years not only in professional circles, but also among ordinary people who need help in solving health problems. At the same time, not everyone knows what lies behind this concept, as well as about its capabilities.

The term "kinesiology" consists of two words - "kinesio" and "logos", which in translation from ancient Greek means "movement" and "knowledge". Thus, kinesiology is the science of human movement. Moreover, movement is considered not only from a mechanical point of view (biomechanics), but also through the prism of the physiological and psychological properties of the human body.

Kinesiology as a scientific and educational discipline, as well as therapeutic and preventive practice (appliedkinesiology) has emerged relatively recently at the junction of sports medicine, physiology, morphology, biomechanics, bioergonomics, theory of sports training and recreational physical activity of a person.

To date, there are different points of view on the definition of kinesiology as a science. Here are some of them.

According to V.B. Korenberg (2005), kinesiology is a science that organically integrates biomechanics, pedagogy, psychology, and sections of other sciences that somehow help the formation and solution, analysis, cognition, design and planning of motor tasks.

According to foreign scientists, kinesiology is the science of movement, including biomechanics, anatomical and physiological foundations of movement, features of neuromuscular transmission, principles of the main types of muscular activity (R. Granit, 1973).

In the scientific works of V.K. Balsevich (2000), kinesiology is defined as an integrative field of scientific knowledge about human motor activity and the morphological, functional, biomechanical systems that provide it and methods of their development and improvement.

Applied kinesiology is considered as a new multidisciplinary approach to health based on a functional study of the patient, including analysis of posture, walking, volume of movements, static and dynamic palpation, using standardized diagnostic techniques in assessing the patient's condition (R. Granit, 1973; D. Goodhard, 2005; P. Dennison, 1998).

One of the successfully developing areas of kinesiology related to the learning process is educational kinesiology, in the center of which, according to V.N. Irkhin (2012), is the educational motor activity of a person. The means of educational kinesiology are mainly used for pedagogical purposes to improve the teaching of reading, writing, solving mathematical problems, etc.

The development of sports kinesiology is associated with the name of N.A. Bernstein, who in the 30s of the twentieth century opened a fundamentally new direction, including consideration and consideration of psychophysiological and psychological factors in the implementation of motor actions. He called this direction "biomechanics of motor actions", referring to the crucial role of "managerial" components that distinguish the concept of "motor action" from the concept of "execution of a system of movements".

We invite scientists to publish articles that are aimed at finding new approaches in the development of sports science.

Editor-in-Chief,
Honored Worker of Physical Culture of the Russian Federation, Ph.D., Professor L.I. Lubysheva

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105122 Moscow,
Sirenevy blvd, 4.
e-mail: fizkult@teoriya.ru

www.teoriya.ru/en

Theory and Practice of Physical Culture

Contents

Philosophical meanings of physical (body) culture

UDC 130.2 (045)

PhD, Associate Professor **E.R. Rogozina**[1]
PhD, Associate Professor **L.V. Batalova**[1]
PhD, Associate Professor **E.M. Berestova**[1]
Dr. Sc. History, Professor **G.V. Merzlyakova**[1]
[1]Udmurt State University, Izhevsk

Corresponding author: elfrogozina@yandex.ru

Abstract

Objective of the study was to analyze the body culture philosophy progress history in the axiological context.

Methods and structure of the study. We used the following key research methods: philosophical, ideological and socio-cultural analyses of the corporeality concept, physical/ body culture and physical culture since antiquity through the middle ages to nowadays.

Results and conclusion. Our philosophical, ideological and socio-cultural analyses of corporeality and body / physical culture give a historic overview of the concepts of physical education in their evolution.

Ancient philosophers were among the first to analyze human body culture, with the most focused and comprehensive analyses found in the heritage of Plato and Aristotle.

There is a growing need for further development of philosophical conceptions of body culture in view of the traditional and new mass media and blogosphere being increasingly engaged in the body beauty cult for the last decade. The popular interests are not limited by the diets and sporting lifestyles as such; but rather focused on a virtual body shaping up by the mass media toolkit. The efforts to "create" a beautiful (and real) body to present it on Instagram are contributed by the beauty industry experts that offer a range of services to shape up any body; whilst virtual bodies with their presentations are unlimited in fact, with the modern software filters available to make up every drawback and underline every benefit. A real human being in this virtual environment often loses its identity to evolve into a sort of 'ideal carrier' of a set of optional bodily parts including lips, eyes, nose, etc.; with the human body viewed as a kind of investment asset or frame lacking any individuality.

Keywords: *physical culture, body culture, physical culture philosophy, motor activity philosophy, body beauty cult.*

Background. Physical culture philosophy is a fairly young research discipline. Till recently it has been traditional for the body culture to be of interest for only natural scientific research by biologists, physicians, physiologists and psychologists that were later on joined by humanitarians including cultural scientists, sociologists, teachers and others. Despite the fact that philosophy has always been interested in body/ physical culture (since antiquity as far as we know in fact), it was only in the late 20th century that it became subject to a purely philosophical comprehensive research. Presently the notion of physical culture is commonly interpreted within the philosophical knowledge domain as the body/ somatic/ physical culture and (personality-sensitive) physical education [8], with both of the definitions comprising a subject field for the modern body culture philosophy.

Objective of the study was to analyze the body culture philosophy progress history in the axiological context.

Methods and structure of the study. We used the following key research methods: philosophical, ideological and socio-cultural analyses of the corporeality concept, physical/ body culture and physical culture since antiquity through the middle ages to nowadays.

Results and discussion. The concept of body culture / physical culture appears multifaceted, with the research community offering a few definitions for the term. For example, body culture is considered an in-

tegral part of a social culture and one of the social activity fields with its health/ physical progress priorities. This interpretation is somewhat academic since fairly common for the reference literature [7]. Physical culture may be defined as the system of values within the whole range of physical activity formats. Some authors interpret physical culture as the motor activity array or set of exercises geared to transform individual body. One more group of the physical culture definitions prioritizes its sporting domain. Having analyzed the above common definitions, we found that the researchers tend to associate physical culture with physical activity in combination with a range of other socio-cultural functions. In this context, it may be beneficial to consider body culture in the context of the general human culture.

Ancient philosophers were among the first to analyze human body culture, with the most focused and comprehensive analyses found in the heritage of Plato and Aristotle. Thus Plato, famous ancient Greek philosopher, emphasizes that health, physical beauty and perfect body shape should be built up and maintained based on a sound artistic and natural scientific background by lifelong physical exercises and gymnastics [5].

The so-called body beauty cult is known to originate in the ancient Greece in B.C. period. The ancient Greek philosophers gave a special priority to individual physical education due to popularity of the Spartan upbringing with its narrow military contexts. The Greeks classified the physical culture practices into physical exercises, i.e. general physical education and agonistics that mean special precompetitive trainings and competitions as such. Gymnastics, in its turn, implied a variety of exercises for multisided physical fitness, including palaestrika i.e. dance elements for movement grace, plasticity, postural shaping and controls, and perfect body shaping practices including orchestrika and outdoor games [4].

Plato promoted the Spartan educational system with a special priority to the intellectual progress facilitating elements, particularly in the preschool educational system dominated by game formats. The games were designed to train children for challenges of the-then adult lifestyles. Children were even encouraged to watch warfare from a safe distance. Plato analyzed benefits of consistent governmental educational system to secure harmonious physical and intellectual education conditional on the "young people's commitment for an abstemious lifestyle with compliance of good hygienic rules" [5]. These ideas may be considered as forming basics of the physical education culture to a degree.

Aristotle, another ancient thinker, also believed in the colossal benefits of good physical education and underlined that the care of body should be preceded by a care of the soul. He was, however, very critical for the Spartan physical education system arguing that the bodily stresses tend to hamper an intellectual progress. He believed that an educational system should give a top priority to beauty rather than animalistic side. This was the prime reason for him to recommend eased gymnastics practices in the body culture agenda [2].

The PBC epoch with its admiration of a beautiful athletic body and physicality was followed by a period of hostility to corporeality. The medieval Christian asceticism preached suppression of natural desires and attractions and condemned sinful earthly corporeality as opposed to the world of divine grace in every Christian doctrine and practice. Pope Gregory the Great called the body "a disgusting capsule for the soul" in the times when monks who mortified their flesh were ranked on top of the social role models. This epoch polarized the spiritual, noble "top" of the human nature nearing the Absolute as opposed to its corporeal, carnal and godless "bottom" [3]. It was common to believe that a sinful human body deserves being mortified by a wide range of flesh killing and punishment practices. No wonder that flagellantism or the movement of the scourged was so widespread in the XIII century. It is worth noting that the medieval philosophy paid a special attention to the unity of soul and body. Thus Thomas Aquinas viewed a human is a soul-and-body creature with its substantial integrity secured by an indissoluble connection of soul (as form) and body (as substance) [1].

Jean-Jacques Rousseau, a French thinker, came up with an original and revolutionary concept of natural physical education that was outlined in his treatise "Emil, or On Education" [6]. The physical education success in this concept is determined by the following three key factors: nature (individual qualities and gifts from nature), people (sharing their practical experiences and helping the individual to socialize), and things (that help develop the individual behavioral models when coping with multiple life situations).

Furthermore, Rousseau believed that child's behavior should be controlled unobtrusively, without coercion, to help him arrive at the right solution on own

discretion. This theory offers an age-specific education ranking system with the following four progress periods: (1) birth to speech appearance (0 to 2 years), with a special emphasis on physical education; (2) 2 to 12 years phase, with an emphasis on sensuality; (3) 12 to 15 years time, with a priority to intellectual education; and (4) 15 to 18 year period with a top focus on morality cultivating education; with the educational process of a socially responsible citizen completed by 25 years of age.

Rousseau gave a special importance in the above system to the first and second periods critical for a good health formation, when the child should not be swaddled, nor protected from drafts and cold to temper his body. In the 2 to 12-year period, child should spend as much time as possible outdoors to independently explore and test the outside world when jumping over a fire, climbing trees, running, playing with peers, getting familiar with everything within his reach.

In addition, Rousseau prioritized physical labor among the key intellectual progress facilitating means. He believed that a child should both master every accessible tool and excel in some vocational craft to later on feed himself and his family. In this craftsmanship excellence process the philosopher gave special importance to the intellectual practices; with physical labor recommended to reasonably alternate with intellectual work for active recreation. He also recommended a special focus on the moral education in the 15-18-year phase when the "storms and passions" period comes, as it is the right time for the adolescent to "learn ropes of a human life" [6].

Conclusion. Our philosophical, ideological and socio-cultural analyses of corporeality and body / physical culture give a historic overview of the concepts of physical education in their evolution. The ancient Greeks were so much obsessed with the ideas of physical perfection that gave a primary role to the physical education issues, and it was at that period that the body beauty cult emerged; with the physical education formats, in opinions of the Greek philosophers, being still reasonably measured to effectively protect and improve health.

The corporeality and body beauty prioritizing period was followed by the medieval era with its extremely negative attitudes to body, corporeality and physical education. J.-J. Rousseau tried to offer a ‘golden mean’ in this educational domain with his natural harmonized physical education concept with the ages-specific phases to secure a gradual progress from the regular physical education practices in the childhood complemented with reasonable labor/ craft mastering trainings and intellectual practices in adolescence ended up with a morality cultivation education. The Rousseau system gave a strong impetus to progress of the global physical education concepts, with some of his provisions forming a basis for the M. Montessori's education method and Soviet pedagogical systems.

There is a growing need for further development of philosophical conceptions of body culture in view of the traditional and new mass media and blogosphere being increasingly engaged in the body beauty cult for the last decade. The popular interests are not limited by the diets and sporting lifestyles as such; but rather focused on a virtual body shaping up by the mass media toolkit. The efforts to "create" a beautiful (and real) body to present it on Instagram are contributed by the beauty industry experts that offer a range of services to shape up any body; whilst virtual bodies with their presentations are unlimited in fact, with the modern software filters available to make up every drawback and underline every benefit. A real human being in this virtual environment often loses its identity to evolve into a sort of ‘ideal carrier’ of a set of optional bodily parts including lips, eyes, nose, etc.; with the human body viewed as a kind of investment asset or frame lacking any individuality.

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Goal setting in physical education and sports sector

UDC 37.013.21

Associate Professor, PhD **S.L. Sazonova**[1]
Associate Professor, PhD **A.K. Simonova**[1]
[1]Ural State University of Physical Culture, Chelyabinsk

Corresponding author: nir@sport-ural.ru

Abstract

Objective of the study was to theoretically substantiate the goal setting technology application in sports and offer a goal setting application algorithm to facilitate competitive progress.

Methods and structure of the study. We run, for the purposes of the study, psychological tests to rate the goal setting situation and potential progress in sampled athletes (n=40). The test set included: (1) Goal-Methods-Result test to rate the individual predispositions for purposeful actions and profile the individual goal setting skills and specifics; and (2) Self-esteem rating test.

Results and conclusion. The study demonstrates benefits of the goal setting technology application for success in sports, provided it is well designed and managed at every training stage to help the athlete develop the need and skills for self-reliant persistent goal setting for the individual and group progress. Determined goal setting practicing helps develop a range of qualities critical for success including determination, responsibility, efficiency, decision-making, progress management and forecast skills. Benefits of a prudent goal setting technology are particularly clear and fast in the physical education and sport sector, since an athletic progress take relatively little time when prudently designed and managed so as to efficiently set specific goals in the growth process taking into account the individual and socio-psychological specifics at every progress stage. The goal setting algorithm should be applicable for very specific progress missions to be effective. Prudent training process design should consider clear goal setting as a starting point for success and a key element in the professional service of every sports trainer.

Keywords: *goal setting, goal attainment theory, priority values, sports activity, athlete.*

Background. Presently the sports practice finds virtually no application for the goal setting technology (ranked high among other progressive psycho technologies) due to the fact that it is not covered by the sports psychologist training curricula; with the situation further aggravated by the shortage of the practical application guidelines. Efforts to develop and implement the goal setting application algorithm in the modern sports training systems on an individualized and customized application offer great benefits for the competitive performance, resource mobilization and success motivations – and that is why the relevant research is needed.

Objective of the study was to theoretically substantiate the goal setting technology application in sports and offer a goal setting application algorithm to facilitate competitive progress.

Methods and structure of the study. We run, for the purposes of the study, psychological tests to rate the goal setting situation and potential progress in the sampled athletes (n=40). The test set included: (1) Goal-Methods-Result test to rate the individual predispositions for purposeful actions and profile the individual goal setting skills and specifics; and (2) Self-esteem rating test.

Results and discussion. The Goal-Methods-Result test found most of the sample facing the following goal setting problems in the Goal domain: goal formulation and grounding difficulties; unclear/ volatile goals; reliance on support from outside (such test data were highlighted by yellow). Two athletes were tested particularly incapable in goal setting and, therefore, prone to "micro-goals" setting. And only a few people in the sample were tested capable in setting specific clear goals and determined to attain them.

Around 37.5% of the sample was found quite adequate in the Methods domain, i.e. in choosing methods adjustable to the actual situations; and 42.5% were tested with occasional problems in finding methods. This limitation may be due to some personal psychological barriers or a need for really constructive, clear and achievable goal. A few athletes reported shortage of attainment methods and a limited choice; and about the same proportion was tested spontaneous on the Methods scale.

And on the Results scale the sample was tested highest, with 80% found sober and balanced when rating the results without over- or underestimation; and the remaining 20% were tested prone to overestimation on the Results scale. Therefore, the Goal-Methods-Result test data give the grounds to believe that the goal setting skills building efforts should be designed mostly to help the athletes clearly set goals and find due methods to attain them.

On the Self-esteem scale, 65% of the sample was tested not confident enough in own resource and having doubts in decision-making. One athlete (2.5%) showed an inflated self-esteem i.e. proneness to overestimating own capacity, whilst the rest were quite objective in self-rating.

Goal setting and emotional stress/ tension in competitions are known to depend on how the athlete is determined i.e. on his/ her success motivations – that may vary in their turn depending on the individual and social value of the win or loss. The goal setting process should be generally designed to: formulate the personal goal in the event; build up a positive mindset to attain this goal; and reinforce confidence in the goal being realistic and attainable. However, in the goal attainment, the athlete should closely monitor and rate the situation and own resource to efficiently manage own actions versus the personal progress benchmarks.

Furthermore, the goal setting implies coping with barriers on the way to success in the most efficient way. One of the most important prerequisites for success is that the athlete should be fully committed and conscious in the goal setting process, acting with good understanding of every difficulty in the precompetitive training so as to manage own resource at every training stage knowing the practical significance of the goal. The goal setting process should be driven by a rational algorithm for success, with prudent energy cost rating and management elements. The algorithm implies a sequence of questions and answers paving the way to the preset goal. It should also be mentioned that such a goal setting process algorithm would help effectively change the athlete's mental conditioning patterns for competitions and generally make his life strategies more rational and energy-saving.

One of the benefits of the prudent goal setting technology in sports is that it helps the athletes develop the independent solution-finding skills with a growing reliance on own resource, life experience, intuition and feelings. At the same time, the staged goal setting process helps work out individual consciousness on deeper levels to mobilize motivation, creativity, intentions, vital energy and cognitive resource to effectively employ own potential, with special benefits for the overall mental controls. As a result, the athlete may develop leadership qualities and success motivations for fast competitive progress, plus sound responsibility, with the decision-making and own life management abilities.

In terms of the modern sports psychology, the goal setting technology is an effective tool for the athlete's mental conditioning that should be as regular as the physical training process for success. Mental control qualities and skills are known to grow with regular trainings and stresses in the same way as muscles become elastic and strong with physical trainings.

Conclusion. The study demonstrates benefits of the goal setting technology application for success in sports, provided it is well designed and managed at every training stage to help the athlete develop a need and skills for self-reliant persistent goal setting for the individual and group progress. Determined goal setting practicing helps develop a range of qualities critical for success including determination, responsibility, efficiency, decision-making, progress management and forecast skills. Benefits of a prudent goal setting technology are particularly clear and fast in the physical education and sport sector, since athletic progress take relatively little time when prudently designed and managed so as to efficiently set specific

goals in the growth process taking into account the individual and socio-psychological specifics at every progress stage. The goal setting algorithm should be applicable for very specific progress missions to be effective. Prudent training process design should consider clear goal setting as a starting point for success and a key element in the professional service of every sports trainer.

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Coordination skills to excell ski jumping technical skills

UDC 796.925

PhD, Associate Professor **A.I. Popova**[1]
PhD, Associate Professor **A.E. Ardashev**[1]
G.Y. Prokopenko[1]
Postgraduate student **E.D.** [1]
[1]Tchaikovsky State Institute of Physical Culture, Tchaikovsky

Corresponding author: ski@chifk.ru

Abstract

Objective of the study was to offer a new coordination skills test model for the modern ski jumping sport.

Methods and structure of the study. We made a theoretical analysis for the study knowing the modern ski jumping trampoline systems and based on our practical coaching service to the national ski jumping elite. We sampled for the coordination skills tests the 10-21-year-old male ski jumpers (n=124) qualified Junior Class athletes to Masters of Sport. The sample was tested by the following tests: static equilibrium rating test on an unstable T-shape balance plate fixed parallel or perpendicular to the wall to obtain the individual Sagittal Balance and Frontal Balance test data; and the following overall coordination skills rating tests with the spatial orientation test elements: figure-of-eight shuttle sprint test; and the specific low-limb coordination skills rating 10 hurdles jump test. The resulting test data were analyzed versus the ski jumping technique scores.

Results and conclusion. The coordination skills excellence practices were found highly beneficial for progress in the modern ski jumping sport trainings and competitions at every stage of an individual sports career. Competitive accomplishments in the modern ski jumping sport heavily depend on a harmonious progress in coordination skills, with a special priority in the coordination skills trainings given to the ski jumping practices on a few trampolines with different dimensions and profiles. Such trainings are known to develop high stress tolerance and solution-finding skills in practical ski jumping competitive settings.

Keywords: *ski jumping, coordination, simulation practices, flight phase, ski jumping technique.*

Background. Presently the ski jumping sport research community has accumulated a theoretically sound research data demonstrating the movement coordination and technical performance being closely correlated, as is the case for many other sports as well [5]. The modern ski jumping is commonly ranked among the sports disciplines that require "high movement coordination and body balancing skills". The ski jumping sport techniques require perfect control in a wide range of angular accelerations in a few jumping phases [7]. Perfect movement coordination in the ski jumping sport should be associated with high decision-making, stress tolerance, solution-finding and execution control skills customizable to the ever changing weather conditions. Generally, individual coordination skills are known to heavily contribute to the competitive performance in the modern ski jumping sport. Technical excellence trainings in the sport, therefore, should make a special emphasis on the competitive environment control with spatial/ strength/ timing aspects in every trained skill, and with the coordination skills considered as a basis for competitive progress [1]. The relevant study reports give enough information on the coordination skills training service goals, methods, models and tools in different sports, albeit in the ski jumping sport these issues still need to be developed on a more extensive and detailed basis.

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Methods and structure of the study. We made a theoretical analysis for the study knowing the modern ski jumping trampoline systems and based on our practical coaching service to the national ski jumping

elite. We sampled for the coordination skills tests the 10-21-year-old male ski jumpers (n=124) qualified Youth Class athletes to Masters of Sport. The sample was tested by the following tests: static equilibrium rating test on an unstable T-shape balance plate fixed parallel or perpendicular to the wall to obtain the individual Sagittal Balance and Frontal Balance test data; and the following overall coordination skills rating tests with the spatial orientation test elements: figure-of-eight shuttle sprint test; and the specific low-limb coordination skills rating 10 hurdles jump test [6, 8]. The resulting test data were analyzed versus the ski jumping technique scores.

Results and discussion. Given in Table 1 hereunder are the averaged coordination skills test data versus ski jumping technique scores of the sample.

The T-shape bar tests found the 10-12 and 15-18-year-olds being most sensitive to the specific coordination skills training. This reportedly holds true for many other sport disciplines, including track and field sports, swimming and martial arts [3]. The 13-15-year-old ski jumpers are normally tested with the coordination skills sags due to the fast body growth process [6], since the pubertal age with the active body growth and neuromuscular apparatus transformations complicates adaptation to the rapid changes. It is very important in this period to avoid excessive physical trainings that should rather prioritize the coordination skills training elements – with their percentages in the total workloads being kept stable. The practices should be more diverse and free of unnecessary complications – being dominated, for example, by balance on a fitball when the body is kept upright with slow flexions in the knee joints. The ski jumping trainings in this period should be kept within a supportive format and run at high speed to maintain the attained technical skills.

By 15-17 years of age, the body growth normally stabilizes, and progress in the coordination skills goes back to norm. Based on the accumulated skill set till 17 years of age, the athletes would show fast progress in the vestibular balancing skills [7]; thus the 18-19-year-olds are highly sensitive to the coordination training elements. Practices on the balance plates may be complicated at that time by hand control excellence trainings with different appliances plus the acceleration technique excellence elements.

The figure-of-eight and 10-hurdles test rates were found to fast grow till 13 years of age, as this period is known as most beneficial for the coordination skills trainings [3]; with the coordination skills progress later on stabilized in the 13-16 and 19+ year-old groups. Our test data showed a gradual progress in special dexterity, movement redirection and spatial orientation skills, with progress in the test completion times among other things [2]. We recommend in this period the trainings to be complemented with the coordination ladder practices and acrobatic elements (trampolining, somersaults, flips, etc.). The coordination ladder practices will excel the movement coordination skills on the run, with faster responses, lower limb speed, techniques and balance improvement elements.

Vertical jumps on trampolines are known to develop the vestibular apparatus and body control skills in the aerial and landing phases, with special benefits from the coups and rotations in the flight phase. These

Table 1. Age-specific averaged coordination skills test data versus ski jumping technique scores of the sample

Age	Sagittal Balance, s	Frontal Balance, s	Figure-of-eight, s	10 hurdles, s	Ski jumping technique score
10 (n=6)	2,40±1,07	2,11±1,24	21,78±1,30	7,77±1,05	39,0±4,5
11 (n=9)	2,55±1,12	2,63±1,12	20,26±3,10	6,82±2,22	41,0±3,5
12 (n=19)	2,78±0,82	3,02±1,3	19,77±2,43	6,46±1,39	44,0±6,5
13 (n=16)	2,26±1,20	2,37±0,76	19,02±2,12	6,20±0,47	43,0±5,5
14 (n=21)	2,14±0,75	2,68±1,04	19,81±1,76	6,32±0,66	45,0±3,5
15 (n=21)	2,55±1,17	2,54±0,84	19,23±1,51	6,37±0,74	44,5±2,5
16 (n=7)	2,53±0,85	3,78±1,65	18,07±1,39	6,31±1,26	47,5±2,5
17 (n=5)	2,66±1,48	3,90±1,55	18,22±0,61	5,59±0,65	48,0±2,5
18 (n=8)	3,76±1,45	4,13±1,82	18,73±1,92	5,71±0,77	48,0±3,5
19 (n=3)	3,75±0,08	3,92±0,34	17,96±0,65	5,57±0,16	48,5±2,5
20 (n=5)	3,68±0,79	4,02±1,01	18,29±1,44	5,61±0,69	50,0±1,5
21 (n=4)	3,48±0,62	3,80±0,68	17,91±0,24	5,80±0,14	49,5±2,0

skills are particularly important for the acceleration, take-off, flight and landing skills in real ski jumping competitions. The athletes should focus on horizontal rotations around the body axis, with the practices completed with the landing stance ('raznozhka') repetitions to excel the coordination and balance in the pre-landing and landing phases.

In the active body growth period, active trainings with a special focus on the dynamic coordination and speed-strength training elements for the key muscle groups responsible for the movement pacing and timing in the take-off phase, are rather beneficial as verified by the 10-hurdles jump test. These test data are indirectly indicative of the individual coordination skills in the take-off phase and best aerodynamic stance taking with no loss for the take-off and flight speeds [4].

Progress in the above coordination skills in the ski jumping trainings will be facilitated by the relevant dynamic balance excellence practices – including, e.g., one-leg "pistol" squats with gradual growth in amplitudes (squat depth) critical for both the speed-strength and dynamic balancing qualities. Such trainings may apply special equipment and simulators including a 'trolley' plate on rollers. The trolley practices may be used to excel the static/ dynamic balancing skills critical for success on the acceleration rack and in the take-off phase, when the body mass center needs to be perfectly controlled for success.

To speed up progress, the above practices will simulate as close as possible the harmonized, sequential and efficient lower-limb muscle operations in the take-off phase. Individual executions in the trainings are recommended to be captured using video cams for further tests and analyses to timely detect and correct execution errors as provided by the feedback mechanism. These practices should help improve the take-off sequence with a special emphasis on the gradual progress in the muscular coordination skills and motor memory, to secure the motor skills being excelled to perfection and automated by multiple repetitions [2].

It should also be emphasized in the context of the above study data, that the ski jumping sport specific coordination skills are indispensable for the technical and competitive progress as verified by analysis of the coordination skills test data that was found to significantly correlate with the ski jumping technique scores, with the Spearman correlation ratio varying at 0.7-0.8.

Conclusion. The coordination skills excellence practices were found highly beneficial for progress in the modern ski jumping sport trainings and competitions at every stage of an individual sports career. Competitive accomplishments in the modern ski jumping sport heavily depend on a harmonious progress in coordination skills, with a special priority in the coordination skills trainings given to the ski jumping practices on a few trampolines with different dimensions and profiles. Such trainings are known to develop high stress tolerance and solution-finding skills in practical ski jumping competitive settings.

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Rating physical working capacity based on respiratory function

UDC 796.015

Postgraduate **F.B Vashlyaev**[1]
PhD, Associate Professor **I.R. Vashlyaeva**[2]
[1]Ural State University of Physical Culture, Chelyabinsk
[2Y]ekaterinburg Institute of Physical Culture (branch), UralSUPC, Yekaterinburg

Corresponding author: zhir4ik@mail.ru

Abstract

Objective of the study was to identify approaches to rating physical working capacity based on the respiratory function.

Results and conclusion. For sports pedagogy, the subject of which is movements, it is advisable to distinguish from a large number of factors and responses that determine the physical working capacity level an indicator that would integrate multi-level responses. This indicator is energy supply: aerobic (ox-idation) and anaerobic (primarily anaerobic glycolysis). It is the relationship between these two processes that determines the level of physical working capacity.

Numerous tests (since 2003) of people of different ages and physical fitness levels (from beginners to Olympic champi-ons) have proved that the dynamics of the mentioned ventilatory capacity and ventilatory pulse indicators reflect the level of physical working capacity by demonstrating:

– the presence or absence of neuromuscular fatigue;

– aerobic or anaerobic type of energy supply in terms of load increment.

The accessibility of the proposed approaches to physical fitness tests provides ample opportunities for monitoring and managing recreational and sports activities.

Keywords: *tests, physical fitness, problems, power, respiration, pulse.*

Background. The success of physical education and sports activities is largely determined by the effectiveness of monitoring of the human response to physical loads. Modern technologies provide great opportunities for measuring different determinants of motor activity [1, 7, 13]. However, «what is true of a group member is not true of the group as a whole». It should also be noted that sophisticated monitoring technologies are not available to everyone.

At the same time, monitoring is a must for everyone – children, adults, beginners, and champi-ons. It is impossible to set clear, unambiguous priorities. The increasing need for objective monitoring of physical loads has revealed many problems, including:

• The number of those involved in health-improving physical practices, fitness, and children's and youth sports is much greater than that of highly skilled athletes, with different means for monitoring.

• By no means do all coaches recognize the importance of regular monitoring.

• By no means do all experts fully understand what needs to be monitored.

• Monitoring techniques for a narrow range of qualified athletes require sophisticated equipment and services from trained professionals, which are not always readily available or feasible.

• In sports clubs and sports schools, even with a sports doctor or a doctor's office, it is not ad-visable to maintain expensive equipment and implement complex methods.

As a result, a significant number of athletes perform physical loads uncontrolled, which leads to inefficient recreational and sports activities. There is a need for physical fitness monitoring procedures accessible to a wide range of trainees.

Objective of the study was to identify approaches to rating physical working capacity based on the respiratory function.

Results and discussion. For sports pedagogy, the subject of which is movements, it is advisable to distinguish from a large number of factors and responses that determine the physical working capacity level an indicator that would integrate multi-level responses. This indicator is energy supply: aerobic (ox-idation) and anaerobic (primarily anaerobic glycolysis) [8]. It is the relationship between these two pro-cesses that determines the level of physical working capacity [10].

Historically, the predominance of the type of energy supply has been identified through the gas analysis of the exhaled air or through the measurement of the lactate concentration in the bloodstream, which is relatively expensive and not always agreeable, for example, in children's sports. However, in-creased anaerobic glycolysis can be due to the activation of the respiratory function [11]. Modern spiro-graphs make it possible to quickly measure respiratory minute volume (RMV, l/min). The respiratory sys-tem reacts immediately to any physical load. All that is left to do is to compare the respiratory minute volume rate to the amount of workload performed.

In this comparison, it becomes possible to formalize physical loads in cyclic locomotions in terms of power or its equivalents, such as speed and tempo. However, it is quite difficult to do in other motor actions, such as sports games or martial arts.

It should be emphasized that with an increase in heart rate to an average value of 170 bpm, work power (N, W, Fig. 1) increases linearly [11].

In addition, according to our records, in a wide range of movements, heart rate highly correlates with the increasing indicators characterizing load power or its equivalents (r=0.85-0.98). This makes it possible to take as an argument not only the power mechanical characteristics (equivalents) but also heart rate, which helps estimate physical working capacity based on the energy supply type (aerobic, anaerobic) outside laboratory conditions, for example, during trainings.

The function is the non-linear dependence of respiratory minute volume on power (including its equivalents) and heart rate under loading (Fig. 1) [2]. Among the identified functions are [3, 4, 5]:

1. Ventilatory capacity (VC, l/W, or specific respiratory volume), the first derivative of dRMV/dN, physical significance – the volume of ventilated air necessary to provide a unit of work.

2. Ventilatory pulse (VP, l/beat), the first derivative of dRMV/dHR, physical significance – the volume of ventilated air per tick of the blood.

Physical working capacity rating is based on the comparison of respiratory minute volume with power (N) when performing a stepwise increasing load on a cycle ergometer, treadmill or stepper, as de-tailed in many works [1, 6, 7, 13, 14], as well on the comparison of respiratory minute volume with heart rate during movements in any chosen sport, including trainings [5]. The breathing mask is given to the subject only for 15-20 seconds at the end of the loading stage or work stage. This makes it possible to re-duce the disruption of natural breathing and not to distort heart rate.

With individual differences in biological responses to loading, the trends at the individual parts of the ventilatory capacity and ventilatory pulse diagrams illustrate the following (see Figure) [3-5]:

1. Stability of the ventilatory capacity and ventilatory pulse rates (5%) under increasing loads – adequacy of aerobic energy supply [12].

2. An increase in the ventilatory capacity and ventilatory pulse rates under high-power loads – the respiratory function provides not only the performance but also the elimination of the resulting oxygen debt, of course, due to the activation of the respiratory function. The ventilatory capacity and ventilatory pulse rates may increase at different speeds depending on the intensity of lactate production and oxidizing capacity of its utilization. It is not always possible to differentiate between the aerobic (AT), anaerobic (AnT), and critical power (Ncrit.) thresholds, since the two closest ones may be within one stage (Fig. 1). But in respect of the pedagogical aspect, it is primarily important to detect an increase in anaerobic glycolysis when performing physical loads. In this case, the steepness of the increase in the ventilatory capacity and ventilatory pulse rates indicates either compensation or predominance of anaerobic glycolysis.

3. A decrease in the ventilatory capacity rates or increase in the ventilatory pulse rates under mod-erate-power loads – neuromuscular fatigue and (or) an irrational movement technique due to excessive pulmonary venation or increased pulse.

4. It should be noted that there are cases, not given in Fig. 1, of a decrease in the ventilatory capacity and ventilatory pulse rates under sub-maximum loads, indicated significant fatigue due to respiratory center depression [9].

In the step test, the illustrations given (except for the fourth one) were detected in terms of two dimensions N1 and N2, which greatly accelerated the testing process (see Figure 1).

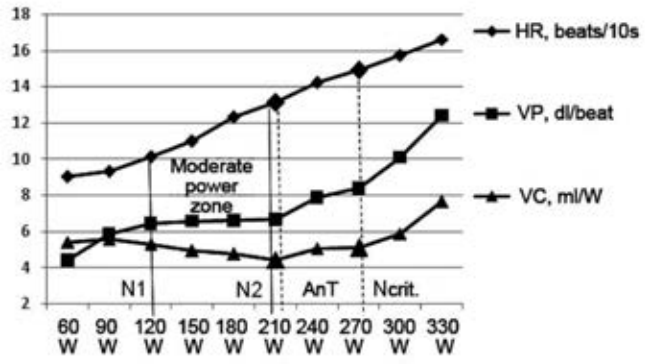

Fig. 1. *Cycle ergometer step test with measuring of RMV and HR. Biathlon. HMS A. Sh.*

At the same time, it is very important for the training and especially health-improving processes to identify a zone of moderate power characterized by an equal ratio between oxygen demand and oxygen consumption under changing load, which determines the "true stable state" and, consequently, stable working capacity for a long time [10, 11].

Conclusion. Numerous tests (since 2003) of people of different ages and physical fitness levels (from beginners to Olympic champions) have proved that the dynamics of the mentioned ventilatory ca-pacity and ventilatory pulse indicators reflect the level of physical working capacity by demonstrating:

– the presence or absence of neuromuscular fatigue;

– aerobic or anaerobic type of energy supply in terms of load increment.

The accessibility of the proposed approaches to physical fitness tests provides ample opportunities for monitoring and managing recreational and sports activities.

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Economic culture building technology for academic physical education system

UDC 796:005

Dr. Hab., Professor **I.V. Bryzgalov**[1]
[1]Yekaterinburg Institute of Physical Culture (branch) of the Federal State Budgetary Educa-tional Institution of Higher Education "UralSUPC", Yekaterinburg

Corresponding author: ivb-obr@mail.ru

Abstract

Objective of the study was to provide a theoretical basis for the new economic training tech-nology for the national physical education universities.

The economic training methods may be listed as follows. Traditional methods, with their nat-ural limitations as they provide mostly for the one-way education flow (from teacher to stu-dent) with the student considered an object for requirements and tests; with his/ her progress rated and encouraged, regress penalized; and motivations secured by the public opinion, per-suasion, practicing, teaching, stimulation, tests and progress rates. These methods need to be complemented by many reasonably managed techniques including success situations, hyper-boles, highlights, pauses, focuses, contrasts, subtexts, hints, compromises, agreements, guide-lines, etc.

Results and conclusion. The proposed economic training technology complementary to the traditional academic physical education curricula is designed customizable to the latter and manageable, since the universities have all necessary test tools to verify its practical benefits. It is also important that the economic training technology and discipline is reproducible and user-friendly in application, i.e. may be implemented at every university provided the curriculum, educational service guidelines and textbooks are available.

Keywords: *system, education, economic culture, student, physical education.*

Background. The versatility principle pursued by the national educational system encouraged us to develop a new economic training technology as complementary to the academic physical education curriculum to develop economic culture in students. We have good reasons to believe that the economic training service will be designed on the modern educational basis with the relevant economic educational service content, values and priorities including the corporate efficiency improvement ones. The new economic training technology may be de-scribed as follows: it is innovative as based on the author's own idea; alternative, i.e. different from the traditional approaches, schools and technologies; conceptual that means that the technology integrates the relevant philosophical , socio-economic, pedagogical and cultural concepts; socially sensitive, i.e. designed to meet the modern social demand for the graduates' economic competences to contribute to the corporate efficiency, taxation basis and, hence, national budget; and based on the best practical experiences and technological progress achievements [7, p.219]. The initiative to develop the economic training technology for the academic education system was motivated by the following: still low economic culture in the national business sector; progress of the national pedagogical science that facilitates the eco-nomic training initiative; sound pedagogical experience accumulated by the economy teachers in the national academic system; the author's own multiannual professional teaching experience, etc.

Objective of the study was to provide a theoretical basis for the new economic training tech-nology for the national physical education universities.

Results and discussion. We believe that any new technology will be created on an integral basis to effectively solve every problem in the training, education and personality progress agenda of every student; and meet every need of the faculties prepared to implement the new economic culture building technology [7, p. 245-246].

We recommend the efforts to select and implement the new economic training technology be-ing governed by the following principles: in the application domain: starting from the educa-tional service in the general secondary educational system; in terms of philosophical founda-tion: humanistic and cultural priorities; the key progress factor: motivational-volitional; in terms of the training concept: geared to offer a new production management project for the physical education and sports sector by the improved economic culture; in terms of the per-sonality progress agenda: prioritizing self-learning to build up the economic culture for an ef-ficient professional service in the physical education and sport sector; in terms of the cognitive process management: individual and partner (director and chief accountant) operations, and teamwork in groups of three-four people; in terms of the teacher-student communication: a personality-sensitive training service with the relevant most efficient methods including the problem-solving, research-centered, research-facilitated, active and creative; and in terms of the target student groups: designed mostly for the senior students.

The new economic training technology was designed on the following conceptual provisions and priorities: development and self-development; educational service humanization; educa-tional service democratization; socializing and psychological progress; practical support; and sensitivity to the external factors of influence on the educational service. The new economic training technology naturally sets its mission, principles, contents, training methods, models and tools.

The Mission of the economic training technology for senior students is to develop the eco-nomic culture by means of the new educational service on a sound pedagogical foundation. The core audience for the new economic training technology is the 3-4-year students master-ing in Physical Education and Sports; the core subject is the economic knowledge-base, skills and abilities; and the core teacher's goal is to build up the economic culture in the students [5, p. 33-40]. We generally modeled the new economic training technology as recommended by V.S. Bezrukova, with a special focus on the creative activity in the educational service.

The economic training technology was designed on the following principles: interest in spe-cialties of special demand on the labor markets; and special respect to the instructors having practical business experience. The key principle of the economic training teacher' service is standard: fair professional service for success. In our practical work, we were also governed by the principles of conformity to nature, humanization, integrity, democratization, cultural conformity, and professional efficiency [5, p. 41-50].

It is quite natural that the quality of teaching and learning largely depends on the educational service toolkit. Pedagogical means include the university assets, teaching equipment, labora-tory equipment, didactic technologies, teaching aids, and other material/ pedagogical means. In the new economic training model piloting experiments, we used the following means: school audio-video equipment, classrooms and furniture. The didactic means included the practical guidelines for the Effective Manager training course from the UK Open University's Business School, with hardcopy modules, audio-materials, videotapes, floppy disks, digests, etc. The economic training equipment also includes the classroom/ personal computers, Zoom electronic communication toolkit for the distance learning; and Ator-Vuz academic progress test system.

The economic training methods may be listed as follows. Traditional methods, with their nat-ural limitations as they provide mostly for the one-way education flow (from teacher to stu-dent) with the student considered an object for requirements and tests; with his/ her progress rated and encouraged, regress penalized; and motivations secured by the public opinion, per-suasion, practicing, teaching, stimulation, tests and progress rates. These methods need to be complemented by many reasonably managed techniques including success situations, hyper-boles, highlights, pauses, focuses, contrasts, subtexts, hints, compromises, agreements, guide-lines, etc. [1, p. 23-33].

We believe that a special role in the economic training success is played by the economic training models that, in case of an academic establishment, include: lectures, practical work-shops, laboratory works, consulting, additional lessons, work at library, visits to the economi-cally sound businesses, research schools, etc.

The fact-finding stage and economic training piloting experiment at Yekaterinburg Institute of Physical Culture and Sports geared to build up the economic culture in students helped devel-op a system of economic training tasks to facilitate the training process. The economic training tasks were solved at the following four stages: (1) analyze the situation and set the economic training goal; (2) analyze every potential solution and find the best option under the present conditions; (3) implement the solution in practice to solve the problem, with a special focus on cooperation, management, control and correction of the process; and (4) analyze the results of the solution [5, p. 165-166]. The economic training tasks may be classified into the following two types: (1) progress-encouragement tasks with the student expected to achieve a new stage in his/ her competences, knowledgebase, experience, etc.; and (2) functional tasks to explore and master new models and tools to achieve the preset goal.

Furthermore, goals may be classified into strategic, tactical and operational ones. Thus the strategic goals of economic training service include: develop the progress planning, manage-ment, remuneration and control culture; labor stimulation and remuneration culture; and labor efficiency analyzing culture. And the tactical goals of the economic training service include the following: develop good marketing, financing, HR selection and management, business management skills and experience based on the economic culture.

As dictated by the common logics, every teaching service will start from spelling out its con-tent viewed as the human experience that should be mastered by the student. Functions of the content are numerous, albeit it is generally designed to set the teacher-student practical inter-action environment for success of the training service.

Conclusion. The proposed economic training technology complementary to the traditional academic physical education curricula is designed customizable to the latter and manageable, since the universities have all necessary test tools to verify its practical benefits. It is also im-portant that the economic training technology and discipline is reproducible and user-friendly in application, i.e. may be implemented at every university provided the curriculum, educa-tional service guidelines and textbooks are available.

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Legal education of physical education university students: areas of modernization

UDC 378

PhD, Associate Professor **A.K. Simonova**[1]
G.S. Simonov[2]
[1]Yekaterinburg Institute of Physical Culture (branch) of Ural State University of Physical Culture, Yekaterinburg
[2]Ural State Law University, Yekaterinburg

Corresponding author: asimonova@bk.ru

Abstract

Objective of the study was to survey legal literacy and need for legal education in a physical education university student community.

Methods and structure of the study. We sampled for the questionnaire survey the 1-3-year students (n=124, including 1-, 2- and 3-year groups of 42, 44 and 38 people, respectively) majoring in physical education at Yekaterinburg Institute of Physical Culture.

Results and conclusion. The efforts to develop legal literacy in young communities are recommended to prioritize the legal education models geared to gradually build up the group legal cultures with a special emphasis not only on the formal laws but also on the most sensitive and relevant legal issues, rights, values and priorities. One of key benefits of legal education service in the academic educational system is the graduates' awareness of the legal mechanisms offered by the legal system and their preparedness and willingness to effectively defend their own and other people's rights in constructive cooperation with every group.

Keywords: *legal education, rule-of-law state, civil society, legal literacy.*

Background. Modern challenges of the national government system with its evolution trends including the local/ regional government subsystems urge the national research community to undertake systemic and well designed and managed theoretical and practical studies of the legal education service for the young population on the whole and youth sports communities in particular, since the national athletes competing on the global arenas have to be basically literate in many legal matters. In this situation, the national physical education and sport sector realizes the need for special legal education service for a wide variety of home sporting communities.

Objective of the study was to survey legal literacy and need for legal education in the physical education university student community.

Methods and structure of the study. We sampled for the questionnaire survey the 1-3-year students (n=124, including 1-, 2- and 3-year groups of 42, 44 and 38 people, respectively) majoring in physical education at Yekaterinburg Institute of Physical Culture.

Results and discussion. The first question was "What rights do you know?" The sample was found mostly aware of the right for education as reported by 67% and 40% of the 1- and 2-year groups, respectively, and a fair proportion of the 3-year group. We were surprised to find only 44%, 31% and 8% of the 1-, 2- and 3-year groups (respectively) reporting awareness of the top priority human right for life. Many in the sample (26%, 28% and 35% in the 1-, 2- and 3-year groups, respectively) acknowledged being "unaware of own rights" in fact.

Ranked third by the legal literacy survey was the freedom of speech and expression – probably for the reason that it is widely discussed by the popular mass media and everyone knows it. And ranked fourth was the freedom of choice reported by 12%, 6% and 6% of the 1-, 2- and 3-year groups, respectively. Furthermore, only the 1-year group demonstrated some awareness (8%) of the right to personal inviolability. The right for food was reportedly known by 11% and 11% of the 2- and 3-year groups. Only 6% of 1-year students showed awareness of the consumer rights; whilst the property protection right and right for legal service was found known by 2% and 5% in the 3-year group, respectively. On the whole, responses to question 1 showed a sad situation: the sample was virtually unaware of own basic rights. Could it be that some of them were just unable or unwilling to clearly articulate their knowledge and feelings?

It should be mentioned that outcomes of such surveys are virtually never predictable enough and are normally of special interest for the group priorities ranking purposes – our university groups in the case. What are the group understandings of the rule-of-law state? On the whole, they want to see it honest and fair. The national leaders including President, has repeatedly stated that our goal is to build up a rule-of-law state that is a multiannual mission for at least our generation. This goal implies the modern legal education for the key population groups, with a special attention to the young people's legal literacy. As demonstrated by our questionnaire survey, the university students still show rather poor legal literacy.

And the key question of the survey was "Do we need a legal literacy and what way should it come?" The question was responded positively by 40%, 40 and 62% of the 1-, 2- and 3-year groups, respectively. However, virtually every second (49%) in the sample reported "feeling no need for legal education at university" – despite the fact that their legal literacy is doubtful to say the least. They seem to perceive the world and government system established on some "concepts" rather than laws.

Conclusion. The efforts to develop legal literacy in young communities are recommended to prioritize the legal education models geared to gradually build up the group legal cultures with a special emphasis not only on the formal laws but also on the most sensitive and relevant legal issues, rights, values and priorities. One of key benefits of legal education service in the academic educational system is the graduates' awareness of the legal mechanisms offered by the legal system and their preparedness and willingness to effectively defend their own and other people's rights in constructive cooperation with every group.

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Creativity centered training model for bachelors of physical education and sports

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O.V. Lomovceva[1]
[1]Yekaterinburg Institute of Physical Culture (branch) of Ural State University of Physical Culture

Corresponding author: lomovceva_olga@mail.ru

Abstract

Objective of the study was to design a creativity centered training model for Bachelors of Phys-ical Education and Sports and test its benefits.

Methods and structure of the study. The Bachelors of Physical Education and Sports creativity fostering model testing experiment was run at Yekaterinburg Institute of Physical Culture. We set requirements for the individual creative resource in the context of the key professional values, progress needs and priorities. The Bachelors of Physical Education and Sports service values are basically determined by the social mission of the modern physical education and sports service and its economic function that is to facilitate progress of the physical education and sports sector as one of the drivers of the national economy; with a special focus on the popular physical edu-cation and sports service network to encourage health physical education and sports and healthy lifestyles in the client communities and thereby create jobs and expand the taxation bas for the national economy.

Results and conclusion. The creativity centered training model for Bachelors of Physical Edu-cation and Sports was tested beneficial as it facilitates the academic progress, management ca-pacities and professional fitness of the future physical education and sports specialists.

Keywords: *creativity, Bachelor of Physical Education and Sports, professional values.*

Background. Professional services that require direct personal contacts with clientele are gener-ally rather difficult for standardization and, hence, require certain creativity for the service cus-tomization and individualization for the clients' need. This is true for the Bachelors of Physical Education and Sports who are expected to provide a wide range of modern training, recreational, health, physical education and sports, entertainment and other services. Bachelors of Physical Education and Sports (graduates of a physical education and sports university) may serve as coaches, instructors, Physical Education and Sports instructors/ practitioners, etc.; and these ser-vices require from them to be always sensitive to the market demands in every segment, so as to meet the variable needs of the physical education and sports service clientele including children, amateur health groups, professional athletes, clients of the fitness industry, sports managers, etc.

Modern physical education and sports service personnel needs to highly proficient to apply a wide variety of motivational tools when dealing with the clients to successfully encourage their physical education and sports interests and determination in achieving certain individual physical progress goals. Therefore, a Physical Education and Sports specialist shall demonstrate

certain creativity for professional success, and such creativity should be developed on the relevant theoretical knowledgebase to acquire due practical skills and experience, particularly in the physical education and sports service safety domain, to prevent any harm to the clients.

It is the academic physical education and sports educational system that should develop such knowledge, competences, skills and basic practical experience. As provided by E.F. Zeer, indi-vidual professional progress resource is secured by good education that provides professional knowledge, general and special skills and facilitates progress in the personality qualities of special social and professional importance. The professional resource mobilization and success depends on many factors including the individual biological predispositions, social situations, professional requirements and environments, individual determination and the personality progress agenda [1].

Objective of the study was to design a creativity centered training model for Bachelors of Phys-ical Education and Sports and test its benefits.

Methods and structure of the study. The Bachelors of Physical Education and Sports creativity fostering model testing experiment was run at Yekaterinburg Institute of Physical Culture. We set requirements for the individual creative resource in the context of the key professional values, progress needs and priorities. The Bachelors of Physical Education and Sports service values are basically determined by the social mission of the modern physical education and sports service and its economic function that is to facilitate progress of the physical education and sports sector as one of the drivers of the national economy; with a special focus on the popular physical edu-cation and sports service network to encourage health physical education and sports and healthy lifestyles in the client communities and thereby create jobs and expand the taxation bas for the national economy.

Results and discussion. Modern bachelors of physical education and sports include not only training, education and sports services but they are also expected to manage the theoretical edu-cation and practical trainings, control teamwork and even take the corporate management re-sponsibilities when they control physical education and sports businesses operating in highly competitive environments. Such physical education and sports management services can hardly be stereotyped/ standardized as they require permanent efforts to find the best physical training and competitive methods, models and tools with a special attention to the business cost efficien-cy, income generation, physical education and sport service development, service popularization, healthy lifestyle promotion and other relevant goals.

Physical education and sports university students need to realize since the early days of their studies the core mission and social role of their profession, with the maturation process recom-mended being facilitated by a variety of competitive and cultural events at the communal, local and regional levels. A special priority should be given to the popular physical education and sports events (including the Ski Track of Russia, Cross-country Race of Nation, etc.) of great public interest as they are widely perceived as reviving the traditional physical education and sports values and sporting lifestyles in our country. Efforts to design, organize and manage every such event heavily contribute to the students' practical experience, particularly in the documents processing and reporting domains.

Creative progress will be also purposefully facilitated by the relevant project design and defend-ing experiences during the studies. The projects should be geared to promote sports in the under-age and junior communities and in some other priority age/ client groups. In the academic study period, students will be encouraged to contribute to such events, with the individual organiza-tional and managerial services acknowledged by formal letters of gratitude and certificates added to their portfolios.

The individual creativity will be also prioritized in practical sports classes and theoretical studies in the relevant humanitarian disciplines. Students will also design the class/ off-class sessions and other extra-curricular activities; manage questionnaire surveys; run psychological surveys of athletes with profiles and analyses; draft cost estimates for the sports events, etc. Every such ef-fort claims certain knowledge and skills, plus requires a range of practical solutions for the up-coming professional service issues that imply the individual creativity being mobilized and de-veloped for success.

The educational, research, creative, sporting and other accomplishments of every student are indicative of his/ her academic progress and should be ranked among the individual professional fitness indicators, with a special priority to the forecasting, revising and resource mobilizing ca-pacities critical for the professional progress and personal success agenda. Furthermore, for the academic study period,

the student must realize the mission and contribution of the specialty into the social progress on the whole and health of the new generation in particular. It should be men-tioned in this context that N.V. Kuzmina and her followers formulated a provision on the role of a personality agenda for the individual professional progress and experience. This means that an integral determined person well aware of own individual resource with its gifts and limitations will be able to consciously and purposefully design and manage own progress in the professional and personality improvement domains for success [2].

The professional progress and experience backed with the personality progress agenda, in their turn, are heavily boosted by satisfaction from the professional service and broader successes and acknowledgements. Therefore, when the student fully realizes the mission, social role and de-mand for of the future profession, he/ she receives a great impetus for progress in the theoretical and practical knowledge and skills and develops good determination and creativity in the aca-demic educational process.

Conclusion. The creativity centered training model for Bachelors of Physical Education and Sports was tested beneficial as it facilitates the academic progress, management capacities and professional fitness of the future physical education and sports specialists.

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Competency-building natural scientific training model for bachelor of physical education

UDC 796.077.5

PhD, Associate Professor **L.A. Osadchaya**[1]
[1]Ural State University of Physical Culture, Chelyabinsk

Corresponding author: lydmila_osadchaya@mail.ru

Abstract

Objective of the study was to analyze progress of the natural scientific training service in the bachelor of physical education training system in the context of the new Federal State Higher Education Standards.

Methods and structure. We analyzed the modern bachelor of physical education training service mod-ernization trends versus variations in the bachelor of physical education natural scientific training stand-ards and requirements.

The natural scientific training content with the learning materials was designed at the university based on the modern post-non-classical paradigm.

Results and conclusion. Modern bachelor of physical education natural scientific training service is known to heavily contribute to the individual worldview formation and personality progress agendas, and this is the key reason why the academic communities give a special priority to every issue of this service. The natural scientific training service model offered by Yekaterinburg Institute of physical culture affili-ated with Ural State University of Physical Culture has proven beneficial for the systemic informed criti-cal thinking skills formation mission, conditional on a good integration of the learning materials with a special attention to the humanitarian and natural sciences knowledge harmonization/ synergizing aspects.

Keywords: *natural scientific training, natural scientific knowledgebase, integration, world view, natural scientific world-view, competency-building approach, system approach, critical thinking.*

Background. It is natural for the ongoing reforms of the academic education system to advance serious changes in the bachelor of physical education training system. Revision of the national educational paradigm with a growing priority to the competency-building educational model as provided by the new Federal State Higher Education Standards require the academic curricula being efficiently modernized. It should be mentioned that the ongoing reforms of the bachelor of physical education curriculum has resulted in a notable sag of interest in the natural sciences disciplines. This negative trend may be due to the following: (1) natural disinterest of humanitarians in the natural sciences as alien to their genuine scopes of interests [1]; and (2) growth of the competency-building education in the bachelor education system.

Natural scientific training we would consider as synonymic to the notion of competency in natural sciences that may be defined as the process and result of the individual natural sciences knowledgebase formation service. It should be mentioned that the reference literature in psychology and pedagogy defines natural scientific training as the purposeful process and result of individual natural scientific knowledgebase, skills and experience formation service with the relevant theoretical/ cognitive and practical elements, in the context of the relevant values and priorities [2, p.10].

Many scientists (O.N. Golubeva, L.Y. Zorina, V.S. Stepin, A.D. Sukhanov et al.) believe that natural scientific training should be considered among the personally important and social values due to its enormous worldview forming, methodological, analytical and cognitive progress potential [6]. One of the modern trends in the general education system is a special focus on the literacy in natural sciences interpreted as the individual ability to employ the natural sciences knowledgebase with the relevant facts, rate their meanings, identify problems, forecast potential

Table 1. *Comparative analysis of the FSHES for the competency-building bachelor of physical education natural scientific training service*

FSHES-2010 for 034300 Physical Education discipline set by the Minister of Education Decree (MED) №121 of 15.02.2010 [9]	FSHES-2014 set by MED No.935 of 07.08.2014 [7]	FSHES-2017 set by MED No.940 of 19.09.2017 [8]
- Good thinking culture; data processing, summarizing and analyzing ability; goal-setting and attaining ability (GC-1); - Ability to analyze worldview-specific, social and personally important philosophical issues and processes (GC-12); - Ability to use natural science knowledgebase basics for professional service needs, and apply efficient theoretical and experimental research methods for the professional service (GC-13); - Knowledge of the IT role for modern social progress; awareness of the relevant IT risks; competency in the IT security basics, including the state security related ones (GC-14); - Competences in the data mining, storage and processing methods, models and tools; good computer literacy for the professional service data processing missions (GC-15); - Data processing skills in the global computer networks; efficient application of the traditional and innovative communication tools for the professional service in the state language (GC-16)	- Well-shaped world-view with the professional service standing (GC-1); - professional-service-specific problems solving skills with application of the professional service database and bibliography, modern data processing and communication technologies; and compliance of the data security codes (GC-13)	- Data mining, critical analyzing and synthesizing skills, with a systematic approach to attain the professional service goals (UC-1)

changes and make informed conclusions to better understand the modern reality in the context of the human activity [4].

Therefore, the natural scientific training lays a foundation for an individual worldview with its integral natural sciences knowledgebase and, hence, affects the humanitarian education aspects as it expands the general cultural outlooks and contributes to the professional culture. Of special importance are also the natural scientific training cognitive and developmental functions as they largely facilitate intellectual progress and creativity. An efficient natural scientific training service develops a research culture and thinking, i.e. the students learn to think to gradually develop the critical interpretation, analyzing, fact-finding, assessment and interpretation abilities with the relevant emotional elements and creative imagination. These considerations urge the modern academic education communities give a special priority to the bachelor of physical education natural scientific training service improvements.

Objective of the study was to analyze progress of the natural scientific training service in the bachelor of physical education training system in the context of the new Federal State Higher Education Standards.

Results and discussion. We analyzed the modern bachelor of physical education training service modernization trends versus variations in the bachelor of physical education natural scientific training standards and requirements: see Table 1 hereunder.

As demonstrated by the above Table, presently the bachelor of physical education natural scientific training service mission is to form the universal competency in "Systemic critical thinking" domain as a basis for the general and specific professional competences. We studied the bachelor of physical education natural scientific training service structures and contents in the key national physical education universities that offer the Vocational Sports Training curricula. The prior FSHES-2014 specified a natural scientific training cycle in the bachelor of physical education training curricula among the key training cycles including the following standard disciplines: mathematics, computer science, physics, chemistry and biology with the basics of ecology [3]. Draft 49.03.01 physical education curriculum within the obligatory Disciplines and Modules offers the physical education-and-sports-specific IT discipline [5]. Our analysis of the physical education curricula at the leading physical education universities in Russia found that the customizable part of the bachelor of physical education curriculum includes limited natural scientific training sets with: mathematical statistics in the physical education and sport sector, statistical data processing, and natural sciences basics in physics and chemistry.

Therefore, the efforts to retain the bachelor of physical education natural scientific training traditions may be successful conditional on the new approaches in the modern education service being advanced on a continued and consistent basis with a range of key (fundamentalization, humanization, humanization, individualization and differentiation) concepts and the competency-building, practice-prioritizing, personality-sensitive and interdisciplinary approaches and provisions.

Yekaterinburg Institute of physical culture affiliated with Ural State University of Physical Culture has taken efforts to improve the bachelor of physical education natural scientific training to form good scientific worldview, reality analyzing skills and professional ser-

vice facilitating intellectual resource with due cognitive process management abilities. The academic natural scientific training discipline may be defined as giving a set of modern natural sciences concepts to overview and explain in general outlines the objective reality on the whole with the natural processes and aspects of the life/ humanity emergence on the planet.

The natural scientific training content with the learning materials was designed at the university based on the modern post-non-classical paradigm. For example, the Physical Progress Picture of the World subject considers progress of the movement ideas, with the learning material delivered in chronological sequence, with a special attention to the worldviews development history and the key progress milestones in the context of the new paradigm formation process – to help the students realize the natural sciences progress logics. The discipline is designed to encourage the students' independent creativity by a variety of problem-solving practices in the natural sciences methodology mastering process.

Conclusion. Modern bachelor of physical education natural scientific training service is known to heavily contribute to the individual worldview formation and personality progress agendas, and this is the key reason why the academic communities give a special priority to every issue of this service. The natural scientific training service model offered by Yekaterinburg Institute of physical culture affiliated with Ural State University of Physical Culture has proven beneficial for the systemic informed critical thinking skills formation mission, conditional on a good integration of the learning materials with a special attention to the humanitarian and natural sciences knowledge harmonization/ synergizing aspects.

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Interactive training course to develop information and communication competences in sport school coaches

UDC 378.046.4

PhD, Associate Professor **D.A. Polyak**[1]
[1]Ural State University of Physical Culture, Chelyabinsk

Corresponding author:polli402008@yandex.ru

Abstract

Objective of the study was to test benefits of a new interactive training course, complementary to the advanced training system, to develop information communication competences and skills in the sport school coaches.

Methods and structure of the study. Information and communication competences may be defined as the "professionally important integrative personality knowledgebase and skills to independently find, process, analyze and present necessary information; model and design the relevant objects and processes; and implement the relevant projects by both individual and group efforts".

In the information and communication competence training course, the students were trained to actively communicate using the modern communication tools (Zoom, WhatsApp, Telegram, e-mail, etc.); develop joint products including elements of the training service plans and reports in the text processors; elements of the physical fitness and competitive success monitoring systems with reports and graphical presentations on a Google disk, etc.

Results and conclusion. The new information and communication competence training course piloting project was finalized by the group Digital Coaching Office projects submitted by the trainees for discussions, evaluations and progress scores. Based on the scores and final IT/ communication knowledge and skill tests, we rated the information and communication competence of every trainee. A progress analysis found the information and communication competence growing on average by 2% and 5% in the knowledge and skills domains, respectively.

The new interactive training course, complementary to the advanced training and retraining system, to develop information communication competences and skills in the sport school coaches was tested beneficial and may be recommended for practical application.

Keywords: *information and communication competences, interactive training technologies, coach's advanced training, distance learning, office software.*

Background. Modern information technologies make progress in every social sector including the physical education and sport services. Since the Ministry of Labor and Social Protection approved a Coaching Service Standard by its Decree No. 952N dated 12/24/2020, the coaching community found that the new service standards require a coach being competent and skillful in modern "information and communication technologies" [5]. Therefore, in the context of the ongoing competence-prioritizing reform in the national education system, coaches are expected to be proficient in the information and communication theory and practice.

Objective of the study was to test benefits of a new interactive training course, complementary to the advanced training system, to develop information communication competences and skills in the sport school coaches.

Methods and structure of the study. Information and communication competences may be defined as the "professionally important integrative personality knowledgebase and skills to independently find, process, analyze and present necessary information; model and design the relevant objects and processes; and implement the relevant projects by both individual and group efforts" [4]. In other words, information and communication competences combine the data processing skills, optimal communication climate formation skills, ability to mobilize knowledge and personality qualities for efficient operations in the Internet;

effectively apply and synergize the internal and external data flows, etc. The information and communication competence is ranked nowadays among the key professional competences as it secures the professional demand for the service facilitating data being effectively satisfied to encourage individual progress and teamwork.

Modern information and communication competence includes a range of components including the data processing ones for multiple operations with information required to model and design systems and processes; communicative, to establish cooperative environments with dialogues and effective teamwork; individual managerial to make independent decisions facilitated by the research and creative skills, responsibility, self-discipline, determination and self-control qualities; and the technological component, with the ability to effectively apply own technical knowledge and skills for the modern information and communication technology application in different professional and other settings.

Therefore, the information and communication competence may be generally grouped into (1) knowledge of the fundamental elements of modern IT technologies that facilitate progress in the professional data flow processing domain; (2) professional data flow processing and analyzing skills benefits for productive professional communication; and (3) data processing and summarizing experience for productive professional communication to attain every professional goal [6]. This means that the information and communication competence may be interpreted as the pedagogical notion that refers to an integral part of the specialist's professional competency base, including the physical education and sport related one.

We piloted the new interactive information and communication competence training course at the Yekaterinburg Institute of Physical Culture's Personnel Advancement and Retraining Department for the Youth Sports School coaches to contribute to the Digital Coaching Office Development Project. Interactivity may be defined as the concept that refers to interpersonal and group interactions [2]; whilst an interactive training means such educational process that is designed to facilitate an efficient communication of every party to the process.

Prior to the study, the trainees were encouraged to outline and analyze their problem fields. The analysis and entrance tests and interviews found a contradiction between the actual progress needs of the coaches in the modern IT mastering and training service applications – and still poor knowledge and skills in this domain. As a result of the productive joint work, we developed a Goals and Expectations Map: see Table 1.

Based on the preparatory works and entrance test/ monitoring data and analyses, we designed a sample Digital Coaching Office for youth sports school coaches and instructors. Every trainee reported, on an individual or group basis, what office technologies are needed for the training service and may be facilitated by the peer communication in the relevant software packages. Given in Table 2 hereunder is the Training Course Roadmap. The training course was piloted in the challenging epidemiological situation with lockdowns, access restrictions, etc. This was the reason for us to widely apply the modern distance learning technologies: see Table 3.

Table 1. *Interactive training course: Goals and Expectations Map*

Expectations	Goals	Results
Training service planning algorithm	Develop a training service plan in a text application	Monthly/ quarterly/ yearly training service plans
Junior trainees' fitness monitoring system	Develop a fitness monitoring system element in electronic tables	Implement a fitness monitoring system element in electronic tables
Sport school coach/ instructor's training service report	Develop a sport school coach/ instructor's training service report with graphical presentation toolkit	Monthly/ quarterly/ yearly training service reports
Peer/ trainee's family communication system	Develop a family communication system	Family questionnaire surveys processed and analyzed on Google disk
	Develop a peer communication system	Google disk document processing in the peer communication system

Table 2. *Training Course Roadmap for the Digital Coaching Office*

Topic	Prior topics	Time, hours
1. Training service planning and reporting		2
2. Fitness monitoring system	1	2
3. Office software toolkit 3.1. Text processors	1, 2	8
3.2. E-tables	1, 2	8
3.3. Graphical presentations	1, 2	8
4. Communication technologies	1, 2	8
Total		36

Table 3. *Distance learning formats*

Design	Workshops	Training	Project	Practical session	Business games
Active	Zoom-based webinar			Zoom-conference	Zoom-conference, tasks
Passive	Online lectures and workshops using padlets	Online lectures and workshops using padlets	Tasks, e-mail	Online lectures and workshops using padlets	Practices on Google disk

In the information and communication competence training course, the students were trained to actively communicate using the modern communication tools (Zoom, WhatsApp, Telegram, e-mail, etc.); develop joint products including elements of the training service plans and reports in the text processors; elements of the physical fitness and competitive success monitoring systems with reports and graphical presentations on a Google disk, etc.

Results and discussion. The new information and communication competence training course piloting project was finalized by the group Digital Coaching Office projects submitted by the trainees for discussions, evaluations and progress scores. Based on the scores and final IT/ communication knowledge and skill tests, we rated the information and communication competence of every trainee. A progress analysis found the information and communication competence growing on average by 2% and 5% in the knowledge and skills domains, respectively.

Conclusion. The new interactive training course, complementary to the advanced training and retraining system, to develop information communication competences and skills in the sport school coaches was tested beneficial and may be recommended for practical application.

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Physical education and sports graduate's professional independence diagnostics

UDC 796.011.3

A.M. Parfenova[1]
PhD, Associate Professor **S.L. Sazonova**[1]
D.A. Raskovalova[1]
N.I. Sazonov[1]
[1]Yekaterinburg Institute of Physical Culture (branch) of the Federal State [1]Budgetary Educational Institu-tion of Higher Education "UralSUPC", Yekaterinburg

Corresponding author: eifk@sport-ural.ru

Abstract

Objective of the study was to test the academic physical education and sports graduates' professional independence.

Methods and structure of the study. Professional independence may be defined as the individual con-centration on the self-reliant professional service quality and efficiency ranked among the most important credentials critical for success in the professional service design, management and perfection domains; with this quality mastered and excelled by students largely in the self-education process so that to make them fully fit for the future professional service.

The graduate's professional independence rating criteria may be listed as follows: sustainable motivations for persistent professional progress by a range of means dominated by self-education; diligence and effi-ciency in attaining every goal; ability to master best professional service models and tools and implement innovative physical education and sports technologies and practices; successfully cooperate with the rele-vant public, commercial and non-governmental organizations; design, manage and control teamwork in a capacity of a team leader and decision-maker; analyze the individual and corporate progresses; and revise own professional service when necessary.

Every professional independence element may be scored in points indicative of the self-educational de-termination and professional competences.

Results and conclusion. Modern physical education and sports specialist is expected to demonstrate high knowledge, skills, competences and individual creativity as drivers for continuous professional education, self-improvement and progress, for the physical education and sport specialist being able to effectively contribute to the progress of the physical education and sport service his/ her versatile skills and experi-ence on the professional independence basis, with the professional independence ranked among the most valuable professional qualities.

Keywords: *professional independence, competences, self-learning, personality, professional service, diagnostics.*

Background. The ongoing reforms in the national physical education and sports sector have prioritized, for the last few years, new progress avenues for the national physical education and sports specialist education system. The key mission of the sector, however, is still to train highly skilled and knowledgeable physical education and sports specialists for sports training service, with their professional independence ranked among the key qualities and competencies for success.

Objective of the study was to test the academic physical education and sports graduates' professional independence.

Methods and structure of the study. Professional independence may be defined as the individual concentration on the self-reliant professional service quality and efficiency ranked among the most important credentials critical for success in the professional service design, management and perfection domains; with this quality mastered and excelled by students largely in the self-education process so that to make them fully fit for the future professional service.

The graduate's professional independence rating criteria may be listed as follows: sustainable motivations for persistent professional progress by a range of means dominated by self-education; diligence and

***Table 1**. Graduates' professional independence elements rated on a 5-point scale*

Professional independence groups and elements	Points				
	5	4	3	2	1
1. Professional service 1.2 Professional service analysis with ability to select and implement innovative professional service technologies, models and tools and test their benefits; 1.3 Logical analysis of the best physical education and sport service experiences; 1.4 Own progress analysis with self-control of the studies and professional service as required by the core mission and goals.	.	.	.	.	.
2. Research skills: 2.1 Analyze and summate of own education and professional service in the context of the national and foreign research achievements in physical education and sports and related fields; 2.2 Analyze and apply the best practical professional service experience in own service; 2.3 Set research mission and goals and apply the most efficient methods and tools for success.	.	.	.	.	.
3. Teaching abilities and qualities: 3.1 Facilitate cultural progress of trainees to help them accept the common human values and behavioral standards for social progress in multicultural settings; 3.2 Encourage the trainees in their efforts to form the knowledgebase, skills and practical experiences in the theoretical and practical trainings and competitions; 3.3 Ability to motivate the trainees for education and self-learning	.	.	.	.	.
4. Professional service management skills: 4.1 Professional service planning and management skills; 4.2 Teamwork coordination, control and decision-making skills; 4.3 Efficiency in cooperation with the public, commercial and NG organizations; 4.4 Regulatory/ financial/ reporting documents processing capacity	.	.	.	.	.
5. Other professional service competences and skills …					
Total score:	.	.	.	.	.

efficiency in attaining every goal; ability to master best professional service models and tools and implement innovative physical education and sports technologies and practices; successfully cooperate with the relevant public, commercial and non-governmental organizations; design, manage and control teamwork in a capacity of a team leader and decision-maker; analyze the individual and corporate progresses; and revise own professional service when necessary.

Every professional independence element may be scored in points indicative of the self-educational determination and professional competences. The resulting professional independence scores of every physical education and sports graduate will be benchmarked and totaled: see Table 1.

Results and discussion. The study found that a physical education and sports graduate's professional independence may be ranked by the following four levels.

Level 1: Non-systemic knowledge in the professional-service-unspecific and specific domains; low cognitive determination; still poor self-learning agenda; professional service analyzing ability is still underdeveloped and limited by some knowledge of inconsistent facts and phenomena; poor skills in application of the relevant research models, tools and professional-service-specific terms and meanings. No positive genuine motivation for professional service – often associated with negative attitude to professional service; intellectual inertia; poor willpower and mental/ emotional control.

Level 2 (productive): The physical education and sports graduate demonstrates basic professional service skills and competencies; ability to analyze and digest knowledge coming from every source; find causes and effects; i.e. shows certain self-learning agenda. The basic physical education and sports knowledge and skills facilitate progress in professional service, particularly when the progress is modeled and guided by an experienced mentor/ practitioner. However, at this level the graduate still largely lacks determination for excellence in professional service, with the professional competencies found still insufficient, particularly in the professional independence domain.

Level 3 (research): The physical education and sports graduate shows elementary process research elements in professional service. Having accumulated a sound theoretical knowledgebase, the graduate tends to critically analyze and summarize the data flow. When solving the professional service problems, he/ she shows a multisided approach in making informed and grounded economic decisions; ability to design and pursue the self-development trajectory; make

introspective progress analyses; shows good professional service self-control and revision capacity as required by the mission and goals; demonstrates fair communicative competences as verified by the practical contributions to business events; actively searches new knowledge; and contributes to the constructive analysis of the peer professional service; shows high mental/ emotional controls, good willpower and constructive success-focused behavioral models.

And Level 4 (research creativity): means that the physical education and sports graduate is tested highly motivated for persistent progress to accumulate a sound professional service knowledgebase and skill sets; with the professional service responsibilities met with a high quality associated with own great satisfaction and emotional uplift; the motivations urge persistent progress, with special emphases on the cognitive progress elements; he/she demonstrates a growing independence and determination in many research fields and particularly the most challenging ones that were once non-accessible for the self-learning efforts and professional progress.

Conclusion. Modern physical education and sports specialist is expected to demonstrate high knowledge, skills, competencies and individual creativity as drivers for continuous professional education, self-improvement and progress, for the physical education and sport specialist being able to effectively contribute to the progress of the physical education and sport service his/ her versatile skills and experience on the professional independence basis, with the professional independence ranked among the most valuable professional qualities.

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Cognitive interest encouragement model for academic physical education: psychological and educational benefits

UDC 796.011.3

PhD, Professor **I.Y. Sazonov**[1]
PhD, Associate Professor **I.V. Tarasevich**[1]
Dr. Hab., Professor I.V. Bryzgalov1
[1]Ural State University of Physical Culture, Chelyabinsk

Corresponding author: igorx45@mail.ru

Abstract

Objective of the study was to test benefits of a new cognitive interest encouragement model for academic physical education system.

Methods and structure of the study. The new cognitive interest encouragement model was developed on the following educational provisions: personality-sensitive approach in the physical education service design and management; axiological design of the physical education service; physical education service customization and individualization requirements; academic progress rating/ scoring system. We sampled for the cognitive interest encouragement model the 3-4-year students (n=80) whose progress was tested by the following pre- versus post-experimental tests: V.S. Yurkevich Cognitive Interest Intensity Questionnaire Survey; and T. Ehlers Personal Success Motivations and Failure Avoidance test. The cognitive interest encouragement model includes the following components: (1) Active and interactive teaching methods including heuristic discussions, problem-solving analyses, situational problems etc. to develop the professional competences; (2) Extracurricular activities geared to spur up cognitive interest in the future professional service.

Result and conclusion. The new cognitive interest encouragement model for academic physical education system was tested beneficial as demonstrated by the sample's progress in the physical education theory and practice including the professional knowledgebase and skills of the future physical education and sport specialists, with special benefits for the senior students' motivations for success in their professional careers.

Keywords: *cognitive interest, students, physical education university, psychological and educational aspects.*

Background. Presently the national academic physical education and sport system gives a growing priority to the modern specialist training formats that secure good fitness for a wide range of professional missions. This revised education paradigm requires new education approaches designed to encourage cognitive activity among the other personality development factors. These efforts need to spur up the students' cognitive interest that implies a variety of personal qualities and predispositions being mobilized for professional growth agenda. Modern psychological and pedagogical literature tends to consider PI as the selective individual predisposition that prioritizes certain objects and phenomena.

It is important for the students' cognitive interest to be focused on learning in every academic discipline, with different universities traditionally prioritizing different disciplines in the professional progress cycle. It should be mentioned that the national physical education and sports universities take efforts to encourage cognitive interest in the physical education and sport theory and practice and the related fields to motivate students for professional progresses on a harmonized and comprehensive basis.

Modern research with concern to the cognitive interest formation issues takes into account a range of the associating pedagogical problems including the continuity of learning and harmony of the growth and development processes since the academic study period is the time when the age-specific mental and physical development processes are fast and rather sensitive. Therefore, the cognitive interest encour-

Table 1. *Pre-experimental cognitive interest test data of the sample, %*

Tests	Results			
Ehlers Personal Success Motivations and Failure Avoidance test	Low success motivations	Moderate success motivations	Fair success motivations	Excessive success motivations
	45	27	10	8
Yurkevich Cognitive Interest Intensity Survey	High cognitive needs	Low cognitive needs		
	35	65		

agement efforts need to be based on the students' resource tests and analyses to effectively and harmonically develop the bodily functions and systems and maximize their healthy productive resource for professional progress with formation of the vocational knowledgebase and skills.

Objective of the study was to test benefits of a new cognitive interest encouragement model for academic physical education system.

Methods and structure of the study. The new cognitive interest encouragement model was developed on the following educational provisions: personality-sensitive approach in the physical education service design and management; axiological design of the physical education service; physical education service customization and individualization requirements; academic progress rating/ scoring system [3]. We sampled for the cognitive interest encouragement model the 3-4-year students (n=80) whose progress was tested by the following pre- versus post-experimental tests: V.S. Yurkevich Cognitive Interest Intensity Questionnaire Survey; and T. Ehlers Personal Success Motivations and Failure Avoidance (PSMFA) test.

The cognitive interest encouragement model includes the following components: (1) Active and interactive teaching methods including heuristic discussions, problem-solving analyses, situational problems etc. to develop the professional competences; (2) Extracurricular activities geared to spur up cognitive interest in the future professional service, with the following elements:

– Leisure time activities with multiple entertainments and other events geared to develop the key cultural values and priorities, particularly for professional service in the physical education and sport sector;

– Research and cognitive formats to encourage teamwork of the students and teachers, with special interests in different fields – including, e.g., research groups to explore some topical problems;

– Initiatives to develop responsibility to society and nation on the whole, with a special contribution from patriotic events;

– Special trainings to prevent deviant/ addictive behavior in the student communities;

– Special research groups leaded by the student activists and supervised by designated faculty members;

– Efforts to encourage the student self-governing initiatives to promote physical education and sports / health/ progress values and agendas including the cognitive ones; and

– Academic communication facilitation tools including public information media, posters, newspapers, online social networks, etc.

Result and discussion. The pre-experimental tests rated 45% of the sample with low success motivations (SM), and 65% with low cognitive needs: see Table 1.

The post-experimental tests showed high cognitive interest in the student groups with good progress in academic studies and extracurricular activity: see Table 2.

Table 3 hereunder gives correlations of the learning motivations with cognitive interest.

As demonstrated by Table 3, the 'Thirst for new knowledge' was found to strongly correlate with the very high cognitive interest (R= 0.96) – that may be interpreted as indicative of the personality-sensitive approach success in the physical education service formats; whilst the 'Productive teacher-student co-

Table 2. *Post-experimental cognitive interest test data of the sample, %*

Tests	Results			
Ehlers Personal Success Motivations and Failure Avoidance test	Low success motivations	Low success motivations	Low success motivations	Low success motivations
	10	60	17	13
Yurkevich Cognitive Interest Intensity Survey	High cognitive needs	Low cognitive needs		
	78	22		

Table 3. *Correlations of the learning motivations with cognitive interest*

Motivations	Rank	Cognitive interest level	Cognitive interest encouragement provisions
Productive teacher-student co-operation	2	High	Physical education service customization and individualization
Learning determination in subjects of interest	4	Low	Academic progress scoring/ rating system
Thirst for new knowledge	1	Very high	Personality-sensitive approach in the physical education and sport service
Better employment opportunities in vocational specialties	3	Medium	Axiological focus of the physical education and sport service

operation' was found to highly correlate with the high cognitive interest (R=0.73) to show the need for the physical education and sport service being well customized and individualized for success.

Conclusion. The new cognitive interest encouragement model for academic physical education system was tested beneficial as demonstrated by the sample's progress in the physical education theory and practice including the professional knowledge-base and skills of the future physical education and sport specialists, with special benefits for the senior students' motivations for success in their professional careers.

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Organization of all-russian events to develop sports event tourism

UDC 796.075

PhD, Associate Professor **T.I. Okonnikova**[1]
Dr.Sc. Hist., Professor **G.V. Merzlyakova**[1]
PhD, Associate Professor **L.V. Batalova**[1]
[1]Udmurt State University, Izhevsk

Corresponding author: okonnti@gmail.com

Abstract

Objective of the study was to analyze the potential benefits of the Izhevsk Rifle Biathlon for the sports event tourism sector and its modernization options to lure the flow of visitors.

Methods and structure of the study. The study was designed to include the following stages. Stage 1 included a questionnaire survey of supporters who visited the 49th Izhevsk Rifle Biathlon competitions in December 26-29, 2018. We surveyed 150 out of 800 supporters (18.75% of the total) to find 66.6% of Izhevsk residents and 33.4% visitors from other regions. Furthermore, 55.34% of the sample were reportedly newcomers to the event; 26% regular fans; and 18.66% occasional visitors. Stage 2 was designed to interview the leading biathletes and sport experts (n=11). One of the questions was on what should be done to promote the Izhevsk Rifle Biathlon event and make it an attraction for the sports event tourism sector. And Stage 3 offered a survey of the sports event tourism expert team from the Udmurt Republic (n=7) on what should be done to encourage a tourist flow to the Izhevsk Rifle Biathlon.

Results and conclusion. Our survey of three key stakeholder groups found that the Izhevsk Rifle Biathlon competitions may facilitate progress of the sports event tourism in the area conditional on the A.M. Demidov Republican Shooting Sports Complex rehabilitation project to make it compliant with the international standards and meet the needs of competitors, supporters, referees and journalists for modern services, including new international terminal at the Izhevsk airport. The Izhevsk Rifle Biathlon organizing committee composed of the local governmental officers and sports managers should give places to the local sports event tourism business managers. The event should be promoted by the large-scale advertising and public information campaigns to have every interested group timely informed on the schedules and services including new tour routes and attractions. The supporters should be offered thematic souvenirs and special service options including sightseeing tours and excursions in Izhevsk and Udmurt Republic. The event should be further promoted by solemn opening and closing gala ceremonies with invited biathlon celebrities and veterans; with all the above initiatives facilitating the local sports event tourism development projects under the Izhevsk Rifle Biathlon brand name.

Keywords: *Izhevsk Rifle Biathlon, sports event tourism, Udmurt Republic, supporters, athletes, sports expert, tourism business expert.*

Background. Modern sports event tourism specialized in serving flows of visitors to major sports competitions is presently ranked among the tourism business sectors most spectacular and beneficial for investments [3, 4, 7]. The Udmurt Republic, however, its vast potential for sports event tourism is still hardly noticeable on the global map of the top-ranking sports events [5]. The only major popular sports event traditional for the Udmurt Republic for the last 50 years (since 1969) is the Izhevsk Rifle Biathlon event. The event is hosted by a Republican Shooting Sports Complex named after Major General A.M. Demidov, head of the local military construction business and sponsor for the SSC construction project [6]. The Izhevsk Rifle Biathlon is very popular in the national elite biathlon and supporter communities as a qualifier event for the World Cup and the IBU Cup in January. The Izhevsk Rifle Biathlon popularity reached its peak in the Soviet period when the event attracted leaders of the national biathlon, and the opening ceremony was a sort of a municipal holiday with a march of

athletes on the central streets [1, 2]. The Izhevsk Rifle Biathlon tradition was still alive in the 1990s when the roller ski track of the A.M. Demidov Republican Shooting Sports Complex was upgraded to comply with requirements for the world class competitions for hosting the 1999 European Biathlon Championship.

Presently there is still a risk for the Republican Shooting Sports Complex to fall in the ranking of the potential global hosts for the major events due to the outdated assets and growing competitiveness of the modern biathlon complexes worldwide. Nevertheless, the Republican Shooting Sports Complex and Izhevsk Rifle Biathlon potential is still high, with its track certified for the international class competitions and ranked among the best in the country.

Objective of the study was to analyze the potential benefits of the Izhevsk Rifle Biathlon for the sports event tourism sector and its modernization options to lure the flow of visitors.

Methods and structure of the study. The study was designed to include the following stages. Stage 1 included a questionnaire survey of supporters who visited the 49th Izhevsk Rifle Biathlon competitions in December 26-29, 2018. We surveyed 150 out of 800 supporters (18.75% of the total) to find 66.6% of Izhevsk residents and 33.4% visitors from other regions. Furthermore, 55.34% of the sample were reportedly newcomers to the event; 26% regular fans; and 18.66% occasional visitors. Stage 2 was designed to interview the leading biathletes and sport experts (n=11). One of the questions was on what should be done to promote the Izhevsk Rifle Biathlon event and make it an attraction for the sports event tourism sector. And Stage 3 offered a survey of the sports event tourism expert team from the Udmurt Republic (n=7) on what should be done to encourage a tourist flow to the Izhevsk Rifle Biathlon.

Results and discussion. Supporter community survey data: Optional reported reasons for visits to the Izhevsk Rifle Biathlon were grouped as follows: 69.33% of the sample mentioned their interest in the biathlon competitions; 35.33% said they support the Russian biathlon team; and 26.66% wanted to get autographs and make selfies with the sports celebrities and veterans. The event organization and servicing were scored by 5 and 4 points on a 5-point scale by 47.33% and 40.66%, respectively. Positive aspects of the event were grouped as follows: great emotions (31.33%); happy animation (28.66%); hot tea (27.33%); and free transportation to the venues (22.66%). The sample mentioned the following inconveniences for the crowd: need for more options and freedom of access to different positions on the track to watch the race (including extra screens, extra access sites on the tracks, more broadcast points, more stalls for the crowd, etc.). Going next are recommendations to make more comfortable the stalls for supporters in cold weather including hot meals, warm pavilions, etc. (12.66%); some wanted to visit other sports events in Izhevsk at the same time (12.66%); have information about sports in Izhevsk and Udmurtia, local sports celebrities and Izhevsk Rifle Biathlon history (8%); and some wanted to shoot not only in the amateur shooting range, but in a rifle range with 50m targets (6.66%).

Leading athletes' and sport experts' survey data (summarized):

(1) The A.M. Demidov Republican Shooting Sports Complex needs a rehab project to meet the modern requirements to hosts of the world class competitions and to attract tourists. The sample recommended to: build a separate office for the service personnel; upgrade the guest house for the refereeing team; establish an office for journalists; modernize and expand the hotel to offer more comfort for the athletes and referees, with some accommodations for the fans; (2) As soon as they are licensed for hosting the European Cup and World Cup events, the hosts should immediately send their premade announcements to the Russian Biathlon Union and then to the IBU. The higher is the rank of the competition, the greater will be the inflow of tourists;

(3) The hosts should better promote the event, renew the traditional gala opening and closing ceremonies with the award ceremonies on the central square of Izhevsk; offer commemorative Izhevsk Rifle Biathlon medals as souvenirs for the supporters; offer raffle prizes for the fans; and

(4) Offer paid entry tickets to the events; and expand the payable parking lots.

Sports event tourism expert's survey data (summarized):

(1) The Izhevsk Rifle Biathlon should be promoted under a brand name of Udmurtia with its regional attractions. Advertising and information should be readily accessible online for the general public and biathlon supporter communities, with the outdoor

advertising in Izhevsk and via mass media organizations nationwide;

(2) The sports event tourism business community should enter the organizing committee to have its say in discussions of agenda, conveniences for the crowd and public information campaign to keep the potential tourists well and timely informed on the event and the travel/ service options;

(3) The A.M. Demidov Republican Shooting Sports Complex needs a rehab project to modernize the infrastructure for spectators;

(4) The opening and closing ceremonies should be solemn, entertaining and memorable, with special options and attractions for the visitors, with invited sports celebrities, photo sessions, etc.; and

(5) The Izhevsk airport should be reconstructed to include an international service terminal.

Conclusion. Our survey of three key stakeholder groups found that the Izhevsk Rifle Biathlon competitions may facilitate progress of the sports event tourism in the area conditional on the A.M. Demidov Republican Shooting Sports Complex rehabilitation project to make it compliant with the international standards and meet the needs of competitors, supporters, referees and journalists for modern services, including new international terminal at the Izhevsk airport. The Izhevsk Rifle Biathlon organizing committee composed of the local governmental officers and sports managers should give places to the local sports event tourism business managers. The event should be promoted by the large-scale advertising and public information campaigns to have every interested group timely informed on the schedules and services including new tour routes and attractions. The supporters should be offered thematic souvenirs and special service options including sightseeing tours and excursions in Izhevsk and Udmurt Republic. The event should be further promoted by solemn opening and closing gala ceremonies with invited biathlon celebrities and veterans; with all the above initiatives facilitating the local sports event tourism development projects under the Izhevsk Rifle Biathlon brand name.

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Popular physical education and sports in the volga federal district: progress analysis

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D.G. Maksimov[1]
PhD, Associate Professor **A.V. Anoshin**[1]
PhD, Associate Professor **N.V. Kotlyachkova**[1]
PhD **A.Y. Merzlyakova**[1]
[1]Udmurt State University, Izhevsk

Corresponding author: maksim.dan.gen@gmail.com

Abstract

Objective of the study was to analyze progress of popular physical education and sports in the Volga Federal District using cluster analysis.

Methods and structure of the study. We applied for the purposes of the study a group of statistical data processing methods commonly referred to as the "learning without teacher", with a special application of a non-hierarchical clustering method with separation around k-medoids. Medoid means herein a centroid whose coordinates are shifted to the nearest input data array. We mined data for the study from the 2017-2020 reports of the Ministry of Sports of the Russian Federation.

Results and conclusion. A comprehensive statistical data processing with cluster analysis made it possible to find the constituents of the Volga Federal District in need of special support in the popular physical education and sports encouragement initiatives. It should be mentioned that the Udmurt Republic has been ranked among the constituents still lagging behind in the physical education and sports committed population growth statistics for the last four years under study.

Keywords: *cluster analysis, development of physical education, mass sport, sports practices.*

Background. Health benefits of sports are considered indisputable nowadays, with sound scientific evidence that a habitual physical activity helps prevent cardiovascular diseases [3, 7], mental and cognitive disorders, and even exposure to risks of cancer [7]. In addition to the health benefits, physical education and sports are known to improve labor activity and, consequently, corporate progress standards in terms of at least HR management and labor facilitation physiology [1]. It should be emphasized, however, that modern sports have evolved into a large commercial sector, with the modern physical education and sports industry considered among the groundwork elements for the social and economic progress [4] and contributors to the gross domestic product. This is the reason why the national governments tend to support sports industries by facilitating sponsorships on the whole and sports event sponsorship in particular [6], plus multiple governmental initiatives and programs to encourage sports.

Objective of the study was to analyze progress of popular physical education and sports in the Volga Federal District using cluster analysis.

Methods and structure of the study. We applied for the purposes of the study a group of statistical data processing methods commonly referred to as the "learning without teacher", with a special application of a non-hierarchical clustering method [5] with separation around k-medoids. Medoid means herein a centroid whose coordinates are shifted to the near-

est input data array. We mined data for the study from the 2017-2020 reports of the Ministry of Sports of the Russian Federation.

Results and discussion. We grouped the Volga Federal District constituents based on reports of the National Physical Education and Sports Development Program of the government of the Russian Federation for 2017-2020: see the Table 1.

Table 1. Statistical indices for the Volga Federal District constituents clustering analysis

Index
1. Population group reporting habitual physical education and sports, %
2. Supply of the local physical education and sports infrastructure rated by the full service capacity, %
3. Disabled population group reporting habitual physical education and sports versus the relevant health group total having no contraindications for physical education and sports, %
4. The 3-29 year-old population group reporting habitual physical education and sports versus the relevant group total, %
5. The 30-54 year-old women and 30-59 year-old men reporting habitual physical education and sports versus the relevant total, %
6. The 55-79 year-old women and 60-79 year-old men reporting habitual physical education and sports versus the relevant total, %

The non-hierarchical clustering method implies a simple effective algorithm; although, as reported by K.V. Shitikov and S.E. Mastitsky [2], it has two significant problems: (1) Its results are sensitive to a random selection of the initial group centers; and (2) It requires a number of clusters being preset for the clustering analysis. Problem 1 may be solved by multiple iterations. And Problem 2 may be solved by a few special methods to find an optimal number of groups, with the average elbow width method being one of them. We used this method to find the optimal number of clusters (two) for 2017-2020 data arrays.

Having analyzed the 2017 data, we formed the following two clusters with medoids (see Figure 1): (1) Udmurt Republic and (2) Republic of Tatarstan. It should be noted that Cluster 1 indices are below the Volga Federal District average; versus Cluster 2 indices that are significantly above the district average. This is the reason for us to assume that Cluster 1 represents the constituents with relatively low commitment for physical education and sports – versus Cluster 2 with the high proportion of the habitually sporting population.

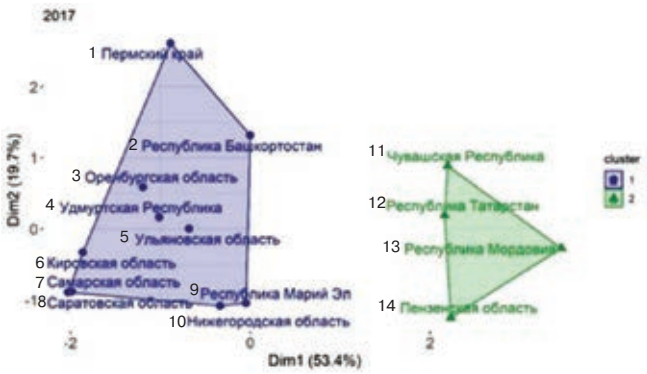

Figure 1. *Regional clusters of the constituents covered by the Physical Education and Sports Development Program of 2017*

1. Perm Area
2. Bashkortostan Republic
3. Orenburg Oblast
4. Udmurt Republic
5. Ulyanovsk Oblast
6. Kirov Oblast
7. Samara Oblast
8. Mari El Republic
9. Saratov Oblast
10. Nizhny Novgorod Oblast
11. Chuvash Republic
12. Tatarstan Republic
13. Mordovia Republic
14. Penza Oblast

Cluster analysis of the 2018 data (Figure 2) shows the Udmurt Republic as one of the cluster centers, and Penza Oblast as the other cluster center. Note that the statistical indices of Cluster 1 (with Penza center) constituents are above the district average; and Cluster 2 (with the Udmurt Republic center) statistics are below the average. A comparison of the 2017 and 2018 data shows that the share of habitually sporting population has expanded to cover the Orenburg Oblast, Mari El Republic and Bashkortostan Republic.

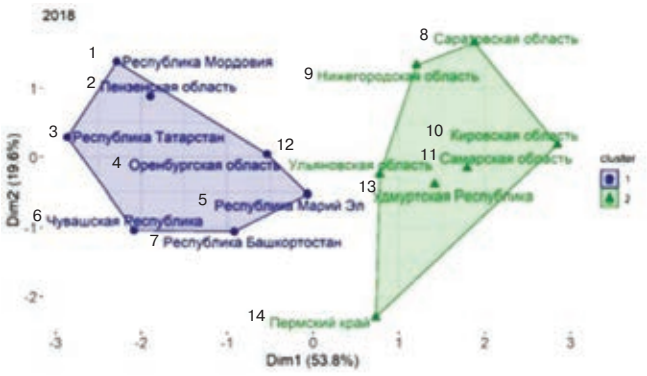

Figure 2. *Regional clusters of the constituents covered by the Physical Education and Sports Development Program of 2018*

1. Mordovia Republic
2. Penza Oblast
3. Tatarstan Republic
4. Orenburg Oblast
5. Mari El Republic
6. Chuvash Republic
7. Bashkortostan Republic
8. Saratov Oblast
9. Nizhny Novgorod Oblast
10. Kirov Oblast
11. Samara Oblast
12. Ulyanovsk Oblast
13. Udmurt Republic
14. Perm Area

Cluster analysis of the 2019 data (Figure 3) shows the cluster centers shifted to the Nizhny Novgorod Oblast for Cluster 1 (with low share of habitually sporting population) and the Orenburg Oblast in center of Cluster 2 (with a high sporting share), whilst the group compositions keep virtually the same.

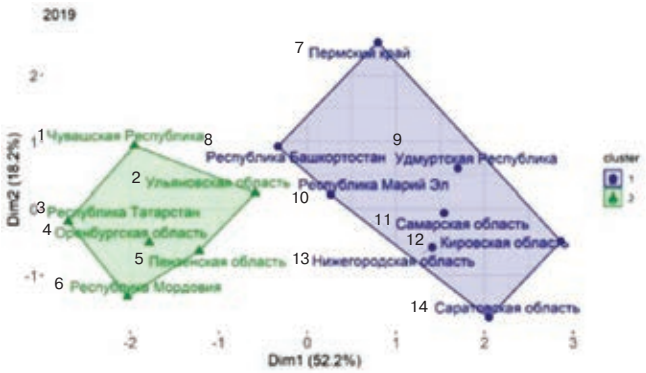

Figure 3. *Regional clusters of the constituents covered by the Physical Education and Sports Development Program of 2019*

1. Chuvash Republic
2. Ulyanovsk Oblast
3. Tatarstan Republic
4. Orenburg Oblast
5. Penza Oblast
6. Mordovia Republic
7. Perm Area
8. Bashkortostan Republic
9. Udmurt Republic
10. Mari El Republic
11. Samara Oblast
12. Kirov Oblast
13. Nizhny Novgorod Oblast
14. Saratov Oblast

Cluster analysis of the 2020 data (Figure 4) shows the picture close to the prior periods: with the Tatarstan Republic being in center of the highly sporting cluster and Mari El Republic central in the low sporting cluster. Note that the physical education and sports statistics of the both groups come closer to the district average in this period. This fact, however, is unlikely due to progress of the constituents in the physical education and sports encouragement efforts, rather to the pandemic-related restrictions for popular physical education and sports including public physical education and sports events, gym trainings, swimming in pools, etc.

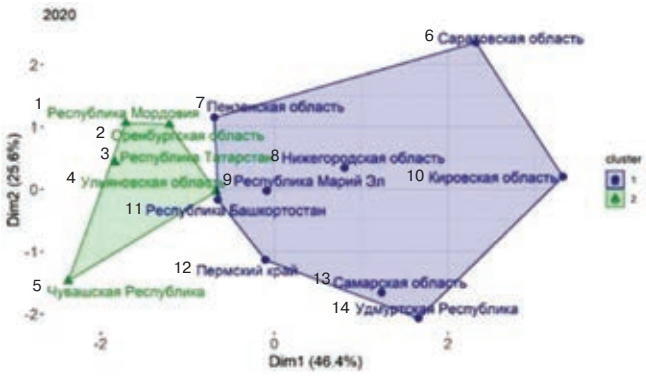

Figure 4. Regional clusters of the constituents covered by the Physical Education and Sports Development Program of 2020

1. Mordovia Republic
2. Orenburg Oblast
3. Tatarstan Republic
4. Ulyanovsk Oblast
5. Chuvash Republic
6. Saratov Oblast
7. Penza Oblast
8. Nizhny Novgorod Oblast
9. Mari El Republic
10. Kirov Oblast
11. Bashkortostan Republic
12. Perm Area
13. Samara Oblast
14. Udmurt Republic

Conclusion. A comprehensive statistical data processing with cluster analysis made it possible to find the constituents of the Volga Federal District in need of special support in the popular physical education and sports encouragement initiatives. It should be mentioned that the Udmurt Republic has been ranked among the constituents still lagging behind in the physical education and sports committed population growth statistics for the last four years under study.

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Regional basic sports qualification method: economic and statistical provisions

UDC 796.078, 51-78

PhD, Associate Professor **A.V. Litvin**[1]
PhD, Associate Professor **A.N. Lashkarev**[1]
[1]Udmurt State University, Izhevsk

Corresponding author: litvin-andrey@mail.ru

Abstract

Objective of the study was to develop a regional basic sports selection/ qualification method using modern economic mathematics to match the findings with the actual basic sports reported by the regional sports authorities, with the Udmurt Republic taken for the case study.

Methods and structure of the study. It was in 2013 that the national Ministry of Sports issued a basic sports qualification procedure for the constituents of the Russian Federation effective for four-year periods.

We mined the input data for our basic sports qualification method in the annual governmental statistical reports 1-FK of 2014-2017 and 2018-2020 submitted by the Udmurt Republic regional executive offices to the Ministry of Sports. The yearly data arrays in these reports are provided in matrices with 73 lines that list the local sports and 18 columns with 14 statistical indices plus 3 expert ones. The sport discipline priority for basic sports qualification is specified in a binary column as 0 for non-basic and 1 for basic sports. We applied the commonly used data mining technique to find the potential correlations and logics in the input data arrays.

Results and conclusion. The study demonstrated benefits of the new regional basic sports qualification method that takes into account the actual progress indices of every sport discipline for the prior periods.

Keywords: *basic sports, region, statistical report, factor analysis, linear model, weight matrix, forecast.*

Background. "Basic sports" are defined by the relevant Federal Law as "the sports disciplines listed in programs of Olympic Games, Paralympic Games, Deaflympic Games, plus other sports favored by the Russian Federation constituents in their areas with respect to the popular historic traditions, progresses of the local sports leaders, their qualifications for the national sports teams and successes of the latter in the national and international championships" [4]. As provided by the valid budgeting regulations, basic sports are in special priority in the federal and regional budgets. It should be mentioned, however, that some sports popular in one or another region demonstrate a high popularity and progress regardless of whether or not they are formally financed by the budgets.

Objective of the study was to develop a regional basic sports selection/ qualification method using modern economic mathematics to match the findings with the actual basic sports reported by the regional sports authorities, with the Udmurt Republic taken for the case study.

Methods and structure of the study. It was in 2013 that the national Ministry of Sports issued a basic sports qualification procedure for the constituents of the Russian Federation effective for four-year periods [5]. Table 1 gives the basic sports reported by the Udmurt Republic government for two such periods.

The above Table shows little differences of the periods that may be interpreted as indirectly indicative of some inertia, tradition or stereotypes in the relevant regional decision-making process.

We mined the input data for our basic sports qualification method in the annual governmental statistical reports 1-FK of 2014-2017 and 2018-2020 submitted

Table 1. Basic sports reported by the Udmurt Republic for two four-year periods

2014-2017	2018-2021
Basketball*	Biathlon
Biathlon	Boxing*
Mountain biking	Mountain biking
Cycling races	Cycling races
Handball	Handball
Track and Field Athletics	Judo*
Cross-country skiing	Track and Field Athletics
Table tennis*	Cross-country skiing
Swimming	Swimming
Rifle shooting	Rifle shooting
Bench shooting	Artistic gymnastics*
Figure skating*	Bench shooting
Football	Football

**unrepeated (period-specific) sports*

by the Udmurt Republic regional executive offices to the Ministry of Sports [3, 6]. The yearly data arrays in these reports are provided in matrices with 73 lines that list the local sports and 18 columns with 14 statistical indices plus 3 expert ones. The sport discipline priority for basic sports qualification is specified in a binary column as 0 for non-basic and 1 for basic sports. We applied the commonly used data mining technique [1, 2, 7] to find the potential correlations and logics in the input data arrays.

Results and discussion. Having processed the data arrays, we calculated the weight matrices that show linear correlations of the input indices with a few implicit factors. Table 2 hereunder gives the weight matrix for 2014-2017.

The above Table shows the first three factors (P1, P2, P3) as the most informative. The machine algorithm ranks the factors in a descending order by their contributions, with the strong linear correlations bolded in the Table. Thus, P1 factor shows a significant correlation with the following six indices: sports facilities, sports organizations, coaches, athletes, sporting population and total finance; that means that the factor may be used as indicative of the sport popularity. Note that it shows no significant linear correlation with the competitive success and priority rates of the sports. Furthermore, P2 factor shows insignificant linear correlations (above 0.7 in absolute value) with the indices. Some correlation can be found for the athletes in the sporting population and the 1-3 places won in the national competitions – indicative of the sport

Table 2. Weight matrix for 2014-2017

Index	P1	P2	P3
National championships	-0,35	0,27	-0,08
Sports facilities	-0,83	0,36	-0,01
Local sporting population	-0,76	0,31	0,23
Active athletes in the local sporting population	-0,17	-0,62	-0,24
Sports organizations	-0,78	-0,1	-0,19
Sports popularity	-0,23	0,28	-0,83
Sports management/ coordination difficulty	0,01	0,17	-0,89
Accessibility	-0,54	-0,06	-0,11
Total finance, RUR thousand	-0,94	0,04	0
Athletes	-0,94	0,05	0,01
Coaches	-0,95	0,1	-0,02
Competitions	-0,59	-0,3	0,05
Referees	-0,65	0,15	0,16
Local qualifiers for the national teams	-0,55	-0,46	0,33
1-3 places won in the national championships	-0,54	-0,62	-0,11
1-3 places won in the international championships	-0,23	-0,58	-0,23
Basic 14	-0,4	0,37	0,29

Table 3. Weight matrix for 2018-2021

Index	P1	P2	P3
National championships	-0,33	-0,05	-0,06
Sports facilities	-0,82	-0,28	-0,14
Local sporting population	-0,77	-0,25	0,14
Active athletes in the local sporting population	0,18	0,44	-0,15
Sports organizations	-0,83	0,28	-0,1
Sports popularity	-0,27	0,04	-0,89
Sports management/ coordination difficulty	-0,02	0,19	-0,89
Accessibility	-0,55	0	-0,02
Total finance, RUR thousand	-0,94	-0,09	0,01
Athletes	-0,94	-0,09	0,01
Coaches	-0,95	-0,09	-0,03
Competitions	-0,5	0,12	0,16
Referees	-0,62	-0,18	0,15
Local qualifiers for the national teams	-0,21	0,87	0,22
1-3 places won in the national championships	-0,37	0,79	0,23
1-3 places won in the international championships	-0,18	0,84	-0,07
Basic 18	-0,44	-0,12	0,17

Table 4. Modeled (M) indices versus the sport priority rates (PR)

2014-2017	M1	PR1	2018-2021	M2	PR2
Track and Field Athletics	1,18	1	Track and Field Athletics	1,22	1
Football	1,11	1	Rifle shooting	1,06	1
Mountain biking	0,95	1	Cycling races	1,01	1
Rifle shooting	0,85	1	Judo	1,00	1
Cycling races	0,83	1	Swimming	0,86	1
Swimming	0,82	1	Football	0,78	1
Biathlon	0,76	1	Artistic gymnastics	0,75	1
Bench shooting	0,58	1	Bench shooting	0,70	1
Table tennis	0,55	1	Biathlon	0,69	1
Handball	0,54	1	Basketball	0,49	0
Basketball	0,50	1	Kickboxing	0,46	0
Equestrian sports	0,48	0	Mountain biking	0,45	1
Cross-country skiing	0,46	1	Cross-country skiing	0,43	1

professionalization. And P3 factor refers to the sport popularity and management/ coordination difficulty as provided by the expert survey. Table 2 hereunder gives the weight matrix for 2018-2021.

Table 3 shows the structure of factors close to the prior period, with the exception of P2 factor indicative of the athletes' successes i.e. qualifications for the national teams highly correlated with the top places won in the national and international events. Skipping a detailed description of the model, we would note the following: although the sport priority index is not included in the most informative factors for the both periods, it may be fairly well modeled using by a set of indices. Moreover, the logistics model secures a complete matching of the formally approved and forecast basic sports due to the greater flexibility of the model. We used a simple linear model for calculations as it gives a reasonable range of basic sports options for consideration for the next period rather than secures a full match. Table 4 hereunder gives summarized results of the model.

The above Table data (with the M values descending to M>0.4) shows the following errors in the formal basic sports qualifications: figure skating in 2014-17; and handball and boxing in 2018-21; whilst the model gives priority to equestrian sports, basketball and kickboxing. It should be noted that when the bottom threshold of the model is raised (for example, to M >0.5), the erroneous formal basic sports numbers would change significantly.

Conclusion. The study demonstrated benefits of the new regional basic sports qualification method that takes into account the actual progress indices of every sport discipline for the prior periods.

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Correlation between external respiratory indicators and amino acid composition of blood in athletes

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Dr. Med. **V.A. Pavlov**[1]
PhD **O.S. Rogov**[1]
PhD, Associate Professor **A.I. Doronin**[1]
[1]Ural State University of Physical Culture, Chelyabinsk

Corresponding author: nir@sport-ural.ru

Abstract

Objective of the study was to identify the role of amino acids in the formation of the specific signs of the structural trace of adaptation.

Methods and structure of the study. The tidal volume rates were obtained by means of spirometry, including inspiratory and expiratory reserve volumes (RVinsp, RVexp) and actual vital capacity; by means of morphometry - predicted vital capacity, maximum tidal volume under loads, respiratory minute volume, maximum and specific tidal volume (per Watt of energy), as well as PWC170, specific PWC170 and critical specific power (specific power, at which the respiratory function efficiency is reduced).

Results and conclusions. Branched-chained amino acids (their relative content) in the wrestlers have a comprehensive effect on the external respiration function. The critical specific power in the hockey players positively correlates with the absolute glycine level and negatively - with the absolute taurine (TAU) level. In addition, there is a positive correlation with the relative glutamine and arginine levels.

Therefore, the identified difference in the amino acid composition of the athletes' blood is accompanied by different correlation relationships between the external respiratory indicators. It should be noted that it is ancient amino acids that have the largest number of such correlations - in representatives of all sports. The wrestlers were found to have more correlations with the absolute content of amino acids, and the hockey players have more correlations with the relative content of amino acids.

The data obtained can be used as a marker for the athletes' training level.

Keywords: *adaptogenic amino acids, sports training, external respiration indicators.*

Background. The nature of activities of representatives of various sports is related in some ways to their metabolism, with different absolute and relative amino acid contents, on the one hand, and a variety of trends in the amino acid content due to the skills grow, on the other hand [3].

The total amino acids form the substrate basis of the structural trace of adaptation. The structural trace of adaptation is formed in representatives of various sports to ensure activities typical of a particular sport. This trace is also present in the body structure and is detected during the functional diagnostics of the state of the internal organs and in the psychological tests, which is well known to every sports coach [1, 2].

Objective of the study was to identify the role of amino acids in the formation of the specific signs of the structural trace of adaptation.

Methods and structure of the study. The tidal volume rates (TV) were obtained by means of spirometry, including inspiratory and expiratory reserve volumes (RVinsp, RVexp) and actual vital capacity (VC); by means of morphometry - predicted vital capacity, maximum tidal volume under loads, respiratory minute volume (RMV), maximum and specific tidal volume (per Watt of energy), as well as PWC_{170}, specific PWC_{170} and critical specific power (CSP) (specific power, at which the respiratory function (RF) efficiency is reduced).

Table 1. Correlations between absolute amino acid content and respiratory function in wrestlers

Indicators	«Ancient» amino acids	Sulfur amino acids	Glutamine derivatives	Branched-chain amino acids	Cyclic amino acids	Total
RVinsp	SER		GLN			2
RVexp	-SER, -GLY		-GLN		-TRY	4
Actual VC			-ORN		-TRY	2
Predicted VC						
TVmax		-CYS	GLN			2
RMVmax			GLN			1
Specific TV						
PWC_{170}						
Specific PWC_{170}	ASP					1
CSP						
	4	1	5		2	12

Results and discussion. In the wrestlers, RVinsp and RVexp are characterized by two types of correlation, several of which are reciprocal. For example, the absolute serine (SER) and glutamine (GLU) levels positively correlate with RVinsp and negatively – with RVexp. In addition, the relative amount of isoleucine (ILE) negatively correlate with RVinsp and positively – with RVexp. There are also negative correlations between RVexp and absolute glycine (GLY) and tryptophan (TRY) levels, as well as positive correlations with leucine (LEU) (Table 1).

The actual vital capacity negatively correlates with the absolute content of ornithine (ORN) and tryptophan levels and the relative tryptophan level. The predicted vital capacity in the wrestlers does not correlate with the amino acid metabolism.

The maximum tidal volume and maximum respiratory minute volume in the wrestlers correlate with the absolute glutamine level. The absolute glutamine level in the wrestlers' blood is therefore associated with the effectiveness of the external respiration function. The wrestlers' ability to breathe is supported by the

Table 2. Correlations between relative amino acid content and respiratory function in wrestlers

Indicators	«Ancient» amino acids	Sulfur amino acids	Glutamine derivatives	Branched-chain amino acids	Cyclic amino acids	Total
RVinsp				-ILE		1
RVexp			-GLN	ILE, LEU		3
Actual VC					-TRY	1
Predicted VC						
TVmax				LEU		1
RMVmax				-LEU		1
Specific TV				-LEU		1
PWC_{170}						
Specific PWC_{170}	ASP, -ALA					2
CSP				-LEU		1
	2		1	6	1	10

Table 3. Correlations between absolute amino acid content and respiratory function in hockey players

Indicators	«Ancient» amino acids	Sulfur amino acids	Glutamine derivatives	Branched-chain amino acids	Cyclic amino acids	Total
RVinsp		-MET		-ILE		2
RVexp		MET		ILE		2
Actual VC	ASP					1
Predicted VC			-ORN,-ARG		-HIS	3
TVmax						
RMVmax	-GLU, GLY					2
Specific TV	-GLU					1
PWC_{170}						
Specific PWC_{170}					TYR	1
CSP	GLY	-TAU				2
	5	3	2	2	2	14

Table 4. Correlations between relative amino acid content and respiratory function in hockey players

Indicators	«Ancient» amino acids	Sulfur amino acids	Glutamine derivatives	Branched-chain amino acids	Cyclic amino acids	Total
RVinsp						
RVexp						
Actual VC	-GLY					1
Predicted VC					TYR	1
TVmax						
RMVmax	-SER	-MET	GLN			3
Specific TV		-MET	ORN			2
PWC_{170}						
Specific PWC_{170}						
CSP			GLN, ARG			2
	2	2	4		1	9

intensity of the detoxification reactions in the brain. The cysteine (CYS) level negatively correlates with the maximum tidal volume, that is, it has more correlation relationships with the structure of the respiratory organs than with their function. The relative leucine level also correlates with the maximum tidal volume and respiratory minute volume, yet in different ways: there is a positive correlation with the maximum tidal volume, but a negative one with respiratory minute volume, as well as with the specific tidal volume.

The wrestlers' power rates in the PWC_{170} does not correlate with the amino acid composition of the blood. At the same time, the specific power positively correlates with the aspartic acid (ASP) level and negatively – with the alanine (ALA) level.

Finally, the critical specific power (at which respiratory failure occurs) negatively correlates with the relative leucine level.

RVinsp and RVexp in the hockey players, like in the wrestlers, reciprocally correlate with the absolute amino acid content (Tables 3, 4). Unlike the wrestlers, in the hockey players, the absolute methionine (MET) and isoleucine levels negatively correlate with RVinsp and positively – with RV exp.

The actual vital capacity in the hockey players positively correlate with the absolute aspartic acid level. The predicted vital capacity negatively correlates with absolute levels of ornithine, arginine (ARG) and histidine (HIS) and positively correlates with the relative tyrosine (TYR) level.

The maximum tidal volume in the hockey players is not associated with the amino acid metabolism. The maximum respiratory minute volume in the hockey players positively correlates with the absolute glycine level and negatively - with the absolute glutamic acid level. The same indicator negatively correlates with the relative serine and methionine levels and positively - with the relative glutamine level.

The specific tidal volume (per unit of work power) in the hockey players is associated with the amino acid metabolism. There is a negative correlation with the absolute glutamic acid level, a negative correlation with the relative methionine level, and a positive correlation with the relative ornithine level.

The PWC_{170} rates in the hockey players have no correlation relationships. The specific PWC170 (per kilogram of weight) correlates with the absolute tyrosine.

Conclusions. Branched-chained amino acids (their relative content) in the wrestlers have a comprehensive effect on the external respiration function. The critical specific power in the hockey players positively correlates with the absolute glycine level and negatively - with the absolute taurine (TAU) level. In addition, there is a positive correlation with the relative glutamine and arginine levels.

Therefore, the identified difference in the amino acid composition of the athletes' blood is accompanied by different correlation relationships between the external respiratory indicators. It should be noted that it is ancient amino acids that have the largest number of such correlations - in representatives of all sports. The wrestlers were found to have more correlations with the absolute content of amino acids, and the hockey players have more correlations with the relative content of amino acids.

The data obtained can be used as a marker for the athletes' training level.

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Seasonal changes in functional state of cardiovascular system in female students with different levels of physical activity

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Dr. Hab. Professor **V.D. Povzun**[1]
PhD, Associate Professor **A.A. Povzun**[1]
[1]Surgut State University, Surgut

Corresponding author: povzun64@mail.ru

Abstract

Objective of the study was to assess seasonal changes in the functional capabilities of the circulatory system of female students with different physical activity levels.

Methods and structure of the study. During the study, we assessed the cardiovascular system functionality in two groups of female students. The first group was made of the female skiers studying at sports universities, the second group – of the female students not engaged in sports. The subjects' response to physical loads were assessed based on the indicators reflecting both their adaptive capabilities and cardiovascular system functionality.

The indicators included: heart rate (bpm), systolic and diastolic blood pressure (mmHg), pulse pressure and average dynamic pressure (mmHg), systolic volume (ml) and MBV (l/min). The average daily values of these indicators were used to calculate: Kerdo index, index of functional changes in the circulatory system, or adaptive capacity, type of self-regulation of circulation, circulatory deficiency coefficient, circulatory endurance coefficient, circulatory efficiency coefficient, Robinson index or double product. The resulting digital material was subjected to standard mathematical processing by the method of variation statistics with the calculation of the average value and its error.

Results and Conclusion. Given the correct distribution of physical loads in the long-term prospects, there should be no negative consequences of changes in the central regulatory vector, which determines the predominant distribution of the load among the structural elements of the body, namely sympathicotonia. However, this possibility should be taken into account, otherwise the change in the central regulatory mechanism will lead to the strengthening of the catabolism characteristic of the strenuous functioning and utilization of the bodily reserves and, as a consequence, to the reduction not only of adaptive but also functional capabilities of athletes, which could affect their sports results.

Keywords: *functional capabilities, cardiovascular system, adaptive capabilities, physical loads.*

Background. In characterizing seasonal changes in the structure of the biological rhythms of separate physiological indicators in female university students with different physical activity levels, we have previously identified significant changes in the rhythm [1]. It was not so much their presence in the sporting group that alerted, but the direction and absence of such changes in the non-sporting group. The restructuring of the rhythm, while in itself naturally-determined and manifesting in only one group in the same conditions, may reflect its instability, which is a poor indicator characterizing, in our case, a seasonal decline in adaptive capabilities, which is particularly pronounced in the sporting group [2]. These changes were especially pronounced in the rhythm structure of the cardiovascular system, in particular the daily average of the minute blood volume (hereinafter MBV). In the sporting group, this indicator is seasonally increasing; however, its increase is not accompanied by a rise in the systolic discharge, which for the sporting group would normally be the result of sports trainings, but due to an increase in HR. Consequently, both the adaptive capabilities and functional capacities of female

athletes become very low by spring, as this growth in MBV is typical of untrained people only.

Since the dynamics in the average daily rhythm in the sporting group is accompanied by a decrease in the amplitude of the HR oscillations, it can be assumed that the circulatory system is in a very tense state in spring due to intense physical loads.

Such changes as response to loads, especially physical ones, are, without doubt, inevitable and determined by the local self-regulation mechanisms, in spite of the direction of the rhythm restructuring [3]. The reason for the lack of a rhythmological response, which at first glance is a stable rhythm, may be precisely the absence of expressed physical loads in the non-sporting group. In the long-term prospect, however, the rhythm may reflect not only a shift from self-regulation to the inclusion of the central regulatory mechanisms, but also a shift in the regulatory direction of these mechanisms, which should be taken into account in the organization of the training process by both the athlete and coach.

Objective of the study was to assess seasonal changes in the functional capabilities of the circulatory system of female students with different physical activity levels.

Methods and structure of the study. During the study, we assessed the cardiovascular system functionality in two groups of female students. The first group was made of the female skiers studying at sports universities, the second group – of the female students not engaged in sports. The subjects' response to physical loads were assessed based on the indicators reflecting both their adaptive capabilities and cardiovascular system functionality.

The indicators included: HR (bpm), systolic (SBP) and diastolic (DBP) blood pressure (mmHg), pulse pressure (PP) and average dynamic pressure (ADP, mmHg), systolic volume (SV, ml) and MBV (l/min). The average daily values of these indicators were used to calculate: Kerdo vegetative index (KVI), index of functional changes in the circulatory system, or adaptive capacity, type of self-regulation of circulation (TSC), circulatory deficiency coefficient (CDC), circulatory endurance coefficient (CE), circulatory efficiency coefficient (CEC), Robinson index (RI) or double product. The resulting digital material was subjected to standard mathematical processing by the method of variation statistics with the calculation of the average value and its error.

Results and discussion. Given in Table 1 are the results obtained during the study.

While analyzing seasonal changes in the rhythms of the females in both groups, no fundamental differences were found in the average daily hemodynamic indices, which means that the functional state of the circulatory system, taking into account their different physical fitness levels, remain relatively stable throughout the year. The index of functional changes (IFC) is also stable and does not approach the critical value in both groups. Consequently, the

Table 1. Changes in the functional indicators of the cardiovascular system of the female university students with different physical activity levels

Indicators	Sporting group		Non-sporting group	
	Autumn	Spring	Autumn	Spring
HR	62.2 ± 1.6	65.2 ± 1.1	80.09 ± 2.9	80.91 ± 3.2
SV	67.52 ± 1.4	67.67 ± 0.9	65.88 ± 2.14	65 ± 1.5
MBV	4.20 ± 0.16	4.42 ± 0.12	5.34 ± 0.12	5.18 ± 0.12
SBP	112 ± 1.8	107.4 ± 1.6	111.27 ± 2.6	110.9 ± 1.6
DBP	69.3 ± 1.9	67.1 ± 1.8	71.5 ± 2.1	71.6 ± 1.85
PP	42.6 ± 0.7	40.3 ± 0.4	40.32 ± 1.9	39.38 ± 1.4
ADP	87.26 ± 1.9	84.02 ± 1.5	88.35 ± 2.13	80.05 ± 1.5
KVI	-11 ±0.9	-3 ± 0.2	10 ± 1.1	10 ± 0.9
TSC	111 ± 3.31	103 ± 2.78	90 ± 2.11	88 ± 2.19
CDC	1.81 ± 0.04	1.65 ± 0.03	1.39 ± 0.03	1.37 ± 0.03
CEC	14.4 ± 1.29	16.2 ± 1.31	20.0 ± 1.41	20.7 ± 1.34
CEC	2666 ± 116	2600 ± 112	3200 ± 123	3159 ± 119
RI	69.4 ± 2.86	69.6 ± 2.17	88.8 ± 2.67	89.1 ± 2.77

total adaptive reserve (AR) of the subjects in both groups remains at a quite acceptable level.

The physiologically standard and predictable picture is confirmed by other hemodynamic indices. The excellent state of the cardiovascular system reserves in the sporting group reflects the cardiac index (Robinson index). It is normal in the non-sporting group. The circulatory deficiency coefficient, which does not increase in any of the groups, is not a cause for concern. This is crucial for the sporting group, as the reduction of this indicator at all training stages reflects the normalization of the cardiovascular system functionality.

The circulatory endurance coefficient, which is virtually stable and reflects the abnormally low cardiac training level of the non-sporting female students, grows seasonally in the sporting group, which indicates at least the restoration of the working capacity that reduces, for example, due to fatigue. It should also be noted that it is the presence of fatigue in the sporting group that indirectly confirms the changes in the other indices. Although slight, the increase in the circulatory efficiency coefficient indicates a decrease in the economical efficiency of hemodynamics, which is due to their fatigue. The seasonal shift in the hemodynamic load towards the heart, and therefore the increased utilization of the functional reserves, is evidenced by the changes in the type of self-regulation of circulation. The type of self-regulation of circulation changes, though slightly.

The group deflections are not critical and this confirms the change in the Kerdo index, which, while reflecting the change of the type of central regulation and decreasing seasonally, remains within the vagotonic zone, which is more acceptable for athletes. These shifts do exist, as opposed to the non-sporting group, where these indicators and the biological rhythm values remain almost unchanged, while being functionally low to reflect the poor training level of cardiovascular system.

Conclusion. The rhythm stability in the non-sporting group may indicate to insignificant loads that require tension in the cardiovascular system in particular, and the cardiorespiratory system in general. The absence of physical loads, other than ecological-climatic, allows the rhythm to remain more stable and ultimately creates the illusion of sustainable adaptive reserves. There is such a reserve, of course, as evidenced by the quite acceptable index of functional changes, which scope is limited by the low functional capabilities, which in the long-term prospects will undoubtedly lead to a further shift in the regulatory mechanisms towards sympathicotonia and reduced economization.

The body of the female students of the sporting group, while reacting to additional, regular and intense physical loads in the same environmental-climatic conditions, utilizes adaptive reserves more actively, and therefore, a high economisation level is not at issue here either. However, the instability of the rhythm in this case reflects not so much the decrease of the adaptive capabilities of the female athletes but the tension in the cardiovascular system itself, reflecting the possibilities of urgent adaptation. The analysis of the hemodynamic indices shows that there are no changes or shifts in the central regulation mechanisms, and that is what counts.

This means that, given the correct distribution of physical loads in the long-term prospects, there should be no negative consequences of changes in the central regulatory vector, which determines the predominant distribution of the load among the structural elements of the body, namely sympathicotonia. However, this possibility should be taken into account, otherwise the change in the central regulatory mechanism will lead to the strengthening of the catabolism characteristic of the strenuous functioning and utilization of the bodily reserves and, as a consequence, to the reduction not only of adaptive but also functional capabilities of athletes, which could affect their sports results.

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Development of motor functions in children with autism spectrum disorders

UDC 376

PhD, Associate Professor **A.I. Repina**[1]
PhD, Associate Professor **I.V. Timofeeva**[1]
PhD, Associate Professor **M.I. Salimov**[1]
[1]Yekaterinburg Institute of Physical Culture (branch) Ural State University of Physical Culture, Yekaterinburg, Russia.

Corresponding author: raial286@bk.ru

Abstract

Objective of the study was to experimentally substantiate the development of motor functions in children with autism spectrum disorders.

Methods and structure of the study. The educational experiment was conducted on the basis of two institutions: the theoretical part – at the Department of Theory and Methodology of Adaptive Physical Education of Yekaterinburg Institute of Physical Culture (branch) of Ural State University of Physical Culture (UralSUPC), the practical part – at the Autism Therapy Center «Aurora», Yekaterinburg.

Motor tests were used to rate the level of development of motor functions in children with autism spectrum disorders, including the level of motor skills and physical abilities according to age.

Results and Conclusion. The application of the methodology of development of motor functions in the children with autism spectrum disorders, taking into account their individual abilities, significantly improves their physical development and has a positive effect on the complex of morphofunctional properties of the body. It also helps to enhance the children's physical capacities, build and strengthen their motor skills.

Keywords: *children with autism spectrum disorders, correction, motor function development, physical development.*

Background. Motor disorders in infantile autism are characterized by their close relationship with sensory disorders, particularly with the lack of sensation of own movements. It is therefore needed to provide a comprehensive and systematic approach to the development of motor functions in children with autism spectrum disorders.

Objective of the study was to experimentally substantiate the development of motor functions in children with autism spectrum disorders.

Methods and structure of the study. The educational experiment was conducted on the basis of two institutions: the theoretical part – at the Department of Theory and Methodology of Adaptive Physical Education of Yekaterinburg Institute of Physical Culture (branch) of Ural State University of Physical Culture (UralSUPC), the practical part – at the Autism Therapy Center «Aurora», Yekaterinburg.

Motor tests were used to rate the level of development of motor functions in children with autism spectrum disorders, including the level of formation of motor skills and physical abilities according to age.

Results and discussion. The main directions of the methodology of development of motor functions in children with autism spectrum disorders are selected on a case-by-case basis, taking into account children's individual abilities:

1. Development of motor coordination skills:

– development of consistency of movements of individual body links: climbing an artificial wall, climbing a ladder; trampoline jumping with the execution of various tasks; walking with the execution of arm

movements; exercises with objects, exercises on a movable surface, etc.;

– development of visual-spatial coordination and space orientation: obstacle course with running objects around, crawling through a tunnel, stepping and springing over obstacles, 360 rotations; exercises from unusual starting positions, etc.;

– development of static and dynamic equilibrium: balancing exercises with closed eyes; stand on tiptoe – arms down, forward, and up; alternating arabesque; swinging exercises – «flying carpet», «log» forward-backward, right-left, clockwise and counterclockwise; turns, tilts, rotations on a limited, elevated or movable surface; «bosu» exercises, etc.;

– formation of rapid reaction to changing external conditions and precision of movements: following along with the teacher's movements at a rapid pace; reaction ability exercises (sound, clap); ball throws on target, etc.;

– training muscle effort differentiation: stepping up, jumping on the stepper of different heights (10 cm, 20 cm, 30 cm), etc.;

2. Development of strength and endurance:

– development of wrist strength: making a fist; pressing a soft object (ball) with a hand; squeezing balls (expanders) of different diameter with a hand – one hand, two hands, etc.;

– improvement of muscular endurance of the back, abdominal press: parterre gymnastics; abdominal exercises; exercises against resistance; body-weight moves;

– improvement of muscular endurance of the upper and lower limbs: climbing an artificial wall; push-ups – from the knees, on the gymnastic bench; squats; lunges – left, right, forward and backward; medicine ball exercises;

– improvements of overall endurance: 15 min variable running; 10-15 min relay.

3. Development of flexibility:

– development of joint mobility: stretching exercises using soft modules, yoga in hammocks, swaying movement, etc.;

4. Development of speed:

– teaching children to differentiate the frequency of movements: high-knees running in place, heels-up running – quickly, slowly, etc.;

– development of reaction speed, speed of successive motor actions in general;

5. Correction and development of basic movements:

– formation of climbing, crawling, climb-over, and crawl-under skills: exercises using soft modules, tunnel, etc.;

– formation of ball throwing and catching skills: kick the ball from the floor (large diameter first, then small diameter), weighted ball throws with both hands behind the neck, underarm ball throws, ball throws on target (hoop) with one hand from a distance of 3-5 m, etc.;

– formation of jumping skills: jumping from a height of 30-40 cm; jumping squats; jumping to the right, left, forward, backward; one-leg leaps; springing over obstacles on one leg, on both legs; jumping onto the platform, 20-30 cm high, etc.;

6. Correction and prevention of somatic disorders:

– correcting and preventing postural disorders, scoliosis, flat feet, talipes valgus, talipes varus, cubitus recurvation, normalization of the muscle tone: symmetrical, asymmetrical exercises to form the core; detorsion exercises; using massage tracks to strengthen the sole muscles; alternation of muscle tension and relaxation; fitball gymnastics, «bosu» exercises, etc.;

– improvement of the respiratory and cardiovascular functionality: sound gymnastics; exhaling through a plastic tube into the water; abdominal breathing exercises; blowing up a balloon, short-distance accelerations (10-20 m), variable cross-country running (10-15 min), etc.

7. Development of sensory systems:

– formation of simultaneous reciprocal sensorimotor interactions, feeling of the body boundaries and its position in space, improvement of proprioceptive sensations: exercises using a «heavy blanket»; «bosu» exercises, etc.;

– development of tactile, dermo-kinesthetic, and musculo-articular perceptions, mimic gymnastics;

– development of fine motor skills: finger gymnastics, working in the pool with beans, peas, exercises on a tactile platform, «busy board» exercises;

– teaching to differentiate visual and auditory signals: reaction ability exercises (auditory signals of different modalities, visual color signals).

Children with autism spectrum disorders should be trained using visual aids (mirror exercises, use of pictures with exercises, boundary settlement). Children should be offered to choose among the number of repetitions (e.g. 10 or 15 reps). To broaden the horizon, the scores can be kept by units, hundreds, thousands, etc. (1,000, 2,000, 3,000, etc.). Instruc-

tions should not be long and should be given to a child clearly and specifically.

Conclusion. The application of the methodology of development of motor functions in children with autism spectrum disorders, taking into account their individual abilities, significantly improves their physical development and has a positive effect on the complex of morphofunctional properties of the body. It also helps to enhance the children's physical capacities, build and strengthen their motor skills.

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Motor actions formation in 3-4-year-olds with down syndrome: efficient progress test and monitoring set

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PhD, Associate Professor **I.V. Timofeeva**[1]
PhD, Associate Professor **M.I. Salimov**[1]
PhD, Associate Professor **A.I. Repina**[2]
[1]Senior Lecturer of the Department of Thermal Engineering AFC N.S. Plushcheva
[2]Ural State University of Physical Culture's Yekaterinburg Institute of Physical Culture (affiliate), Yekaterinburg, Russia.

Corresponding author: afk-ural@mail.ru

Abstract

Objective of the study was to develop a progress test and monitoring set to track the motor skills formation process in the 3-4-year-olds diagnosed with Down syndrome.

Methods and structure of the study. The progress test set was subject to an experimental study at "Sunny Children" NGO centers in the Yekaterinburg, Kamens-Uralsk, Verkhniaya Pyshma, Revda, Berezovsky and Zarechny affiliates (Sverdlovsk Oblast). We sampled for the tests the 3-4 year-olds diagnosed with Down syndrome (n=40) and concomitant diseases including minor cardiac defects and visual and hearing impairments. The kids were sampled on the family consents for the tests and personal data processing. Most common among the concomitant diseases are the cardiovascular system ones.

Results and conclusion. The three-stage progress test and monitoring system makes it possible to timely find the children having specific problems/ needs in the motor skills mastering process in every group and focus the adaptive physical education instructors' service on their developmental challenges. A special attention in the set of the motor skills development service should be paid to whether or not the child shows an interest in active games and physical exercises, with the interests rated by teachers' monitoring in the training process. Test sessions will be run at least three times a year to fairly profile the individual motor progress. Such test and monitoring service should be designed to adequately rate the individual movement quality and controls versus the group- and age-specific standards.

The monitoring and test service is commonly considered the most productive and informative progress rating method in the adaptive physical education / health service for this health group. This service will help the adaptive physical education instructor concentrate on the key aspects to timely and efficiently design and manage the service on an individualized basis. Such test and monitoring service helps analyze the adaptive physical education service benefits and drawbacks on a timely basis to attain the interim and final progress goals for success.

Keywords: *Down syndrome, motor actions, adaptive physical education.*

Background. Down syndrome is ranked among the most usual chromosomal aberrations diagnosed in 0.1% of the newborn population by the national statistics [1]. Thus the Sverdlovsk Oblast health statistics report around 30-35 Down-syndrome-diagnosed newborns every year. The syndrome includes delays and disorders in psychomotor and speech functions associated with a range of congenital malformations. This is the reason why the motor functionality variations are given a special priority by the mental and physical development test systems. For success in the highly coordinated complex motor skills formation process, the kids need to master their basics as a foundation for their further progress. There is a commonly known and accepted fine/ gross motor skills formation sequence customized to the natural mental and physical development process stages and terms. A key logic of this process is that the motor skills set formed in some stage should provide a foothold for the next motor skills formation stage [4]. Theoretical and practical analyses of the Down-syndrome-diagnosed kids'

socializing processes have demonstrated the relevance and significance of these issues. The global research community is still in need of specific and successful physical development control methods, albeit the existing integrated rehabilitation systems within the common adaptive physical education service are still known to somewhat facilitate harmonious development of the Down-syndrome-diagnosed children [6].

Objective of the study was to develop a progress test and monitoring set to track the motor skills formation process in the 3-4-year-olds diagnosed with Down syndrome.

Methods and structure of the study. The progress test set was subject to an experimental study at "Sunny Children" NGO centers in the Yekaterinburg, Kamens-Uralsk, Verkhniaya Pyshma, Revda, Berezovsky and Zarechny affiliates (Sverdlovsk Oblast). We sampled for the tests the 3-4 year-olds diagnosed with Down syndrome (n=40) and concomitant diseases including minor cardiac defects and visual and hearing impairments. The kids were sampled on the family consents for the tests and personal data processing. Given on Figure 1 hereunder are the consolidated health data of the sample.

Most common among the concomitant diseases are the cardiovascular system ones including atrial septal defect (65% of the sample); gastrointestinal diseases (duodenal atresia, Hirschsprung's disease, atresia of the anus): 21%; hearing impairments (conductive and sensorineural hearing loss): 19%; visual impairments (strabismus, congenital cataract): 51%; and congenital hip dislocation: 49% of the sample. Each child was diagnosed with at least two concomitant diseases with secondary abnormalities of different origins. We sampled the 3-4-year group with respect to the known research data on the Down syndrome in four-minus year-olds normally associated with heavy underdevelopments of the key mental functions (memory, thinking, speech), followed by some progress in the mental functions and their versatility range since 4-5 years of age [5].

Zhiyanova P.L. reports an interesting correlation between the cognitive progress and gross motor skills formation progress. Progress of the Down-syndrome-diagnosed kids, in her opinion, is hampered by poor bodily sensitivity that adversely effects every movement quality and the motor controls on the whole [2]. She mentions that the Down-syndrome-diagnosed children with hypotension may suffer from inadequate limb straightening, imbalances, poor joint controls, inadequate co-contraction (i.e. counter muscles contraction disharmony around the joint), inadequate proprioceptive postural and movement controls, joint hyper-mobility, etc.; with the children normally tested with serious postural control issues. However serious are the latter, the children are still normally driven by natural progress needs and striving to master the key movements making resort to a range of compensatory mechanisms including the Down-syndrome-specific symmetrical poses and monotonous symmetrical motor patterns [3]. Therefore, the adaptive physical education service to the Down-syndrome-diagnosed children will include the most efficient developmental exercises, based on the prior motor skills statues and staged/ interim efficiency rating tests, to facilitate the individual progresses.

Results and discussion. We believe that the Down-syndrome-diagnosed kids' motor skills rating criteria need to factor in their individual psychophysical and socializing progress profiles. We engaged experts to rate the motor skills in the sample versus the elementary motor skills quality

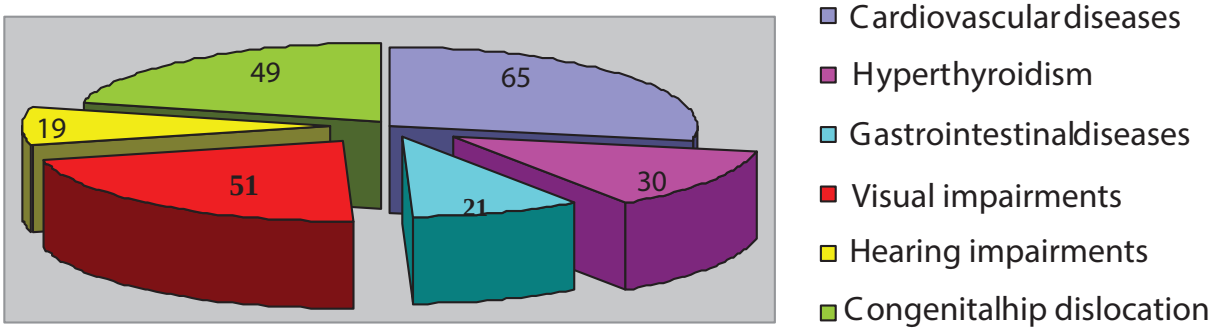

Figure 1. *Consolidated health data of the sample (n=40): concomitant diseases, %*

Table 1. Motor skills test report (excerpt)

Motor skills test	Scores, points									
	0			1			2			Total
1. Go upstairs alternating legs on every step										
2. Walk fast downward on a moderately steep slope holding an assistant's hand										
3. Make a few standing jumps holding hands on a support										
4. Make standing jumps without a hand support										
5. Catch a light middle-size ball flying straight to the hands from 1m distance										
6. Throw with the both hands a light middle-size ball to the partner										
7. Kick the ball in front of you without a support/ assistance										
Total score:										

benchmarks, with the classified execution errors. The motor skills were grouped into the key skill groups to have them tested and ranked as follows: unformed, partially formed and formed skills were rated by 0, 1 and 2 points, respectively: see the Table hereunder.

The above test set makes it possible to rate the final and interim adaptive physical education system efficiency for the whole period, with test service including the prior, interim and final tests at least. Note that due to the physical development rates of the Down-syndrome-diagnosed children varying in a wide range, they may not always be benchmarked versus the standard. The individual progresses from the interim to final tests will be computed by the formula: N = X/ Y, where N is the current test result in points, X is the current test result in the relevant physical units, and Y is the prior test result in the physical units.

This approach considers the motor skills formation service as geared to transform the child's mental and physical statuses on a harmonized/ integral basis. The prior tests will rate the children's developmental statuses and needs to design the correctional service on an individualized basis. The final tests will track the individual progress in the motor skills to see if the actual results match with the expectations. And the interim tests will be designed to rate the staged progress and make necessary adjustments on the way. On the whole the test set should facilitate the efforts to design and manage the individual = physical education service route for the mental and physical progress.

Conclusion. The three-stage progress test and monitoring system makes it possible to timely find the children having specific problems/ needs in the motor skills mastering process in every group and focus the adaptive physical education instructors' service on their developmental challenges. A special attention in the set of the motor skills development service should be paid to whether or not the child shows an interest in active games and physical exercises, with the interests rated by teachers' monitoring in the training process. Test sessions will be run at least three times a year to fairly profile the individual motor progresses. Such test and monitoring service should be designed to adequately rate the individual movement quality and controls versus the group- and age-specific standards.

The monitoring and test service is commonly considered the most productive and informative progress rating method in the adaptive physical education / health service for this health group. This service will help the adaptive physical education instructor concentrate on the key aspects to timely and efficiently design and manage the service on an individualized basis. Such test and monitoring service helps analyze the adaptive physical education service benefits and drawbacks on a timely basis to attain the interim and final progress goals for success.

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Beauty and aesthetic appeal of sports: aesthetic training of athletes

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Professor, Dr. Sc.Phil. **A.V. Medvedev**[1]
[1]Institute of Physical Culture, Yekaterinburg (branch), Ural State University of Physical Culture

Corresponding author: medvedev10@yandex.ru

Abstract

Objective of the study was to reveal the aesthetic education standards in student community and their need for basic aesthetic education in the physical education curriculum.

Methods and structure of the study. We sampled for the questionnaire survey the 4-year students (n=120) from the Yekaterinburg Institute of Physical Culture's Humanitarian and Socio-Economic Departments majoring in Physical Education discipline.

Results and conclusion. Having analyzed the questionnaire survey data in the context of the ongoing aestheticization of the professional sports, we would make the following preliminary conclusions. First it should be emphasized that the physical education faculties and students recognize the need for modern aesthetic education in the professional training systems, with such education being particularly beneficial for the sports managing community. Second, there is a clear need for a broad discussion of a basic aesthetic education curriculum for the physical education universities – that should cover the whole academic study period on an uninterrupted basis. And third, there is a growing need for the modern aesthetic education and training methods and models as complementary to the traditional academic physical education curriculum. The traditional studies and lectures, no matter how important they are, are not always sensitive to the ever-changing demands of the student community, and should give way to a range of modern interactive training tools. These transformations deserve special attention and support from the academic educational system management.

It should be also emphasized that modern education should not prioritize the notorious competences as such anymore, since every trainee's individuality should be respected and personality progress facilitated by a variety of education tools including modern aesthetic education and training ones – that expand the professional limitations and facilitate individual progresses by improvements in harmony and synergy of the physical and spiritual growth process.

Keywords: *beauty, professional sport, attraction, aesthetic education, aesthetic training.*

Background. Modern sports have evolved into a global phenomenon playing special social roles with multiple effects on the individual and social lifestyles and the relevant economic, political, geopolitical, artistic, communicative and other aspects and influences from and on communities the world over. One of the key individual priorities and attractions in the aesthetic domain is beauty as one of the most general and leading aesthetic notions, with the modern sports being definitely not alien to it. Beaty of modern sport disciplines is appreciated not only by sports professionals, analysts and researchers, but also by the fan communities that rank it high among the competitive values and appeal; particularly when its elements in the routines and combinationions are emphasized by the sports commentators, all the more that the artistic merits are often critical for success in a number of sports. It is not unusual for the modern sports communities to run contests of the best goals, best matches and combinations – e.g. in chess and some other sports.

The role of beauty in sports may be analyzed in the following two aspects: (1) beaty of a sport discipline as its genuine and essential element; and (2) inflow of beaty from outside to a sport discipline. As for the first aspect, it has always been of special interest for researchers as demonstrated by the relevant study reports [1, 4, 5]. It is a common knowledge that since ancient times the popular athletes have often provided models for artistic masterpieces; as the arts, as

provided by N.G. Chernyshevsky, have always been sensitive to the commonly appreciated things and values. The never ending attention of arts to sports and athletism on the whole is indicative of the central role played by sports in the individual and communal lifestyles and agendas [7, 9, 10]. Arts cannot but respond and reflect the emotional dramas of fierce competitions with triumphs of the winners and despairs of the losers, being always inspired by beauty of an athletic body, its movement plasticity and elegance. Of special popular interest the world over is the ongoing discussions of whether or not some sports may be ranked with arts [2, 7, 10].

The second aspect is particularly relevant when a sport is viewed and analyzed as a show, with the fans watching competitions as spectacles in an organic emotional unity with the competitors. In the modern terminology, a spectator may be qualified a sport product consumer or client of the sports industry – often rather influential on the sports techniques, strategies and tactics, particularly in the team sports. Needs and demands of the fan community, its tastes, aesthetic ideals and expectations and the whole support and devotion culture as such comprise a necessary element or seasoning of the sports show. This interdependence of the fans and competitors is particularly high for the modern professional sports and their commercial aspects. Competitors in the popular team sports on the whole and football in particular (commonly referred to as the team sport No. 1) now and then emphasize that they always 'play for the fans', and commentators replicate this statement to inspire the athletes and make them feel heroes of a virtually theatrical peformance. This cultural phenomenon is promoted as a sort of show by the global mass media, with the public interest heated up to fever prior to the Olympic Games and other major events, with repercussions in the smaller-scale local events.

It is not unusual, therefore, that the purely competitive elements have to give way to a degree to some other aspects, dominated by the social ones. As was mentioned by J. Huizinga, "professional performance is virtually never limited by the competitive agenda only, since professionals are never free to act spontaneously and carelessly" [8, 222]. No wonder that this aspect often triggers conflicts. When the notorious footballer A. Arshavin responded to a criticism of the fans "your expectations is your problem", these words were in fact a sort of protest against habitual dilution of the sporting mission, focuses and priorities by the sports-unrelated elements.

This new reality of the modern sports urges the sports community to give a higher priority to their aesthetic aspects – even if they seem foregn for the essence and mission of the sport. They may be perceived as a kind of 'aesthetic jewelry' which mission is to lure as many spectators as possible, since beauty and aesthetic appeals of some sports may be rather influential and emotional and, hence, rather important for the public appreciation and support.

The growing priority to beauty of sports, and the efforts to promote and emphasize their beaty beyond the purely sporting anc competitive aspects may be seen as manifestations of the sports aestheticization process. The growing awareness of this tendency in professional sports urges the sport communities to analyze the role and benefits of aesthetic education in the academic physical education system.

Objective of the study was to reveal the aesthetic education standards in student community and their need for basic aesthetic education in the physical education curriculum.

Methods and structure of the study. We sampled for the questionnaire survey the 4-year students (n=120) from the Yekaterinburg Institute of Physical Culture's Humanitarian and Socio-Economic Departments majoring in Physical Education discipline.

Results and discussion. The key question "What the beauty of sports means for you?" was mostly responded as follows: execution elegance; technical perfection; professionalism; harmony; movement coordination, perfect teamwork, etc. The history of aesthetics give multiple definitions of beaty albeit they are dominated by the idea of natural harmony i.e. perfect compliance with the laws of nature. Therefore, every single combination – e.g. in football – is commony rated perfect when it meets a range of specific criteria including the execution precision, technical perfection of the reception and passing sequence, passing efficiency with the shortest way to goal, unpredictable feints and, last but not least, scoring efficiency, i.e. goals. Having considered the responses in the above context, we have grounds to believe that the sample realizes the essence of beauty in sports and, hence, demonstrates certain aesthetic feel and standards.

The question "What is the role of beauty in sports for you?" was responded as follows: "Beauty is a natural element of every sport" (30%); "Beauty is an appealing addition" (63.5%); "Beauty contributes to the

commercial benefits" (5.5%); and "Uncertain" (1%). This means that virtually 94% of the sample demonstrated good understanding of beauty in sports and its benefits for the competitive progress.

The question "Do you feel that sports aesthetics need to be prioritized in athletic trainings?" was responded as follows: "Yes, for sure" (20.5%); "Desirable" (44%); "Not needed" (11%); "It may hamper trainings" (11%); and "Uncertain" (13.5%).

Having summarized the pros and cons of an aesthetic education in the professional training systems found by the questionnaire survey, we have grounds to say that the student community not only understands the need for aesthetic education but also demonstates a sort of demand for aesthetic education in the physical education curriculum.

Of special interest were also responses to the question "How important, as you feel, are the athlete's efforts if any to shape up and improve the personal image?" that were as follows: "Rather important for competitive success" (13%); "Important to a degree albeit not for the results" (46%); "Actually unimportant for the athletic performance" (13%); "Important rather for the career than for competitive progress" (10%); "Make no difference" (10%); and "Uncertain" (8%).

And the question "Do you believe that artistic works that praise sports encourage progress in willpower and success motivations?" was responded as follows: "Yes, and largely" (23%); "Yes, they provide an extra incentive" (70%); "I don't think so, they make no effect" (4%); "No, they are harmful as they distort the sports reality" (2%); and "Uncertain" (1%).

Conclusion. Having analyzed the questionnaire survey data in the context of the ongoing aestheticization of the professional sports, we would make the following preliminary conclusions. First it should be emphasized that the physical education faculties and students recognize the need for modern aesthetic education in the professional training systems, with such education being particularly beneficial for the sports managing community. Second, there is a clear need for a broad discussion of a basic aesthetic education curriculum for the physical education universities – that should cover the whole academic study period on an uninterrupted basis. And third, there is a growing need for the modern aesthetic education and training methods and models as complementary to the traditional academic physical education curriculum. The traditional studies and lectures, no matter how important they are, are not always sensitive to the ever-changing demands of the student community, and should give way to a range of modern interactive training tools. These transformations deserve special attention and support from the academic education system management.

It should be also emphasized that modern education should not prioritize the notorious competences as such anymore, since every trainee's individuality should be respected and personality progress facilitated by a variety of education tools including modern aesthetic education and training ones – that expand the professional limitations and facilitate individual progresses by improvements in harmony and synergy of the physical and spiritual growth process.

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Nicotine addiction and attitudes survey at university of physical education

UDC 613.84

Dr. Biol., Associate Professor **O.B. Gileva**[1]
PhD **O.S. Rogov**[1]
PhD, Associate Professor **D.A. Polyak**[1]
[1]Yekaterinburg Institute of Physical Culture (branch), UralSUPC, Yekaterinburg

Corresponding author: nir@sport-ural.ru

Abstract

Objective of the study was to survey nicotine addictions and attitudes at university of physical education.

Methods and structure of the study. We run a questionnaire survey on a sample of students (n=133) majoring in 49.02.01 physical education discipline. The questionnaire survey was designed to group smokers and nonsmokers with/ without past smoking experiences, and test the groups for awareness of the nicotine addiction health risks, influences of different social/ environmental factors on their attitudes to smoking, motivations, etc.

Results and conclusion. The sample was found to believe that the anti-smoking initiatives should include administrative restrictions on smoking; active campaigning to keep the students informed on the health risks and methods to quit smoking; and social climates with zero tolerance to smoke. The anti-smoking campaigners are recommended to prioritize the following three approaches: zero-tolerance social climates; efficient stress-coping strategies to help smokers; and administrative restrictions with no-smoking zones and regulations.

Keywords: *smoking, students, youth needs structure, healthy lifestyle values.*

Background. Modern epidemiology and social hygiene give a special priority to the key health risk factors with smoking ranked among the most common and serious ones.

Objective of the study was to survey nicotine addictions and attitudes at university of physical education.

Methods and structure of the study. We run a questionnaire survey on a sample of students (n=133) majoring in 49.02.01 physical education discipline. The questionnaire survey was designed to group smokers and nonsmokers with/ without past smoking experiences, and test the groups for awareness of the nicotine addiction health risks, influences of different social/ environmental factors on their attitudes to smoking, motivations, etc.

Results and discussion. Only 9 people in the sample confessed smoking, with 5 (4%) and 4 (3%) smoking seldom and often, respectively. Only 16 students (12% of the sample) reported former smoking experiences, with only 9 (6%) still smoking. 5 of the smokers reported 1-3-year smoking experiences and 4 yearly and shorter experiences.

Furthermore, 74 people (56%) reported living in smoking environments i.e. being passive smokers; and 59 people (44%) reported being non-exposed to passive smoking. Therefore, more than half of the sample was found exposed to passive smoking, with the active and former smokers being relatively more exposed. 60 (45%), 20 (15%) and 53 (40%) people reported having active, former and no smokers in their families, respectively. This means that 62% of the sample is exposed to passive smoking in their families, with the students' mothers found particularly influential in this aspect [2]. This finding is consistent with our prior data that smoking students more likely than the others have smokers in their families.

52 (39%) and 81 (61%) of the students reported having smokers and non-smokers among their friends, respectively – that means that families of the sample smoke more often than friends. On the whole, the smoking families and/or friends were found to provide a strong motivation to begin smoking. Being tested on the responds for smoking, 8 people were uncertain, 4 mentioned smoking friends, 3 academic challenges, and 1 desire to look mature. The question if they know that smoking is very unhealthy was responded positively by 114 (86%) people in the sample; with 14 (10%) uncertain and 5 (4%) non-believing in its health risks. Moderate nicotine addiction was reported by 3 smokers, 1 former smoker and, surprisingly, 1 non-smoker. High nicotine addiction was reported by 2 students, with the others reporting no nicotine addiction.

When surveyed about the nicotine addiction provoking factors, 18 (14%) students mentioned cheap cigarettes (albeit none of the smokers agreed with that); whilst 62 (47%) and 53 (39%) said this factor is likely and unlikely influential, respectively.

Peer influence was mentioned among the strong motivations for smoking; with 66% starting smoking "with the company". In some communities this influence appears less strong – as reported by only 40% beginner smokers at Bratsk Medical College and 39.4% at Tyumen State University. Furthermore, “curiosity” was mentioned by 16% of the sample, whilst some studies increase the share of the first tries for this reason to 21.2% and 73.8%. “Home/ college problems” and “stress” was mentioned by 17% to 30.3% of the sample. And the desire to “look mature and independent” or “change the image” was mentioned by 1% to 9.1%. It should be mentioned that surveys often find no reasons for beginner smoking – thus, some studies report up to 53% of the samples being uncertain on this point [1, 2, 3]. Advertising, TV and works of art were mentioned among the nicotine addiction motivators by 54 (41%) people as likely, 17 (12%) people as very likely and 62 (47%) said they did not believe in such influences.

In responses to the question if the antismoking campaigns in the student communities make sense and effect, 25 (19%) people were uncertain, 28 (21%) people were positive; 47 (35%) said the effect was little if any; and 33 (25%) people said they were senseless. This means that most of the sample is skeptical about effects of the antismoking campaigns, although quite a few still believe that these efforts are necessary and important. On a more specific basis, the positive part of the sample mentioned the following campaigns as beneficial: administrative measures were mentioned by 48 people (36%); lectures by 14 (11%); fashion for healthy lifestyle by 35 (26%); recreational service by 21 (16%); and the healthy lifestyle promotion initiatives by 15 (11%). Of the smokers, 3 mentioned benefits of strict administrative measures; 3 mentioned fashion for healthy lifestyle; and 1 mentioned the healthy lifestyle promotion, health-improving activities and lectures.

When asked if they are going to quit smoking in the near future, 3 smokers complained it is beyond their control. These were the above individuals that prioritized administrative measures in the anti-smoking toolkit. Mentioned among the reasons to quit smoking were the health risks, smell, financial costs, and belief that the nicotine addiction is enslaving, senseless and draining. It should be emphasized that 5 out of 9 smokers reported past unsuccessful attempts to quit smoking.

Conclusion. The sample was found to believe that the anti-smoking initiatives should include administrative restrictions on smoking; active campaigning to keep the students informed on the health risks and methods to quit smoking; and social climates with zero tolerance to smoke. The anti-smoking campaigners are recommended to prioritize the following three approaches: zero-tolerance social climates; efficient stress-coping strategies to help smokers; and administrative restrictions with no-smoking zones and regulations.

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Social adaptation of sporting students: psycho-physiological health tests and analysis

UDC 612.821+57.024+57.026

PhD, Associate Professor **O.A. Makunina**[1]
Dr. Med., Professor **E.V. Bykov**[1]
PhD, Associate Professor **I.F. Kharina**[1]
[1]Ural State University of Physical Culture, Chelyabinsk

Corresponding author: oamakunina@mail.ru

Abstract

Objective of the study was to test benefits of the sporting students' social adaptation profiling psychophysiological health test system.

Methods and structure of the study. We run the psychophysiological health testing educational experiment at the Environmental Stressors and Adaptation Research Laboratory of the Ural State University of Physical Culture's Physiology Department in 2016 through 2020. We sampled, on a voluntary random basis, the first-, second- and third-year sporting Ural State University of Physical Culture students (n=254) and tested them for attention-deficit hyperactivity disorder (ADHD) symptoms by the Toulouse-Pieron test. Based on the test data, we further composed an Experimental group (n=25, 8.7%) of the ADHD-diagnosed students and Reference Group (n=25) of their ADHD-free peers. The groups were tested by the NS-PsychoTest set with prior verbal instructions. The nervous/ cardiovascular system functionality exposures to stressors were tested by the Loskutova Test. The regulatory system responses and stress tolerances were tested by the computerized Polyspectr-ANS Test system based on the heart rate variability profiles. The heart rate was measured for five minutes within some 300 cardiac cycles. The electrocardiograms were analyzed automatically with prior processing of artifacts. Based on the test data, we computed a stress index i.e. the heart rate control centralization ratio.

The individual social adaptation progress was tested by the standard academic and competitive progress rating systems.

Conclusion. The study data and analyses found the ADHD-diagnosed sporting students more exposed to stressors. A regression analysis showed the stress tolerance and nervous system functionality tests being beneficial for the sporting students' social adaptation profiling purposes. The study findings demonstrate the need of the ADHD-diagnosed sporting students for an efficient social adaptation tracking service. Regular physical activity is recommended as beneficial for their emotional and social adaptation progress proved associated with the academic and competitive progress. The physical education faculties are recommended using a wide range of efficient individualized training methods, models and tools customizable for the psycho-physiological test data of the health group.

Keywords: *psychophysiology, social adaptation, sporting students, progress, Toulouse-Pieron test, simple visual-motor response, heart rate variability.*

Background. A comprehensive student health monitoring system implemented at the university offers, among other things, psychophysiological health tests for sporting students diagnosed with attention-deficit hyperactivity disorder (ADHD) symptoms to rate their social adaptation. The social adaptation means herein "the process of active individual adaptation to the social environment classifiable by types of environmental interactions" [3]. Academic progress is known to claim high psychophysiological resources and expose students to multiple stressors that may suppress the nervous system functionality (NSF) and distress the circulatory system. Well-designed psychophysiological tests give the means to track individual responses to the combined mental and physical stress in the educational process [7]. We believe that the academic system with its high mental and physical stressors needs a well-designed adaptive-compensatory behavior control service to help the sporting students cope with stresses; such service will be designed to harmonize the physiological and psychological

Table 1. Social adaptation rating psychophysiological test data of the sporting students (M±δ), points

Group	Stress index	System functionality, points	Stress tolerance	Academic progress	Competitive progress
EG	18,2±3,3***	4,2±0,3	97,4±25,1***	3,3±0,2	2,8±0,2*
RG	7,0±5,0	4,9±0,2**	58,2±23,2	4,3±0,7*	1,5±0,5

*Note: intergroup difference significance rates: *p<0.05; **p< 0.01; ***p<0.001*

systems to facilitate the individual social adaptation and contribute to the professional progress, with the academic progress and social adaptation tests applicable to rate the potential competitiveness of the physical education university bachelors.

Objective of the study was to test benefits of the sporting students' social adaptation profiling psychophysiological health test system.

Methods and structure of the study. We run the psychophysiological health testing educational experiment at the Environmental Stressors and Adaptation Research Laboratory of the Ural State University of Physical Culture's Physiology Department in 2016 through 2020. We sampled, on a voluntary random basis, the first-, second- and third-year sporting Ural State University of Physical Culture students (n=254) and tested them for ADHD symptoms by the Toulouse-Pieron test [6]. Based on the test data, we further composed an Experimental group (n=25, 8.7%) of the ADHD-diagnosed students and Reference Group (n=25) of their ADHD-free peers. The groups were tested by the NS-PsychoTest set (by Neurosoft Ltd., Ivanovo) [5] with prior verbal instructions. The nervous/ cardiovascular system functionality exposures to stressors were tested by the Loskutova Test that generates individual consolidated response times indicative of the integral system functionality for the total test period. The computerized test system automatically produces the individual system functionality rates [5]. The regulatory system responses and stress tolerance were tested by the computerized Polyspectr-ANS Test system (by Neurosoft Ltd., Ivanovo) based on the heart rate variability profiles [6]. The heart rate was measured for five minutes within some 300 cardiac cycles. The electrocardiograms were analyzed automatically with prior processing of artifacts. Based on the test data, we computed a stress index i.e. the heart rate control centralization ratio [1].

The individual social adaptation progress was tested by the standard academic and competitive progress rating systems. Thus the group academic performance was rated a 5-point scale as poor (1), unsatisfactory (2), satisfactory (3), good (4) and excellent (5), respectively; and the competitive progress was rated by the Competitive Progress Self-rating Survey on the same 5-point scale as very unhappy [with progress] (1), rather unhappy than not (2), rather satisfied (3), rather happy than not (4); and very happy (5). The test/ survey data were statistically processed by Jamovi software toolkit, with the intergroup differences rated for meaning by the Mann-Whitney U-test.

Results and discussion Table hereunder gives the test data.

The stress tolerance tests found the EG more exposed to stressors than the RG as verified by the lower system functionality rates indicative of the current functionality of the central nervous system. The system functionality / stress tolerance test rates urged further medical examinations that found sympathicotonia in the EG and normotonia in the RG. Furthermore, the EG demonstrated the 23.2% lower academic progress than the RG. On the competitive progress scale, however, the EG was tested 53.6% higher than the RG. A test data correlation analysis found clear positive correlations of the system functionality / stress tolerance test rates with the academic/ competitive progress. The correlation vectors and specifics showed a direct correlation of the stress exposure with the system functionality / stress tolerance and academic/ competitive progress rates.

Conclusion. The study data and analyses found the ADHD-diagnosed sporting students more exposed to stressors. A regression analysis showed the stress tolerance and nervous system functionality tests being beneficial for the sporting students' social adaptation profiling purposes. The study findings demonstrate the need of the ADHD-diagnosed sporting students for an efficient social adaptation tracking service. Regular physical activity is recommended as beneficial for their emotional and social adaptation progress proved associated with the academic and competitive progress. The physical education faculties are recommended us-

ing a wide range of efficient individualized training methods, models and tools customizable for the psycho-physiological test data of the health group.

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Artificial intelligence method to detect psychological/ learning disorders in physical education and sports activities

UDC 37.01

Dr. Hab., Professor **M.G. Kolyada**[1]
Dr. Hab., Professor **S.I. Belykh**[1]
PhD, Associate Professor **T.I. Bugaeva**[1]
Postgraduate student **O.S. Oleinik**[1]
[1]Donetsk National University, Donetsk

Corresponding author: kolyada_mihail@mail.ru

Abstract

Objective of the study was to analyze benefits of an artificial intelligence application method for detecting psychological/ learning disorders in the physical education and sports sector.

Methods and structure of the study. Many Russian scientists including A.I. Akhmetzyanov, S.A. Vasyur and N.I. logolevich, A.N. Gud et al. have made efforts to adapt the existing intellectual analytical methods and develop new ones using temporal series to describe poorly structured processes and detect disorders thereof; although, regretfully, modern artificial intelligence methods are still underdeveloped in application to the physical education and sports service abnormalities detection purposes. Basically, a disorder detection approach will be designed to determine whether some process (or local data array) falls into the normality field – and if not, rate it abnormal.

Abnormalities in data arrays are usually suspected in cases of omissions or excesses in the data groups going beyond the permissible range, whilst the disorder detection approaches should address, in addition to the above, the behavioral anomalies in the entire data range including specific disorders in the local trends. Therefore, specific detection and analyzing methods need to be selected as dictated by some of the two above provisions.

Results and conclusion. Special selected methods and algorithms applied by artificial intelligence systems help not only successfully find disorders/ abnormalities in the data arrays – where genuine correlations of specific indicators can hardly be found by other means, particularly when the indicators refer to complex psychological, learning and/ or psychophysiological phenomenon/ process – but also effectively forecast consequences of the detected disorders.

Keywords: *artificial intelligence, psychological/ learning disorders, anomalies, retardations, giftedness, taxonomic method, physical education and sports.*

Background. Self-learning systems of artificial neural networks are being widely applied in modern physical education and sports sector as they are considered beneficial in many aspects including prediction, with certain probability, of contributions (weight) of different psychophysical test rates into competitive progresses on a separate/ synergized basis, in view of aesthetic merits, sensatory experiences, multisided semantics, meanings and many other things that can hardly be formalized – albeit are still relevant and influential for modern physical education and sports.

Objective of the study was to analyze benefits of an artificial intelligence application method for detecting psychological/ learning disorders in the physical education and sports sector.

Methods and structure of the study. Many Russian scientists including A.I. Akhmetzyanov, S.A. Vasyur and N.I. logolevich, A.N. Gud et al. [2, 3] have made efforts to adapt the existing intellectual analytical methods and develop new ones using temporal series to describe poorly structured processes and detect disorders thereof; although, regretfully, modern artificial intelligence methods are still underdeveloped in application to the physical education and sports service abnormalities detection purposes. Basically, a disorder detection approach will be designed to determine whether some

process (or local data array) falls into the normality field – and if not, rate it abnormal.

Abnormalities in data arrays are usually suspected in cases of omissions or excesses in the data groups going beyond the permissible range, whilst the disorder detection approaches should address, in addition to the above, the behavioral anomalies in the entire data range including specific disorders in the local trends. Therefore, specific detection and analyzing methods need to be selected as dictated by some of the two above provisions.

Results and discussion. We have taken for the case study a group of trainees as the multidimensional data array subject to the disorder detection method with an objective to find the most gifted individuals in the group. We opted in the case for the taxonomic method in the wide artificial intelligence application toolkit. Taxonomy may be defined as the theoretical study of the fundamentals, principles, rules and procedures of scientific classification of objects based on their similarities, relationship or other correlation criteria [1]. Numerical taxonomy in this context may be interpreted as the reliable quantitative classification/ clustering tool designed to rate correlations/ similarities of objects under consideration.

As far as the individual physical education and sports giftedness is concerned, its detection mission may be reduced to finding a specific abnormality (a peak in the test criteria in this case) versus the normal variation range of criteria in the group under study, and, hence, may be defined as the systematization of multidimensional objects by the relevant taxonomic procedures. This method will primarily find the so-called taxonomic distance i.e. the distance between points of a multidimensional data array/ space described by a range of parameters/ criteria (five in the case) characteristic of the studied object (giftedness). Having found these distances, we will locate every specific point relative to the others and thereby systematize the whole array [4]. In other words, the key principle is that the closer the parameters of two objects are, the closer they are in their features. Therefore, when we rate a degree of similarity/ difference of the parameters/ criteria, we should first find the distance between them within the relevant conditional coordinates. Using this principle, we would describe the taxonomic ordering/ systematizing of multidimensional parameters as including the following stages:

1. Define a universal criterion as the reference ratio needed to analyze the entire multidimensional object;
2. Find the distance between a specific point (study object) and the universal ratio;
3. Systematize the multidimensional points (conditional "weights" of trainees in the case) by their proximities to the reference point; and
4. Find the taxonomic progress ratio, i.e. the proximity (minimal distance) to this reference point.

Conclusion. Special selected methods and algorithms applied by artificial intelligence systems help not only successfully find disorders/ abnormalities in the data arrays – where genuine correlations of specific indicators can hardly be found by other means, particularly when the indicators refer to complex psychological, learning and/ or psychophysiological phenomenon/ process – but also effectively forecast consequences of the detected disorders.

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Priority values survey in different men's sports

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T.F. Vostroknutova[1]
PhD, Associate Professor **S.I. Vostroknutov**[1]
PhD, Associate Professor **M.G. Savelyeva**[1]
[1]Udmurt State University, Izhevsk

Corresponding author: vostroknutova.tf@mail.ru

Abstract

Objective of the study was to survey and analyze priority values specific for different men's sports.

Methods and structure of the study. We sampled for the survey three groups of athletes (n=90) representing the following men's sports: Group 1 (G1): martial artists (n=30); Group 2 (G2): cyclists (n=30); and Group 3 (G3): fitness club members (n=30). The priority values of the sample were rated by the M. Rokeach Human Values survey method [4], with the test data processed by the rank distribution analysis to obtain terminal/ goal values. To obtain significant survey data, we requested the sample to rank the presently relevant "real" values, and then the desired "ideal" values. We provisionally grouped the 18 priority values ranks into (1) priority values module: ranks 1 to 6; (2) neutral values module: ranks 7 to 12; and (3) rejected values module: ranks 13 to 18.

Results and conclusion. Our survey and analysis of the sport-specific priority values in a few men's sports give grounds for the following conclusions:

– Two types of the M. Rokeach rank distribution for "real" and "ideal" priority values were found beneficial for the individual priority values differentiation and analyzing purposes;

– The modular priority value structure in three sports groups was found virtually identical that may be interpreted as indicative of the similar social and vocational worldviews with the set of specific, private, interpersonal and activity values; and

– Rankings of the values in transition from the real to ideal ones were found to change towards the private life related values, including the adaptive ones.

Keywords: *athletes' priority values, values system, value orientations, values, terminal/ goal values.*

Background. Modern societies give a growing priority to values viewed as a kind of integrator with the fundamental function of a consolidation factor – since the common values accepted by a social majority heavily contribute to the communal integrity and stability; and this holds true for the ongoing social structuring process in Russia.

In the psychological domain, priority values appear directly correlated with volitional processes, with a special role played by their regulatory function in the needs, goals and motivations formation process. priority values determine the individual actions and behaviors and the worldviews on the whole, which is particularly relevant nowadays. Priority values also shape up the individual practical attitudes to reality including conscious positioning in the interpersonal relations, social environments and self-esteem domain [2].

Objective of the study was to survey and analyze priority values specific for different men's sports.

Methods and structure of the study. We sampled for the survey three groups of athletes (n=90) representing the following men's sports: Group 1 (G1): martial artists (n=30); Group 2 (G2): cyclists (n=30); and Group 3 (G3): fitness club members (n=30). The priority values of the sample were rated by the M. Rokeach Human Values survey method [4], with the test data processed by the rank distribution analysis to obtain terminal/ goal values. To obtain meaning-

ful survey data, we requested the sample to rank the presently relevant “real” values, and then the desired "ideal" values. We provisionally grouped the 18 priority values ranks into (1) priority values module: ranks 1 to 6; (2) neutral values module: ranks 7 to 12; and (3) rejected values module: ranks 13 to 18.

Results and discussion. The study found the following priority values in every sports group: interesting job, happy family life, and health; and the following rejected values: entertainment, beauty of nature and arts, other people’s happiness, and creativity.

Further priority values analysis found the following intergroup differences. Martial artists of G1 complemented the above priority values by public recognition – that was ranked among the rejected values by G2 and G3. Cycling G2 was found to rank self-confidence on top of the priority values set; whilst G3 preferred freedom and active life (ranked among neutral and rejected values by the other two groups). Note that the intergroup differences were rated statistically significant ($p<0.05$) by the Mann-Whitney U-test.

Furthermore, the priority values were grouped into the following eight modules: (1) Specific values: health, happy family life, friends, financial security; (2) Abstract values: progress, creativity, freedom, cognition; (3) Personal: entertainment, friends, health, love, happy family life; (4) Professional success: interesting job, cognition, creativity, productive life, active life; (5) Interpersonal (IP): happiness of other people, public recognition, friends, family life; (6) Individual values: financial security, freedom, active life, health, entertainment, creativity; (7) Active values: freedom, active life, productive life, interesting job; and (8) Passive values: self-confidence, cognition, common wisdom, and beauty of nature and arts.

The survey data classified by the above 8 priority values modules were used to make the sport-specific psychological profiles. Table hereunder gives the average modular priority values ranks for the sports groups.

The above data give grounds for the following general conclusions on the sport-specific real priority values (with the intergroup differences tested meaningful at $p<0.05$): (1) The priority values structure (distribution of the modular priority values by ranks in every group) was found virtually identical for the three groups; (2) The sample was found to prioritize the specific values, personal life values, interpersonal relations values and active values; (3) The groups differed in the analysis of three priority value modules in the following aspects: G1 prioritized the interpersonal values; G2 passive values; and G3 active values. These results can unlikely be interpreted unambiguously, albeit the priority value ranks in the groups definitely tend to be sports-specific, i.e. dictated by the sports standards.

Next stage of the study was designed to rank the ‘ideal’ terminal values to analyze, among other things, the empirical differences between the "real" and "ideal” values sets [3].

The transition from the “real” to "ideal" values was associated with the following changes: G1 showed a drop (devaluation of subjective significance) of the public recognition from 8.3 to 10.4 in the average ranking; and growth of financial security from 9.0 to 7.3. G2 showed drops in value of interesting job from 8.4 to 10.2 in the average ranking, and cognition from 9.0 to 10.4; with a simultaneous growth of the financially security from 9.4 to 7.3. And G3 was tested with a growth of the financial security rank from 9.9 to 5.8 and drops in friendship (7.8 to 9.5) and freedom (8.5 to 10.2) rankings. On the whole, the "ideal" values system of the three groups showed a higher contribution of the financial security versus the “real” values set.

Table 1. Sport-specific modular priority values with the average group ranks: real values

Module	G1	Rank	G2	Rank	G3	Rank
1	Specific	4,0	Specific	5,5	Specific	5,3
2	Personal	5,4	Active	6,0	Personal	6,6
3	Interpersonal	7,5	Personal	6,8	Passive	7,6
4	Active	9,5	Professional success	8,4	Interpersonal	10,3
5	Individual	10,0	Interpersonal	9,3	Individual	10,4
6	Professional success	10,0	Abstract	9,5	Active	10,5
7	Passive	11,6	Individual	10,0	Professional success	10,9
8	Abstract	12	Passive	11,8	Abstract	11,3

Therefore the focused psychological tests found the sample giving preference to a financially secure life, happy family and love. Of special interest was the finding that the "ideal" values set of the athletic sample was free of the professional values as such being apparently driven by the job-related motivations only with exclusively functional aspects lacking the vocational ones.

Conclusion. Our survey and analysis of the sport-specific priority values in a few men's sports give grounds for the following conclusions:

– Two types of the M. Rokeach rank distribution for “real” and “ideal” priority values were found beneficial for the individual priority values differentiation and analyzing purposes;

– The modular priority value structure in three sports groups was found virtually identical that may be interpreted as indicative of the similar social and vocational worldviews with the set of specific, private, interpersonal and activity values; and

– Rankings of the values in transition from the real to ideal ones were found to change towards the private life related values, including the adaptive ones.

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Teenage martial arts groups: trainer's locus of control versus trainees self-control tests and analyses

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PhD, Associate Professor **A.R. Kirpikov**[1]
Dr. Sc. Psych., Professor **A.A. Baranov**[1]
Dr. Hab., Professor **N.Y. Erofeeva**[1]
[1]Udmurt State University, Izhevsk

Corresponding author: kirpi@udm.ru

Abstract

Objective of the study was to rate and analyze effects of the trainer's locus of control on the trainees' behavioral self-control and personality progress.

Methods and structure of the study. We sampled for the study two coaches with the polar (external and internal) locus of control, plus their teenage trainees having 2-3-year training and competitive experiences under their management (n=20). The trainees' and trainers' self-control were tested by the V.I. Morosanova Behavioral Self-control Style test (BSCS) and the locus of control in the interpersonal and business relations and personal problem solving was rated by the A.K. Osnitsky locus of control test.

Conclusion. We found the trainer locus of control largely influential on the trainees' one; whilst the BSCS of the young athletes are likely to be sport-specific and dictated by the individual motivations. It should be emphasized, however, that the trainees of trainer with the internal locus of control tend to mimic his attitudes in solving business problems; whilst the trainees of trainer with external locus of control tend to rely on external control in solving their business problems.

A trainer's locus of control was found to influence some aspects of the trainees' self-control. Thus the group of trainer with internal locus of control was tested with better action programming qualities and more independent in the activity planning, behavioral control, goal attainment, progress rating, and interim/ final result rating domains. The group of trainers with external locus of control was tested with a better planning ability, individual goal setting and progress management skills.

Keywords: *trainer's activity, locus of control, self-control, personality of teenage martial artist.*

Background. Trainer's personality is commonly known to largely determine his/ her professional successes, with the efficient and respected trainers often providing a role model for the teenage trainees in many sports. The trainer's appealing personality, responsible behavior, healthy lifestyle and attitudes to other people and sport often facilitate the trainees' progress in socializing and athletic growth domains and personality development agenda [1, 4]. Teamwork in sports groups is potentially beneficial for a teenage personality progress, lifestyle and self-control. Self-control may be defined as the individual ability to plan own performance in the context of the individual progress mission and goals, with good self-control known to be pivotal for the performance assessment and correction purposes and contributing to the individual determination and success [2, 3].

Modern psychology interprets the locus of control as the individual's perception about the underlying main causes of events in life [3]. The trainer's locus of control vector would largely contribute to the trainees' personality progress in a direct correlation with the latter's self-control. This is particularly true for the teenage athletes with their age-specific growth imbalances and natural focuses on the reference group values with the trainer's role model. The trainer, depending on his/ her own locus of control, is highly influential on the teenage trainee's personality formation and self-control building process.

Objective of the study was to rate and analyze effects of the trainer's locus of control on the trainees' behavioral self-control and personality progress.

Methods and structure of the study. We sampled for the study two coaches with the polar (external and internal) locus of control (see Table 1), plus their teenage trainees having 2-3-year training and competitive experiences under their management (n=20). The trainees' and trainers' self-control were tested by the V.I. Morosanova Behavioral Self-control Style (BSCS) test [2]; and the locus of control in the interpersonal and business relations and personal problem solving was rated by the A.K. Osnitsky locus of control test [3].

Table 1. Service data of the trainers

	Age	Service record	Trainees served	Average age of trainees	Active competitors
A	25	5	57	12	8
B	25	5	61	12	13

Results and discussion. The primary locus of control test data rated trainer A and B with internal and external locus of control, respectively. Given in Tables 2 and 3 are the trainees' Behavioral Self-control Style (BSCS) and locus of control test data.

The above test data show the trainees largely mimicking trainer A in the BSCS and locus of control domains. They also tend to manage their lives as required by the own plans being determined to mobilize their internal resources. The test data show the trainees being largely governed by the role model of their trainer.

The above test data also show the trainees largely mimicking trainer B (external locus of control) in the Behavioral Self-control Style and locus of control domains. They replicate him in the focus on external goals, being realistic in own resource rating, and demonstrating a focus on the business domain with a strive for independence.

We used the Fischer F-test to find the statistically significant intergroup differences in the trainees' Behavioral Self-control Style and locus of control test data versus the trainer's locus of control. On the whole, we found no statistically significant differences in the general self-control test. The teenagers' general self-control is likely to be sport-specific and dictated by the individual motivations. It should be noted, however, that the trainer A (internal locus of control) group is statistically significantly different from the trainer B group in the planning skills test ($p<0.05$) and personal problems solving skills test ($p<0.01$). The trainees of trainer B (external locus of control) were tested significantly different in the result rating ($p<0.05$), independence ($p<0.05$) and business solutions ($p<0.01$) tests.

Conclusion. We found the trainer locus of control largely influential on the trainees' one; whilst the Behavioral Self-control Style of the young athletes are likely to be sport-specific and dictated by the individual motivations. It should be emphasized,

Table 2. Trainees' Behavioral Self-control Style and locus of control test data: trainer A (internal locus of control) group

Group	BSCS test							Locus of control test		
	Planning	Result rating	Modeling	Flexibility	Programming	Independence	General self-control	Business solutions	HR solutions	Personal problem solving
Mean	6,28	6	5,71	5,85	6	4,28	29,28	11,71	8,71	5,14
б	1,39	1,1	1,28	1,4	1,31	1,28	1,7	3,8	6,8	9,22

Table 2. Trainees' Behavioral Self-control Style and locus of control test data: trainer A (internal locus of control) group

Group	BSCS test							Locus of control test		
	Planning	Result rating	Modeling	Flexibility	Programming	Independence	General self-control	Business solutions	HR solutions	Personal problem solving
Mean	6,14	4,71	4,57	6,57	5,42	4,84	26,57	3,28	1,57	3,28
б	0,64	1,5	1,4	1,3	1,92	1,9	1,9	5,00	7,65	3,33

however, that the trainees of trainer with the internal locus of control tend to mimic his attitudes in solving business problems; whilst the trainees of trainer with external locus of control tend to rely on external control in solving their business problems.

A trainer's locus of control was found to influence some aspects of the trainees' self-control. Thus the group of trainer with internal locus of control was tested with better action programming qualities and more independent in the activity planning, behavioral control, goal attainment, progress rating, and interim/ final result rating domains. The group of trainers with external locus of control was tested with a better planning ability, individual goal setting and progress management skills.

Furthermore, the trainees' orientation on the trainer's locus of control is specific in the following aspects. Trainees of trainer A (internal locus of control) were tested more focused on themselves, own personality progress agendas, not always prepared to act now, and this is the reason for their shortage of real accomplishments at present. For example, they are less determined to compete and less successful in competitions than their peers in the trainer B group. The trainer B (external locus of control) group was tested more focused on specific goals, more realistic and conservative in the own progress rating domain. Therefore, an ideal trainer should be well balanced in combining the external (beneficial at present) and internal (beneficial in the future) locus of control to help the trainees explore and mobilize the personal assets and resources to clearly visualize and implement their personal progress agendas.

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Mental health protecting recreational physical education model for 40-50-plus year-olds

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PhD **R.K. Makhmutova**[1]
Dr.Sc.Psych., Professor **A.A. Baranov**[1]
PhD, Associate Professor **A.E. Prichinin**[1]
[1]Udmurt State University, Izhevsk

Corresponding author: marokach@mail.ru

Abstract

Objective of the study was to analyze benefits of a new mental health protecting recreational physical education model for the 40-50-plus year-olds.

Methods and structure of the study. We sampled for study the 43-52 year-olds (n=87) and split them up into Experimental Group (20 men and 24 women) reporting habitual (at least three times a week) fitness trainings; plus non-sporting Reference Group of 22 men and 21 women. We used the following tests: Mini-Mult Psychological Test adapted by F.B. Berezin and M.P. Miroshnikov; Physical Activity Rating Test; and the L.I. Wasserman Anxiety Test; plus a standard statistical data processing toolkit.

Results and conclusion. The new mental health protecting recreational physical education model for the 40-50-plus year-olds analyzed gives a special priority to the socializing factors among the mental health protection tools – to complement the predominant studies of the age group's physical health and mental health risk factors. The recreational mental-health-improvement model for adults was found beneficial. We would recommend the study data and analyses being taken into account by the studies geared to motivate different age groups, including the mature and older ones, for physical development and sporting lifestyles in the social contexts that encourage every individual physical education and sports agenda.

Keywords: *recreational physical education, mature age, mental wellbeing, mental health, physical activity, stress tolerance, mental health risks.*

Background. The progress trends in the modern human communities are associated with multiple serious risks for sustainable development including: the growing information flows; mounting pressures from the modern urban lifestyles; growing technological and environmental stresses; volatile and unpredictable professional and social progress patterns; growing demand for the individual mental adaptability to the explosive difficulties of the information/ technological environments; need for multiple re-adaptations to rapidly changing reality; mounting living problems and contradictions for the modern communities, etc. These and many other factors heavily contribute to the mental/ emotional stressors to result in physical fatigue, falling labor efficiency and living activity, with inevitable risks for the physical and mental health [1, 3] commonly viewed as the most important prerequisites for a high quality of life and productive individual, corporate and social activity [2].

Physical activity is traditionally ranked among the most accessible and controllable resources for the efforts to mitigate mental health risks and increase individual stress tolerance. Many foreign studies demonstrate direct correlations between physical activity and mental health, with reasonable physical activity proved to improve mood, self-esteem, cognitive functions and quality of living and prevent/ mitigate depression [4-6]. The ongoing cohort studies have showed benefits of reasonable habitual physical education and sports for mental health. The WHO defines mental health as the individual wellbeing making it possible to mobilize own resource for coping with the everyday stressors to work and live

a productive, happy and efficient life [2]. Most of the national studies of the adult people's mental health and functionality prioritize analyses of the mental health risks and stressors within the relevant social environments to identify the key mental health protection factors and offer mental health improvement initiatives.

Objective of the study was to analyze benefits of a new mental health protecting recreational physical education model for the 40-50-plus year-olds.

Methods and structure of the study. We sampled for study the 43-52 year-olds (n=87) and split them up into Experimental Group (EG, 20 men and 24 women) reporting habitual (at least three times a week) fitness trainings; plus non-sporting Reference Group (RG) of 22 men and 21 women. We used the following tests: Mini-Mult Psychological Test (MMPT) adapted by F.B. Berezin and M.P. Miroshnikov; Physical Activity Rating (PAR) Test; and the L.I. Wasserman Anxiety Test; plus a standard statistical data processing toolkit.

Results and discussion. The EG anxiety tests found domination of moderate anxiety rates; versus the RG tested with a higher emotional stress tolerance. The emotionally volatile subgroup in the EG (with high anxiety, stress intolerance, irritability) was found dominated by women who apparently appreciate the gym trainings for their metabolism activation, cardiovascular system functionality conditioning, body shaping, muscle training and other benefits.

Most of the sample was tested with moderate hypochondria, with their proportion in the EG found lower – that may be due to the benefits of habitual fitness practices. The individualized physical trainings in comfortable gyms apparently help rehab mental balancing qualities and skills with the energy boosting effects. Furthermore, most of the sample reported moderate depression levels, with only a few women in the EG reporting a high depression, with the habitual physical practices apparently helping them keep up the individual mental controls to better cope with the emotional volatility and human relations issues.

On the Pd scale the sample was tested with mostly moderate hostility rates, with a particularly low aggression and conflict exposure in an EG women's subgroup, whilst the low-aggressive men were seldom in both groups. We found the habitual muscle tension-relaxation exercises in the EG definitely beneficial for the emotional stress tolerance. The Ra tests found more individuals prone to high aggressiveness and vindictiveness in the RG. Tables 1 and 2 hereunder give the statistically meaningful intergroup differences in the mental health test data.

Table 1. Statistically significant differences in the mental health test data: women's subgroups

Mental health issues	Women's mental health test averages		U	p
	EG	RG		
Hypochondria	47,30	54,60	64,500	0,044
Hysteria	47,45	56,27	70,000	0,046
Psychasthenicity	45,26	54,72	67,000	0,058

The RG women were tested more prone to passive submissiveness, low adaptability, low responsibility, high anxiety and indecision. We believe that the active recreation model of the EG with simplest accessible physical activity facilitates the women's efforts to improve mental health, with special benefits from socializing aspects of the practical health activity.

The EG men were tested statistically significantly better on the psychopathicity and schizoidness rating scales and higher versus the RG peers on the mood stability, adaptability and emotional tolerance scales, with the qualities and skills particularly beneficial for the interpersonal relations. Their recreational agendas were found determined by the body shaping (somatotype-sensitive), activation, mental health and healthy lifestyle awareness, plus the mental health improvement motivations.

Table 2. Statistically significant differences in the mental health test data: men's subgroups

Mental health issues	Men's mental health test averages		U	p
	EG	RG		
Psychopathy	47,36	53,04	68,000	0,046
Schizoid	49,60	54,25	63,500	0,051

Definite interpretations of the mental health test data and benefits of the physical activity on the gender- and age-specific mental health issues are not always possible due to the deficient initial health test data (prior to the habitual physical education practices). However, reductions in the sitting behavior and progress in physical activity with moderate trainings of the cardiovascular system secured by the recreational physical education service are undoubtedly beneficial for the physical health and

mental health standards and individual physical performances.

Conclusion. The new mental health protecting recreational physical education model for the 40-50-plus year-olds analyzed gives a special priority to the socializing factors among the mental health protection tools – to complement the predominant studies of the age group's physical health and mental health risk factors. The recreational mental-health-improvement model for adults was found beneficial. We would recommend the study data and analyses being taken into account by the studies geared to motivate different age groups, including the mature and older ones, for physical development and sporting lifestyles in the social contexts that encourage every individual physical education and sports agenda.

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Musculoskeletal system disorders and dysfunctions in academic physical education service: mathematical model for kinesiological correction and progress forecast

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Dr.Hab., Professor **L.I. Lubysheva**[1]
PhD, Associate Professor **T.V. Koltoshova**[2]
[1]Russian State University of Physical Culture, Sports, Youth and Tourism (GTSOLIFK), Moscow
[2]Omsk State Technical University, Omsk

Corresponding author: fizkult@teoriya.ru

Abstract

Objective of the study was to offer a mathematical model for the students' musculoskeletal disorders correction service complementary to the physical education process.

Methods and structure of the study. Our study was designed to rate severity of the musculoskeletal disorders and dysfunctions in the context of the controllable education service factors – both exogenous and endogenous. The endogenous factors were assumed as controllable by the physical education / training system management with prudent timing and intensity of the training process, and efficient training and rehabilitation tools; and the endogenous ones controllable by the customizable kinesiological methods to effectively mitigate the dorsal disorders and pains. We used the test data correlation analysis to select arguments for a mathematical model for the dorsal discomfort and pains correction service forecast.

We sampled for the mathematical model testing experiment the 1-2-year students (n=300) of Omsk State Technical University majoring in physical education and sports and complaining about dorsal/ spinal discomfort and pains. The sample included 270 sporting students trained in the elective basketball, volleyball, powerlifting and swimming groups (n=60 each), plus a special health group (SHG, n=60).

Results and conclusion. The new mathematical model for the students' musculoskeletal disorders / dorsal discomfort and pains correction applicable in the physical education process makes it possible to complement the physical education curricula with customizable elective-sport-specific kinesiological methods. The progress test data generated by the mathematical model provides a basis for the individual musculoskeletal disorders / dorsal discomfort and pains correction forecasts to attain progress in the key controlled factors (X1 - X11), for effective mitigation of the symptoms. The mathematical model testing experiment showed the following progress variation zones in the sample: 61-70% (low); 71-75% (moderate); and 76-78% (high).

Keywords: *students, musculoskeletal disorder, dysfunction, dorsal discomfort and pains, mathematical forecast, physical education.*

Background. Presently the national health statistics rank musculoskeletal disorders in the student population second after cardiovascular pathologies due to many factors dominated by the innate musculoskeletal malformations and underdevelopments plus inefficiencies in the physical education service applied for the musculoskeletal disorder correction purposes [3, 11]. Analyses of the relevant research literature demonstrate growth in the student population complaining dorsal and spinal discomforts and pains. These health issues are clearly due to the academic education service with its mental/ emotional stressors and physical inactivity with the traditional sitting in classes in fixed postures – particularly stressful for the shoulder girdle muscles and spine. These and other aspects may be ranked among the educational health risk factors of special potential negative effects on the musculoskeletal system associated with the dorsal and spinal discomforts and pains [5, 7]. It should be mentioned that sporting young population is more exposed to the above health risks due to their musculoskeletal systems being under "double pressure" from both the academic classes and athletic training systems [6, 8].

Health disorders with the above symptoms are normally corrected by a set of traditional clinical physical therapy methods including massage, manual therapy, physiotherapy, acupuncture, etc. [2, 4], although these services are not always accessible and affordable for the sporting and unsporting students due to time limitations, financial constraints, etc. This is the key reason why the academic communities report a growing demand for do-it-yourself musculoskeletal disorders correction and health improvement methods as complementary to a reasonable physical activity for good health, quality of life and healthy lifestyle to counter the academic education related health risks. Presently a special priority in this context is given to the behavioral control approach geared to reduce the students' exposure to the health risks on the whole and musculoskeletal disorders / dorsal discomfort and pains risks in particular. Ideally such approaches should include individual kinesiological toolkits applicable as complementary to the academic education and athletic training processes.

Objective of the study was to offer a mathematical model for the students' musculoskeletal disorders correction service complementary to the physical education process.

Methods and structure of the study. Healthy lifestyles in the student communities will be encouraged by the pedagogical positions (role models) of the faculties with the progress facilitating provisions (institutional, logistical, moral and humanistic), and with a special contribution of modern kinesiological methods in the regular and self-reliant extracurricular theoretical and practical physical education / health activity.

Of special promise in the above health policies and practices are modern mathematical models applicable to diagnose and rate dorsal disorders and pains in student groups, with a special attention to the sporting ones [1, 9, 10]. Our study was designed to rate severity of the musculoskeletal disorders and dysfunctions in the context of the controllable education service factors – both exogenous and endogenous. The endogenous factors were assumed as controllable by the physical education / training system management with prudent timing and intensity of the training process, and efficient training and rehabilitation tools; and the endogenous ones controllable by the customizable kinesiological methods to effectively mitigate the dorsal disorders and pains. We used the test data correlation analysis to select arguments for a mathematical model for the dorsal discomfort and pains correction service forecast.

We sampled for the mathematical model testing experiment the 1-2-year students (n=300) of Omsk State Technical University majoring in physical education and sports and complaining about dorsal/ spinal discomfort and pains. The sample included 270 sporting students trained in the elective basketball, volleyball, powerlifting and swimming groups (n=60 each), plus a special health group (SHG, n=60).

Results and discussion. Given in Table 1 hereunder are the controllable factors (X1-X11).

A mathematical analysis to find the key controllable factors for the pain ranking index calculation gave us the means to produce a set of the following sport-specific progress forecast equations for the basketball, volleyball, swimming and powerlifting groups and SHG (Table 2):

Basketball: $y = 79,951 – 9,398 \cdot F_1 – 2,532 \cdot F_2$;

Volleyball: $y = 87, 535 – 7,074 \cdot F_1$;

Swimming: $y = 51,153 – 6,953 \cdot F_1$;

Powerlifting: $y = 34,682 – 5,738 \cdot F_1 + 2,325 \cdot F_3$,

and Special Health Group: $y = 58,039 – 4,016 \cdot F_1$,

Table 1. Controllable test rates

Anthropometric characteristics, functionality and physical fitness test rates	Weights
Body mass index, BMI	X_1
Deadlift strength, DS	X_2
Static endurance of the dorsal muscles, SEDM	X_3
Static endurance of the abs, SEA	X_4
Mobility of the cervical spine, MCS	X_5
Mobility of the lumbar spine, MLS	X_6
Standing long jump, SLJ	X_7
Pull-ups, PU	X_8
100m sprint, 100S	X_9
2000m race, 2000R	X_{10}
12-min walk/ run Cooper test, CT	X_{11}

Table 2. Controllable musculoskeletal disorders correction factors

Test rates	Weight	Basketball			Volleyball		Swimming			Powerlifting				SHG	
		F_1	F_2	F_3	F_1	F_2	F_1	F_2	F_3	F_1	F_2	F_3	F_4	F_1	F_2
BMI	X_1	-	0,683	-		0,748	-	-	0,906		0,805				-0,612
DS	X_2	0,829	-	-	0,668	-	0,717	-	-			0,892		0,543	-
SEDM	X_3	0,741	-	-	0,917	-	0,747	-	-	0,843	-	-	-	0,884	-
SEA	X_4	-	0,688	-	0,926	-	0,890	-	-	0,844	-	-	-	0,877	-
MCS	X_5	0,760	-	-	0,828	-	0,752	-	-	-	0,782	-	-		0,685
MLS	X_6	-	-	0,901	-0,943	-	-0,899	-	-		-0,707	-	-		-0,637
SLJ		-	0,776	-	-	0,690	-	0,833		0,810	-	-	-	0,820	-
PU	X_8	-	0,838	-	0,725	-	0,666	-	-	-	-	0,762	-	0,716	-
100S	X_9	0,758	-	-	-0,808	-	-	-	0,678	-	-		0,876		
2000R	X_{10}	-	-	-0,652	-0,669	-	-	0,630	-	-	-	-	0,645	-	-
CT	X_{11}	-	-	-	-	-	-	-	-	-	-	-	-	-	0,707
Variation %		32,9	25,7	16,3	57,14	12,46	48,19	17,40	12,16	33,96	19,77	13,17	10,72	45,85	15,38
Pain ranking index, %		69,3	18,7	12	89	11	87	13	-	66,3	6,9	26,8	-	78	22
Progress forecast zone variations		74,9% medium			69,6% low		77,75% high			77,63% high				61,23% low	

Note: X_1 is the body mass index (BMI); X_2 is the deadlift strength (DS); X_3 is the static endurance of the dorsal muscles (SEDM); X_4 is the static endurance of the abs (SEA); X_5 is the mobility of the cervical spine (MCS); X_6 is the mobility of the lumbar spine (MLS); X_7 is the standing long jump (SLJ); X_8 is the pull-ups (PU); X_9 is the 100m sprint (100S); X_{10} is the 2000m race (2000R); and X_{11} is the 12-min walk/ run Cooper test (CT).

where y means the pain ranking index, and F_1, F_2, F_3 are the key controllable factors based on analysis of the key variables $X_1 – X_{11}$.

The above analysis of key controllable factors using the mathematical model method makes it possible to individualize and customize the dorsal discomfort and pains correction service in every physical education / sport group to effectively mitigate the pain ranking index using the accessible kinesiological methods to restore the muscular tones and functions, with a special role played by a prudent physical training process management service.

Conclusion. The new mathematical model for the students' musculoskeletal disorders / dorsal discomfort and pains correction applicable in the physical education process makes it possible to complement the physical education curricula with customizable elective-sport-specific kinesiological methods. The progress test data generated by the mathematical model provides a basis for the individual musculoskeletal disorders / dorsal discomfort and pains correction forecasts to attain progress in the key controlled factors (X1 - X11), for effective mitigation of the symptoms. The mathematical model testing experiment showed the following progress variation zones in the sample: 61-70% (low); 71-75% (moderate); and 76-78% (high).

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Physical activity of 7-10 year-old primary schoolchildren in northern region

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PhD, Associate Professor **Z.I. Busheva**[1]
[1]Surgut State University, Surgut

Corresponding author: zh.i.busheva@mail.ru

Abstract

Objective of the study was to profile the daily/ weekly physical activity of the northern primary schoolchildren sample.

Methods and structure of the study. We sampled for the study the 1-4-year (7-10 years old) primary schoolchildren (n=1342) qualified with the main health group from the Surgut and Nefteyugansk cities and Surgut Province in the Khanty-Mansi Autonomous Yugra area, whose daily/ weekly physical activity was rated using pedometers. The primary test data in movement numbers (locomotor units) were processed to produce empirical curves i.e. the daily/ weekly physical activity profiles. The physical activity profiles were found dependent on the individual living conditions, sports trainings and school studies. Based on the physical activity data analysis, the sample was grouped into the low, moderate, high and excessive physical activity ranks/ subgroups, with the relevant locomotor units limits.

Results and conclusion. Our study of the 7-10-year-olds' daily/ weekly physical activity profiles in the Khanty-Mansi Autonomous Yugra area found a few regularities. On the whole, the daily/ weekly physical activity rating tests are recommended for research as they give stable data, conditional on gender-unspecific daily regimen being stable enough (with scheduled sports trainings, school physical activity classes and other studies without absenteeism). The study grouped the sample into the low, moderate, high and excessive physical activity / functionality ranks/ subgroups, with every of them tested with its specific daily/ weekly physical activity profiles. Our correlation analysis found the daily/ weekly physical activity being gender-specific, with the boys groups showing significantly higher physical activity in every functionality subgroup.

Keywords: *physical activity, primary schoolchildren, Northern region.*

Background. The social policies being pursued by the Russian Federation give a special priority to the healthy lifestyle promotion and health improvement ones that imply a focused support for every popular physical activity format. Primary school age is commonly considered a highly favorable period for the physical education and sporting agenda formation in multiple physical activity formats [3]. This age offers great opportunities and motivations for everyday physical practices, outdoor games and sports, with a special role played by the national, traditional and ethnic games and competitions as the most affordable and effective physical activation and progress facilitation tools.

Objective of the study was to profile the daily/ weekly physical activity of the northern primary schoolchildren sample.

Methods and structure of the study. We sampled for the study the 1-4-year (7-10 years old) primary schoolchildren (n=1342) qualified with the main health group from the Surgut and Nefteyugansk cities and Surgut Province in the Khanty-Mansi Autonomous Yugra area, whose daily/ weekly physical activity was rated using pedometers. The primary test data in movement numbers (locomotor units, LU) were processed to produce empirical curves i.e. the daily/ weekly physical activity profiles. The physical activity profiles were found dependent on the individual living conditions, sports trainings and school studies. Based on the physical activity data analysis, the sample was grouped into the low (LPA), moderate (MPA), high (HPA) and excessive physical activity (EPA) ranks/ subgroups, with the relevant locomotor units (LU) limits.

Table 1. *Northern primary schoolchildren daily physical activity test data (M±m)*

Physical activity intensity rank	Girls	Boys	p
Low, LPA	2578,2±228,1	4656,3±274,6	<0,05
Moderate, MPA	5839,1±265,7*	8633,5±202,4•	<0,05
High, HPA	11459,1±235,2**◊	15469,6±237,5•• ♦	<0,05
Excessive, EPA	13785,4±303,1□◊◊	19956,7±323,9■♦♦	<0,05

*Note: data difference significance (p<0.05) in the girls group for: *LPA vs MPA; **LPA vs HPA; □ HPA vs EPA; ◊ MPA vs HPA; ◊◊ HPA vs EPA; and in the boys group for: •LPA vs MPA; •• LPA vs HPA; ■ LPA vs EPA; ♦ MPA vs HPA; and ♦♦ HPA vs EPA*

Table 2. *Northern primary schoolchildren weekly physical activity test data (M±m)*

Physical activity intensity rank	Girls	Boys	p
Low, LPA	18539,2±822,4	34685,4±889,5	<0,05
Moderate, MPA	41367,6±892,7*	63743,3±832,2•	<0,05
High, HPA	82256,5±956,0**◊	111238,0±903,6•• ♦	<0,05
Excessive, EPA	99372,8±963,3□◊◊	140809,4±996,9■♦♦	<0,05

*Note: data difference significance (p<0.05) in the girls group for: *LPA vs MPA; **LPA vs HPA; □ HPA vs EPA; ◊ MPA vs HPA; ◊◊ HPA vs EPA; and in the boys group for: •LPA vs MPA; •• LPA vs HPA; ■ LPA vs EPA; ♦ MPA vs HPA; anδ ♦♦ HPA vs EPA*

Results and discussion. As defined by V.K. Balsevich [1], physical activity is the "purposeful individual motor actions geared to improve some aspects of the individual physical resource and/ or master athletic/ physical education skills or values". Physical activity optimization goal is interpreted in this context as the "most favorable physicality and functionality levels that secure an adequate quality of life" [2]. The efforts to optimize the northern primary schoolchildren physical activity need to be designed, managed and customized based on the daily/ weekly physical activity testing and profiling studies. Given in Table 1 hereunder are daily physical activity test data we obtained.

Based on the physical activity tests, we classified the girls and boys groups into the physical activity intensity ranks/ subgroups. The physical activity was found gender-specific, with every boys subgroup tested with the higher daily averages (p <0.05) versus the girl peers. Daily physical activity variation in the girls group was typically low till 12.00 with a peak around 14.00 and a gradual fall thereafter till 22.00. The daily physical activity curve was flatter for the boys low physical activity subgroup; whilst the boys high and excessive physical activity subgroups were tested with the relatively high physical activity in the evenings (18.00 to 20.00) – apparently due to the sports trainings. Given in Table 2 hereunder are the primary schoolchildren weekly physical activity test data we obtained.

The average group physical activity rates were found to vary by the intensity ranks. The boys/ girls low physical activity subgroup showed a gradual fall of the locomotor units

by the mid-week (Wednesday for boys and Thursday for girls) followed by growth on weekends. Both gender groups were tested with a steady locomotor units growth on Monday to Thursday followed by a fall on Friday with a slight growth on Sunday. The high and excessive physical activity subgroups with their high locomotor units showed a gradual physical activity fall by Saturday with a slight growth on Sunday.

The study data and analysis found the low physical activity subgroup with its low weekly locomotor units activating on weekends to reach the healthy weekly physical activity total; whilst the high and excessive physical activity subgroups, on the contrary, tend to reduce the physical activity on weekends to recover from the prior high physical and mental stresses.

Conclusion. Our study of the 7-10-year-olds' daily/ weekly physical activity profiles in the Khanty-Mansi Autonomous Yugra area found a few regularities. On the whole, the daily/ weekly physical activity rating tests are recommended for research as they give stable data, conditional on gender-unspecific daily regimen being stable enough (with scheduled sports trainings, school physical activity classes and other studies without absenteeism). The study

grouped the sample into the low, moderate, high and excessive physical activity / functionality ranks/ subgroups, with every of them tested with its specific daily/ weekly physical activity profiles. Our correlation analysis found the daily/ weekly physical activity being gender-specific, with the boys groups showing significantly higher physical activity ($p<0.05$) in every functionality subgroup.

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Psychological and pedagogical support service to martial arts coaches

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PhD, Associate Professor **N.I. Khokhlova**[1]
PhD, Associate Professor **T.A. Rodermel**[1]
[1]Surgut State University, Surgut

Corresponding author: fizkult@teoriya.ru

Abstract

Objective of the study was to assess the specific nature of coaching activities in martial arts as a basis for the development of the psychological and pedagogical support program.

Methods and structure of the study. The study was conducted in two stages: 1) definition of the cognitive and emotional components of coaching activities; 2) development of the psychological and pedagogical support program for martial arts coaches. The methods applied during the study were as follows: the Buss-Perry Aggression Questionnaire; the Viability Test (adapted by D.A. Leontiev and E.I. Rasskazova); the C. Riff Psychological Well-being Rating Scale (adapted by T.D. Shevelenkova and P.P. Fesenko). The mathematical and statistical data processing was carried out using the non-parametric Mann-Whitney and Fisher tests.

The specific nature of coaching activities was assessed based on the results of the questionnaire survey of 50 martial arts coaches in kickboxing, hand-to-hand combat, MMA, etc. (21 subjects, hereinafter - Group 1) and coaches in individual sports such as swimming, ski sports, tennis, track and field athletics (29 subjects, hereinafter - Group 2). The survey was conducted in the sports institutions of Surgut, Nizhnevartovsk, Langepas both online and during immediate interaction.

Results and Conclusion. Based on the data obtained, the activities of martial arts coaches will be characterized by such aspects as communication problems, a high level of autonomy; the ability to influence others. The support service to martial arts coaches should be focused on building communication processes with athletes and colleagues, finding different ways to resolve conflict situations and increase (mainstream) their self-reflection level.

Keywords: *coaching activity, martial arts, psychological factors, goal-setting, aggression.*

Background. Modern sports require from its participants maximum physical, mental, and emotional fitness levels. This necessitates a permanent psychological and pedagogical support service to both athletes and coaches. In the field of sports, the support service shall be understood to mean a method that makes it possible to create favorable conditions for the subject to make optimal decisions in various life situations [1, 4, 5].

The psychological and pedagogical support service is based on the unity of four functions: diagnostics of the essence of the problem; identification of the ways to address the problem; development of the problem-solution process; initial assistance at the plan execution stage [2]. The purpose of psychological support in sports is to ensure the mental and psychological well-being of athletes and coaches, i.e. to create favorable conditions for the subjects' comprehensive mental development at all stages of their professional journey. «In this regard, the center link of psychological support is psychological preventive measures including: prevention of mental health disorders (reduction of anxiety and aggression among them); prediction of possible deviations in the subjects' becoming within their professional journey; increase of the coaches' resilience» [7, p. 97].

It is customary to distinguish between three types of support: permanent, phased, situational [5]. At the same time, it is particularly important to pay special attention to two coaching activity domains: needs and

motivations formation and operational and technical aspects of training (goals, task, action and operation, control).

Objective of the study was to assess the specific nature of coaching activities in martial arts as a basis for the development of the psychological and pedagogical support program.

Methods and structure of the study. The study was conducted in two stages: 1) definition of the cognitive and emotional components of coaching activities; 2) development of the psychological and pedagogical support program for martial arts coaches. The methods applied during the study were as follows: the Buss-Perry Aggression Questionnaire; the Viability Test (adapted by D.A. Leontiev and E.I. Rasskazova); the C. Riff Psychological Well-being Rating Scale (adapted by T.D. Shevelenkova and P.P. Fesenko). The mathematical and statistical data processing was carried out using the non-parametric Mann-Whitney and Fisher tests.

The specific nature of coaching activities was assessed based on the results of the questionnaire survey of 50 martial arts coaches in kickboxing, hand-to-hand combat, MMA, etc. (21 subjects, hereinafter - Group 1) and coaches in individual sports such as swimming, ski sports, tennis, track and field athletics (29 subjects, hereinafter - Group 2). The survey was conducted in the sports institutions of Surgut, Nizhnevartovsk, Langepas both online and during immediate interaction.

Results and discussion. Group 1 was made of the subjects aged 24-53 years whose coaching experience ranged from 3 to 35 years; Group 2 - of the subjects aged 23-49 years whose coaching experience ranged from 3 to 32 years. Given in the table below are the collective test results.

According to the Buss-Perry Aggression Questionnaire, aggression was more pronounced in Group 2 (45% of the respondents were found to have a high level), which differed statistically significantly from Group 1 (Fisher criterion at $p \leq 0.01$). The aggression factor is a marker of difficulties in solving communicative problems as well as in regulating own psychoemotional state.

To assess the coaches' ability to cope with stressful situations, the C. Riff Psychological Well-being Rating Scale and Viability Test were used. D.A. Leontiev believes that resilience is a generalized personal quality, which makes it possible to cope with stressful situations at an optimal level of working capacity [3]. Resilience can be seen as a professionally significant characteristic of a coach's personality, enabling to overcome professional difficulties and risks by transforming them into a development situation, while keeping up health and maintaining tolerance to emotional burnout and job satisfaction. Resilience correlates with individual well-being, which includes environmental mastery, self-acceptance, life purpose, positive relations with others, and personality progress. It should be noted that Group 1 was found to have a high level of viability and no low rates. At the same time, 30% of the group subjects had a low level of involvement, and high levels of self-control and risk taking. In Group 2, 10% of the respondents had a low level of resilience, indicating their inability to cope with stressful situations, low levels of involvement and self-control, and a high level of risk taking. It should be noted that both groups were characterized by the low levels of involvement, passivity, poor fixation on personality progress (lack of personal development, lack of interest in life), and average level of stress tolerance.

Table 1. Mean group values (in points)

Methods	Group 1	Group 2
The Buss-Perry Aggression Questionnaire		
Physical aggression scale	23.7	30.5
Anger scale	14.7	22.7
Hostility scale	13.5	25.2
The C. Riff Psychological Well-being Rating Scale		
Positive relations scale	68.2	63.7
Individual autonomy scale	71.5	63.7
Environmental mastery scale	73.7	62.4
Personality progress scale	52.7	51.9
Life purpose scale	50.4	48.3
Self-acceptance scale	57.2	59.2
The Viability Test		
Viability scale	80.2	68.6
Involvement scale	28.8	27.6
Self-control scale	36.8	23.4
Risk taking scale	18	17.5

According to the data correlation analysis, the psychological and pedagogical factors that drive coaching activities in martial arts, as opposed to those of coaches in individual sports, would be characterized by such aspects as: high degree of difficulties in building positive relations with others (46.6% of the respondents, which differed statistically significantly from Group 2 according to Fisher's criterion - $p \leq 0.05$); high level of coaches' autonomy (40% of the respondents, which differed statistically significant from Group 2 accord-

ing to Fisher's criterion - p≤0.05); pronouncement of indicators on the Environmental Mastery scale (59.4% of the respondents, which differed statistically significantly from Group 2 according to Fisher's criterion - p≤0.01). Among the common factors contributing to the activity of coaches in martial arts and individual sports were: poor fixation on personality progress (lack of personal development, lack of interest in life) - 50% and 60% in Group 1 and 2, respectively; low level of involvement - 20% and 40% in Groups 1 and 2, respectively.

Therefore, the support service to martial arts coaches should be focused on building communication processes with athletes and colleagues, as well as on finding different ways to resolve conflict situations [6]. Given the high level of autonomy of martial arts coaches, consideration should be given to the increase (mainstreaming) of their self-reflection level.

Within the framework of the psychological and pedagogical activities coaches, we designed a development course (8-10 meetings, 2 hours each) consisting of several thematic clusters. Subjects: 1) Types of martial arts. History of martial arts. Philosophy of martial arts; 2) Image of a modern coach - a mentor and a trainee; 3) Perspective planning of trainees' personal development and sports activities; 4) Psychological and pedagogical components of training activities.

In the process of course implementation, relationships with coaches are built up. At the same time they can act as experts of coaching activity and mentors to younger coaches, performing the only task – to teach others. It is important to identify the most important issues in order to discuss them further and find a solution. Then follows a long-term planning, which is important to develop a goal-setting system, first by the example of the coach's personality and his activities, and then by the example of the athlete's personality and activities. Special attention is paid to the coach's psychological portrait: analysis of his strengths and weaknesses based on the examination of archetypes in the context of psychoanalytic theory (K. Jung), creation of a real and ideal image of a coach. What is important in adjusting the ideal image are the teamwork methods (analysis of unusual situations in the training process, films, experimental research, survey of athletes), resolution of conflict situations from the perspective of different roles, for example, in the logic of a transactional analysis (E. Bern), and actualization in psychology and martial arts of the system of methods that enable to normalize coaches' emotional state in stressful situations. It is important to emphasize the participants' attention on the philosophical context of martial arts. At the end of the course, a briefing is organized and a situation analysis (video episodes filmed by each course participant) is carried out during a training session.

Conclusion. Based on the data obtained, the activities of martial arts coaches will be characterized by such aspects as: communication problems, a high level of autonomy; the ability to influence others. The support service to martial arts coaches should be focused on building communication processes with athletes and colleagues, finding different ways to resolve conflict situations and increase (mainstream) their self-reflection level.

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