Tytovych A.O., Holovchenko O.I.

FEATURES OF THE MENTAL STATES OF ATHLETES AND DANCERS AND THEIR CORRECTION TO INCREASE COMPETITIVE EFFICIENCY

SUMY-2025

UDC 796+793.3].071:796.09-027.236:159.942.5(02)
T45

Recommended for publication
by the Academic Council Sumy State Pedagogical University
named after A.S. Makarenko
(protocol No. 8 from 24 February 2025)

Reviewers:

PRYKHODKO Volodymyr Vasylovych – Doctor of Pedagogical Sciences, Professor, Head of the Department of Theory and Methods of Sports Training of the Prydniprovsk State Academy of Physical Culture and Sports;

LAZARENKO Serhii Anatoliyovych – Doctor of Pedagogical Sciences, Associate Professor, Associate Professor of the Department of Physical Education and Sports of the NNMI of Sumy State University;

ONOPRIENKO Volodymyr Petrovych – Doctor of Pedagogical Sciences, Professor of the Department of Tourism of SNAU.

ISBN 978-966-698-358-2

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T45 Features of the mental states of athletes and dancers and their correction to increase competitive efficiency: monograph. – Sumy: SSPU named after A.S. Makarenko, 2025. – 178 p.

ISBN 978-966-698-358-2

UDC 796+793.3].071:796.09-027.236:159.942.5(02)

CONTENT

FOREWORD

The monograph discusses modern approaches to the individualization of the training process based on taking into account the mental state of athletes.

On the basis of experimental research and practical experience, a theoretical analysis of the problem of the relationship between the effectiveness of sports activities and the mental state of athletes has been carried out; signs of mental states of athletes have been identified, contributing to the increase of individual indicators when performing exercises with a predominant manifestation of complex coordination, endurance and speed-strength qualities; signs of a mental state adequate to the goals and conditions of performing exercises have been identified, distinguishing specific tasks facing the athlete in the process of performing them in training; methods have been developed to assess the correspondence of the mental state that arises in an athlete before performing exercises to their specifics and specific training tasks in order to individualize his training process.

Considerable attention is paid to determining the prognostic and informative signs of the mental state of athletes, which can be used to individualize their training process and assess the success of their training activities.

It is very difficult to analyse the art of our time because we are always in a psychological field, of which dance is a part, and it is the aesthetic dominant in society. Choreography has a prominent place among the arts. Its uniqueness lies in the prediction of world perception both by thought and by the experience of this thought. Dance is a work of art created by a person. A person is an individual who is a combination of psychological and physiological factors. The combination of these factors constantly gives rise to various forms, and that is why they are called the world of art. A choreographic performance has magical

power and is a sensation and perception, an insight and a distinction, all combined into one. The psychology of a dancer's personality can explain many aspects of their work, but not the result. Physiology, on the other hand, determines the outcome of dance activity, not its aspects. Dance is inherently multifaceted. By building a system of psychological comfort, it makes it possible to compensate for negative emotions and helps transform them into positive ones. The artist's awareness of dance contributes to the development of self-awareness and self-importance.

For a wide range of teachers, specialists, teachers, scientists, graduate students, students.

LIST OF CONDITIONAL ABBREVIATIONS

BP - blood pressure;

BP diastolic - blood pressure diastolic;

SBP - blood pressure systolic;

BEP - bioelectropotentiometry;

PT - self-assessment of specific activity - desire to train;

O2/kg - oxygen consumption per 1 kg of body weight;

RC- readiness to compete;

DINopt/max - the ratio of optimal effort to the maximum at manual dynamometry;

ST – satisfaction with the course of the training process;

GDI - general developmental exercises;

GPT - general physical training;

EG - experimental group;

VCL - vital capacity of lungs;

O2P - oxygen pulse;

O2U - oxygen utilisation ratio;

Mood - self-assessment of mood;

P/kg - power per 1 kg of body weight;

CVS - cardiovascular system;

SPS - self-esteem of sports prospects;

ST - situational anxiety;

W-B - self-assessment of physical well-being;

T-Tdos - error in reproducing a given pace of movements;

T-Topt - optimal number of movements per 10 s;

T-Topt/max - the ratio of the optimal number of movements to the maximum;

MVB - minute volume of breathing;

HR - heart rate.

ENTRY

Choreographic activity makes performers want to improve and refine their abilities, technique and sense of rhythm. The desired skills and abilities are in the area of immediate development, the main motive of which is to gain recognition from others, including the audience, and to improve oneself. Possession of the "dance vocabulary", plasticity and specific movements that help to embody and convey an artistic image, reflect the nature of a choreographic performance are the conditions for successful performance of dance activities, which is the main part of the operational-cognitive component (reflection, a complex mental process of reflecting the subject's own forms of mental activity): awareness of mental activity and its results, evaluation and control.

Thus, the mystery of choreographic art is a transcendental problem, i.e. one that connects choreography on the one hand and psychology and physiology on the other. These components cannot solve this problem separately from each other.

CHAPTER 1
CURRENT CONCEPTS OF MENTAL STATE AND ITS INFLUENCE ON THE PERFORMANCE OF SPORTS ACTIVITIES OF ATHLETES

1.1. The role of mental state in human activity

The main task of professional training in any type of human activity, including sports, is to form a mental state of readiness for the acquisition of knowledge, skills and abilities. This is especially important in intense types of activity. It is essential that a person's success in such types of activity is possible only when the subject achieves the optimal level of professionally important mental states. Moreover, these states must be experienced by a person and be realized and assessed by him as relevant (or necessary) in a given period of time.

Moreover, both in the professional activities of specialists and in sports activities, the least studied question remains: what is the positive result of the influence of the mental state of the subject as a factor in his psychological sphere? To answer this question, it is necessary to retrospectively consider the emergence of the doctrine of human mental states and the awareness of their role in his activity.

It turns out that the more significant the activity is for a person in biological or social terms, the more the role of his mental state is manifested. So, back in the 60s of the last century, the role of a person's mental state and its influence on activity was shown. That is why, in order to increase the reliability and effectiveness of significant activity for a person, it is necessary to take care of optimizing its pre-working and working state. That is why solving the problem of mental states that prevent activity and accompany it is of great practical importance in the psychology and practice of sports.

Control and management of the mental state of a person as a subject of activity is a necessary condition for solving practical problems of increasing the efficiency of activity.

It is the needs of practice that have determined that the problem of mental states has received the greatest development in applied research.

According to the dialectical-materialist understanding of determinism in psychology, external influences cause one or another psychological effect not directly and indirectly, but through the mediation of internal conditions. The most important component of these internal conditions is the mental state of the subject, which characterizes it at a given time and leaves a certain imprint on the course of mental processes [26; 45; 87]. Starting from the 60s of the last century, the problem of mental states began to be addressed in various applied research in psychology.

Analysis of the mental state from a physiological point of view convinces that it is a process that occurs at a certain level of excitation or inhibition, or it is a mosaic - within one of the analyzer systems or the cerebral cortex as a whole (diffuse inhibition - sleep, diffuse excitation - wakefulness, etc.). The physiological basis of mental states are the functional levels (phase states) of the cerebral cortex. By the nature of their occurrence, mental states can be conditioned reflex and unconditional reflex. They are formed in certain circumstances (under the influence of environmental stimuli) or under the influence of internal states of the organism [16; 23; 33].

The physiological mechanisms of mental states are adequately explained by the doctrine of O. O. Ukhtomsky (2006) about the dominant. The dominant "holds" the process at a certain level, regulates the energy coming from stimuli. For example, attention as a mental state O. O. Ukhtomsky explained the action of the dominant. When attention takes place, clear perception, productive thinking and

productive activity take place. Arising on the basis of past influences reflected in the brain, dominants regulate human behavior in the present.The dominant is a temporary mechanism of brain activity, it leaves a trace and can be reproduced again under the influence of an adequate stimulus.

The idea of the nervous mechanism of pre-work states was formulated by M. I. Vinogradov (1966) in the term "pre-emptive innervation", that is, the innervation of muscle activity, which reflects the characteristic features of future actual work and precedes it. Since pre-emptive innervation is a physiological expression of readiness for action, it most closely corresponds to the idea of O. O. Ukhtomsky about "operative calm" - the dominant attitude of the organism that arises due to external irritation in preparation for future work.

The term O. O. Ukhtomsky "operational calm" is close, on the one hand, to the terms "anticipatory reflection" and "action acceptor" of P. K. Anokhin (1980) and, on the other hand, to the concept of "attitude" of D. N. Uznadze (1966). In all cases, we are talking about a certain inclination of the organism to a future specific activity, about the readiness of a person to act in a certain way [2; 3; 11; 31; 76].

One of the most developed areas in general psychology related to the doctrine of pre-activity mental states of a person is the theory of attitude of D. N. Uznadze. Defining the concept of attitude, D. N. Uznadze writes: "In the case of the presence of a need and a situation of its satisfaction, a specific state arises in the subject, which can be characterized as a direction, as his readiness to perform an act that can satisfy this need" (according to D. N. Uznadze). So, attitude is a state of readiness to satisfy this need in a certain way. Special experiments allowed D. N. Uznadze to conclude that the attitude as a readiness aimed at a certain activity is a feature of the activity of a "whole personality". The attitude, according to D. N. Uznadze, characterizes the state of the personality, which cannot be deduced from "personal" concepts of mental processes,

as well as from the personal characteristics of the activity of the peripheral parts of individual analyzers. Based on the concept that the necessary conditions for the manifestation of the attitude are the needs of a person and the situation that has arisen, D. N. Uznadze defined the attitude as a readiness for a certain activity, which depends on the presence of a need and the objective situation of its satisfaction [1; 32; 37; 56].

The attitude prepares and regulates behavior, activates some actions and inhibits others. The attitude regulates both perception and action. Therefore, the attitude becomes the basis of readiness for activity in appropriate conditions and in a certain direction.

Using the principles of a systemic approach to the description of human mental states, V. A. Ganzen and V. I. Yurchenko note that the mental state is a complex, holistic, multifunctional and polystructured phenomenon. They have identified a hierarchical substructure formed by the characteristics of each of the four main levels of organization of the state: physiological, psychophysiological, psychological and socio-psychological.

Physiological level - neurophysiological characteristics, morphological and biochemical changes, shifts in physiological functions. Psychophysiological level - vegetative reactions, changes in psychomotor, sensory. Psychological level - change in mental functions and moods. Socio-psychological level - behavior, activity and relationships [9 ; 28; 30; 49].

Determining the hierarchical substructure of the mental state seems to us important not only in theoretical terms, but also in methodological terms, as it emphasizes the need for a versatile comprehensive approach to the study of this phenomenon.

Mental states are very different and therefore it is extremely difficult to classify them. The first attempt at a general classification of mental states was presented by N. D. Levitov (1994). First of all, by analogy with the division of mental processes, he distinguishes

states depending on which mental functions prevail: cognitive, volitional or emotional.

The first group includes states of curiosity, inquisitiveness, interest, surprise, amazement, astonishment, inattention, boredom, doubt, dreaminess.

The second group includes states of volitional activity or, conversely, passivity, determination-indecision, confidence-insecurity, restraint-incontinence. N. D. Levitov also includes the state of struggle of motives, which he calls a typical complex mental state [38; 42; 56; 67; 83].

The third group includes moods, drives, passions. In addition to this division, N. D. Levitov proposes to classify mental states according to a number of other characteristics:

1) personal and situational: in the first, individual characteristics of a person are mostly expressed, in the second, the characteristics of the situation are decisive;
2) deep and superficial states, depending on the intensity of their impact on a person's experiences and behavior;
3) positive and negative states: in the first case - increasing vital activity, in the second - reducing his vital activity;
4) by duration - long-term and short-term states, from several days to several minutes;
5) states are more and less conscious.

The classification of mental states by Yu. E. Sosnovikova (1975) is very interesting. As the basis for identifying the principles of classification of mental states, the principles of time, space, structure and function are proposed as the most significant in studying the essence of phenomena [51; 57; 73].

Mental states of a person can be classified according to the age principle, which characterizes their leading activity, according to the types of work in which these states arise, according to the principle of significance and the greatest expression in them of essential

personal properties of a person. Mental states differ in the degree of their intensity, in strength, in the reasons that cause them. Any sign of a mental state can be the basis for one or another of their classifications. It all depends on what tasks the researcher sets himself, we are interested, first of all, in the influence of the state on the effectiveness of sports activities.

There is a dialectical relationship between activity and state: the conditions and significance of activity determine the features of the state, which in turn affect the success of the activity. Therefore, the problem of the relationship between activity and state occupies a prominent place in the works of both a general psychological plan (Sagova Z.A., Dontsov D.A., 2018), and in psychological research of an applied nature, focused on the needs of military, labor or sports activities (Sergienko L.P., 2010). Especially sports activities impose objective requirements on nervous loads, reaction speed, maintaining a high level of attention and psychological stability of athletes (Prusik K., 2011). This is one system of requirements. The other is due to the psychophysiological, mental and personal states of athletes at the moment (for example, after competitions - a state of fatigue, even injuries or activity of increased mood). Regulation of activity by the subject consists in coordinating the requirements of both systems. This coordination leads to increased performance, and the need for it arises because, for example, although the genesis of changes in the mental state of an athlete before competitions is based on adaptive reactions of the body to the exercises performed by him, these changes themselves are not always favorable. In other words, the pre-work mental state can be optimal, that is, one that maximally contributes to achieving success in competitions, but it can also be different, inadequate to the conditions and requirements imposed on it (for example, the effect of unusual climatic conditions on it). The study of the relationship between the mental state and the effectiveness of activity was carried out by E. P. Ilyin (1968) in his

doctoral dissertation "Optimal characteristics of human performance" [24; 50; 52; 75].

In this study, E. P. Ilyin proves that the mental state of a person is a characteristic of his internal capabilities to successfully solve the tasks set before him, and the optimal state is as a maximum of performance under normal conditions of regulation (without the use of stimulants). Regarding the motor system, he attributes the following signs of the optimal state:

1) maximum function;
2) long duration of work (endurance) at the maximum level of function;
3) the smallest fluctuation of the maximum function, that is, the greatest stability of the manifestation of the function;
4) inertia (stability) of the optimal state;
5) the greatest mobility, that is, the speed with which a function goes from rest to maximum and back;
6) adequate response of the system to a stimulus;
7) coherence of all systems, components of the working system, rhythm and synchronicity in the work of individual links and functional units;
8) energy optimum;
9) emotional optimum.

This enumeration of the signs of the optimal state of the motor system is justified by the experimental studies of E. P. Ilyin. However, the understanding of the optimal state given by him is broader than the optimal mental state. Many of the signs named by E. P. Ilyin are associated with factors that relate more to the competence of physiology, biochemistry, bioenergetics than to psychology [8; 41].

A significant number of studies of mental states have been carried out in connection with activities in extreme conditions that require a person to demonstrate high reliability. It seems interesting

to us that V. I. Medvedev (1979) distinguished two forms of a person's psychological response in extreme conditions: a state of adequate mobilization (full compliance of the degree of mobilization and the tension of functions with the requirements imposed by these conditions) and a state of dynamic inconsistency (the response is inadequate to the conditions or exceeds the physiological capabilities of a person). A number of such studies were conducted in line with the theory of stress by G. Selye [13; 59; 65].

These studies are undoubtedly of great value, but one cannot but agree with the opinion of T.Ed.Erikson (2010) that the stress theory does not sufficiently develop mechanisms for choosing a way to overcome a stressful situation [18; 78].

Other authors who deal with similar problems distinguish different types of tension: operational and emotional, neuropsychic (Agriev Yu. I., Dmitrieva M. A., Kolesnikova D. K., 2014). Some researchers note that a state of tension complicates purposeful activity and requires the mobilization of mental and physiological reserves.

In the study of Orban-Lembrik L. E. (2010), the influence of three levels of emotional arousal (high, medium, low) on the effectiveness of activities requiring concentration of attention was traced. At a high level of arousal, the focus of attention may be so narrow that it will not cover all the conditions for solving the activity problem. At a low level of arousal, the focus of attention is too wide. Optimal concentration was observed at an average level of emotional arousal [17; 44; 55].

Other types of mental states that arise in the process of activity were also studied. E. P. Ilyin and his colleagues studied the states of monotony and mental saturation. The commonality of the mechanisms of development of these states was revealed. E. F. Rybalko (2017) made an attempt to give a comprehensive characteristic of the state of fatigue [15; 20; 25].

Despite the presence of these and other studies not mentioned here, it can be stated that the problem of mental states that arise in connection with activity and largely determine its success is still far from being solved.

1.2. Mental state as a characteristic of the mental activity of an athlete

From a psychological point of view, human activity is determined by the complex interaction of two types of mental tension: emotional and volitional. The first is often unconscious, poorly regulated or completely carried out automatically, it causes experiences. The second is conscious, arbitrary and generates volitional effort. Their interaction is that each of them manifests itself not only directly in the activity itself, but also in each other. For example, before competitions, emotions in an athlete cause such experiences that quite successfully stimulate him to activity and nullify volitional efforts. At the same time, any volitional effort has an emotional beginning at its core (Tytovych A.O., 2010). Quite often, pre-competition emotional tension is regulated and optimized by purposeful volitional effort. It is believed that emotional activity leads to an increase in the athlete's energy potential, and volitional efforts determine the economy of his use of this energy [62; 79; 80].

According to A.N. Leontiev (2002) considers the components of activity to be motives that motivate a person to it, and goals as its intended results and operational means by which this activity is implemented in life. The practical activity of the subject is carried out due to the function of mental processes that are implemented by certain qualities of the personality.

In this case, it is important to emphasize the following: in psychology, it is believed that mental states are a system that determines the correlation and interaction of mental processes (on the one hand) and the degree of their implementation depending

on the individual psychological qualities of the personality (on the other hand). The absence of a long-term manifestation of a certain mental state, its constant change (accordingly, the action of external and internal factors), multicomponentity and degree of severity are factors that determine the uncertainty of the concept of "mental state", which to this day does not have a generally accepted interpretation [6; 14; 35].

Turning to the psychological dictionary, we have the opportunity to read that: "mental state is a holistic characteristic of mental activity; stable over a certain period of time, it shows the peculiarity of the course of mental processes depending on the reflection of the phenomena of reality, the previous state and the mental qualities of the personality" (Savitsky V.G., 2011; Simonov P.V., 2014).

In the works of researchers of the last century, the mental state was considered as a complex, multicomponent and multifaceted phenomenon. At the same time, the mental state is understood as a complex, holistic manifestation of the personality in given specific conditions and at a specific moment in time, and as a state of mental regulation of activity, and as a person's reaction to external influence (Ilyin E.P., 2010), or a systemic adaptation reaction (Zavalov N.D., Ponomarenko V.A., 2019). Sobzhenko O.A., 2012 understands the mental state as a general functional level against the background of which a process develops, characterizing it as a temporary but relatively stable level of a person's psychological activity.

In the work of Semichenko V.A. (2000), the term mental state is interpreted as a phenomenon that indicates the stability of the corresponding manifestations in a person's mental life, their uniformity and repeatability over a clearly fixed period.

And, for example, Ilyin E.P. (2010) considers mental states together with the functions of emotions, understanding them as a structural unit of the emotional-volitional sphere of an athlete.

Even less certainty of this concept is given in the psychological dictionary edited by Petrovsky A.V. and Yaroshevsky M.G. (1998). They write that: "mental state is a concept used to conditionally highlight in the psyche of an individual a relatively static moment in contrast to the concepts of process… and mental property". An even more general interpretation of the term under consideration can be found in the new explanatory dictionary of the Ukrainian language: "state is a set of signs, features that characterize an object, a phenomenon at a given moment, in accordance with certain requirements for quality, degree of readiness, etc." Although this definition still emphasizes the main personality of the state, that it characterizes … phenomenon at a given moment and in accordance with certain requirements for … degree of readiness.

The most complete interpretation of the concept of mental state was made by Stasyuk R.M. (2008) He writes that: "mental states are holistic characteristics of mental activity for a certain period of time".

She distinguishes three general dimensions in mental states: motivational-motivational, emotional-evaluative and activation-energetic. This author believes that human mental states are characterized by integrity, mobility, relative stability, interconnection with mental processes and personality properties, individual uniqueness, typicality, extreme diversity and polarity [10; 68; 77; 92].

Integrity is understood as the fact that they characterize all mental activity as a whole in a certain period of time and at the same time express the specific interaction of all components of the psyche. Such an understanding of the function of mental states obliges us to seriously, deeply and systematically study their role in various spheres of human life and, of course, in sports activities, which are an excellent arena for such research [26; 39; 61; 74].

The mobility of mental states lies in their variability, in the presence of stages of progression (beginning, certain dynamics, end).

The relative stability of mental states is understood to mean that their dynamics are less pronounced than the dynamics of mental processes. Yarmonov A.A. (2016) writes that mental processes, states and properties of the personality are most closely interconnected. Mental states influence mental processes, while at the same time they are the background for their course. At the same time, they act as a "building material" for the formation of personality qualities, primarily characterological.

The polarity of mental states is interpreted as the presence of an opposite for each of them: for example, activity - passivity, confidence - uncertainty, etc.

Within the framework of the tasks of our study (meaning the determination of the role of mental states in increasing the effectiveness of sports activities), it is important to identify mental states that characterize the professional suitability of an athlete for activity in a particular sport. Today, the mental state that characterizes professional suitability is understood as the subject's awareness of the significance of their profession, the state of joy and success in work, the state of volitional activity, etc. In our opinion, this is directly related to sports activity and the search for ways and methods to identify professionally suitable states in it (Shilko V.G., 2018).

In addition, in the analysis of sports activity and, especially when determining the means of its activation and optimization, the study of the mental state of professional (sports) interest is of great importance. It is characterized by: awareness of the significance of sports activity; the desire to learn more about it and actively act in its field; concentration of attention on objects related to it (Andreev V.V., 2015).

Of particular importance for the study of the role of mental states in sports are approaches in which states of mental tension are analyzed, of which there are many in any kind of sport, especially in extreme conditions of sports activity.

Considering mental states in intense sports activity, Sopov V.F. (2010) approaches from his own position both the interpretation of their content, classification and the features and necessity of assessment and role in obtaining maximum sports results. Thus, he notes "If the psyche is a system of interconnected mental components, then the mental state is a specific, characteristic for a certain current segment of activity ratio and interaction of these components for a specific period of time, which acts as a functional short-term system aimed at achieving a certain result." That is, this author emphasizes that the main criterion of the mental state should be the "current segment of activity." And in connection with this vision, he defines the mental state as follows: “a mental state is an individual’s experience of a specific attitude to the possible results of the current segment of activity.”

It should be noted that such an understanding of the content of a mental state is quite closely interconnected with the doctrine of P. K. Anokhin (1980) about the functional system. This refers to his idea of a “system-forming factor” in which two qualitatively different sides are distinguished: objective and subjective. Moreover, if the set of functional states of an objective nature, which are aimed at replenishing or economizing the body’s energy expenditure, are similar in most people (genetically set), then the manifestation of functional states of a subjective (psychological) nature has clearly expressed individual-psychological features that reflect the psyche of a specific individual, and therefore they are a mental state.

It is extremely important to realize that the subjective side of a person’s mental state is leading, because in the process of endless adaptation, subjective, mental shifts are much ahead of objective ones. For sports activities, this understanding makes it possible to realize that the mechanisms of regulation begin to work earlier than the systems they control. That is, mental states that are subjective in

nature play a leading role in controlling motor activity (Golovchenko O. I., Tytovych A. O., Vostotska I. F., 2018) This is what, in our opinion, is the significance of understanding the role of mental states in sports activities.

Studying the structure of mental states, Sopov V.F. (2010) made their classification, which differs from the classifications of previous authors. In his opinion, all types of mental states should be divided taking into account their influence on the indicators of professional activity, on the mechanism of reaction formation, on external and internal manifestations and on dominance in a particular relevant segment of intense professional activity.

Based on his classification, Sopov V.F. (2010) offers a scheme that shows the interrelationships of components in the process of forming mental states and their dominance in relevant segments of sports activity.

As can be seen from the above scheme, the author tried to show which dominant mental states (antagonistic in action) determine sports activity. Thus, all its components: training, training, recovery, preparation for competitions, competitions and after the competition are carried out in a relevant segment of time for the athlete. It is also important that this scheme provides professionally important mental states for athletes: concentration, activity, satisfaction, confidence, combat readiness and happiness [20; 29; 47].

Using the recommendations of Gusev V. L. (2016), who considered the agreement in the dynamics of the state of indicators of three levels as a condition for high performance of an athlete: mental arousal (emotions, anxiety), vegetative arousal (energy) and motor skill (psychomotor), Sopov V. F. (2010) develops and supplements the conditions and necessity of measuring these levels. In his interpretation, these levels are called three factors: psychological, functional and motor.

The analysis of each of the named factors was carried out by this author, which makes it possible to imagine the structure of the athlete's mental state.

Thus, the most significant for obtaining the desired sports result is the psychological factor, which includes motivational and emotional components as components. And the main function of the psychological factor is to "match" the current state with the desired one and determine the intensity of efforts to overcome the difference "in the image" and "in the image of the current situation" (Karvoven Sakary, 2012).

The energy factor plays the role of a mobilizing component of all vital resources of the athlete's body by activating the vegetative and central nervous systems, which, in turn, enables the athlete to perform sports activities with maximum effort [22; 62; 69].

And, finally, the motor factor of the mental state is a mechanism for controlling motor activity based on two principles: sensory corrections of the performed movement and direct program control (Yakovlev B.P., 2014). Thus, the listed factors are considered the main structural components of the mental state. Based on the analysis of the role of these factors in sports activities, a functional model of the athlete's mental state was built. The most important components of this model include: motivation, activation and regulation of movements.

The study of mental states in the training activities of athletes allowed Sopov V.F. (2010) to identify mental states experienced by them. These include the following: deprivation is a violation of sensory stimulation of the reticular formation; monotony is the uniformity of training movements and their perception; mental satiety is a negative mental state that occurs in the absence of switching to other (except training) activities; anxiety is a mental reaction to real or imagined danger; depression is a decrease in motivation, the development of negative emotions, the lack of desire

for any activity; hyperprojection is a painful increase in attention to changes in the body that occur during training; psychomotor perseveration is an obsessive desire to continue movement or the inability to immediately stop a movement that no longer makes sense; ataraxia is a state of equanimity and peace of mind with full adaptation to physical exertion; Prostration is complete physical and neuropsychic relaxation after severe fatigue or nervous shock.

It is also important that depending on how an athlete experiences various components of the mental state, his competitive activity will be effective or ineffective (Fedulov I.S., 2013).

A number of studies have shown that the dynamics of mental states are affected by external and internal factors: the athlete's age, sports experience, training intensity, emotional imbalance, level of anxiety, dominance, communication, and others (Tolochek V.A., 2018).

The manifestation of mental states is also influenced by the biorhythms of athletes. However, in most studies, the authors are inclined to believe that mental states are an integral part of the process of managing training sessions (Malkin V.R., Rogaleva L.N., 2018), although they themselves must be regulated.

The modern idea of the mechanism of regulation of mental states in people's sports activities is described in Klymenko V.V. (2007). First of all, it should be noted that he distinguishes three main mental states. In his opinion, these are the following: 1) progressive development; 2) stable equilibrium; 3) regression. Directly for sports activities and specifically for success in the educational and training process, the mental state of progressive development plays a major role. According to this author, "progressive development is characterized by the improvement of mental functions, their advancement along the ascending line, where new elements and prerequisites for the formation of new psychological mechanisms for regulating movements and expanding human motor skills appear".

Klymenko V.V. (2007) also determined the parameters of the intensity of mental states during training:

1) optimal state of rest – pulse 60-70 beats / min (the beginning of the countdown for determining the intensity of all other states);
2) optimum activity state (state of intensity of action, when the pulse rate in the zone of 180 beats/min is the limit of integrity defined by the proportion of the "golden section");
3) feeling of operational calm (HR 102±6 beats/min) is the "golden point" of this proportion.

This study shows, firstly, a close relationship and mutual influence between physiological parameters (HR), and, secondly, that psychological control of the intensity of the activity state can be carried out using the athlete's well-being. Because the optimal well-being, which reflects optimal mental tension during muscle work, is at the level of HR 180 beats/min. And the optimal well-being of operational calm is when the HR during rest reaches 102±6 beats/min.

So, in order for the athlete's well-being to be at a high level, it is necessary to exercise a competent psychological influence on him.

1.3. Individual-psychological sphere in sports activities

The role of the individual-psychological sphere in the sports activities of an athlete is certainly significant, and in complicated, extreme conditions of competitions even decisive. As noted by Sopov V. F. (2010), the mental state is a component of the psyche and is in dialectical interaction with it as a part of the whole. As is known, to achieve success in sports activities, athletes need to have perfect psychological preparation. At the same time, it should be taken into account that the main task in the psychological preparation of an athlete is the formation of psychological readiness for the maximum realization of their capabilities in the competition. This can be

achieved by mastering the methods of mental regulation, and the main target for the action of these methods are mental states.

In other words, there is a close connection between the following factors in the proposed system: psyche - mental state - mental regulation - the result of sports activities. In addition, it should be emphasized that maximum success and the highest results are possible when an athlete achieves a certain level of mental states that are necessary for a specific activity in a given sport [27; 36; 64; 70].

It is in this regard that the study of the components of the specified system should be a significant lever in increasing the effectiveness of sports activities.

Analysis of literary sources shows that among the components of the proposed system, the least studied is the mental state. This happened because both practitioners in various sports and scientists were primarily concerned with the issue of finding opportunities and conditions for increasing sports results. As a result, a large number of studies appeared in which the authors recommended certain ways to solve this issue (Malkhazov O.R., 2012).

The next step was the realization of the positive importance for the growth of sports results and especially their demonstration in difficult, extreme conditions of competitions, of the psyche of athletes and the mechanisms of its regulation (Klyuchnikov M.S., Razumets E.I., 2016).

At the same time, mental states remained less studied because they are a set of actions and intermediate between mental processes and qualities of the athlete's personality.

Mental states are characterized by fluidity in time - this is not always a long-term process, but in each specific period of time it determines the obtaining of a result that is adaptive to specific conditions of existence.

Also essential for understanding the content of a mental state is the awareness of the subject of relevance (according to Sopov V.F., 2010). Although one can say the awareness of the biological or social

significance for him of a given type of activity, which is supported by a certain mental state in a specific spatio-temporal plan. Sports science specialists raise and resolve questions regarding the search for ways to increase the preparedness of athletes (Grushchenko M.M., Lelyak L.M., 2016).

For example, studies of the conditions for achieving high results in competitions indicate that they are provided by a high level of development and stability of the physical, technical, tactical and psychological components of the athlete's preparedness. Every year, more and more scientific works are being published aimed at studying various components of the reliability of sports activities, and most of them establish the role and importance of the psychological factor as the leading one in ensuring the reliable performance of athletes (Kuzovkin V.V., Kharitonova A.I., 2016).

High physical and neuropsychic loads, the complexity of motor tasks, personal responsibility of competition participants for the results of their performances place strict demands on psychological preparedness, on the perfection of their psychological sphere.

The state of psychological readiness for competitions is seen as the mental state of an athlete, which contributes to the most effective manifestation of his preparedness.

Many researchers consider the emotional sphere of an athlete's personality to be one of the main components of the mental state (Leonov S.V., 2012; Serova L.K., 2015; Evans B., McGuckin M., Gainforth H., Bruner M., 2015). Therefore, special importance is attached to the role of emotional states, and in particular such as emotional tension. Emotional tension is a state characterized by such a degree of emotional reactions that causes a temporary decrease in the stability of mental processes and working capacity. Emotional tension arises when the motive of self-affirmation is actualized; this state reflects the discrepancy between the internal motives of the individual and the objective components of his activity. E.P. Ilyin (2011)

believes that emotional tension is a state that, to a greater or lesser extent, disorganizes activity and prevents its high reliability and efficiency. In this case, in addition to the expressive aspect, characterized by objective functional variability, which is manifested in biochemical, vegetative-vascular, motor reactions, the important importance of the impressive aspect is established - the athlete's personal attitude to his activity. Personal attitude at the level of psychological mechanisms of regulation of activity and states acts as a specific sphere of reflection of reality – through subjective experience.

O.O. Chernikova (2002) made an attempt to systematize competitive emotions; developed methods of diagnosing emotional stability; proposed methods of arbitrary regulation of adverse emotions.

The study of mental states in sports is closely related to the study of volitional qualities as a conscious regulator of states and activities. The concept of "volitional training of an athlete" was formulated (Akhatov A.M., Rabotin I.V., 2008). The problem of will was considered in a broad aspect of the athlete's life as a representative of society, as well as in the unity of various types of athlete's training: physical, technical, tactical, psychological.

The goal of the psychological training process is the formation of psychological readiness for competition. The result of training is preparedness, which is considered as the level of development of functional systems of the body, regulatory functions of the psyche and nervous system, physical qualities that provide a specific type of motor activity. As is known, preparedness is the result of a long training process and is not subject to variability in short periods of time.

Research on the psychological training of athletes was conducted by many sports psychologists: R.M. Zagainov, O.N. Mazurov, Yu. Ya. Kiselyov, A.V. Rodionov, G.V. Lozhkina, N. Yu. Volyanyuk and others (2008-2016).

If we consider emotional tension as an important factor in the structure of the mental state, then the diagnosis of its manifestation in the pre-competitive period is of great practical value. The peculiarity of the occurrence of emotional tension of an inadequate level, which can destructively affect the state of psychological readiness, is determined not only by the conditions of the competition, but also by the personal characteristics of the athlete, which determine tolerance and insight into distracting factors. However, the state of emotional tension is diagnosed mainly by vegetative indicators: pulse, blood pressure, etc. But vegetative indicators of emotional tension are not sufficient indicators of the reliability of activity, if their analysis is not combined with the analysis of the substantive side of the training and competitive processes and taking into account the subjective indicators of athletes.

Thus, it can be noted that knowledge of the individual characteristics of each athlete allows the application of psychologically justified means aimed at the development of personal mechanisms for regulating his mental state.

An effective activity approach to the problem of studying mental states was reflected in the works of V.F. Sopov (2010). He repeatedly emphasized the role of active motives, goal orientations, promising goal setting, self-regulation, self-control, adequate self-assessments for increasing the level of technical skill of athletes, for their achievement of high results.

There are different points of view on the structure and composition of the signs of the mental state. This indicates the incompleteness of the development of the problem of the mental state in sports activities.

Thus, some authors (Voronova V.I., 2007; Gorbunov G.D., 2012; Zhurova I.A., 2014) in their works highlight the problem of "mobilization readiness" for the direct performance of a sports action. They see the psychological basis of mobilization readiness not in

the optimality of the mental state, but in the guideline that can be realized. The phenomenon of guideline was studied by D.N. Uznadze (2001). According to him, the emergence of any conscious mental process is always prevented at the "conscious" level by a mental instance, which is the athlete's readiness for activity. Such a state of readiness is called guideline. A guideline is a holistic state of an athlete, which is considered as a form of reflection that establishes the relationship between the athlete's needs and the external environment and combines them. External circumstances – experiences, impressions, upbringing determine the formation of guidelines. For each athlete, under the influence of external circumstances, "fixed guidelines" characteristic only for him are formed. It is they, as a result, that form the readiness for a specific type of activity in certain conditions.

A.V. Rodionov (2002) devoted his works to the development of the problem of guidance in the psychological training of an athlete. He proposed to introduce a classification of guidelines based on taking into account the magnitude of functioning in activity. He identified four levels of guidelines: semantic, target, operational and the level of psychophysiological mechanisms - regulators of activity.

Ensuring general readiness for activity, direction and stability is a function of semantic guidelines that express the personal meaning of activity. Target guidelines represent readiness to achieve a result. They ensure stability and selectivity of actions. Operational guidelines determine readiness to implement methods of action. Guidelines, as a mechanism for regulating activity, which gives weight and significance to incoming information, which has the ability to change the dynamics of activity.

Guidelines maintain the direction of activity, stabilize it, but, in our opinion, they are only one of the components of psychological training.

At the same time, there are studies in sports [4; 5; 63; 66], which are devoted to the study of the role of mental states in sports training. One of the main factors in this process is considered to be the athlete's motivation.

Analysis of the characteristics of motivation allows for a more differentiated and in-depth study of the source of many years of extreme activity of athletes, high readiness for competitions, excessive emotional tension. The athlete's activity is determined not just by any one motive, but by a system of exciting motives. At the same time, individual motives turn out to be decisive, such as those that dominate in certain conditions of sports activity. The change in motives, in accordance with the change in the conditions of activity, reflects the dynamic core of the athlete's personality, which is defined as its orientation (Dias C., Cruz J.F., Fonseca A.M., 2009).

Researchers emphasize that depending on the characteristics of the athlete's personal qualities, the specifics of the sport, and his mental state, his sports activity can be implemented either in the direction of solving a specific task (business orientation), or in the direction of self-orientation, or in mutual actions.

Business orientation reflects the predominance of motives generated by the activity itself, enthusiasm for the training process, the development of leading qualities, and the fulfillment of competitive guidelines. Self-orientation is associated with the motives of self-affirmation, the desire for personal superiority, high results, and victory. The orientation to mutual actions is generated by the dominant motives of social approval and communication. In this case, the athlete experiences emotional involvement in joint activities and great tension during collective performance of actions. The indicator of the dominance of a particular motive in the motivation system is primarily its strength [53; 63].

The most important factors, in addition to motives, in psychological training, taking into account the mental state, include a personal assessment of the conditions of activity significant for

the athlete. He evaluates possible situations and his capabilities in them, and this intellectual assessment is the basis for the emergence of emotional reactions (Fedyk O.V., 2013). In the success of psychological training, researchers pay great attention to the analysis of sensorimotor factors.

And the successful implementation of any sensorimotor acts largely depends on the psychological preparation and mental state of the athlete in specific conditions and in a certain period of time.

Therefore, increasingly, experts in the field of sports (Samoylov N.G., Aleshcheva A.V., 2016; Lovyagina A.E., Ilyina N.L., Volkov D.N., 2016) emphasize that psychological factors play a primary role in the successful performance of an athlete.

It is known that the impact of mental stress on the athlete's body during the competitive training period increases compared to the preparatory periods.

This pattern is due, first of all, to the specifics of the competitions, their importance in sports activities, the assessment of competitive achievements in the value orientations of qualified athletes and some other factors of a special methodological and personal nature.

But most of the research aimed at increasing the effectiveness of athletes' activities during the competitive period is limited to developing tasks for improving the physical and technical-tactical aspects of training (Weinberg R., Gould D., 2014). This ratio contributes to the shortage of scientific experimental data on the regularities of the formation of psychological resilience, the development of practical recommendations for managing the behavior of athletes under conditions that ensure successful performance in competitions, that is, training activities [58; 83].

Analysis of the special literature confirms the lack of attention of specialists to the development of issues of taking into account the mental states of athletes both in psychological and in general in sports training.

Of course, for each type of sports activity there is its own optimal level of mental state, at which this activity proceeds most successfully and effectively. In emotional tension, its mental components are of exceptional importance. When analyzing this state, an important role is given to self-assessment of both the state of the organism itself and the conditions determining it.

Special studies show that in different types of sports activities there are their own optimal levels of mental state, which must be identified experimentally. Thus, the quality of motor skills improves significantly with increasing mental tension. But as soon as the tension begins to exaggerate the "optimum line" and turns into tension, the athlete's ability to coordinate fine details in the technique of movements and to relax inactive muscles in a timely manner deteriorates significantly [40; 60; 86].

That is why, when the technique is violated before the start, the coach should not be engaged in correcting movements, but in the mental state of the athlete (Andreychenko O. V., 2016). A similar picture is observed in the correlation of the dynamics of mental tension with the work of the systems and functions of the body that reveal the quality and productivity of motor activity. Their indicators improve in parallel with the growth of mental tension, but only to the "optimum line". Further increase in tension leads to disharmony of functions even before the start of the competition.

Experts say: it is not only possible, but also necessary to worry before the start. Without feeling pre-start excitement, it is impossible to fully reveal one's capabilities. Excitement in this case is a festive sports elation, fighting spirit, impatient anticipation of the fight. Therefore, each athlete needs to know both the general patterns and their individual characteristics of the dynamics of pre-competitive tension. Removing uncertainty in understanding their personal mental state is the beginning of the path to its normalization, which is provided by psychological preparation (Grushchenko M.M., Lelyak L.M., 2016).

Each athlete needs to carefully analyze the features of the pre-competitive mental tension that arises in them and the reasons that cause it. This helps to work out a kind of ritual of pre-competitive behavior, which, in turn, maintains tension at an optimal level. Knowledge of the features of one's mental state and its influence on the result of a performance at competitions contributes to the development of an individual sequence of actions and self-regulation techniques aimed at maintaining an optimal level of mental stress.

When considering the personal factors of psychological preparation, it is necessary to note the significant role of self-esteem. Unfortunately, the phenomenon of self-esteem has not yet become the subject of a special comprehensive study. A large number of publications are devoted to it, but all of them to one degree or another touch on individual aspects of the manifestation of self-esteem (Isaev A.V., Isaichev S.A., 2015). As an example, the study of self-esteem in sports activities can be cited. His studies show a close connection between self-esteem and motivation, personality orientation, and the level of aspirations that characterize the athlete's entire self-esteem.

The phenomenon of self-esteem includes an integral interpretation of the result of the action of the entire complex of regulation of the mental state. Adequate self-esteem of the athlete acquires special importance for the correction of the training process and success in the competitive period of preparation.

Thus, the manifestation of emotional states that ensure the psychological readiness of qualified athletes for competitions is determined by a number of factors: the characteristics of competitive activity; special preparedness for specific competitions; personal and social significance for the athlete of a particular achievement; the athlete's self-assessment of his own preparedness; the importance of the tasks set; his own experience in forming a state of psychological readiness; the athlete's health; emotional state; individual characteris-

tics of the athlete's personality and the features of the course of his mental and physiological processes, and some others [85].

As shown in a number of studies (Malkina V.R., Rogaleva L.N., 2018), the basis of effective psychological training of an athlete is his psychological competence, in which a special place should be occupied by special skills of psychological self-regulation of his mental state.

Mastering and timely use of self-regulation techniques can eliminate many factors that negatively affect the mental state of an athlete not only during competitions, but also during training. However, unfortunately, to this day this problem has not been solved both theoretically and practically. That is why the relevance of this problem, the need for its comprehensive theoretical and experimental research are obvious [84].

One of the most important factors determining the success of a person's activities in performing professional functions is reliability. Reliability is understood as an individually variable property of a person to maintain the stability and constancy of the results of professional activity in conditions of possible complication of the situation.

The main criteria for the reliability of a person who controls complex moving systems are: long-term endurance; endurance to emergency stress; noise resistance; switching (which is considered not only as a characteristic of attention, but also as the flexibility of adaptation to changing working conditions); inevitability; invariability of reaction to unforeseen stimuli; resistance to prolonged exposure to adverse factors (forced working posture, monotony, noise, etc.).

According to Morozov A.V., Chebykina (2011), a more significant role is played by character, professional qualities, than by typological properties of the central nervous system. This thesis is obviously not so indisputable, although one cannot but agree that the modality and quality of the state will largely depend on the personal significance of

situations and events occurring. A.O. Prokhorov (2000) sees the integrating function of mental states in the fact that they contribute to the stable interdependence of mental processes and mental properties and form the unity of the mental, forming a psychological structure: properties - states - processes.

This author considers states in a three-member hierarchical system, depending on their duration: operational mental states (related to the current time of a person's life and lasting seconds-minutes); current mental states (related to the life of this time, lasting hours-days), and long-term mental states (related to the life of a long time and are multi-component). In addition, there is a three-level organization of mental states: individual states, their complexes; holistic structure. Summing up, we can say that the basic function of mental states A.O. Prokhorov (2000) considers it to be an integrating one, due to which mental processes and properties are combined into a holistic whole, which forms the "psychological system" (structure) of the personality in a certain time interval.

It should be noted that we are primarily interested in, in the terminology of A.O. Prokhorov (2000), operational states. Considering them, one cannot help but dwell on the development of the concept of mental states by the same author. He introduces the concept of "non-equilibrium states". These include states associated with increased mental activity (such as anxiety, delight, joy) or with decreased activity (dreams, depression, sadness, fatigue), characterized, respectively, by a higher or lower level of activity relative to the conditional average level. Based on the ideas of A.O. Prokhorov himself (2000) about the structure of mental states, any mental state is inherently non-equilibrium, being a mental whole that reflects the specifics of mental activity in each specific situation, and therefore is constantly changing (including at the level of activation).

Actually, as non-equilibrium states, the author considers extreme states that arise in special, critical conditions of human life and cause

"irrational, inadequate and aggressive behavior". Being a reaction to a frustrating situation, non-equilibrium states determine human actions and behavior. The leading component of non-equilibrium states is the emotional component. In their dynamics, non-equilibrium states are characterized by an increase in the qualitative homogeneity of the psychological structure (both towards stabilization and high productivity of activity, and vice versa). In conclusion, it can be noted that the concept of A.O. Prokhorov (2000) is very interesting, since it is an attempt to consider the structure of the mental state. It is interesting (although not indisputable) to divide the concepts of "operational state", "functional state" and "non-equilibrium state". It turns out that the concept of "unbalanced state" and the phenomenology described by it reflect the content of such a phenomenon as a mental state, while "operational, functional state" - its dynamic characteristics.

An interesting view of A. V. Petryaev (2006) on the problem of the interaction of mental states and stable personality traits within the framework of a dynamic approach to the study of personality. This approach allows us to trace "in private manifestations of mental states, changes in the system of his mental life by the person himself, and in the totality of current mental states - formed and always significant diverse systems of patterns, reactions, relationships, assessments, leading to their integration in the inner world of the individual." Considering the mental state as a holistic characteristic of mental activity, the author identifies energy, subject-relatedness and modality in the structure of the mental state as the most important factors. Based on the concept of D. Watson, A. Tellegen, L. Clark (2015), the general factors that determine the specifics of a mental state are: activation - deactivation, pleasantness - unpleasantness of experiences. In this regard, the entire spectrum of possible states can be determined through positive and negative affect. Negative affect includes a wide range of negative emotional

states and emotions: fear, anger, irritation, guilt, sadness, contempt, disgust, etc. Positive affect, on the contrary, is an indicator of the level of "pleasant involvement, harmony with the surrounding external world of the subject." The emotional experience of a person is thus determined by negative and positive emotionality and is correlated with such individual characteristics as extra-, introverted orientation of the personality and neuroticism. Thus, positive emotionality is determined by extraversion, which is manifested in perseverance, excitement seeking, positive emotional states, etc.

The connection of positive emotionality with the motivation to achieve success is noted. Negative emotional orientation is associated with the factor of neuroticism (alienation, anxiety, worry, impulsivity, vulnerability, victimization) [43; 54].

Thus, according to A.V. Petryaev (2006), there is a close connection between the two-dimensional space of the state and the two-dimensional space of the personality. Based on this, a very interesting conclusion is made that mental states are determined by stable personality traits, which determine the specificity of the symptom complex of the mental state of a person in adverse conditions. Based on the conducted experimental study, the author comes to the conclusion that the most important adaptive traits to the complex of adverse factors are sociability, stable emotionality, introversion, trustworthiness in relationships, resistance to adverse external influences, self-sufficiency, independence, determination, restraint, trust.

When considering the problem of mental states, despite the allocation of a large number of them, it is necessary to emphasize that, strictly speaking, they do not have clear boundaries. We cannot say that at the moment one state has come, which has immediately passed into another (although, at the same time, one should remember about the qualitative differences in their dynamics and content). Adhering to the position that there is an ordered set, a kind

of continuum of states, the human state can be represented as a moving point within this multiplicity. It is due to the constant mutual transitions of one state into another that we encounter their ambiguity and experience difficulties in describing, verbalizing states (especially when they can be attributed to extreme ones). In addition, problems in describing the quality and content of the state are also associated with such a phenomenon as the peculiarities of the dynamics of the state depending on the level of activation (according to the Yerkes-Dodson law), which determines the stable working capacity of a person in the zone of optimal vigor. Going beyond this zone causes a natural decrease in the quality of activity, up to its disintegration. We are interested in mental states close to "off-limits", which go beyond the optimal level of vigilance.

1.4. Features of the manifestation of mental states in athletes

Sports activity consists of two important components: training and competitive processes. Given the significant importance of the mental state of an athlete in achieving success in sports activities, sports psychology has repeatedly raised and to varying degrees resolved the question of the role of mental states in the effectiveness of an athlete's achievements (Rapatsevich E.S., 2006).

It should be noted that the attention of researchers was more attracted to the issue of the effect of mental states of athletes in the competitive period of their sports activities. It is interesting that retrospectively considering the work done in this direction, it can be emphasized that researchers were primarily concerned with the mental states of athletes experienced by them as a result of the manifestation of certain emotions.

That is why initially the subject of research in sports psychology was the pre-start emotional states of athletes. One of the characteristic such states - "fever" - was first described by O.A. Chernikova back in 1937. Subsequently, based on the analysis of a fairly significant

amount of material, A. D. Puni (1977) identified three forms of pre-start states: combat readiness (optimal emotional state), pre-start fever and pre-start apathy (adverse emotional states), and explained their psychophysiological mechanisms and described the signs that characterize them. Later numerous publications by various authors detailed some of the signs.

Popov A.L. (2001) based on the analysis of scientific literature came to the conclusion that each of the forms of the pre-start state can be described using four groups of signs:

1) the balance of cortical processes of excitation and inhibition and the associated vegetative shifts occurring in the body;
2) features of the course of mental processes;
3) features of movements and behavior;
4) typical attitudes of athletes to the upcoming competition.

A.D. Puni (1977) expressed the opinion that the pre-start state is a consequence of a certain attitude of the athlete to the competition. A.A. Borisov (2017) established that one or another attitude to the competition arises in the athlete in connection with the assessment of the pre-start situation, and proposed the following scheme:

Pre-start situation → attitude → pre-start state.

Analysis of the performance of athletes in responsible competitions, comparison of their previous competition and the accompanying state with the results of competitive activity prompted sports psychologists to consider the problem of pre-competition and competitive mental states differently. It became obvious that these states are more complex and diverse than the previously described pre-start emotional states. Thus, the optimal pre-start emotional state (combat readiness) does not overlap the optimal pre-competition state (state of mental readiness for the competition), but is included in it as a component (sign). In understanding this, in introducing the very concept of "state of mental readiness for competition", in the substantive description, the leading role belongs to A.Ts. Puni (1977).

He wrote about the state of mental readiness for competition: "This state, like any mental state, is a complex, holistic manifestation of personality. It is characterized by: 1 - the athlete's sober confidence in his abilities; 2 - the desire to actively and enthusiastically, with full dedication, fight to the end, precisely to the end to achieve the intended goal; 3 - an optimal level of emotional arousal; 4 - a high degree of noise immunity in relation to various, and, above all, especially significant for the athlete, adverse external and internal influences; 5 - the ability to arbitrarily control one's actions, feelings, and all behavior in the endlessly changing conditions of sports competition and the extremely tense, exciting atmosphere of competition" (A.Ts. Puni, 1977).

A.A. Borisov (2017) noted that there is a formal logical inconsistency of the fifth feature (component) with the first four. It is obvious that the ability to effectively self-regulate in difficult competition conditions is not a component, but a holistic characteristic of the state of mental readiness for competition, on the basis of which only the state of readiness can be distinguished from the state of unreadiness. From the standpoint of a descriptive approach to studying the state of an athlete's mental readiness for competition, the other four features do not raise doubts. Probably, a few more can even be added to them. And indeed, V. F. Sopov (2010), in addition to the above, identified the following: readiness for maximum willpower, clear awareness of goals and objectives, and the focus of consciousness on performing future actions. G. Roberts, Biddles (2007) added another feature to the state of mental readiness for competetion, the desire to compete, to those highlighted by A.Ts. Puni. With a descriptive approach, it is difficult to deny the legitimacy of searching for an increasing number of features.

However, in the interests of practice and preparation of athletes for responsible competitions and in connection with the real tasks of sports psychodiagnostics, there is a need to reduce the number of

signs by determining the most significant and informative. This is a rather difficult task, since the state of an athlete is "a complex combination of levels of many functions that are interconnected and determine the unity of the organism." In this regard, when trying to reduce the number of indicators for assessing the mental state of an athlete, one must exercise some caution. "Judgment about the mental state by any one, even the most cardinal indicator, may be erroneous or not accurate enough. It remains to be found out at what stage of training and in which sports which indicator plays the most significant cardinal role" (Panfilova E. A., 2005). From the above, it becomes clear that it is quite difficult to assess to what extent the state of an athlete before the start corresponds to his achievement of the maximum possible result, that is, to what extent this state is a state of mental readiness for competition.

It is even more difficult to determine mental readiness for training.

This problem has been studied by much fewer researchers in both domestic and foreign psychology, despite the fact that the importance of managing the mental state of athletes in training is undeniable. This opinion is confirmed by many specialists. Gavrilyuk D.O. (2018) notes that particularly important importance and skill are necessary to correct the parameters of sports actions taking into account the changing mental state of athletes. Thus, I. P. Volkov and A.G. Dembo (2010) indicate: "The task of sports psychohygiene is to identify and correctly assess the mental state of an athlete, using a set of special methods and measures, to carry out systematic observation of him, to analyze the causes and conditions of the occurrence of symptoms of neuropsychiatric disorders in athletes in order to prevent them and optimize mental states in the process of training and competitions." And in the work, L. Kjenniksen notes that it is possible to control the pre-competition state only after learning to control the state during training.

In recent decades, works have appeared, the authors of which emphasize the importance of taking into account those factors that directly affect the athlete during his participation in sports activities at its various stages [7; 72].

Although it should be emphasized that there are still few systematic and in-depth studies of the relationship between the mental state of athletes and the effectiveness of their training activities [34; 71; 85].

In this case, it is necessary to mention one of the first experimental studies of the state of activity of athletes, which was carried out by V.A. Maslennikov (2000). This study allowed the author to draw a number of conclusions that have a direct and immediate impact on the practice of training athletes:

1) to ensure sustainable activity of athletes, attention should be paid to the formation of value orientations in them in relation to the chosen sport by convincing them of the vital importance and usefulness of those skills, abilities and qualities that they can acquire during long and regular sports activities and by giving social significance to sports activities;

2) pedagogical influences on the formation of indicative bases of athletes' activity are more effective in the presence of active motives for sports activities that arise on the basis of value orientations;

3) the relationship of the "working" state with the activity of athletes gives grounds to use activity accounting for the diagnosis of this state and for influencing it by managing activity during training;

4) dynamic parameters of activity in a particular activity can serve as one of the informative characteristics of the "working" state of an athlete;

5) athletes with a strong nervous system showed a tendency towards increased activity when performing exercises that require great physical and volitional effort, and vice versa, those with a "weak" nervous system showed opposite tendencies: increased activity when performing lighter exercises.

V.A. Maslennikov (2000) established an inverted "U"-shaped relationship between manifestations of activity and the effectiveness of training activities in the training cycle. Similar results were reached by Heinzelmann F. Willis (2016).

However, not only consciously demonstrated activity, but also the level of vegetative activation, often associated either with unconscious motor attitudes or with emotional arousal and anxiety, has a significant and multidirectional effect on motor activity. Thus, studies by J. Mosko, D. Landers (2007) confirmed the correspondence of the Yerkes-Dodson law and the dependence between the level of emotional arousal and sports motor activity. A similar relationship between the level of anxiety, measured using the Spielberger "STAI" scale, and motor activity was established by R. Martens (2002).

These and other modern studies conducted in our country and abroad have shown the dependence of the effectiveness of sports activities on emotional arousal and the level of anxiety. But establishing the presence of such a dependence is clearly not enough to make psychologically sound recommendations aimed at increasing the efficiency of managing the process of training athletes, since the level of anxiety is only a component of the pre-activity and activity mental state, and not a characteristic of the state as a whole. In the interests of sports practice, it is necessary to assess the mental state of the athlete from the point of view of its compliance with the requirements and conditions of activity. "The central problem of accounting for the psychological aspects of organizing management and control of the training process is the diagnosis and assessment of the mental state of athletes," - A.A. Krylov and V.K. Safonov (2011) rightly point out.

For example, Andreev V.V. (2015), based on extensive practical experience with elite athletes, considers the main task of psychologically sound management of the training process to be the creation of favorable mental states in athletes before training and competition.

What should be understood by the epithet "favorable" state? Obviously, this is the same as what other authors call "optimal" (from the Latin optimus - the best). Therefore, for successful management of the training process, it is necessary to clearly imagine what is the criterion for the optimality of the mental state.

Regarding the emotional state, V.V. Andreev (2015) gave the following definition: "We will call that emotional arousal that contributes to the realization of the maximum possible (in accordance with the development of motor qualities, functional systems of the body and technical and tactical preparedness) result optimal. Establishing a relationship between the result achieved in training or competition and the indicators of the emotional state preceding training or competition is a way to determine the optimality of the latter."

Such a criterion of optimality (favorability) is suitable, in our opinion, for assessing the mental state of athletes before and during training. However, in this case, additional difficulties arise. In competitions, an athlete performs exercises specific to his sport, using previously formed and consolidated motor skills. As a rule, he strives for the maximum achievable result, realizing in competitions his physical motor qualities, functional capabilities and abilities for self-regulation. In training, the tasks solved by an athlete are more variable: sometimes he "works" on the formation of a new skill, sometimes even destroys an old one, sometimes he improves mainly only one motor quality (strength or speed, or endurance), sometimes "polishes technique", etc. It follows that finding criteria for the optimality of an athlete's mental state before and during training is even more difficult than before a competition [48].

When studying states that arise in connection with training activities, it is necessary to take into account not only the extent to which this specific state contributes to achieving the maximum result of the activity (this may be sufficient when assessing the pre-competi-

tion mental state), but each time to determine the compliance of the pre-activity state with specific conditions, goals and objectives of training. There is an urgent need to find specific signs of the mental state that contribute to the performance of various (again, specific) training tasks (actions). It is unlikely that the dynamics of the indicators of any one test can be used as such signs. Such attempts were not fully justified even in the diagnosis of pre-competition states, when V.M. Pisarenko (1970) used only tremor indicators as an indicator of wrestlers' readiness for competition, or when Yu. L. Khanin (1989) used only indicators of situational anxiety for the same purpose. Diagnostics of states before training, as already mentioned, is even more complicated.

The mental pre-activity states of a person cannot be judged by means of individual psychological, psychophysiological, biochemical and other indicators, since "the subject does not carry out activities with isolated qualities, processes and states", - as L.G. Dyka and V.A. Chursina (1983) rightly note.

The need for a comprehensive approach to assessing the mental state of athletes before training is also due to the fact that the mental state "includes in its structure various functional systems and levels of regulation, starting with the vegetative and motor systems and ending with higher mental levels of regulation associated with motives, will, etc." Studies of the mental state of athletes allow us to believe that for an adequate assessment of the state, a set of methods can be used, including:

1) fixing athletes' self-assessments of their own mental state;
2) tests, the use of which as indicators of mental state is due to the fact that at each specific moment the accuracy, speed, stability and activity of the athlete's regulation of his activity depend on his state;
3) measurement of vegetative manifestations of mental state. The set of specific methods may vary in connection with the specific objectives of the study, but the "named three channels of information" must always be involved simultaneously.

CHAPTER 2
MENTAL STATES OF ATHLETES, WHICH AFFECT THE PERFORMANCE OF MOTOR ACTIVITIES OF DIFFERENT ORIENTATIONS

With the aim of identifying mental states, their signs and factors, that contribute to or hinder athletes in the success of training activities, in achieving maximum results when performing tasks of different orientations and exercises, that require manifestation of various abilities and qualities, it was necessary to select groups of athletes of appropriate specializations.

Thus, in the first ascertaining experiment, aimed at defining differences in mental state of athletes before training sessions of various performance, took part men (n=34) and women (n=19), who specialized in rowing and canoeing. The same experiment involved track and field athletes (n=46), who were engaged in triple jump, sprint running and long jump. Among them 29 were men, 17 – women. All athletes had the qualification of 1st sports category or candidate for master of sports. All of them were students of Kharkiv and Sumy Pedagogical Universities and were aged 18-22 years old.

The second ascertaining experiment was devoted to identifying mental states in the same athletes before training of different orientations, in which there were different attitudes towards performing exercises. For this experiment, athletes involved in sports activities, which combine multi-directional training sessions: jumping on an acrobatic track and group acrobatics exercises, were involved. The former are characterized by the performance of complex coordinated exercises of a speed-coordination orientation, and the latter require the manifestation of strength and balance. Therefore, it was hypothetically assumed that the same athletes would have different optimal mental states before training of different orientations.

This experiment involved 23 male athletes aged 18-22 years old, and their sports qualifications were 1st category or candidate for master of sports.

The success of the training and the condition of the athletes were assessed almost as in the previous experiment. Additionally, the characteristics of the stability of self-regulation were implemented, because they are specific indicators of the quality of acrobatic jumps: without a sufficient level of self-regulation, the quality of jumps on the acrobatic track is low.

The third ascertaining experiment was aimed at determining the role of emotional arousal as one of the factors of success in training in jumping on an acrobatic track. It was assumed that in different conditions of sports activity a level of emotional arousal is necessary, which can be achieved in different ways. In this regard, 76 young athletes aged 15-17 years, specializing in five different sports, were involved in this experiment: boxing (n=13), acrobatic jumping (n=11), rowing (n=19), swimming (n=21), basketball (n=12).

The participants of this experiment had little sports experience and qualifications at the level of 2nd-3rd categories. In the course of this experiment, 8 qualified acrobat athletes (first-class athletes and candidates for master of sports) were examined in order to determine the role of emotional arousal as a factor in success in training, in which there is risk and the level of anxiety should be increased.

The study of low-skilled athletes was held at the training sessions before they began. Situational anxiety and bioelectropotentiometry (BEP) indicators were taken into account as the ratio of the indicator obtained before training to the one that this athlete has in a calm state, before the background state.

The determination of mental states that appear in athletes when it is necessary to achieve maximum results was carried out in three natural ascertaining experiments.

The first experiment involved the 23 skilled acrobats mentioned above. They performed a standing jump without using their hands, which is an indicator of their special fitness.

The second laboratory experiment involved 47 young athletes aged 15 to 17. The aim of this experiment was to study the characteristics of the mental state that contributes to achieving maximum results during endurance work. The subjects were male (n=29) and female (n=18).

The third experiment was held during a training camp with the participation of athletes who were the first to be studied. It was attended by 19 men and 9 women aged 18-22 years, who had qualifications of 1st and 2nd sports categories and a candidate for master of sports. They were engaged in kayaking and canoeing. The purpose of this experiment was to identify the relationship between the mental states of athletes directly during training and achieving maximum results when working "on endurance".

To determine the role of the mental state of athletes in performing tasks that require endurance, strength, speed, and complex coordination, 12 decathletes were examined, who during training have to perform exercises that require the listed qualities. All athletes were male, aged 18-22 years. As in previous experiments, a significant number of athletes were students of higher educational institutions.

Thus, the total number of athletes who participated in the study at its various stages was 240 people.

2.1. The influence of mental states on the success of athletes' training activities

As noted in section 2, before training sessions, the athletes' mental state indicators were recorded, which were subsequently analyzed in connection with the success and failure of the training. The study was conducted during the mesocycle.

The results of the study of self-esteem, well-being and mood in highly qualified athletes specializing in kayaking and athletics (long jump, triple jump, sprint) are presented as arithmetic means in table 2.1.

Table 2.1

Indicators of athletes' well-being and mood before successful and unsuccessful training (X±m, n=99; %)

Athletes examined	Sex	Well-being		t p	Mood		t p
	M/F	Successful	Unsuccessful		Successful	Unsuccessful	
Rowers n = 53	M n = 34	77,4 ± 1,20 n = 21	73,3 ± 1,17 n = 13	2,45 ‹0,05	81,4 ± 8,18 n = 21	56,7 ±7,26 n = 13	2,26 ‹0,05
	F n = 19	88,1 ± 3,30 n = 11	78,2 ± 3,40 n = 8	2,09 ›0,05	85,6 ± 7,03 n = 11	64,4 ± 7,56 n = 8	2,10 ‹0,05
Track and field athletes n = 46	M n = 29	78,7 ± 6,24 n = 19	59,3 ± 5,33 n = 10	2,36 ‹0,05	81,4 ± 7,14 n = 19	63,1 ± 6,38 n = 10	1,91 ›0,05
	F n = 17	78,4 ± 5,35 n = 11	61,1 ± 6,20 n = 6	2,11 ‹0,05	85,6 ± 3,38 n = 11	75,0 ± 3,35 n = 6	2,24 ‹0,05

The data obtained on self-assessments of "well-being" and "mood" before successful and unsuccessful training sessions allowed us to identify a certain tendency for self-assessment of well-being and mood to be higher before successful training sessions than before unsuccessful ones, however, the significant spread of individual indicators prompts us to use the z-test of signs to determine the reliability of differences in the state of the same athletes before training sessions of different orientations. The reliability of differences between the indicators of representatives of different sports or different sexes in training of the same success was determined here and further by the Mann-Whitney U-test at a 5 percent significance level.

The obtained data indicate, firstly, that qualified athletes fairly accurately distinguish to what extent their condition corresponds to the tasks facing them, and, secondly, the emotional background (mood) preceding training is no less significant factor in the success

of activity than physical well-being. This allows using self-assessments of well-being and mood to predict the success of the training process, taking into account the individual limits of their fluctuations.

The results of the study of the same contingent of athletes by indicators reflecting activity are presented in Table 2.2.

Table 2.2

Indicators of motor activity of athletes before successful and unsuccessful training (X±m; n=99)

Athletes examined	Sex/ Success	Desire to train (points)	T-Topt/max (relative quantity)	Dynopt/max (conventional units)	BEP (milliamperes)
Rowers n = 53	M/successful n = 21	81,7 ± 4,32	0,53 ± 0,11	0,73 ± 0,051	32,0 ± 4,01
	M/unsuccessful n = 13	63,8 ± 4,23	0,31 ± 0,096	0,55 ± 0,043	44,3 ± 3,86
	Probability level	*t=2,96; p‹0,01*	*t=1,43; p›0,05*	*t=2,72; p‹0,05*	*t=2,33; p‹0,05*
	F/ successful n = 11	92,9 ± 7,26	0,69 ± 0,13	0,68 ± 0,042	40,2 ± 3,75
	F/ unsuccessful n = 8	71,3 ± 7,03	0,58 ± 0,17	0,55 ± 0,038	55,6 ± 4,16
	Probability level	*t=2,10; p‹0,05*	*t=0,18; p›0,05*	*t=2,32; p‹0,05*	*t=2,75; p‹0,05*
Track and field athletes n = 46	M/successful n = 19	86,4 ± 7,05	0,85 ± 0,042	0,84 ± 0,038	49,8 ± 3,81
	M/unsuccessful n = 10	65,6 ± 6,94	0,73 ± 0,038	0,77 ± 0,034	38,6 ± 3,79
	Probability level	*t=2,1; p‹0,05*	*t=2,41; p‹0,05*	*t=1,75; p›0,05*	*t=2,11; p‹0,05*
	F/ successful n = 11	91,4 ± 6,24	0,84 ± 0,037	0,88 ± 0,046	41,5 ± 0,56
	F/ unsuccessful n = 6	75,2 ± 5,33	0,70 ± 0,033	0,74 ± 0,044	39,7 ± 0,52
	Probability level	*t=1,98; p›0,05*	*t=2,86; p‹0,01*	*t=2,33; p‹0,05*	*t=2,34; p‹0,05*

From the analysis of the data in Table 2.2, it becomes clear that representatives of two different sports, as well as women and men, have both similarities and differences in activity indicators before successful and unsuccessful training. Rowers and track and field

athletes have a higher self-assessment of their desire to train - DT (a perceived indicator of the athlete's specific activity) before successful training than before unsuccessful training. At the same time, its decrease, which leads to failure, is more pronounced in men. The same table presents data on motor and vegetative indicators. Motor and vegetative activity indicators show differences due to the characteristics of the activity. Against the background of the general tendency to increase the ratio of optimal efforts and pace to maximum before successful training compared to unsuccessful ones, it becomes noticeable that this attitude is much higher in track and field athletes than in rowers. This is due to the fact that track and field athletes (long jumpers and sprinters) need a more pronounced setting for maximizing the pace of movement and effort before training. Rowers, whose competitive exercises are much longer, also need a setting for economizing effort. This is confirmed by the fact that in male rowers, whose distance is twice as long as in women, the setting for economizing the pace is more pronounced. Even more significant is the difference in the indicator reflecting vegetative activation - in bioelectric potential. In track and field athletes, this indicator is higher before successful training than before unsuccessful ones, and in rowers, on the contrary - lower. This difference is especially clearly manifested in men. This is explained by the fact that high activation contributes to the emergency mobilization of the energy potential of the athlete's body and the actualization of the attitude towards maximizing speed and strength manifestations, which helps to achieve high results in speed and strength exercises, but hinders the manifestations of endurance.

Similar differences can be seen in the indicators of speed and accuracy of self-regulation, which are presented in Tables 2.3 and 2.4.

Table 2.3

Indicators of the speed of self-regulation of motor actions of athletes before successful and unsuccessful training (X±m; n=53)

Athletes examined	Sex/ success	T-Topt/max (relative quantity)		MF (conventional units)		Speed (sec.)	
Rowers n = 53	M/successful n = 21	70,1 ± 0,36		0,128 ± 0,0013		43,4 ± 0,56	
	M/unsuccessful n = 13	69,0 ± 0,31		0,133 ± 0,0015		41,2 ± 0,51	
	Probability level	*t=2,39*	*p‹0,05*	*t=2,63*	*p‹0,05*	*t=2,93*	*p‹0,01*
	F/successful n = 11	71,3 ± 1,71		0,128 ± 0,0014		39,5 ± 0,67	
	F/unsuccessful n = 8	65,4 ± 1,45		0,132 ± 0,0012		41,6 ± 0,72	
	Probability level	*t=2,63*	*p‹0,05*	*t=2,22*	*p‹0,05*	*t=2,16*	*p‹0,05*
Track and field athletes n = 46	M/successful n = 19	80,1 ± 0,52		0,108 ± 0,052		32,8 ± 2,21	
	M/unsuccessful n = 10	78,6 ± 0,56		0,126 ± 0,056		40,2 ± 2,45	
	Probability level	*t=1,94*	*p›0,05*	*t=2,57*	*p‹0,05*	*t=2,25*	*p‹0,05*
	F/successful n = 11	82,1 ± 1,70		0,107 ± 0,067		33,4 ± 1,48	
	F/unsuccessful n = 6	76,3 ± 1,46		0,125 ± 0,072		39,1 ± 1,76	
	Probability level	*t=2,58*	*p‹0,05*	*t=1,85*	*p›0,05*	*t=2,49*	*p‹0,05*

The data in Table 2.3 indicates that in all speed indicators, track and field athletes outperform rowers. This is equally clearly observed in both female and male samples. (This should be noted in order to correctly interpret the indicators of self-regulation speed obtained during psychological control of representatives of speed-strength or "endurance" sports). The data presented in the table also indicates that, against the background of the general tendency to improve speed indicators before successful training sessions compared to unsuccessful ones, significant differences in the maximum speed of movements were recorded only in women of both specializations, and significant differences in reaction time were recorded in track and field athletes, women and men.

Table 2.4

Indicators of the accuracy of self-regulation of motor actions of athletes before successful and unsuccessful training (X±m, n=99)

Athletes examined	Sex/ success	RFA (c)	T-T dos. (relative quantity)	KIN (degrees)	DINopt/max kg	RMO (s)
Rowers n = 53	M/successful n = 21	0,57 ± 0,21	5,6 ± 1,45	4,3 ± 0,51	5,5 ± 0,58	0,028 ± 0,0004
	M/unsuccessful n = 13	1,30 ± 0,27	11,0 ± 1,71	6,6 ± 0,56	3,8 ± 0,50	0,027 ± 0,0003
	Probability level	*t=2,21 p‹0,05*	*t=2,41 p‹0,05*	*t=2,53 p‹0,05*	*t=2,20 p‹0,05*	*t=1,78 p›0,05*
	F/successful n = 11	0,51 ± 0,13	4,3 ± 0,79	3,5 ± 0,65	2,9 ± 0,43	0,027 ± 0,0005
	F/unsuccessful n = 8	0,99 ± 0,15	7,4 ± 0,85	5,7 ± 0,74	4,8 ± 0,52	0,029 ± 0,0005
	Probability level	*t=2,53 p‹0,05*	*t=2,69 p‹0,05*	*t=2,27 p‹0,05*	*t=2,88 p‹0,05*	*t=2,66 p‹0,05*
Track and field athletes n = 46	M/successful n = 19	1,32 ± 0,078	11,9 ± 0,81	8,0 ± 0,28	3,5 ± 0,25	0,021 ± 0,0008
	M/unsuccessful n = 10	1,14 ± 0,083	9,8 ± 0,73	7,4 ± 0,25	4,2 ± 0,28	0,025 ± 0,0009
	Probability level	*t=1,80 p›0,05*	*t=2,04 p›0,05*	*t=1,66 p›0,05*	*t=1,94 p›0,05*	*t=3,33 p‹0,05*
	F/successful n = 11	1,26 ± 0,081	10,0 ± 0,67	3,9 ± 1,17	3,3 ± 0,24	0,028 ± 0,0003
	F/unsuccessful n = 6	1,50 ± 0,080	12,1 ± 0,72	8,0 ± 1,20	4,1 ± 0,29	0,027 ± 0,0003
	Probability level	*t=2,4 p‹0,05*	*t=2,16 p‹0,05*	*t=2,45 p‹0,05*	*t=2,22 p‹0,05*	*t=2,50 p‹0,05*

Rowers are characterized by a greater accuracy of dosing microintervals of time and pace of movements than track and field athletes. In rowers, these indicators differ significantly before successful and unsuccessful training sessions. In women who specialize in rowing and track and field athletics, the accuracy of reproducing a given amplitude of movements is higher before successful training sessions. In rowing, women reproduce given

efforts more accurately than men, and this indicator is better in women before successful training sessions than before unsuccessful ones, and in men - vice versa. Obviously, the tendency inherent in men to maximize efforts affects the magnitude of the error in dosed dynamometry.

The data presented above allows us to identify specific indicators, based on which the pre-activity mental states of representatives of different sports can be differentiated into those that contribute to and hinder success in training. The obtained informative indicators can be divided into three groups.

The first group is indicators whose values before successful training and rowing in speed-strength types of athletics are higher than before unsuccessful ones (self-esteem, well-being, mood, desire to train, ratio of optimal efforts and pace to maximum, frequency of movements in small amplitude, speed of reactions and operational search).

The unidirectionality of the changes in the indicators reflects the general requirements of training sports activities for the mental state of athletes, and the quantitative expression of these changes reflects the special requirements that are imposed on the state of athletes by the specificity of training "for endurance" or "for strength-speed".

The second group combines indicators whose differences before successful and unsuccessful training sessions in rowers and track and field athletes are multidirectional. In rowers, the BEP indicator is lower before successful training than before unsuccessful training, and in track and field athletes, on the contrary, it is higher. Rowers differentiate microintervals of time more accurately before successful training than before unsuccessful training, and representatives of speed and power sports of track and field athletics - vice versa.

The third group is selective and informative indicators.

The accuracy of dosages of the pace of movements in rowers is higher before successful training than before unsuccessful training.

The accuracy of dosage of efforts is higher before successful training only in women who specialize in rowing, and the accuracy of dosage of the pace of movements - in women of both specializations.

Further research into the differences in the signs of the mental state that contribute to or hinder the success of training activities was conducted on qualified acrobats (n = 23) - representatives of the sport, in whose sports activities multidirectional training exercises are combined - jumps on the track and exercises for balance and strength (Table 2.5).

The choice of representatives of these types of sports activities was due to the fact that the former are characterized by the performance of complex coordinated exercises of a coordination orientation, and the latter require the manifestation of balance and strength. It was hypothesized that athletes before training of different orientations will have different optimal mental states. In this regard, the indicators of the mental state of acrobats before successful and unsuccessful jumping and strength training were compared. The determination of success was carried out according to 10 indicators by an expert group: a coach, a psychologist, a researcher.

Table 2.5

Indicators of the psychophysiological states of athletes before successful and unsuccessful training in jumping on the acrobatic track and in group acrobatics (X±m; n=23)

Measured indicators	Training focus				t p	T p	t p	t p	t p	t p
	Jumping		Strength							
	Succ.	Unsucc.	Succ.	Unsucc.						
	1	2	3	4	1-2	1-3	1-4	2-3	2-4	3-4
SPEED										
1	0,136± 0,0002	0,143± 0,0002	0,138± 0,0004	0,139±0 ,0003	1,4 ›0,05	1,8 ›0,05	1,7 ›0,05	1,9 ›0,05	1,7 ›0,05	1,7 ›0,05

Continuation of table 2.5

2	72,7± 0,85	69,3 ± 0,69	76,7 ± 1,20	72,2 ± 1,17	2,7 ‹0,05	2,5 ‹0,05	1,9 ‹0,05	2,3 ‹0,05	2,6 ‹0,05	2,4 ‹0,05
3	30,4 ± 0,67	33,0 ± 0,72	32,6 ± 0,25	33,2 ± 0,28	2,7 ‹0,05	2,1 ‹0,05	3,1 ‹0,01	2,2 ‹0,05	2,4 ‹0,05	1,7 ›0,05
ACCURACY										
4	10,3± 0,42	9,2± 0,38	6,7± 1,23	11,6± 1,14	2,0 ›0,05	3,1 ‹0,01	2,6 ‹0,05	3,3 ‹0,01	2,1 ‹0,05	2,9 ‹0,01
5	0,67± 0,18	0,72± 0,19	0,83± 0,16	0,47± 0,22	1,9 ›0,05	1,8 ‹0,05	1,9 ›0,05	2,0 ›0,05	1,9 ›0,05	2,5 ‹0,05
6	0,027± 0,004	0,038± 0,003	0,042± 0,003	0,044± 0,003	1,3 ›0,05	1,6 ›0,05	2,0 ›0,05	1,7 ›0,05	2,1 ‹0,05	1,8 ›0,05
7	3,8± 0,84	4,1± 0,91	2,0± 0,36	4,2± 0,44	2,5 ‹0,05	2,8 ‹0,01	1,5 ›0,05	2,2 ‹0,05	2,2 ‹0,05	2,8 ‹0,01
8	1,3± 0,21	2,6± 0,27	1,9± 0,04	1,6± 0,03	2,1 ‹0,05	1,9 ›0,05	3,1 ‹0,01	1,8 ›0,05	1,9 ›0,05	1,8 ›0,05
STABILITY										
9	38,5± 0,17	58,9± 0,18	68,6± 8,17	46,0± 7,28	1,9 ›0,05	2,1 ‹0,05	2,3 ‹0,05	2,7 ‹0,05	2,6 ‹0,05	2,7 ‹0,05
10	0,025± 0,004	0,042± 0,005	0,031± 0,003	0,032± 0,002	2,5 ‹0,05	1,9 ›0,05	2,2 ‹0,05	2,5 ‹0,05	2,1 ‹0,05	2,5 ‹0,05
11	0,047± 0,003	0,060± 0,002	0,056± 0,004	0,057± 0,003	2,6 ‹0,05	2,0 ›0,05	2,1 ‹0,05	2,6 ‹0,05	2,6 ‹0,05	1,8 ›0,05
ACTIVITY										
12	46,4± 2,46	37,7± 2,20	32,2± 2,22	40,3± 2,41	2,4 ‹0,05	2,8 ‹0,01	2,9 ‹0,05	3,0 ‹0,01	2,3 ‹0,05	2,5 ‹0,05
13	0,772± 0,033	0,660± 0,036	0,687± 0,0003	0,679± 0,0004	2,6 ‹0,05	2,1 ‹0,05	1,5 ›0,05	2,2 ‹0,05	2,5 ‹0,05	2,6 ‹0,05
14	0,568± 0,035	0,554± 0,030	0,854± 0,027	0,439± 0,021	2,5 ‹0,05	2,9 ‹0,01	2,8 ‹0,01	2,0 ›0,05	2,5 ‹0,05	2,5 ‹0,05
SELF-ASSESSMENT										
15	75,2± 0,73	62,6± 0,81	75,4± 2,45	67,1± 2,21	2,5 ‹0,05	1,9 ›0,05	2,5 ‹0,05	2,4 ‹0,05	2,7 ‹0,05	2,4 ‹0,05
16	79,9± 2,18	69,1± 2,23	76,4± 0,43	74,8± 0,51	2,9 ‹0,01	2,5 ‹0,05	2,8 ‹0,01	2,4 ‹0,05	2,0 ›0,05	2,4 ‹0,05
17	80,6± 0,72	78,3± 0,67	84,2± 8,18	78,4± 7,25	2,4 ‹0,05	2,2 ‹0,05	3,0 ‹0,01	2,5 ‹0,05	3,1 ‹0,01	2,7 ‹0,05
18	36,8± 3,70	48,5± 3,79	42,1± 1,76	35,6± 1,48	2,2 ‹0,05	2,5 ‹0,05	2,1 ‹0,05	2,7 ‹0,05	2,6 ‹0,05	2,8 ‹0,05

Note: 1 – SMRT (s); 2 – T-Tmax. (conventional units.); 3 – PA (sec.); 4 –T-T dose (c.u.); 5 – RT (sec); 6 – RMO (sec); 7 – Dyndose. (kg); 8 – KIN (cm); 9 – P-a (c); 10 – RTv (sec); 11 – РДО (p); 12 – ВЕР (ма); 13 - T-Topt /max (conventional units); 14 – Dynopt/max (c.u.); 15 – well-being (WB); 16 – Mood (M); 17 – desire to train (DT); 18 – situational anxiety (SA).

In order to detect physiological and mental changes in the subjects, the following methods were used: time assessment, simple motor reaction, which was determined by the maximum rate of movements at low amplitude (tapping test) and operational search time.

The time of simple motor reaction (SMRT) to a sound stimulus was determined using an electric stopwatch PV-53L with a division value of 0.01 s.

The maximum tapping test (T-T max) was studied using a pulse counter. The subject must perform movements at low amplitude for 10 s at the fastest possible pace.

The dosed tapping test (T-T dose) was determined in the same way as the T-T max., but the subject was given the task of performing half of the maximum pace as accurately as possible in 10 s.

The reaction to time (RT) was determined in the following way: the athlete had to measure 7 s by looking at the stopwatch. After that, it was necessary to reproduce this time without visual control three times. The average deviation from the given interval was taken into account.

The reaction to a moving object. (RMO) was measured using an electric stopwatch. This was done as follows: looking at the stopwatch dial, the athlete had to stop the needle exactly at the 0.7s mark. 7 qualifying attempts were made and the average was counted.

Dosed dynamometry (DD) was determined using a DPR-120 dynamometer. The subject had to, looking at the scale, bring the dynamometer needle to 30kg, and then reproduce this effort three times without given control.

Kinematometry (Kin) was used to identify the degree of accuracy in reproducing spatial angles during movement in the elbow joint. Using the Zhukovsky kinemometer, the subject with closed eyes performed a movement of a given amplitude, after which he repeated this task seven times.

Romberg test (RT): the time of maintaining balance during the performance of various motor actions with open and closed eyes was determined.

The variance of the reaction time (RTv) was determined by the difference between the fastest and slowest reaction.

The variance of the reaction to a moving object (VROm) was determined by the magnitude of the largest deviation from the mark that was determined.

The ratio of the values of the optimal (convenient) number of movements of small amplitude in 10s to the maximum indicator for the same period of time (T-Topt / max) was also determined.

The ratio of the optimal (comfortable) effort to the maximum was also determined (Dynopt / max).

Indicators of the perceptual activity of athletes, which are components of the operational search, were determined using Schulte tables (PA). The time of counting four tables was recorded.

To diagnose the mental state of an athlete, in addition to psychomotor indicators, his conscious and vegetative manifestations were determined. To assess the conscious components of the mental state, a self-assessment scale, a "protractor", was used. This method was used to determine the degree of manifestation of well-being, mood and desire to train. Diagnosis of situational anxiety was carried out using the Spielberger and Khanin method. And to assess the vegetative component of the psychological state, the bioelectro-potentiometry (BEP) method was used. Quantitative data were processed statistically [73]. The results obtained show that among the indicators related to the speed of self-regulation of acrobats, that is, the speed of operational search (with perceptual activity) (PA) is significantly better before successful jumping training in acrobats (30.4 c.u.) than before successful training in strength-acrobats (32.6 c.u.). At the same time, this same indicator is better before successful

jumping training than before their unsuccessful jumping training (respectively, 30.4 and 33.0 c.u.; $p < 0.05$). This means that the speed of receiving and processing visual information is a necessary condition for successful execution of jumps on the acrobatic track. In other words, a faster sensorimotor reaction before a successful jumping training than before an unsuccessful one probably reflects the difference in the functional state of the athletes' CNS in these situations. This is objectively confirmed by the motor reaction time, namely: this indicator is the best before jumping training (0.136 c.u.), which is, firstly, and, secondly, it is smaller than the reaction time indicators before performing strength exercises.

After analyzing the training of strength-acrobats, we have the greatest result in terms of maximum accuracy of movements (0.83 s, $p<0.05$) under the condition of successful training. That is, to perform exercises in group acrobatics, maximum accuracy and caution of movements are necessary. This is because the necessary condition for success in group acrobatics is the accuracy of movements, and therefore athletes tune in to accuracy before performing them. And if their self-regulation is at a high level, success in training is achieved. In the absence of a concentrated mood for maximum accuracy of movements, training is unsuccessful (0.47 c.u..; $p<0.05$).

The activity of reproducing the amplitude of movements is also determined by the quality of their self-regulation by the athlete. Thus, the adequacy of the perception of amplitude and effort is best before successful training of acrobats-forcers (1.9 cm; $p<0.05$), and the error of reaction to a moving object is the smallest before successful performance of jumping exercises (0.027 s, $p<0.05$).

The most important indicator for success in training acrobats-forcers was the time of maintaining static equilibrium (Romberg test). As found in the experiment, before successful training it is equal to 68.6 s ($p<0.05$), and before unsuccessful training – 22.0 s less ($p<0.05$).

At the same time, in acrobatic jump training this indicator has an insignificant value and is equal to 45.2 s. with successful training and 38.5 s with unsuccessful training ($t=2.3$; $p<0.05$). That is, the indicators of the time of maintaining static equilibrium should be used to diagnose the success of performing exercises in group acrobatics. The same pattern applies to the use of an indicator that shows the error in reproducing a given effort.

The smallest error was registered in acrobats-forcers before successful training - 2.0 kg ($p<0.01$) and, accordingly, 4.2 kg ($p<0.01$) before unsuccessful training.

An equally important characteristic of movements is their stability of execution. For example, the difference between the largest and smallest reactions to a moving object in time makes it possible to diagnose the success of acrobatic jumps in athletes. Before successful training, this indicator is the smallest 0.025 s, and before unsuccessful training - a high 0.042 s ($p<0.05$). At the same time, in the training of these same athletes, when they perform strength exercises, the difference between these indicators before successful and unsuccessful training is as small as 0.01 s.

The activity of motor activity, which is adjusted by the process of self-regulation and the corresponding setting for its specific conditions, also changes differently and is not equivalent in acrobats during jumps and balance exercises. Thus, the indicator of the ratio of the optimal pace of movements to the maximum, which means the athlete's setting for the speed of movements, is more informative before training in jumping on the acrobatic track. Before successful training it is equal to 0.787 conventional units, and before unsuccessful training it is 0.669 conventional units ($p<0.05$).

At the same time, the change in this indicator before jumping training is insignificant, and its difference before successful and unsuccessful training is only 0.008 conventional units.

The bioelectric activity of the skin of athletes can be used to diagnose success before jumping training, because in this case it is the greatest. A decrease in this indicator means that the athlete has a weak setting for performing acrobatic jumps. In such a situation, training in balance strength exercises will be much more beneficial, since their successful performance requires insignificant indicators of bioelectrical activity: 32.2 mA, $p>0.05$.

Indicators of self-esteem of mental states are also of significant importance in predicting the success of training. For example, for jumping on the track, it is important that the athlete's mood has high self-esteem. In our study, successful training is accompanied by a score of 79.9 points ($p<0.01$), and unsuccessful training is accompanied by a score of 69.1 points. That is, if the acrobat is not in the mood to master jumping exercises, it is better for him to learn the technique of strength exercises.

A decrease in self-assessments of physical well-being and desire to train is informative for diagnosing success in both acrobatic exercises in a group and in jumping training. With low scores on these states, successful training cannot be expected. Such a state as desire to train is especially important: before unsuccessful training of jumpers in our study, this indicator was 68.3 points, and before successful training - 80.6 points ($p<0.05$), that is, almost 12.3 points more.

Regarding situational anxiety, it can be noted that the indicators differ in all situations that we analyzed. Although the fact of a lower level of anxiety before successful jumps on the track (36.8 points) than before unsuccessful ones (48.5 points, $p<0.05$) is important. At the same time, for success in strength training, a certain "average" level of anxiety is required, since before successful training in our study we received situational anxiety scores of 42.03 points, and before unsuccessful training – 35.6 points ($p<0.05$).

It should be emphasized that the indicators of bioelectric potentials of the skin of athletes and situational anxiety, which are

a reproduction of their emotional tension, are in contradiction: anxiety decreases before successful jumps, and bioelectric potentials, on the contrary, in this case increase. The presence of this contradicttion, from our point of view, can be explained by the fact that the necessary level of emotional mobilization of athletes is achieved due to different mechanisms of its activation.

Further research into the differences in the signs of the mental state that contribute to or hinder the success of training activities was conducted on qualified acrobats – representatives of a sport that combines multi-directional training sessions – training in jumping on an acrobatic track and power acrobatics.

The first are characterized by the performance of complex coordinated exercises, the second - exercises that require a predominant manifestation of accuracy and static balance. If the facts established by us about the dependence of the peculiarity of the pre-activity state on the specificity of sports exercises really take place, then we can expect that the signs of the optimal mental state of acrobat athletes before performing the same exercises on the carpet or on the track will be different. To verify this assumption, a comparison of the mental state indicators of acrobats-powerlifters and jumpers before successful and unsuccessful performance of jumping and power exercises was devoted, the results of which are given in Tables 2.6 and 2.7.

The different dependence of the success of acrobatic jumps and static exercises on the indicators of situational anxiety and bioelectropotentiometry indicators also reflects emotional tension, they allowed us to assume that when performing sports exercises of different orientations, mobilization is necessary, which is provided by different activation mechanisms.

Table 2.6

Significant differences in the mental state of acrobats-security officers before training of different orientations and success rates (by z-test of signs, p<0.05)

Indicators	Significant differences before training			
	Jumping	Strength	Successful	Unsuccessful
	Successful-unsuccessful	Successful-unsuccessful	Jumping-strength exercises	Jumping-strength exercises
SMRT	+			
T-Tmax		+		
PA	+		+	
T-T dose		+		
RT		+	+	
RMO	+		+	
Dyndose		+		
KIN	+		+	
Romb. test	+		+	+
RTv	+		+	
РДОр	+		+	
BEP	+		+	
T-T opt/max		+	+	
Dynopt/max	+	+		+
Well-being		+		
Mood	+			+
Desire to train		+		+
Situative anxiety	+	+	+	+

This assumption was tested by studying the level of situational and personal anxiety (the ratio of the indicator obtained before training to the background) before successful training in 76 young men specializing in various sports (Table 2.7).

Table 2.7

Indicators of situational and personal anxiety in young athletes before successful training (in points, X±m, n=76)

Sport	Amount of people	Situative anxiety	Personal anxiety	Probability level	
				t	p
Swiming	21	49,6±5,33	30,4±6,24	3,4	<0,05

Continuation of Table 2.7

Academic rowing	19	49,0±5,10	30,2±4,31	2,8	<0,01
Basketball	12	38,4±2,54	47,6±2,76	2,5	<0,05
Acrobatic jumps	11	38,7±2,21	47,2±2,45	2,7	<0,01
Box	13	36,5±3,7	48,1±3,8	2,2	<0,05

In table 2.7. attention is drawn to the highest indicators of optimal, i.e. necessary, adequate to the requirements of activity, situational anxiety in swimmers and rowers (4.90 and 4.96 points) with significantly lower indicators in other athletes. If we take into account that swimmers reach higher sports skills earlier than representatives of other sports listed in table 3.7, and that their training requires correspondingly large energy and, therefore, emotional and volitional costs, it becomes clear that they need to generate significant emotional excitement not only before the competition, but also before training. Such excitement (and situational anxiety is its conscious component) contributes to mobilization for future heavy motor activity and, therefore, in this case can be considered a sign that positively affects the success of training activity. Rowers are also representatives of the "endurance" sport, and the increase in situational anxiety before training has the same significance for them as for swimmers. Basketball players, boxers and jumpers on the acrobatic track are characterized by significantly smaller shifts in the background values of situational anxiety before training. One could assume that for representatives of these (speed-strength and complex coordination) sports, emotional arousal before successful training activities is not so important, but this assumption is not supported by the data on personal anxiety before successful training, it is high for them.

According to table 2.7. it is clear that a significant increase in personal anxiety before successful training is observed in boxers, basketball players and jumpers on the acrobatic track, while in rowers and swimmers it practically does not differ from the background.

Thus, it can be noted: the dynamics of personal anxiety indicates that increased activation, which is associated with emotional arousal, is more adequate for the training activity of those athletes who have a low level of situational anxiety before training and, conversely, is not needed by those who have a high level.

This contradiction can be explained based on an understanding of the specifics of different sports. In swimming and rowing, "endurance" activity requires significant and prolonged energy expenditure. This requirement determines the need to economize energy potential before and during training. On the other hand, the conditions of activity of swimmers and rowers are characterized by monotony, unconnected with risk and emotionogenic factors. On the contrary, in boxers, acrobatic jumpers and basketball players, "explosive" activity is associated with various emotionogenic factors.

Obviously, all athletes need to generate a certain level of emotional arousal before training in order to successfully solve the tasks set before them, higher than in normal (background) conditions, which contributes to sufficient activation and mobilization of all systems that provide motor activity. However, this activation in swimmers and rowers is achieved due to the conscious component of emotional arousal - anxiety, the further growth of which is not expected, due to the training conditions, with simultaneous economization of the vegetative component of emotional arousal, the expenditure of which is mandatory in the process of their activity. Boxers, acrobatic jumpers and basketball players often and necessarily have situations in training that cause anxiety. Therefore, they "save" the conscious component of emotional arousal in advance, and achieve the necessary level of mobilization due to the vegetative component.

The role of emotional arousal as a factor in the success of sports training becomes even more obvious with repeated observation of each specific athlete. The comparison of the vegetative component of emotional arousal (personal anxiety), recorded before each jump with

self-assessment of performance on a 10-point scale, in jumpers on the acrobatic track showed that a positive correlation was established between the indicators of personal anxiety and the results of the jumps ($r = 0.435$ at $p < 0.05$).

Figure 2.1 shows as an example the regression relationship between the value of the indicator of personal anxiety and the quality of the jump performance of a high-class athlete which was evaluated in points (regression equation: $y = 101 - 46.2 x + 8.74 x2$). The figure demonstrates that increasing activation to a certain level contributes to an increase in the probability of successful attempts. With low relative to the background indicators of personal anxiety, the effectiveness of training should be low. Unsuccessful attempts can also occur with excessive excitement.

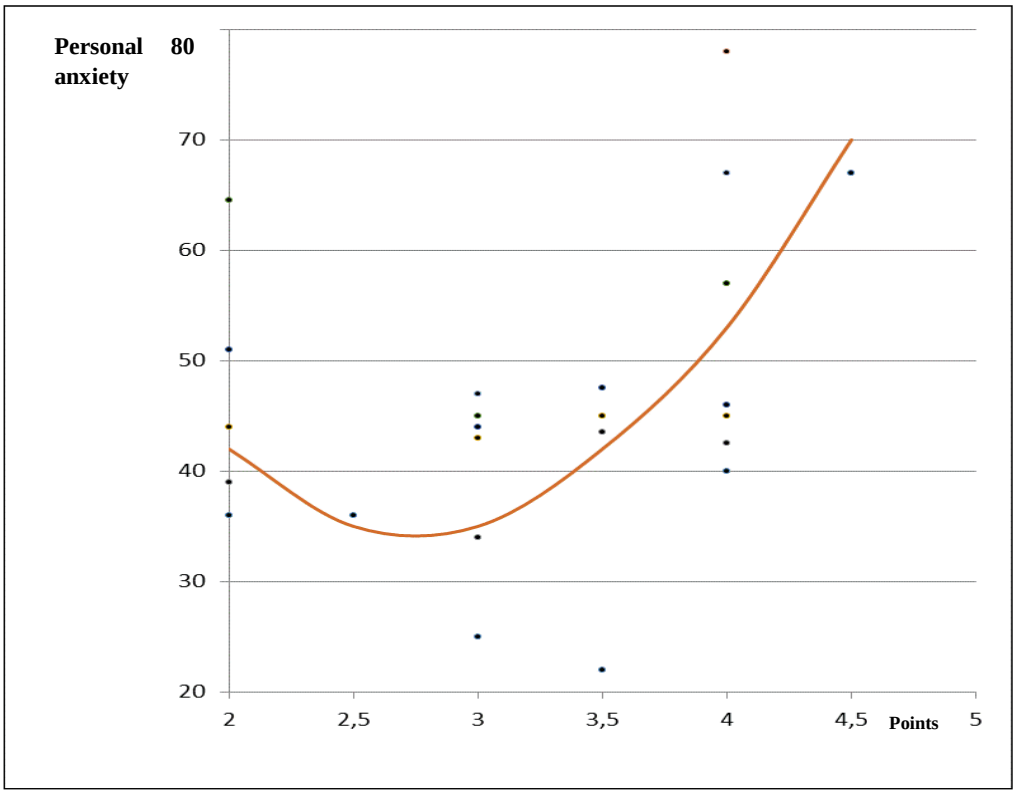

Fig. 2.1. The relationship between BEP and self-assessment of the success of performing jumps on the acrobatic track in athlete

Comparison of the signs of the mental state that contribute to the success of training activities in sports with a predominant manifestation of strength and balance and with a predominant

manifestation of speed and coordination qualities allows us to assume that the emotional arousal adequate to the requirements of the activity is provided in the former at the expense of the psychological (conscious) component itself, and in the latter - at the expense of the psychophysiological (vegetative) component.

In addition, the data obtained allow us to state that the informativeness of motor (psychomotor, sensory-perceptual) indicators of the mental state as signs that contribute to or hinder the success of the activity in the training process is due to the specifics of this activity.

2.2. Signs of mental states of athletes that affect the realization of the maximum result

The mental state of athletes associated with the realization of the maximum result was studied by us in natural conditions of activity - in control training, during test pedagogical examinations of athletes and in laboratory conditions.

In the previous section, data were presented that indicate that for the successful performance of sports actions of a speed-power orientation, a high level of activation is required, which is determined by the bioelectropotentiometry indicator. But in the studies described above, this indicator was compared with the success of training or sports actions that were not necessarily performed, with the maximum use of all the capabilities of athletes. To clarify the influence of the vegetative component of the mental state on the result of speed-power action, in which the athlete strives to achieve the maximum result, a study was conducted during pedagogical testing of highly qualified acrobats engaged in strength exercises and must perform jumping exercises on an acrobatic track.

The test of their special preparedness was a jump up from a place (according to Abalakov) in full coordination and with the exclusion of active hand work.

The results of the study are presented in table 2.8.

From the data of table 2.8. it is clear that the BEP before jumps significantly exceeds the background values. Before jumps with the exclusion of "work" with hands, the increase in BEP indicators is higher than before jumps "in full coordination". This is explained by the fact that for the highest possible jump without the help of hands, great mobilization is necessary, and therefore a higher level of excitement. Before successful jumps in both cases, the BEP is somewhat higher than before unsuccessful ones.

Table 2.8

Indicators of increase (relative to the resting state) of BEP and height of jump up in acrobats-jumpers (X±m; n=23)

Name of the exercise	Qualitative assessment of the jump	BEP (ma)	Jump up (cm)
Jumps with full coordination	Successful Unsuccessful	1) 1,61 ± 0,042 2) 1,50 ± 0,036	70,3 ± 4,01 64,6 ± 3,40
Jumps without active hand work	Successful Unsuccessful	3)1,77 ± 0,038 4)1,61 ± 0,033	58,6 ± 3,86 56,0 ± 3,31
Probability level		t – p (1-3) 2,85 ‹0,01 t – p (2-4) 2,39 ‹0,05	t – p (1-3) 2,21 ‹0,05 t – p (2-4) 1,83 ›0,05

Thus, it can be argued that one of the factors of the mental state that contributes to the realization of the maximum result of a short-term motor action of a speed-power nature is the vegetative component of emotional arousal, the level of which is determined, among other factors, by the specificity of the motor action itself.

But the results of the study of the performance of actions of a speed-power nature cannot be transferred to actions associated with the predominant manifestation of endurance.

In order to determine the indicators of the state of athletes that are informative, that is, make a real contribution to the success of "endurance work" performed "until failure", a laboratory experiment was conducted.

The role of the vegetative component of emotional arousal in the activity of a speed-power orientation was revealed in a ascertaining natural experiment.

The experiment was attended by 23 qualified acrobat jumpers who performed a standing jump (according to Abalakov) during pedagogical testing in full coordination and with the exclusion of hand work. This test is an indicator of special preparedness for them. Before each attempt, the bioelectropotentiometry indicator was recorded and the attitude towards achieving the maximum result was stimulated. After each attempt, the jump height was measured. During the experiment, each athlete performed 10 jumps (2 x 5). Jumps were divided into the best (exceeding the average indicators for each particular athlete) and the worst (not reaching the average values).

To study the signs of the mental state that contributes to achieving maximum results in "endurance work", a laboratory experiment was held. 47 young athletes (29 boys and 18 girls) took part in it. The subjects were asked to perform work on a bicycle ergometer until failure with a conditional pedaling speed corresponding to 40 km / h. Every minute the load increased by 10 kg at a constant pedaling pace. Throughout the work on the bicycle ergometer, the subjects recorded BEP, and before and after the load, the conscious and motor components of the mental state and the tone (tension, relaxation, calm) of the biceps brachii muscle, which is not directly involved in the work on the bicycle ergometer. Therefore, a change in its tone reflects not local fatigue, but a change in the functional state of the body.

The following parameters were used to assess the success of the activity: power divided by a kilogram of the athlete's body weight, and the duration of the work.

As indicators of the perceived components of the mental state, self-assessments were used: well-being (before and after the load); mood (before and after the load); desire to perform the task; forecast

of full use of one's capabilities; importance of completing the task; how much one managed to use one's capabilities; satisfaction with the work performed. In addition, situational anxiety was determined in all subjects before the load. To assess the motor manifestations of the mental state, the following were recorded: simple motor reaction time to a sound signal (RT); choice reaction time (CRT); maximum tapping test (T-Tmax); optimal tapping test (T-Topt); ratio of optimal tapping test to maximum (T-Topt/max); maximum effort during manual dynamometry (Dynmax); comfortable effort during manual dynamometry (Dynopt); ratio of comfortable effort to maximum (Dynopt/max).

To assess the vegetative components of the mental state, the following were used:

1) bioelectropotentiometry before work (BEP);
2) maximum bioelectropotentiometry (BEPmax) - the largest value of the indicator recorded during the work process;
3) bioelectropotentiometry at the end of work (BEPend);
4) the time of reaching BEPmax was recorded;
5) the tone of the biceps muscle at rest (MT);
6) tension tone: (MTH);
7) relaxation tone (MTP);
8) the difference between tension and relaxation tone - amplitude (A-1);
9) the difference between tension and rest tone - amplitude (A-2).

All empirical indicators were subjected to mathematical processing (separately for the sample of men and women).

Reliable correlations of psychological, psychophysiological indicators with indicators of activity performance are presented in Table 2.9. The results obtained indicate that, firstly, various indicators of the athletes' condition correlate with power and duration of work and, secondly, that sexual dimorphism affects the relationship between the studied indicators.

Table 2.9.

Indicators that reliably correlate with the data on the performance of athletes in the process of laboratory research (h)

№ з/п	Indicators	Men (n=29)		Women (n=18)	
		Power	Time of work	Power	Time of work
		Per 1 kg of body weight		Per 1 kg of body weight	
1.	Mood (before exercise)	0,363			
2.	Situative anxiety	-0,453			
3.	Dyn_{max} (before exercise)	-0,407		-0,562	0,521
4.	Dyn_{opt} (before exercise)	-0,367			0,724
5.	Time of reaching maximum BEP		0,743		0,499
6.	Self-assessment of readiness to fully realize one's potential				0,613
7.	Self-assessment of willingness to perform tasks				0,460
8.	The need to show high results				0,553
9.	Dyn_{max} (after exercise)	-0,354	0,433	-0,597	0,550
10.	Dyn_{opt} (after exercise)	-0,455			0,632
11.	Wellbeing (after exercise)			-0,472	
12.	Satisfaction with the achieved result				0,468
13.	Self-assessment of the level of realization of one's capabilities				0,714

Note: at $p<0.05$, the required correlation coefficient value is $r\leq0.349$ for men; $r\leq0.433$ for women.

In men, self-assessment of mood before the start of the activity is positively correlated with work capacity (r=0.363), and negatively - situational anxiety and dynamometry indicators before and after work (r=-0.453; r=-0.407; r=-0.354). The time to achieve the maximum BEP value (r=0.743) and the magnitude of maximum effort after work (r=0.433) are positively correlated with the duration of work.

In women, only the indicators of maximum effort before and after work (r=-0.562; r=0.597) and the assessment of well-being after completing the task are negatively correlated with power. There are more correlations with the duration of work: here there are positive reliable connections not only with the maximum and optimal effort during manual dynamometry (r=0.521; r=0.724), but also with self-esteem, reflecting the attitude and attitude to future work (desire to complete the task (r=0.460), awareness of the importance of its implementation (r=0.613), confidence in the ability to use one's capabilities (r=0.460)), assessment of performance (satisfaction with work (r=0.468), full use of one's capabilities in it (r=0.714)), as well as with the time of achieving maximum BEP activity (r=0.499).

Analysis of the listed correlations indicates that the power of work per kilogram of body weight is not realized by athletes, and the duration of work is consciously assessed by them.

In factor analysis (Fig. 2.2.A and 2.2.B) in men, the first factor (21.1% of the total variance) included all self-assessment indicators, maximum BEP and BEP after work, but did not include performance indicators. However, when homogeneous samples were formed for this factor, which we interpreted as “self-assessment of state and activity”, i.e. subjects who made positive and negative “contributions” to this factor were selected, it turned out that the work power of those who had higher self-assessments of state and higher bioelectrical activity during and at the end of work showed greater power per kilogram of body weight (V = 41, p = 0.01 by the Mann-Whitney test).

In women, the first factor (23.7% of the total variance) together with all self-assessments included the indicator of the duration of work.

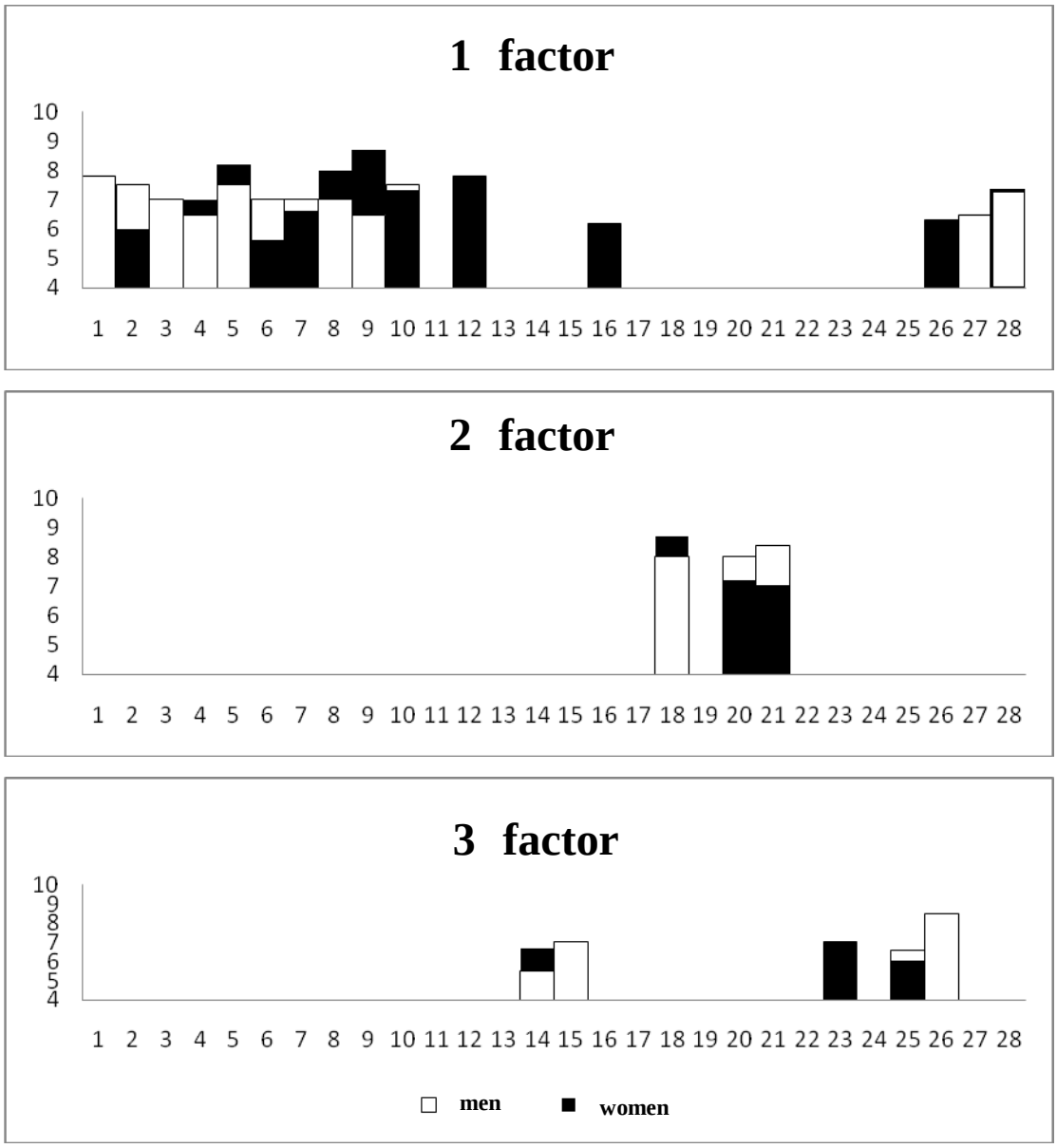

Fig. 2.2.A. Results of factor analysis of the complex of indicators obtained in the study of young athletes (before loading)

Note: 1 - well-being before the exercise; 2 - mood before the exercise; 3 - desire to complete the task; 4 - self-assessment "Will I be able to fully use the opportunities", 5 - self-assessment "It is important for me to show the result", 6 - readiness for the competition; 7 - well-being after the exercise; 8 - mood after the exercise; 9 - self-assessment "How much did I manage to use the opportunities"; 10 - satisfaction with the achieved result; 11 - BEP at the beginning of the work; 12 - duration of work; 13 - power per 1 kg of body weight; 14 - situational anxiety; 15 - competitive personal anxiety; 16 - choice reaction time;

17 - tone of the biceps muscle at rest; 18 - tone of tension; 19 - tone of relaxation; 20 - amplitude of tone 1; 21 - amplitude of tone 2; 22 - maximum tapping test; 23 - optimal tapping test; 24 - opt / max tapping test; 25 - maximum dynamometry; 26 - optimal dynamometry; 27 - maximum BEP; 28 - BEP at the end of work).

All of the above allows us to note that not individual self-assessments of the state, but their general positive orientation has a stimulating effect on the performance of the test load. BEP indicators are also indicators of physical performance. Of the psychomotor indicators, only the maximum and optimal effort during manual dynamometry were associated with the physical performance of young athletes.

The second factor in both boys and girls (12.9 and 13.8% of the total variance, respectively) included indicators of muscle tone. Of great interest is the third factor (11.3% in boys and 12.4% in girls). In boys, it included two indicators of anxiety: situational and competitive personal anxiety and two indicators of dynamometry - Dynmax and Dynopt, which reflect, in addition to the efforts themselves, also the motor attitude towards their maximization.

In girls, this factor, in addition to competitive personal anxiety and Dynmax, also included T-Topt, the increase of which indicates an active motor attitude. This allows us to interpret the third factor as "anxiety" and state that before the test load, the attitude towards increased motor activity is more clearly manifested in more anxious young athletes.

The almost complete coincidence of the factor structure of the indicators in boys and girls in this case indicates the vagueness of the influence of sexual dimorphism on the relationship between the parameters of mental, functional state and physical performance, and also confirms the non-randomness of the presented factor structure.

The factor structure of the studied parameters after the load (Fig. 2.2.B) allowed us to assert that the first factor (25.5% - girls and

20.6% - boys) almost completely coincides with the first factor "before the exercise" (Fig. 2.2.A). The third factor is noteworthy, which in both boys (11.2%) and girls (12.4%) includes BEP indicators: initial with a sign (-), maximum and final with a sign (+).

This indicates that a low level of arousal at the beginning of physical activity contributes to the development of significant arousal by the end of this work, when such arousal is necessary, because it, in turn, contributes to the mobilization of all body systems participating in the work.

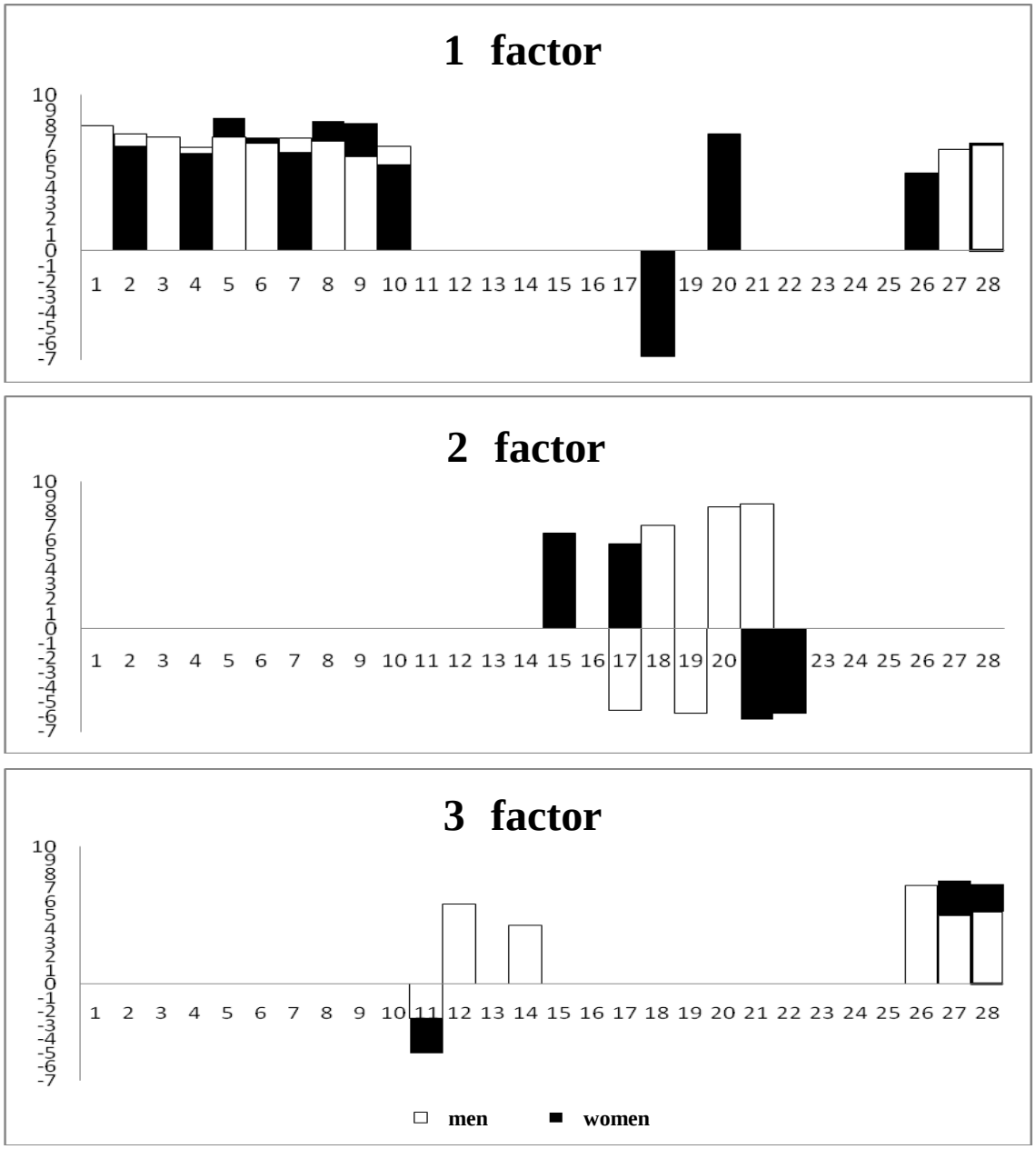

Fig. 2.2.B. Results of factor analysis of the complex of indicators obtained in the study of young athletes (after loading)

Note: 1 - well-being before the exercise; 2 - mood before the exercise; 3 - desire to complete the task; 4 - self-assessment "Will I be able to fully use the opportunities", 5 - self-assessment "It is important for me to show the result", 6 - readiness for the competition; 7 - well-being after the exercise; 8 - mood after the exercise; 9 - self-assessment "How much did I manage to use the opportunities"; 10 - satisfaction with the achieved result; 11 - BEP at the beginning of the work; 12 - duration of work; 13 - power per 1 kg of body weight; 14 - situational anxiety; 15 - competitive personal anxiety; 16 - choice reaction time; 17 - tone of the biceps muscle at rest; 18 - tone of tension; 19 - tone of relaxation; 20 - amplitude of tone 1; 21 - amplitude of tone 2; 22 - maximum tapping test; 23 - optimal tapping test; 24 - opt / max tapping test; 25 - maximum dynamometry; 26 - optimal dynamometry; 27 - maximum BEP; 28 - BEP at the end of work)

Thus, the results of laboratory research of young athletes allow us to name the following as informative indicators (signs) of the mental state, which contributes to achieving maximum results in "endurance work":

1) self-assessment of mood, well-being, desire to show a good result, the needs for its achievement - one-directional and quite high (75% and above the maximum);
2) maximum and optimal dynamometry - values that do not exceed the background or do not even reach them before and after loads;
3) BEP - background or lower values before loads, the duration of time to reach the peak of the indicator during loads, a high indicator after loads.

Further research into the factors of athletes' condition that contribute to and hinder the achievement of maximum results in "endurance work" was conducted in natural conditions (during the training camp) of highly qualified kayak and canoe rowers, where their comprehensive examination was carried out.

The next stage of considering the relationships between the studied parameters was factor analysis.

Figure 2.3 presents the indicators of the studied parameters with significant weights, which were included in three factors and made up 44.8% of the total variance.

The first factor (17.7% of the total variance) is interpreted by us as "success of activity", since it includes parameter 1. Consideration of this factor indicates that success in achieving maximum results in kayaking and canoeing is associated with the oxygen utilization rate, with high self-esteem, with indicators of the optimal pace of movements, reflecting the active motor setting that was before the activity.

The second factor (14.4% of the variance) includes three indicators that characterize the state of the respiratory system, GAD, BEP and CR. This factor is called "functional state". Consideration of the indicators included in it confirms the position expressed during the analysis of the results of the bicycle ergometric experiment with young athletes that a relatively low initial level of BEP is an informative indicator of a favorable state before "endurance work". Another such indicator was a short time of simple sensorimotor reaction, which confirms numerous data on the connection of CR with the functional state of athletes.

The third factor (12.7% of the variance) is interpreted as "activity", since it consists of indicators of satisfaction with training - specific activity and errors in reproducing a microinterval of time and a given effort with signs corresponding to a faster countdown of time and exceeding the required effort, which, according to numerous literary data, is also associated with increasing arousal or activity.

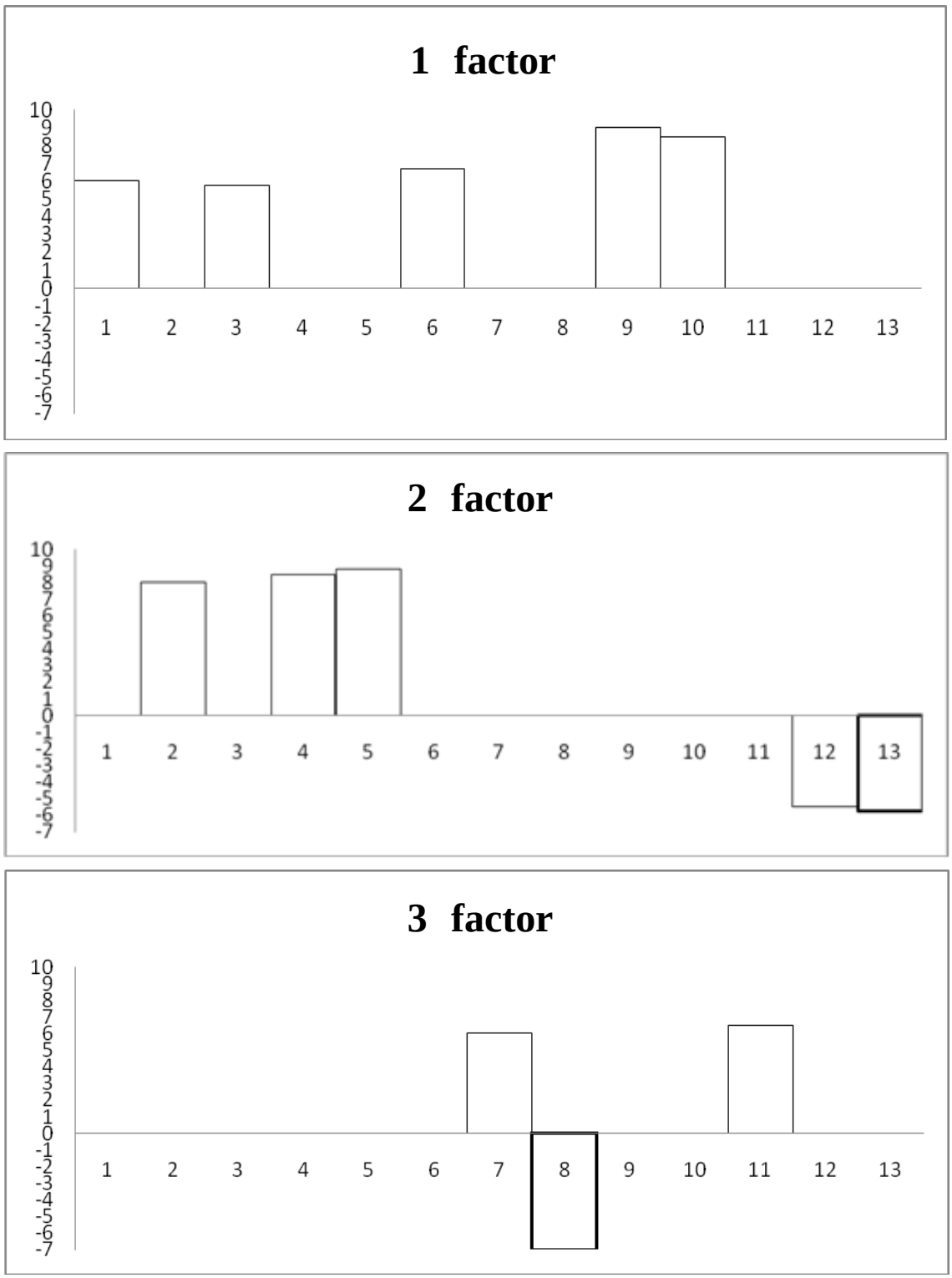

Fig. 2.3. Significant factor weights of indicators of the mental state of athletes obtained before the load, indicators of the success of their activities and functional state

Note: 1 - pedagogical assessment of performance; 2 - MVB; 3 - O2U; 4 - O2/kg; 5 - O2P; 6 - MOOD; 7 - ST; 8 - VRNnl; 9 - T-Topt; 10 - T-Topt / макс; 11 - Din; 12 - RT; 13 – BEP

A different factor structure of the same indicators was revealed when all of them were obtained immediately after completing the competitive distance (Fig. 2.4, 2.5).

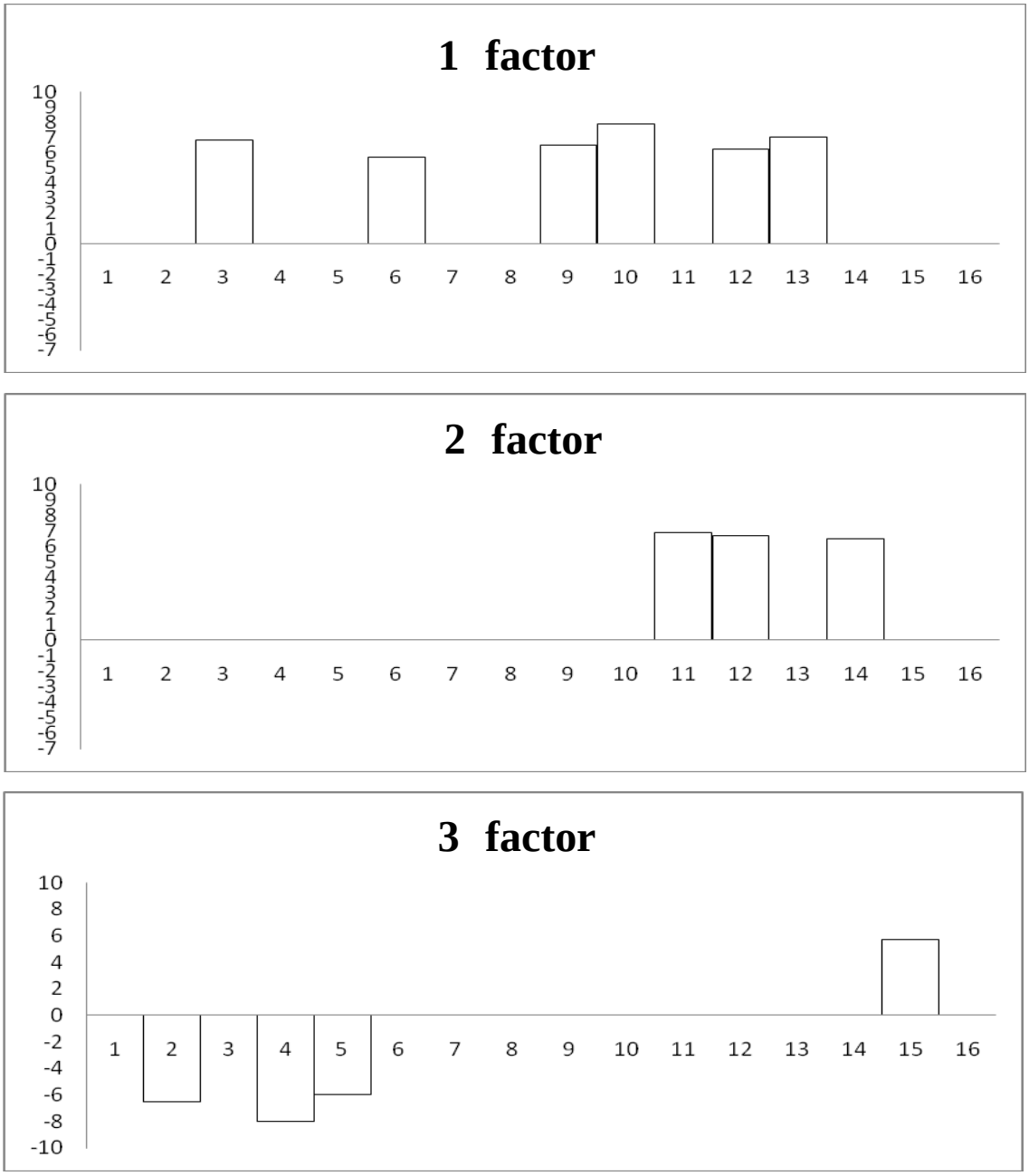

Fig. 2.4. Factor structure of indicators obtained after athletes (men) completed a competitive distance

Note: 1 - pedagogical assessment of performance; 2 - MVB; 3 - O2U; 4 - O2P; 5 - O2/kg; 6 - RC; 7 - VRNnl; 8 - T-Tmax; 9 - T-Topt; 10 - T-Topt/max; 11 - Din_{max}; 12 - Din_{opt}; 13 - Dinopt / макс; 14 - Dindos; 15 - $Dindos_{но}$; 16th place in tests for special strength training).

In men, the first factor (16.8% of the variance) included indicators of oxygen use (3), self-assessment of readiness for competition (6), comfortable pace of movement (9 and 10) and comfortable effort (13). Taking into account these relationships, it can be noted that the preservation of high motor activity after performing the load is associated with a high self-assessment of the most integrative indicator of the athlete's condition - his readiness for competition.

The second factor (15.02% of the variance) included three dynamometry indicators (11, 12, 14), which characterize the preservation of the setting for maximizing efforts after loading.

The third factor (14.0% of the variance) included indicators of MVB, O2P, O2 / kg with negative signs and Din_{dos} .with a positive sign. In sports psychology, there are known facts that exceeding the set effort is often observed in athletes who feel uncomfortable, dissatisfied with their sports activities.

This can explain the relationship of the indicators that make up the third factor.

Another factor structure was found in women. (In adult rowing athletes, the influence of sexual dimorphism on the relationship of indicators after loading is clearly visible, which was not observed in young athletes).

The first factor (23.8% of the variance) in women, along with a high self-assessment of readiness for competitions, included indicators indicating the preservation of the activation of the motor components of the athlete's psychological state after loading: a tendency to premature VRT (7), T-Tmax (8), Din_{max} (11), Din_{opt} (12).Thus, the first factor here, as in men, indicates that the preservation of high motor activity after loading contributes to a high self-assessment of readiness for competition.

The second factor (21.6% of the variance) consists of only two indicators: pedagogical assessment of success (1, with a "+" sign) and error in reproducing a given effort (14, with a "-" sign). Therefore,

the success of achieving the maximum result in rowing is associated with precise control of movements in women according to the intensity parameter of the applied effort.

In the third factor (17.1% of the variance), there are also two indicators with opposite signs, which indicate that the best places in strength training tests (16) are occupied by women with a high oxygen pulse (4).

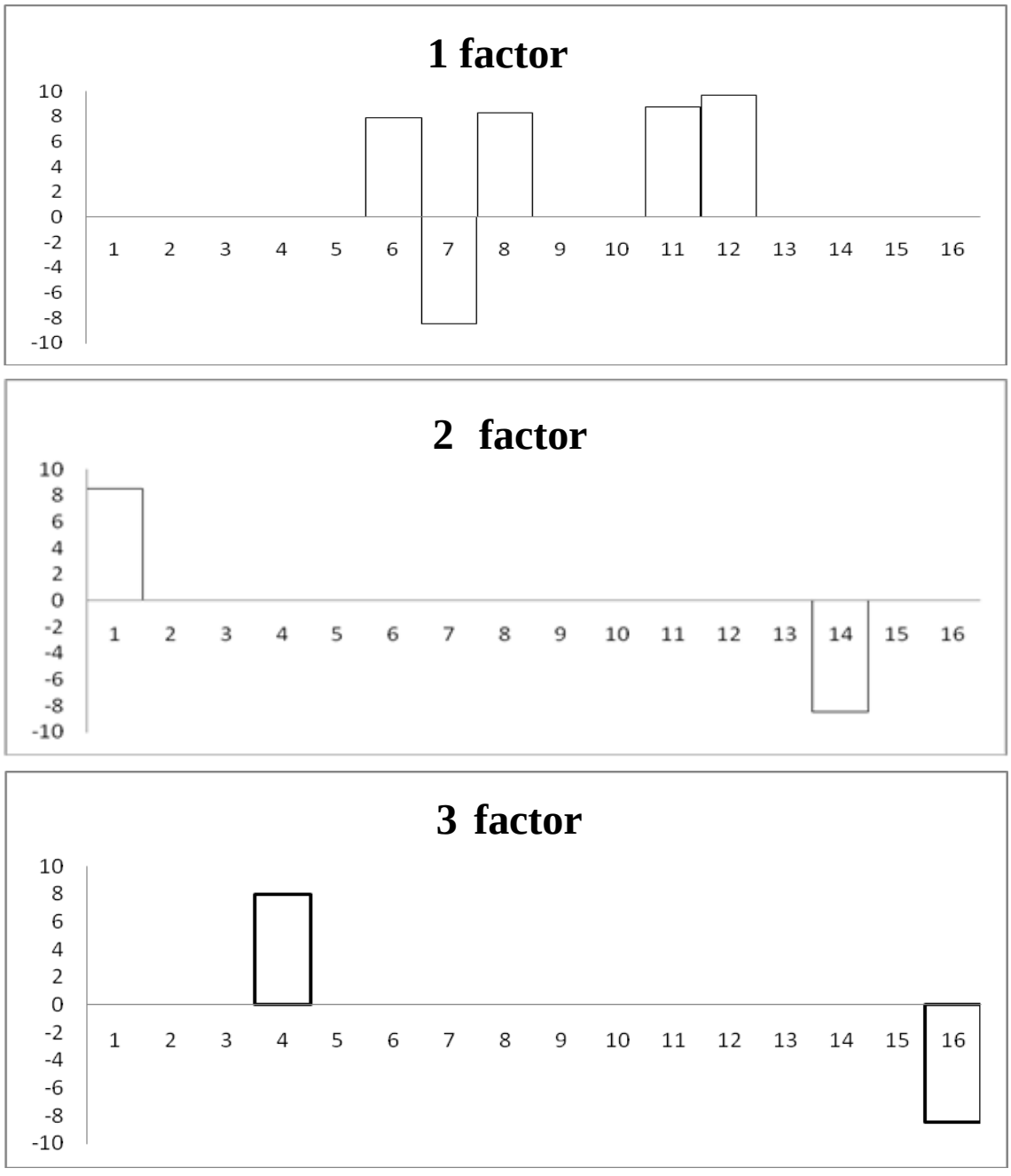

Fig. 2.5. Factor structure of indicators obtained after athletes (women) completed a competitive distance

Note: 1 - pedagogical assessment of performance; 2 - MVB; 3 - O2U; 4 - O2P; 5 – O2/kg ; 6 - RT; 7 - VRNnl; 8 - T-Tmax; 9 - T-Topt; 10 - T-Topt/max; 11 - Dinmax; 12 - Dinopt; 13 - Dinopt / макс; 14 - Dindos; 15 - Dindos.но; 16 - place in special strength training tests).

The results of correlation and factor analyses allow us to name informative indicators (criteria) of the pre- and post-activity state of rowers, associated with the success of their passing the competitive distance when setting the maximum use of their capabilities.

Before passing the distance:

1) self-assessment of mood at the level of background value or higher (75-80% of the maximum);
2) T-T_{opt} and 3) T-$T_{opt/max}$ - both indicators above background values;
3) RT - should not exceed background values;
4) BEP - should not exceed background values.

After passing the distance:

1) self-assessment of readiness for competitions at the level of 65% and higher of the maximum;
2) Dinopt / max and 3) T-$T_{opt/max}$ - both indicators not lower than before passing the distance;
3) RNnl - the number of premature reactions is not less than the background;
4) Dindos - less than the background values (for women).

2.3. Features of the pre-activity mental state of all-around athletes

The difference in the signs characterizing the optimal pre-activity state of athletes is due, as has been shown, to the specificity of their motor activity, as well as to the specific tasks that need to be solved in training. In this regard, when diagnosing the mental state of athletes as a prerequisite for assessing its adequacy for future activity, it is necessary to take into account that the tests used

(and the indicators obtained with their help) are differently informative depending on what specific motor actions the athlete needs to perform and with what attitude he should perform these actions (with maximum intensity, "to failure", with maximum accuracy, "on technique", etc.).

A special study of the connection between the mental state that the athlete had before the activity and the characteristics and requirements of the activity is most appropriate to conduct by studying those athletes who solve the most diverse motor tasks during training and competitions. Among such athletes, we selected decathletes.

2.3.1. Active determinants of the mental state of decathlon athletes

The main feature of track and field all-around is that it is a separate sports discipline, but it includes 10 types of track and field athletics, which impose completely different requirements on the functional systems of the athlete's body, on his musculoskeletal system, on physical qualities, on self-regulation of actions and on the psychological sphere.

Back in 1970, A.Ts. Puni, based on the characteristics of the interaction between the participants of the competition, distinguished three groups of sports:

1) sports where there is no direct collision of rivals and the activities in which are characterized by relative independence;
2) sports that are characterized by a direct connection and dependence of the actions of each on the actions of the opponent;
3) sports that occupy an intermediate position between the first two: they are characterized by the simultaneous entry into the fight of a whole group of athletes, the competition between which is conducted on parallel courses.

In the first group of sports, the optimal mental state during the preparation and performance of a sports exercise is characterized by the focus of consciousness on controlling the leading parameters of the performance technique, on mobilizing all the body's reserves at the right moment, and psychological resistance to distracting factors. These sports include gymnastics, acrobatics, sports dancing, figure skating, and others.

Representatives of the second group of sports have special requirements, according to A.Ts. Puni, for a "sophisticatedly developed orientation function of consciousness", associated primarily with continuous observation of the opponent and anticipation of his actions. Such sports include all types of martial arts and sports games.

In the third group of sports, which are characterized by "overcoming space with the help of cyclic motor acts", there are requirements for subtle "orientation in time against the background of overcoming space" and an adequate assessment of one's capabilities and condition. These are rowing, swimming, skiing, cross-country skiing.

The decathlon includes 6 events belonging to the first group (long jump, high jump and pole vault, shot put, discus and javelin), and 4 events related to the third group (100, 400, 1500 m and 110 m hurdles). The success of an all-around performance consists of the results of the performance in each individual event. The best competitive result can be achieved when an athlete performs at the level of his personal records in all 10 events. Therefore, the main task of training all-around athletes is to achieve maximum results in each event. The ascertaining experiment was conducted with 22 qualified decathletes before they performed six competitive exercises: the 100 m race, the 110 m hurdles, the long, high and pole vault, and the shot put (other all-around events were rarely or not included in indoor training).

At the first stage of the ascertaining experiment, the indicators obtained only before those attempts before which the athletes were instructed to act in full force, "for the result", were taken into account.

These indicators are not given in absolute values, but by their rank. When ranking, a 6-step scale was used (according to the number of exercises performed by the athlete). The 1st rank was equal to the minimum average value of each of the indicators, the 6th rank was the maximum. If the average values of each of them were equal, they had the same (average) ranks.

After analyzing the data presented in Figure 3.6. it becomes clear that the decathletes demonstrate the highest dynamometry indicators before the shot put, and the highest movement rate before the 100 m run. Of course, these indicators reflect the attitude recorded during many training sessions: the shot put requires the manifestation of strength more than other types of decathlon, therefore, before performing this exercise, the athletes actualize the attitude to maximize effort. The 100 m race places the highest demands on speed, and this is also reflected in the corresponding setting - an important component of the preliminary activity of the mental state of athletes.

According to the severity of the setting for maximizing efforts, the studied types of decathlon are ranked in the following sequence: the core, pole vault and long jump, 100 m run, high jump, 110 m run with hurdles. According to the severity of the setting for maximizing speed manifestations, these types are ranked differently: 100 m and 110 m run with hurdles, the core, long jump, high jump and pole vault. Therefore, when assessing the mental state of athletes in each specific case, before each specific exercise, it is necessary to take into account the influence of settings that are spontaneously formed in connection with the requirements of the training activity of the settings.

The highest level of vegetative activation (according to BEP indicators) was found before performing pole vaults. Since this type

of exercise is more traumatic for decathletes than others, it can be assumed that such high bioelectrical activity is associated in this case with emotional tension rather than with motor activity.

According to bioelectropotentiometry indicators, the types of track and field decathlon are ranked as follows: pole vault, 100 m run, high jump, 110 m hurdles run, shot put, long jump.

If we combine all the indicators of an athlete's activity before performing the exercise, it will be clear that the greatest total activity is manifested before the 100 m run, and then in the following sequence: shot put, pole vault, 110 m hurdles run, long jump and high jump.

It is noteworthy that this kind of data was obtained for the first time and, secondly, we emphasize that the indicators characterizing motor and vegetative activity, and at the same time motor and energy settings are different in the same athletes before different types of track and field all-around events.

Since the vast majority of sports require not an isolated manifestation of any motor qualities (strength, speed, endurance, agility), but their combined complex manifestation, it can be expected that speed, power and energy settings will interact, forming a single structure of readiness for motor activity. In order to consider such a structure, we traced the correlation relationships by comparing three indicators of motor and vegetative activity (optimal values of Dyn, T-T and the BEP indicator), obtained repeatedly before performing the exercises in each of the 12 track and field athletes studied in this case.

Three types of all-around were selected for analysis: shot put, long jump and pole vault. Shot put is a motor action, for the successful performance of which it is necessary: a high level of mobilization and activity, the manifestation of speed in movements, short-term and maximum intensity of effort.

Long jump from a run requires maximum running speed, associated with a high frequency of steps, a quick and strong push off from the bar, correct flight and landing.

Pole vault is an even more complex motor exercise in terms of coordination, which places demands, first of all, on the accuracy of the run, setting the pole, transitioning from run to high, overcoming the bar, etc. When jumping with a pole, the run speed is not maximum, but optimal and stable for each athlete; the maximum application of force is required for a short time only at the moment of bending the pole.

Consideration of the above exercises shows that speed, power and energy settings can interact in different ways, ensuring the effectiveness of their execution (table 2.10).

Table 2.10

Correlations between indicators of motor and vegetative activity before performing various exercises in the decathlon (n=12)

Atletes examined	Athletics decathlon exercises								
	Shot-put			Long jump			Pole vault		
	Din-T-T	Din-BEP	T-T-BEP	Din-T-T	Din-BEP	T-T-BEP	Din-T-T	Din-BEP	T-T-BEP
1.	283	247	346	600	740	660	283	695	252
2.	461	393	405	-630	500	100	320	103	265
3.	374	316	377	40	630	60	307	398	13
4.	328	283	362	424	426	180	284	547	184
5.	-93	271	364	-012	620	376	83	399	256
6.	-58	311	521	320	685	304	399	714	397
7.	325	266	354	512	583	412	277	621	218
8.	417	375	391	-324	565	82	313	257	-122
9.	395	338	384	103	463	136	309	328	41
10.	349	298	370	242	528	120	287	473	99
11.	-79	294	446	154	642	332	238	566	328
12.	373	314	377	478	570	246	295	433	53

Note: zeros and commas of correlation coefficients are not given; nnn – $p<0.05$; nnn – $p<0.01$.

From the data in table 2.10. it is seen that before shot put in 9 athletes (75%), reliable correlations connect all activity indicators, before long jumps such connections were found in 4 people (33.3%), and before pole vaulting - in 3 athletes (25%).

Reliable correlations between dynamometry and bioelectro-potentiometry indicators were recorded in all athletes before shot put and long jumps and in 11 people (91.7%) - before pole vaulting. It is quite likely that these connections reflect a general pattern: for a short-term manifestation of maximum strength, a very high energy mobilization (vegetative activation) is necessary.

A reliable correlation between the bioelectropotentiometry and tapping test indicators was found before the shot put in 12 people (100%), before the long jump - in 6 (50%) and before the pole vault - in 5 (41.7%). After all, when shooting the shot put, the maximum tempo of movements is not required. However, such a connection of performance is understandable, if we consider that shooting the shot requires a very high level of vegetative activation. The emerging energy setting causes such a high excitation in the corresponding nerve centers that this excitation radiates, capturing the centers of the motor zone of the cerebral cortex.

Reliable correlations between the indicators of the tapping test and dynamometry, reflecting the relationship between speed and power settings, were observed in 9 athletes (75%) before the shot put, in 11 (91.7%) before the pole vault, and before the long jump - the data require special explanation. The speed of the run-up and the push-off are the main factors that determine the effectiveness of the long jump. Therefore, before performing this exercise, athletes must update their speed setting. But, in addition to it (and sometimes competing with it), a power setting often arises, associated with the athlete's need to make the most powerful push-off from the bar. However, as shown by the studies of Yu. S. Eryomin (1994), such a setting negatively affects the tempo-rhythmic structure of the run-up, lengthens the time of the push-off from the bar, thus preventing the athlete from achieving the maximum possible result in the jump. Despite this, many even highly qualified athletes have a power setting simultaneously present or even dominate before performing a long

jump. This latter circumstance explains the positive correlations of T-T-Dyn in 6 out of 12 examined athletes.

The absence of such correlations in 4 others and the presence of negative connections in 2 people may indicate that they are already counteracting the spontaneously arising power setting, forming a speed setting.

Next, it is advisable to dwell on testing the assumption that specific manifestations of the mental state before performing an exercise in training depend not only on the features and structure of the exercise, but also on the content of the personal task facing athletes during each performance of a sports action (exercise).

In the process of training sessions, a study was conducted in two types of track and field decathlon: shot put and pole vault. In shot put training, mental state indicators were recorded, obtained:

1) before performing the exercise "for the result", that is, when the length of the shot was assessed;
2) before performing the exercise "for the technique" the technique of correct performance of the motor skill was assessed.

In pole vault training sessions, the indicators obtained were taken into account:

1) before overcoming the bar at a near-limit height from the maximum run-up minus three steps (the jump height was assessed provided that the technically correct execution of the attempt was maintained);
2) before jumping from a shortened run-up over a conditional bar (rubber harness) at a height accessible to each athlete. (One of the elements of the jump technique was assessed - crossing the bar).

The results of this study are presented in Table 2.11.

Table 2.11

Indicators of motor and vegetative activity of decathlon athletes before performing various training tasks in shot put and pole vault (X±m; n=12)

Exercises	Dynamometry (kgs)	Tapping test (relative quantity)	BEP (ма)
Shot-put with a "result-oriented" attitude	75,0 ± 1,06	84,8 ± 0,78	66,0 ± 0,34
Shot-put with a "technique" attitude	71,7 ± 0,98	85,9 ± 0,86	64,9 ± 0,27
Probability level	*t=2,29 p‹0,05*	*t=1,96 p›0,05*	*t=2,62 p‹0,05*
Pole vaulting over the bar with a "result-oriented" attitude	74,1 ± 0,85	82,2 ± 0,52	87,0 ± 3,30
Pole vaulting over the bar with a "technique" attitude	71,3 ± 0,79	84,2 ± 0,56	76,7 ± 3,40
Probability level	*t=2,43 p‹0,05*	*t=2,60 p‹0,05*	*t=2,18 p‹0,05*

The results listed in Table 2.11 indicate that the dynamometry and bioelectropotentiometry indicators in both cases are higher before exercises "for the result" than before exercises for the execution technique. No differences were found in the tapping test indicators. This is explained by the fact that such a manifestation of speed as the maximum frequency of movements is not a factor affecting the result in the shot put, where another manifestation of speed is of paramount importance - the speed of a single movement. When running up during pole vaulting, the pace of steps (and to a greater extent the rhythm of the run up) is individually stable for each athlete, therefore, in this type, there is no setting for maximizing the pace of movements.

Thus, the assumption that specific manifestations of the mental state depend not only on the features and structure of the exercise, but also on the personal task to which the athlete's consciousness is directed has been experimentally confirmed.

2.3.2. Individual specificity of the pre-performance mental state of decathlon athletes

In real conditions of the educational and training process, when training athletes, there is often a division of personal and activity approaches. During the sports orientation of novice athletes and when selecting qualified athletes for teams to participate in responsible competitions, attempts are made to study the personal characteristics of people in order to establish the degree of compliance of these characteristics with the specific requirements imposed on a person by the tasks and conditions of training and competitive activity in a particular sport. In other words, when selecting in sports, a personal approach is implemented. However, when training selected athletes, an activity approach is mainly used: they are taught how and what to do, how to act in certain situations, they are prepared to solve typical tasks, in accordance with which training influences are carried out, ensuring the functional, technical and tactical preparedness of athletes.

In this case, both in the practical and scientific aspects of the problem of increasing the effectiveness of athletes' training, there is a division of personal and activity approaches. The integrator of these approaches can only be the individualization of training, which creates conditions for the implementation of a comprehensive personal and activity approach.

Undoubtedly, the individualization of training contributes to a more complete disclosure of a person's abilities, a greater realization of his potential, a faster and higher growth of the results of his sports activity. V.M. Bekhterev noted that under absolutely identical external conditions, different individuals will experience different experiences, which complicates the comparison of the results obtained.

In this regard, it is important to trace the individual uniqueness of the pre-activity and activity state of each athlete, to determine

the signs, based on which, in each specific case, it is possible to distinguish the optimal state (state of readiness) from the unfavorable (state of unreadiness). The results of the study, devoted to the description of the psychological state of individual decathletes, are presented in this section of the work.

In the course of this study, data were obtained indicating that athletes solve even the same motor task differently. In their pre-activity state, the setting for maximizing effort or the setting for maximizing speed, or the increase in vegetative activation, which is expressed in an increase in BEP, may dominate, which reflects the "energy" setting, which contributes to the emergency mobilization of all the athlete's reserves. However, the dominant setting is not always due only to the objective necessity of performing a certain sports action. It may not even be completely adequate to the task facing the athlete. Thus, according to our observations, decathletes who have gaps in strength training, that is, do not reach the required level of development of strength qualities, often develop a power setting before performing even those exercises that do not require maximizing effort. Obviously, the athlete, realizing his relative "weakness", tries (already at an unconscious level) to compensate for it at the expense of the power setting. There were also cases when high activation (a surge in the BEP index) arose not as a result of mobilization for the upcoming exercise, but as a result of insufficient understanding of how to solve the motor task. Such misunderstanding caused uncertainty and increased emotional tension, which is reflected in an increase in bioelectropotentiometry indicators.

The dynamometry, tapping test and bioelectropotentiometry indicators used by us as indicators of various aspects of motor activity, obtained in the study of each specific athlete, did not have reliable differences according to the Mann-Whitney U-criterion before successful and unsuccessful attempts to perform individual

decathlon exercises. This complicated the use of absolute Din, T-T and BEP indicators to assess the favorable-unfavorable pre-activity state of track and field athletes. It was suggested that for such assessments, consideration of the interrelationships of motor activity indicators in each athlete and before each type of all-around can be used.

In the previous section, such interrelationships were considered before performing long jumps and pole vaults and before shot put. It was shown that these interrelationships reflect the objective usefulness of simultaneous and strong expressiveness of power, speed and energy settings before shot put, the optionality of speed setting before pole vaulting (since the run-up is performed not at maximum, but at optimal speed), the desirability of greater expressiveness of speed and less expressiveness of power setting before long jump.

However, for psychological recommendations on managing the process of training athletes and optimizing their pre-activity state, such a statement is not enough. It is necessary to find out what nature of the relationship of indicators contributes or hinders the achievement of the desired result by each athlete in a certain type of exercise.

Therefore, we again resorted to the analysis of data obtained before successful and unsuccessful attempts.

Table 2.12 presents the correlation coefficients between activity indicators obtained before successful and unsuccessful attempts of athletes in the shot put.

The results presented in the table show that the nature of the relationships between the indicators recorded between successful and unsuccessful attempts did not change only in 2 athletes (16.7%), in other cases (83.3%) differences were found. In 2 people (16.7%) the relationships between the T-T-Din and T-T-BEP indicators were closer before successful attempts and less close before unsuccessful ones, and in 1 subject (8.3%), on the contrary, the correlation between the T-T-Din indicators was at the 95% level of significance before

successful attempts, and at the 99% level before unsuccessful ones. The greatest changes in the density of relationships were found in the Din-BEP indicators. In 9 athletes (75%) they are less reliable (or unreliable) before unsuccessful attempts.

Table 2.12

Correlations between motor and vegetative activity indicators obtained before successful and unsuccessful attempts at shot put (X±m; n=12)

Athletes examined	Successful attempts			Unsuccessful attempts		
	Din-T-T	Din-BEP	T-T-BEP	Din-T-T	Din-BEP	T-T-BEP
1.	412	493	456	470	383	667
2.	690	723	712	710	403	651
3.	547	604	583	590	392	660
4.	480	549	519	528	388	666
5.	320	423	628	-267	-103	503
6.	551	253	639	322	147	-123
7.	447	521	488	499	379	657
8.	616	665	641	646	391	658
9.	585	636	615	620	396	654
10.	513	577	551	560	391	662
11.	434	340	633	31	60	195
12.	532	593	564	547	388	663

Note: zeros and commas of correlation coefficients are not given; nnn – $p<0,05$; nnn – $p<0,01$.

Thus, it can be noted that the inconsistency of the dynamics of the energy and power systems leads to a decrease in performance in the shot put. In 5 track and field athletes (41.7%), in whom such differences were not observed before successful and unsuccessful indicators, the deterioration of the results in the shot put is probably due to other factors.

The nature of the relationships before long jumps of different success is presented in table 2.13.

Table 2.13

Correlations between motor and vegetative activity indicators obtained before successful and unsuccessful attempts at long jump (X±m; n=12)

Athletes examined	Successful attempts			Unsuccessful attempts		
	Din-T-T	Din-BEP	T-T-BEP	Din-T-T	Din-BEP	T-T-BEP
1.	-400	700	212	640	960	710
2.	-600	-42	460	-254	-40	-102
3.	203	-98	-43	-103	840	-58
4.	306	298	110	507	714	202
5.	-107	317	339	196	445	301
6.	298	304	97	278	887	327
7.	355	540	158	521	827	406
8.	-206	-68	217	-170	395	-80
9.	-143	111	265	129	371	41
10.	254	97	69	203	777	87
11.	81	309	218	234	668	316
12.	73	234	234	175	613	154

Note: zeros and commas of correlation coefficients are not given; nnn – $p<0,05$; nnn – $p<0,01$.

All athletes showed differences in the density of correlations. In most of them - in 75% of cases (9 people) - before unsuccessful attempts, reliable correlations between the Din-BEP indicators are found, which are absent before successful attempts. This convincingly confirms the previously stated position that the simultaneous effort of the energy and power systems prevents the achievement of a high result when performing the long jump. In 4 athletes (33.3%), the nature of the relationships between the T-T and BEP indicators changed.

These changes are multidirectional: in 2 people, significant correlations appeared before unsuccessful attempts, which were not before successful ones, in 2 others, on the contrary, there are reliable relationships between these indicators before successful attempts,

but not before unsuccessful ones. This circumstance is due to the individual peculiarity of the state of immediate readiness to perform a sports action. The same peculiarity is manifested when considering the relationships between T-T and Din. In 2 athletes, there are no reliable correlations before successful attempts, they appeared before unsuccessful ones, and in 1 athlete they disappear.

The following table shows the same indicators before pole vaulting (Table 2.14).

In 2 athletes there are no changes in the nature of the relationships before successful and unsuccessful attempts. In the remaining 10 people the differences between successful and unsuccessful attempts are less pronounced than before shot put or long jump.

Table 2.14

Correlations between motor and vegetative activity indicators obtained before successful and unsuccessful attempts at pole vaulting (X±m; n=12)

Athletes examined	Successful attempts			Unsuccessful attempts		
	Din-T-T	Din-BEP	T-T-BEP	Din-T-T	Din-BEP	T-T-BEP
1.	472	670	468	213	604	67
2.	237	272	-183	202	137	-173
3.	354	473	327	208	373	43
4.	417	572	398	211	465	57
5.	-98	748	128	223	280	64
6.	150	640	258	824	750	720
7.	444	621	433	207	536	62
8.	296	377	72	205	258	-65
9.	327	422	108	207	301	-58
10.	386	520	363	209	419	51
11.	52	696	200	526	515	392
12.	370	495	252	206	397	11

Note: zeros and commas of correlation coefficients are not given; nnn – $p<0,05$; nnn – $p<0,01$.

In 5 athletes, closer correlations between Din and BEP were found before successful indicators than before unsuccessful ones;

changes in the density of connections of other indicators were in different directions. Thus, correlations between Din and T-T in 2 athletes from unreliable before successful attempts became significant (P <0.01) before unsuccessful ones, and in 4 - significant correlations of these indicators before successful ones became unreliable. A similar picture was observed in relation to 2 and 3 athletes when considering the T-T- BEP connections.

Obviously, in such a complex coordination motor action, which is pole vaulting, the factor of adequate combination of the expressiveness of power, speed and energy settings has a lesser effect on the result, since here the accuracy and stability of self-regulation of movements acquires paramount importance. On the other hand, in such a difficult exercise for all-rounders, the individual originality of solving motor tasks is even more manifested.

Thus, the analysis of correlations between activity indicators in the pre-activity state of track and field athletes once again confirmed the reality of the differences in this state in connection with readiness for a certain type of sports activity and the dependence of success in it on this state.

In addition, it became possible to determine for each athlete which combinations of motor and vegetative activity indicators (reflecting synergy or competition of strength, speed and energy settings) contribute to or hinder the achievement of a certain result in various types of competitive exercises of an all-rounder.

The data obtained indicate the need for psychological readiness of an athlete to perform a specific type of sports activity or certain sports exercises, because the effectiveness of their performance depends on the degree of his readiness. The results of the conducted complex of studies allow us to draw the following conclusions.

CHAPTER 3
PECULIARITIES OF ATHLETES' MENTAL STATES THAT OCCUR BEFORE TRAINING AND THEIR USE TO IMPROVE ITS EFFECTIVENESS

3.1. The role of dynamic psychological control over the state of athletes in increasing the efficiency of management of the process of training rowers

A practical test of the possibility of using the assessment of the mental state of athletes to manage the training process was carried out when working with kayakers and canoeists, acrobatic track jumpers and decathlon athletes.

At the training camps, a number of indicators reflecting the state of the athletes were recorded from highly skilled rowers. The specific choice of the measured parameters was due to the fact that rowers perform the same type of tasks during daily training sessions, so their motor settings are rather rigidly fixed, low-variable and, therefore, it is difficult to expect them to carry useful information during dynamic control. Therefore, the rowers recorded indicators of self-assessments of physical well-being (S-a), mood (M), desire to train (DT), satisfaction with the previous day (SD) and readiness for competitions (RfC) as the most generalised parameter of their functional state, as well as an indicator of autonomic activation - bioelectropotentiometry (BEP). These indicators were recorded every morning before the athletes went out for their morning training. While the athletes were training, the psychologist recorded the data in specially prepared forms (Table 3.1), intended for each of the coaches working with certain groups of athletes. Immediately after breakfast (1 hour before the second training session), the coaches received the results of the psychological examination. This gave them the opportunity to: 1) assess the condition of the whole group; 2) assess

the condition of each of the athletes separately; 3) assess how the athletes reacted to the load offered to them the day before; 4) make adjustments to the plan of the training sessions to be held today; 5) individualise the tasks and requirements for the athletes.

Based on the data in the table (this table is an exact copy of the working document that was filled out directly at the training camp and shown to the coach every day), the coach was able to make individual or group adjustments to the training process.

Lower performance than on most days of the training camp was observed among the athletes on the first day. This is due to a rather long journey to the training camp. It is noteworthy that rowers A and C had a rather high self-assessment of readiness for the competition on the first day of the training camp. This self-assessment dropped sharply the next day. This is due to the fact that both athletes felt the severity of the loads offered to them at the first training sessions.

By the end of the first microcycle, only M-u rated his condition and activity highly, although he had accumulated fatigue, as evidenced by a decrease in the BEP index.

The rest of the rowers on this day recorded a decrease in the indicators of desire to train, satisfaction with the previous day and readiness for competition. In accordance with our recommendations, this circumstance was taken into account by the coach, who organised the next microcycle so that the athletes could better tolerate it (as evidenced by testing).

M-v's self-assessment of physical well-being, mood and desire to train in the morning was found to be reduced. The coach took this into account and somewhat reduced the requirements for M. in the daytime and evening training, which contributed to the improvement of the athlete's condition.

The training camp ended with control competitions. During three days of competitions of the previous microcycle, individually optimal values of self-esteem were recorded for all sportsmen of

the group. Higher values of BEP in the morning on the day of the competition testified to emotional excitement and mobilisation for the upcoming distance.

Table 3.1

Researched athletes	Indicators	Days of the month															
		9	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
1.	S-a	3	5	6	5	B	3	5	4	3	4	5	B	4	5	5	5
	M	4	5	5	4	B	4	5	6	3	5	5	B	5	6	6	6
	DT	3	4	4	3	B	7	8	8	4	5	6	B	4	4	5	5
	SD	2	4	6	5	B	8	8	8	4	6	7	B	6	5	5	6
	RfC	3	5	4	3	B	6	7	7	7	7	6	B	4	4	6	7
	BEP	6	8	8	6	B	8	8	8	11	13	11	B	8	10	12	18
2.	S-a	7	8	8	8	B	9	4	4	6	5	8	B	7	7	8	7
	M	8	9	7	9	B	8	5	5	7	6	7	B	8	6	9	8
	DT	6	9	8	8	B	8	6	6	6	9	9	B	8	8	7	9
	SD	6	9	9	9	B	9	7	7	8	8	8	B	7	7	6	7
	RfC	7	7	7	8	B	8	6	7	7	7	9	B	8	9	6	7
	BEP	26	36	29	16	B	24	20	26	38	36	30	B	32	38	30	52
3.	S-a	5,5	5	7	3	B	8	7	6	5	6	6	B	6	3	6	6
	M	5,5	5	7	4	B	5	5	5	5	6	5	B	5	3	4	5
	DT	4,5	5	7	3	B	6	5	5	5	6	6	B	6	3	5	5
	SD	6	6	8	6	B	8	8	7	8	8	8	B	7	6	6	6
	RfC	8	4	6	4	B	5	5	5	5	5	6	B	8	6	6	6
	BEP	31	48	40	22	B	25	38	34	23	27	32	B	40	30	26	32
4.	S-a	6	7	7	7	B	7	7	7	6	6	6	B	7	7	6	7
	M	6	6	6	6	B	6	6	6	7	5	6	B	5	6	6	6
	DT	8	8	8	7	B	8	8	7	7	7	7	B	6	7	7	7
	SD	4	7	6	5	B	7	7	6	7	6	7	B	5	6	7	7
	RfC	7	5	6	5	B	5	4	5	5	6	6	B	5	6	6	7
	BEP	13	24	18	12	B	20	20	18	20	14	17	B	25	19	25	23
5.	S-a	5,4	6,3	7,0	5,8	B	6,8	5,8	5,3	5,0	5,3	6,3	B	5,5	5,5	6,3	6,3
	M	5,8	6,3	6,3	5,8	B	5,8	5,3	5,5	5,5	5,5	5,8	B	5,8	5,3	6,5	6,3
	DT	5,4	6,5	6,8	5,3	B	7,3	6,8	6,5	5,5	6,8	7,0	B	6,0	5,5	5,8	6,5
	SD	4,5	6,5	6,8	6,3	B	8,0	7,5	6,8	6,5	7,0	7,5	B	6,3	6,0	6,0	6,8
	RfC	6,3	5,8	5,8	5,0	B	6,0	6,0	6,0	6,0	6,3	6,8	B	6,3	6,3	6,0	6,8
	BEP	19	29	23,8	14	B	19,3	21,5	21,5	23	22,5	20	B	23,8	24,3	23,3	31,3

Notes: *S-a- self-assessment of physical well-being; M - self-assessment of mood; DT - self-assessment of specific activity - desire to train; SD - satisfaction with the previous day; RfC - readiness for competition; BEP – bioelectropotentiometry; W - day off.*

Thus, the possibility of increasing the efficiency of managing the process of training rowers by individualising pedagogical influences on the basis of dynamic psychological control over the state of athletes is clearly demonstrated. The use of operative diagnostics of the mental state, based on the account of its conscious and vegetative manifestations, makes it possible to assess not only the individual dynamics of the state in the process of training, but also to analyse the effectiveness of the applied loads during microcycles, to evaluate the success of recovery measures, the correctness of coaching attitudes, etc.

Table 3.2 offers an example of the analysis of average indicators of self-assessments and BEP of highly skilled female kayakers at the training camp using the same methodology as described above.

Table 3.2.

Dynamics of psychological control indicators at the beginning and at the end of three microcycles of training camp for highly skilled kayakers (n=11)

Indicators	Microcycles			Last day of the 1st microcycle	Day 1 of the 2nd m.c.	Last day of the 2nd m.c.	Day 1 of the 3rd m.c.	Before the competition
	1	2	3					
S-a	6,7	7,1	6,8	5,8	7,6	7,6	7,4	7,1
M	6,9	7,1	6,4	6,2	8,0	7,2	6,2	6,9
DT	7,0	6,6	5,8	6,4	7,7	6,6	6,3	5,9
SD	6,9	7,4	6,5	7,3	8,1	7,3	7,2	7,3
RfC	5,8	5,6	5,4	6,0	5,7	5,4	5,9	5,8
BEP	38,0	38,3	44,3	37,2	40,8	41,2	47,6	53,9

***Notes**: S-a- self-assessment of physical well-being; M - self-assessment of mood; DT - self-assessment of specific activity - desire to train; SD - satisfaction with the previous day; RfC - readiness for competition; BEP – bioelectropotentiometry; W - day off.*

The analysis of the self-assessments of health and mood for the three microcycles shows a good general condition of the athletes. The indicators of the first microcycle were undoubtedly affected

by the factors of moving to the training camp. The increase in the second microcycle indicates that the athletes adapted to the training camp regime and successfully mastered the loads offered to them. The decrease in the self-assessment of mood in the third microcycle reflects the proximity of the control tests scheduled for the end of the training camp and the attitude to their physical conditions in the light of the upcoming tests.

The effectiveness of the proposed loads is confirmed by the indicators of bioelectropotentiometry (BEP), which did not deteriorate in the second microcycle, although the loads gradually increased. The increase in BEP in the third microcycle reflects the manifestation of situational anxiety before the control tests to a greater extent. The gradual decrease in the self-assessment of 'desire to train' indicates the insufficient motivation of female athletes for future prolonged and monotonous loads necessary for the creation of general functional fitness.

A decrease in self-assessments of 'readiness for competition' indicates an increase in the criticality of female athletes to their level of preparedness. The analysis of self-assessments of 'satisfaction with the previous day' helps to evaluate the effectiveness of the formation of 'sports form' as the loads are assimilated. The analysis of self-assessments of the last day of one microcycle and the first day of another allowed us to establish that recovery measures in the first case were effective, and in the second, when the athletes went on an excursion and spent about 5 hours in the bus, did not contribute to the restoration of physical and neuropsychological 'freshness'.

Self-assessments before the control test make it possible to assess the state of readiness of female athletes for sports activities.

If we consider these indicators taking into account the fact that female athletes train with different coaches, we can obtain data on the predominant effectiveness of one coach over another, on the correctness and effectiveness of the proposed training means and

methods, bearing in mind that the plan of training loads, both in terms of volume and intensity, is the same for all female athletes.

Given that similar training camps are held every year of the Olympic quadrennium, and a certain alternation of targeted microcycles is repeated within one year, adjustments can be made to the tactics and strategy of the training process.

3.2. The use of control of a mental state of acrobats-jumpers for operative correction of their training process

When working with a team of qualified acrobats-jumpers, which consisted of only 12 people, the psychologist was given the opportunity to more individually assess and correct the mental state of athletes not only before training, but also during it, before individual jumps. Since each jump on the acrobatic track is potentially traumatic and therefore requires the athlete to overcome spontaneous feelings of fear and anxiety, we tried not to focus the jumpers' attention on self-assessment of their state, but to switch them to analysing the technique of the exercise and monitoring the level of activation.

During training, the psychologist was in the gym right next to the jumping track. Before starting the exercise for the next training jump, the athlete would tell the psychologist how his previous attempt at the triple jump went, what exactly worked or didn't work, and what were the most significant mistakes. In addition, he took his BEP score. The psychologist, comparing this indicator with the self-assessment of the jump technique and knowing the optimal 'working' BEP indicator inherent in this athlete, gave specific advice and recommendations on how to 'tune' the jumper for the next attempt and on the use of self-regulation tools.

Depending on the level of activity, on the self-assessment of the jump just performed and on the content of the specific task to be solved in the next jump, the athlete was offered, for example,

to perform several slow breathing movements with an emphasis on a long exhalation before performing the exercise - in the case when he or she was overactive and dissatisfied with the jump. In other cases, the acrobat was advised to intensify his activity with 'muscle' gymnastics: alternately relaxing and tensing the muscles of the arms and legs. The psychologist's advice also included the use of ideomotor training immediately before a jump, i.e. imagining a perfectly executed motor action as a whole or its main elements.

This kind of individualised correction of the pre-activity state of acrobats-jumpers when performing jumping exercises based on the results of operational psychological control during a training session contributed to a better solution of the tasks facing the athletes. In addition, the data of psychological control proved to be useful for determining the optimal number of attempts in learning certain exercises performed by an athlete during training. A steady decrease in the BEP indicator served as a signal that the athlete no longer needed to perform jumping actions in this training, as it became difficult for him to properly mobilise for the next attempt before performing the jumping exercise.

3.3. Individualisation of management of the process of preparation of track and field athletes-all-rounders by taking into account their mental states

An even more differentiated individual approach was carried out by psychodiagnostics of the pre-activity state of decathlon athletes, which is connected, as already noted, with the necessity of performance of various motor actions.

An even more differentiated individual approach was carried out by psychodiagnostics of the pre-activity state of decathlon athletes, which is connected, as already noted, with the necessity of performance of various motor actions.

The testing on indicators T-T, Dyn and BEP, which reflect the pre-activity setting, carried out directly at training sessions, allowed to

estimate its adequacy to the content of a motor action and a concrete task, which the track and field athlete faces. At the same time the data of the operational control were analysed taking into account the previously established individual originality of interconnections of speed, power and energy installations which promote success of performance of each concrete exercise of athletics decathlon.

For example, in the course of the previously performed researches it was established the existence of a reliable correlation between indicators of Dyn and BEP before successful attempts in pole vault, and before unsuccessful ones - correlation between all measured indicators. Taking into account this circumstance allowed to recommend the sportsman not to 'tune up' before a pole vault for maximisation of high-speed possibilities if during the operative control he had high values of the index T-Topt, reflecting the formed high-speed installation.

In sportsman I the pre-activity state before unsuccessful attempts in pole vault was characterised, unlike C, by the absence of correlation between indicators, while before successful attempts there was a reliable connection between Dyn and BEP. On this basis, he was recommended to 'get into the mood' and 'tune in' to the maximum application of effort in cases where there was no unidirectional growth of these indicators before the attempt, and in cases where the Dyn and BEP indicators were sufficient, a positive assessment of the state of readiness for the jump was simply given.

The athletes also received specific recommendations before performing other exercises. If the pre-activity state was inadequate, but persistent and not amenable to prompt correction, the coach was advised to set the athlete a different task or suggest that he or she improve another exercise today. Thus, psychological control contributed to the prompt individualised correction of the training process. In particular, this also applied to determining the individually optimal sequence of exercises in one training session. For example, an

athlete L, whose severity of power plant prevented achieving success in long jumps, was recommended to perform this exercise immediately after training in sprints, while he still had a focused speed plant.

Or the athlete Y was recommended to perform pole vault immediately after shot put because during shot put there is a simultaneous actualisation of speed, power and energy systems, and such integral mobilisation contributes to the success of pole vault performance.

It should be emphasised, however, that such an individually optimal sequence of inclusion of various exercises of the athletic decathlon in training can be applied only in those classes where the main task is to improve (increase the level of preparedness) in any specific types of the all-around. This task, despite its unconditional importance, is not the main one, since the competitive result is determined by the sum of points received by the athlete for performances in all ten events. According to the competition rules, an athlete competes on two consecutive days. On the first and second day, he or she must complete five events, the sequence of which is stipulated by the rules. On the first day: 100m dash, long jump, shot put, high jump, 400m dash. On the second day: 110m hurdles, discus throw, pole vault, javelin throw and 1500m run. Regardless of whether or not this sequence is 'convenient' for a particular athlete, he or she should stick to it. However, a performance in any kind of all-around can have a multidirectional effect on the performance in the subsequent performance. And this phenomenon is the more pronounced the more physical and nervous and mental effort the athlete has made in the previous performance. And yet - this influence is due to the self-assessment of the success of the performance in the previous performance (s). In view of the above, it was assumed that the mental state of readiness, which contributes to the realisation of the maximum available result (personal record) in one particular type of all-around, will differ from the state of readiness for a performance in the same type, but contributes to the achievement of

a personal record in the sum of all-around. As indicators that differentiate such optimal pre-activity states, we chose the indicators of BEP, reflecting the level of activation - the autonomic component of emotional arousal, and situational anxiety, reflecting its conscious component.

In order to determine the optimal (conducive to success) level of anxiety, athletes were asked to retrospectively assess their state preceding the most successful performance in each specific type of the decathlon, and then - the same state also before each type, but in a situation when the best result in the total all-around was shown. As a result of such a study, two types of indicators were obtained: the optimal level of anxiety, which contributes to the achievement of success in setting a personal record in each type of all-around, and the optimal level of anxiety, which contributed to the achievement of success in setting a personal record in the total all-around.

During control training sessions and in a number of competitions of different significance, situational anxiety and BEP were also measured in athletes in each type of all-around. Situational anxiety was recorded in track and field athletes immediately after they 'tuned in' to a specific exercise (type of decathlon), and BEP immediately before performing the exercise. After the competition, the athletes evaluated their performances in all types of exercises (and even by attempts - in those types where there is repetition of actions in jumps and throws) as successful and unsuccessful. Coach's assessments and self-assessments of the success of the performance in the all-around were also taken into account.

As a result, the optimal level of situational anxiety, obtained retrospectively, was tested by an experimental method, with the help of which the optimal BEP indicator for each athlete in each situation was simultaneously obtained.

The data of the study confirmed the assumption that these optima differ for different athletes in cases of success in a particular

sport(s) or success in the all-around. As an example, we will present the optimal values of situational anxiety and BEP for one athlete (P-co). They are presented in Figure 3.1.

The data of Figure 3.1. reflect the individual dynamics of indicators of optimal emotional arousal, but at the same time it is possible to trace some general tendencies. Firstly, both indicators of optimal emotional arousal are higher in case of setting a personal record in individual events than in case of setting a record in the total all-around. Secondly, a significant coincidence of the dynamics of indicators in both cases indicates their dependence on the structure of the motor action.

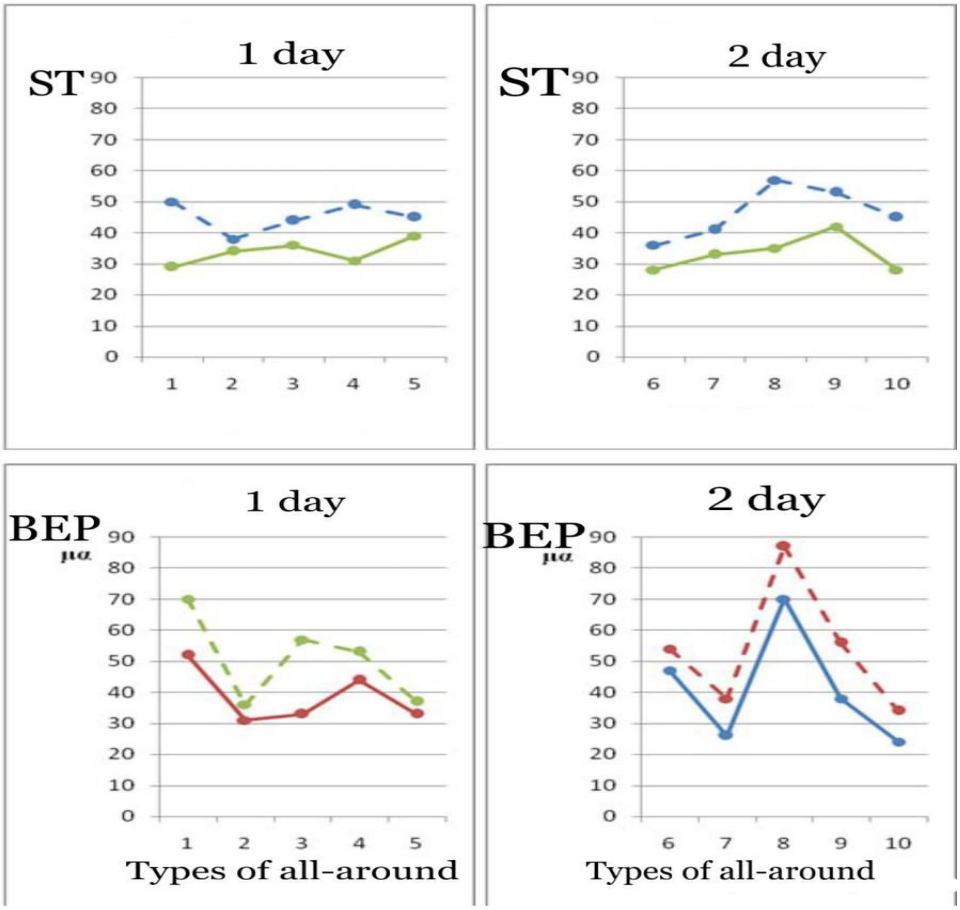

Fig 3.1. Indicators of situational anxiety and BEP contributing to the successful performance of decathletes in competitions

Notes: 1 - 100m run; 2 - long jump; 3 - shot put; 4 - high jump; 5 - 400m run; 6 - 110m hurdles; 7 - discus throw; 8 - pole vault; 9 - javelin throw; 10 - 1500m run.

The analysis of individual peculiarity of dynamics of indicators of situational anxiety and BEP allows to receive additional information for correction of preparation of each sportsman. Thus, relatively low values of BEP before shot put and discus throw in P-c with a successful performance in all-around testify to insufficient technical preparedness of a sportsman in these kinds.

In practical use of graphs of individual dynamics of optimal values of indicators of emotional excitement it is necessary to take into account that convergence of these values at achievement of high result in separate kinds and in the sum of all-around may speak about the best preparedness of track and field athletes. The conformity of the indicators of the pre-activity state fixed in each particular case to the previously established optimal values indicates the readiness of the athlete for the performance, inconsistency - about the unpreparedness and, consequently, about the necessity of emergency correction of the athlete's state.

For each athlete, not only graphs were drawn up, but also special tables (Appendix B), which indicated the values of situational anxiety before each type, and BEP - before each attempt, contributing to a successful performance in the total all-around.

Thus, each athlete knew his/her own, unique indicators of the mental state that contribute to success in competitions.

To implement this knowledge in practice in order to improve the effectiveness and reliability of sports activities, it was necessary to solve two more tasks: to teach athletes to independently assess their pre-activity state, determining its compliance or degree of inconsistency with the optimal one, and to teach them methods of self-regulation of emotional states.

During the training sessions, the athletes were first asked to determine the level of situational anxiety and BEP on their own, without using a scale or device, and then to compare their self-assessments with the indicators of the anxiety scale and bioelectropotentiometry. After a certain number of repetitions (different for

different people), the athletes mastered the skill of assessing these indicators quite accurately without filling out forms and using bioelectropotentiometry. Based on their existing self-regulation skills, they were able to fine-tune their own pre-activity state.

The introduction of operational control over their condition during training in the training of decathlon athletes contributed to more effective management of their training process, which had a positive impact on the dynamics of growth of sports results.

Thus, the effectiveness of psychological and pedagogical influences can be stable only if individually determined data are obtained from a particular athlete. As shown in our study, the most informative indicators are situational anxiety and bioelectropotentiometry. For example, the values that were considered optimal for athlete X, who pushed the shot put in previous training sessions, were as follows: situational anxiety at the level of 35-37 points, and bioelectropotentiometry - 55-60 ma.

To achieve the effectiveness of this exercise in the shot put, it is necessary to measure the indicators of situational anxiety and bioelectropotentiometry before each attempt in subsequent training sessions. The closer the measured indicators are to the previously established optimal ones (with a permissible deviation of one point), the better the exercise will be performed.

Deviation from these quantitative indicators (especially persistent) will mean a deterioration in the quality of the exercise and requires coaching correction with the obligatory identification of the causes of changes in the psychophysiological state of the athlete.

It should be emphasised that the effectiveness of exercise performance also depends on the athlete's ability and willingness to evaluate his/her performance of each exercise and pre-activity readiness, because self-assessment and the ability to compare the results of measurements before the exercise with those obtained earlier is an additional lever in achieving success.

In addition, the effectiveness of performing both individual exercises and sports activities in a particular sport is significantly influenced by the typological characteristics of the body and its systems of a particular athlete. For example, the speed qualities of an athlete, where the indicators are a short response time to a signal, rapid muscle contraction and a high maximum rate of movement, are due to the ratio of a weak nervous system to the mobility of nervous processes and the dominance of excitation processes. The more pronounced these processes are as typological features of the central nervous system, the more effective the athlete is in performing high-speed exercises.

To confirm this opinion, we measured the strength of nervous processes of excitation, inhibition, balance and mobility according to the method of Jan Strelau within the framework of a preliminary experiment.

The measurements were carried out before performing a 100-metre run in 12 decathletes (Table 3.3).

Table 3.3

Indicators of the properties of the nervous system of decathletes (in points, X±m; n=12)

№	The power of the nervous system		Mobility	Balance
	By excitement	By braking		
1	50	56	45	0,71
2	58	44	59	0,72
3	59	43	58	0,74
4	46	58	47	0,86
5	45	59	43	0,90
6	57	42	60	0,70
7	60	43	59	0,71
8	44	57	46	0,83
9	45	56	48	0,88
10	43	59	47	0,70
11	46	58	48	0,77
12	45	57	46	0,73

The obtained data show that out of twelve studied athletes, four (2, 3, 6 and 7) had the highest indicators of nervous system strength in terms of excitation and mobility of nervous processes. That is, these are the parameters of the nervous system functions that determine the athlete's ability to perform high-speed exercises effectively.

The test of 100-metre run performance showed that these athletes had the best results in this exercise during training.

Thus, one of the parameters that should be taken into account when predicting an athlete's ability to perform specific exercises may be testing the typological features of his or her nervous system.

CHAPTER 4
SPECIFICITY OF STRUCTURE AND CONTENT OF DANCE IN THE CONTEXT OF PSYCHOLOGICAL AND PHYSIOLOGICAL FACTORS

4.1. The model of creating the spatio-temporal structure of dance

The art of dance is one of the earliest forms of artistic creativity. Dance as a temporal art is created in space according to the laws of the stage, and in time - according to the laws of drama, i.e. action. In a choreographic composition, the laws of drama are the support on which the overall structure of the work is built, as if on a foundation. In each of the time-based arts, including choreography, the basis is the development of action, which is conditioned by the millennial practice of communicating with the audience [91].

If we study it in this capacity, we will need to recognise that beauty is not only inherent in material objects. Dance emphasises what is changing and passing in art; it is not about the material product, but about the action. The study of the psychology of dance requires a focus on the dynamic part of art, when the peculiarity of human behaviour is the beauty of behaviour and the special semantic (meaningful) content of movements. Dance creates the conditions for the beauty and meaning of action to become available for contemplation. The most convincing examples of such visual perception of the art of dance are the movements of dancers and dance figures. The rhythmic combination of figures is marked by the correctness of forms, and the spatial relationship and arrangement of the dancers' bodies is constant. Constancy, correctness and repeatability of forms are essential attributes of the art of dance, and it is through them that it conveys an external, visible image.

The role of the "expressive" means of the stage space in the work on a choreographic work is of great importance. For the plastic

solution of a choreographic work, directors, artists, choreographers, and choreographers use the features of the architectural or landscape playing space they have chosen or provided. As a dynamic image system, the stage space consists of the following elements:

- the stage environment (the object circle);
- stage kinetics (all possible movements by technical means);
- stage light (including all types of film and light projections);
- stage costume, make-up, props, accessories, etc.

Given the three-dimensional nature of the stage space (width, depth, height), leading experts take into account the asymmetrical visual perception of this space when working on a choreographic work. The viewer's eyes perceive an object or subject, an actor, located on the right, better, more accurately and more precisely, although the object is expected to appear on the left, because the human gaze is directed from left to right. Leading specialists (choreographers, choreographers, artists, directors) use the peculiarities of the geometric (visual) and psychological (semantic) centre of the stage space, i.e. the visually active point of perception of the work, when working on an artistic work.

Particular attention should be paid to the composition of the stage space in a choreographic work, i.e. the arrangement of the scenography and the cast. The composition of the stage space is an effective kinetic system that actively interacts physically and psychologically with the actor-character and the entire cast of the choreographic work.

The dancer is a measure (module) of the plastic solution of the stage space in the work with the choreographic team. In this context, when working on a work of choreography, it is important to take into account the compositional relationships of the stage space plasticity:

- the relationship of the scenic composition in interaction with the performers of the choreographic work;
- the relationship between architectural, stage and performance space;

- the ratio of the main and secondary elements of the scenography of the choreographic work.

To reveal the content of the composition, which is formed together with the plastic solution, leading experts use the features of spatial arts - the colour of painting, graphics, expressiveness and plastic completeness of sculpture, geometric clarity of architecture. Meaningful compositional connections play a major role in the plastic solution of the stage space. The creative idea of a choreographic work as the main organising force gives the composition completeness and integrity. The external and internal movement of the composition should be balanced and dynamic. Since the plasticity of the stage space is a unity of content and form, the change of form should be dictated by the content of the artistic work, and if the transformation of the stage space is only technical (not justified by artistic logic - movements of the trolleys, turns of the stage circle, etc.), the perception of the content and integrity of the choreographic work is disturbed.

Since the beginning of the twentieth century, the study of dance as an art form has focused not on the material object of activity, but on the action that generates this object. Similarly, in the expressionist schools of art, when studying the secrets of creativity, a painting is the result of the artist's self-expression in the process of painting. Later, the importance of the action itself in creativity (the so-called "pictorial action") was increasingly emphasised, but the result was still given an important role. Finally, the goal of the study of creative activity became the action itself. We can give examples of the study of the creative process of the newest schools of creativity, in which actions determine the goal: "dramaturgy of situations" ("situationism"), "jokes and pranks" ("happening"), "comic action" (performance) [89].

When considering the behavioural aspects of art, we should focus on the specific features of dance movements. How do they differ from any other motor activity? In order to answer this question, we need to define the meaning of the concept of types of human

bodily movements. All the known classifications of movements came from choreography. In order to get an idea of the difference between dance movements and ordinary movements, one cannot limit oneself to describing dance movements taken separately: these movements cannot be distinguished from ordinary, "everyday" movements. It is necessary to look at the people who create the dances in a group, considering the dance activity as a whole. What turns the dancers' movements, which look like ordinary motor acts, into a completely different kind of activity? We can approach this question from two perspectives: phenomenological (what appears) and ethological (custom and character). The ethological point of view is closely related to evolutionary theory, physiology, genetics, and comparative psychology. And both of them stem from the idea of the integrity of the subject of study - choreographic art, in particular dance [81].

The phenomenology of dance has accumulated a vast experience of observing the human body. But the phenomenological description of dance movements was not enough. It turned out that in order to get a complete, holistic picture of dance, it is necessary to study not only the movements, but also the context in which they are performed. By "context" we mean not only the social and cultural components of dance, but also the holistic motor activity in which each individual dance movement is included. Into what general system is each movement embedded? It can be assumed that the system with which dancers relate their movements is generated by them in the process of group coordination. Dance seems to be wedged into the space and time of everyday life, like a living being, it has its own time and space. We can classify dance as a created length in a created time. But space and time are not the simple receptacle of dance. They serve to measure the visual picture that dance creates.

Space and time are inherent in the inner content of dance, they appear simultaneously with the emergence of dance. Therefore, in the study of dance activity, which consists of a live interaction of space and time, it is necessary to describe the process of its creation [88].

Thanks to the ethological approach, a new dimension was introduced to dance, which consisted in studying the patterns of sequential bodily movements, especially ritual ones. It is known that the movements of animals can resemble a dance, the elements of which are similar to the movements of human dance. That is why we focus on the description of typical dance movements, their coordination and patterns of combination. From the point of view of ethology, we analyse the simplest (primary) forms of human artistic behaviour, which allows us to compare dance movements with complex forms of animal communication behaviour. Here we can see the coherence between behaviour and meaning, which is manifested not only in dance, but in any bodily movement. Of all the art forms, dance is the best example to demonstrate this coherence. It is possible to express an artistic idea in a painting, sculpture, or book, which will be realised in a material product with the help and involvement of material media. In dance, however, this idea can be conveyed using only the human body as a medium [82].

How to learn dance? To solve this problem, it is necessary to identify the peculiarities of dancers' behaviour in a group. This behaviour consists in creating, maintaining and modifying a common spatio-temporal structure for the group. This spatio-temporal structure immediately subordinates all the dancers. It is quite clear that the model of the spatio-temporal structure is full of special psychological content. It is an artistic behaviour that combines complex ritual animal movements, early forms of artistic expression in dance, as well as the spatial and temporal structures of dance.

What does the spatio-temporal structure of dance mean? The meaning of this concept is the ability of dancers to be in a certain place at the right moment. Who determines this place and this moment? When music sounds, everything becomes clear: it is its rhythms that indicate the necessary moments of movement, and the place and directions of movement are determined by the structure of dance

"pas". The action of creating a spatio-temporal structure is subject to special laws.

Spatial structure is defined as the relative positioning of performers in space with all its successive changes. It can be depicted using two methods. The first is sketches using film. A series of such sketches allows you to study the process of forming the dance space. It is possible to study the spatial structure of the dance based on geometric transcriptions, when the body of each dancer is depicted as a so-called through link. In this way, the contribution of the dancer's body, which is seen as a special space, to the unified space of interaction in the dance is determined.

The dance space has an internal integrity: the movements of an individual dancer are interconnected with the body position of each group member in the process of dance interaction. In order to study the structure of dance, it is important to describe the shape of the dance space, taking into account its size in relation to the surrounding space.

The time structure is easier to understand. We are talking about the tempo of the dance. Tempo is the speed at which a dance unfolds in time. How does the tempo emerge, how does it change? How is the tempo maintained? In order to answer these questions, we need to focus on how the tempo of a dance is maintained in a group of performers. Since the premise of our analysis is that group dance is based on the ability of the dancer to be in the right place at the right time, we believe that the right time is indicated by the tempo. But who determines the tempo? What if there is no music? Obviously, the performers need to set the overall tempo by coordinating individual rhythms [92].

Almost every dance requires a clear tapping of the main rhythm, which we will call the "pulse". This pulse should be started by the dance group - its members independently create the temporal structure of the dance. The carrier of the pulse can be singing, tapping, clapping, etc. When the pulse becomes noticeable, you can

use a structural review of the movements, dismember the body of the movement. The method of studying the pulse of the dance corresponds to the way it is maintained. Sometimes, when there are many dancers, the pulse can be better felt by ear. Different forms of dance have different pulsations [91].

Which dances should we consider in order to trace the emergence of spatial and temporal structures? It is known that spatial structures are dictated by choreography, and temporal structures by music. Therefore, it is not necessary to use music to explore the temporal structure - then the dancers are forced to create their own unifying pulse. At the beginning of the performance of such dances, the relative positioning of the dancers is not yet fixed, and this allows us to follow the emergence of the spatial structure. Game dances meet these requirements.

Training groups of 5-15 people can be used as material for researching the ethology of dance, where you can change the spatial and temporal elements of the dance: rearrange the dancers in different ways, offer different rhythms. Dance is a subject of art, but it is also important for us that dance is an activity that involves the active participation of each dancer. Therefore, the dance experience that a person gains by participating in dance circles and schools is important for the study of the dance structure [90].

But in order to thoroughly study the psychology of dance, external observation alone is not enough. You need to live among the dancers as an equal participant. Live participation is mandatory: without it, any analysis aimed at fully understanding the meaning of dance can lead to many misunderstandings. The difficulties begin with the word "dance" itself. In our study, we will focus on simple things: the relative position of the dancers in space or the changes in the pulse of the dance over time. Based on this knowledge, we can study the meaning of dance, the semantics of each of its movements [82].

Some forms of art, such as sculpture, produce works that are immobile, that can be touched. Dance is changeable, stretched out in

space, moving from one state to another. That is why we cannot treat the spatio-temporal structure as an object - it must be seen as a process. The origins of the artistic properties of the spatio-temporal structure must be sought in the movements that create and develop the structure of the dance. The main thing in dance is movement, so the spatio-temporal structure must not only be created, but also maintained and modified. Without active support, the already established spatio-temporal structure of a dance can very quickly collapse: either the spatial coherence of the movements will weaken, or their synchronisation will be shaken and the dance can break up into many individual rhythms. Thus, the overall tempo of the dance will be destabilised [92].

It is well known that rhythmicity is a sign of all living things on earth, the basis of life. The rhythmic development of the stage space consists of pictorial, constructive and kinetic rhythmic constructions, the rhythms of the light score, and the rhythmic movement of the choreographic performers. The rhythms are divided into calm ones that evoke pleasant feelings and emotional ones that are built on the principle of opposition and that make the composition dynamic, arousing the interest of the viewer. The rhythms should have a ratio of contrasts, which is one of the most important "expressive" means of choreographic art [81].

The action of maintaining the spatial and temporal structure of the dance, of keeping the same rhythm in the same spatial positions, can quickly become boring. Therefore, both the spatial and temporal pattern of the dance must be changed in some way. These changes give the dance its special appeal. They are inherent in artistic behaviour and bring inner satisfaction to the participants: they tickle the nerves, enjoy, excite, allow them to feel novelty, express their individuality, etc. The psychological significance of such changes lies in the fact that perception as a mental process requires the distinction of figure and background. This is exactly what happens in dance:

the background is not space and time in general, but the special spatial and temporal structure that dancers create and maintain.

Each group of dancers has a specific spatial structure. If people want to dance, they immediately take the necessary places. But it happens that there is no clear beginning to a dance - it starts involuntarily. This is clearly seen in the dances of students. They begin to perform the movements characteristic of the dance, but they do not yet have the appropriate spatial relationships. Gradually, step by step, they line up in a circle. At first, the movements of the heads and torsos are random, but over time a certain coherence emerges; it sets the framework within which the movements of each dancer fit. It takes time to create the spatial structure; it changes every time, depending on various factors. For example, a particular mood, the dancer's motivation, etc. After creating the spatial structure - the circle - the question arises: how to create the temporal structure of the dance? In other words, how to achieve consistency of movements and their synchronised performance? At first, the movements are performed separately by each dancer, and then they acquire the appropriate direction. Later, the time factor is introduced, which is indicated by certain movements (jumps, spins, steps). The pulse of each dancer can be defined as the amplitude of movements and their sequence. Each jump is counted as a beat, the strongest part of which falls at the moment of the greatest bending of the legs at the knees. This rhythm coincides with the sense of pulsation of the dance, which is studied and determined by landing under the influence of gravity. Each of these moments can be traced during the frame-by-frame viewing of the film. The emergence of a unified temporal structure will thus become visible: at first, each dancer subordinates his or her jumps to his or her own rhythm, and after a while all these rhythms synchronise. The connection of the dancers' positions to the dance space and the synchronisation of the rhythm are inseparable. In order to make their unity clear, it is necessary to indicate which points in the dance space are the strongest beat shares [89].

For dance, it does not matter when synchronicity occurs, nor which body positions are dominant: what matters is the special spatial structure of the dance, that is, the position of the dancers in relation to each other. All of the dancers' body movements are aimed at creating a coherent form. The specific space of dance becomes understandable and perceptible only when this form is comprehended. Only after this recognition takes place can one look back and understand the process of building a spatial structure based on starting points. They are the starting points of the reference system. But these points can only be found in the process of creating the spatio-temporal structure of the dance: step by step. It cannot be otherwise, because the dancers are not united by an external force. Coherence is not pre-set, it must be realised in the form of a spatio-temporal structure in the dance itself. Once created, the spatio-temporal structure subdues the dancers. In its creation, the performance of movements is important, because each time the spatio-temporal structure must be reproduced again, because dance, unlike painting, is not preserved in a material form [90].

Maintaining the spatial and temporal structure of the dance

The overall spatio-temporal structure must be created by the dancers themselves. After that, it needs to be maintained. It is unstable: the established rhythm can easily be shaken, and the circle can be broken, and then interest in the dance is lost. Maintaining the spatio-temporal structure means correcting and maintaining a stable arrangement of the dancers. For example, when lining up in a line, the dancers will constantly align the lines, changing the length of the steps, and thus ensuring that the entire structure is maintained. Maintaining temporal structure (keeping the tempo) can only be studied when it is actually manifested in a given group of dancers. The inner basis of this stability is sometimes called "meter". The term "themes" is more appropriate for the study of dance. It indicates

the ability to accelerate, decelerate or maintain the same speed. The term "meter" suggests a stability that is imposed from the outside. This idea is connected with the special properties of music, which is seen not as an established psychological experience, but as a recorded text with musical beats that set the course of musical time from the outside. However, music is not confined to an external metrical framework; it marks time for itself, creating and maintaining an appropriate temporal structure. Unlike music, dance maintains its own created time so that it can plan the movements of different parts of the body with some advance planning.

Maintaining a steady tempo in dance is not particularly difficult, especially if we compare dance with choral singing. The rhythmic movements of the whole body help to maintain the tempo of the dance, unlike in a singing choir. The inertia of moving bodies not only helps to maintain the tempo, but also prevents it from changing. Thus, when the group has the opportunity to choose a dance theme, it stops at the tempo that has been set. A short-term breakdown in the rhythm leads to a change in tempo, which occurs after a new steady tempo emerges. Obviously, there is a psychological effect that manifests itself in the dancers' internal desire to stabilise the tempo. The location of the dancers in space and the coherence of their movements in time are subject to a space-time structure, and therefore maintaining this structure is necessary to preserve the very basis of the dance. The spatio-temporal structure is the only stable element in the dynamic process of dance performance, the unchanging beginning that is preserved in all transformations. From the very beginning to the end of the dance, the spatio-temporal structure carries the once and for all holistic image. Thus, something like an external support is created that determines where, when and in what positions the dancers should be [82].

Modifications of the spatio-temporal structure

Maintaining the spatio-temporal structure ensures the preservation of the overall pattern that organises the dancers' movements. The most exciting experience for the dancers is when the spatio-temporal organisation breaks down and a new one is created. Changes within the spatio-temporal structure are carried out in different ways. One of the most common ways is to change movements. In the spatial structure, modifications occur by moving one body position to another. Modification of the temporal structure is more complex. The basic metre of the dance is more stable, but there are complex rhythmic figures within the beat. Sometimes the rhythm changes in such a way that a strong part of the beat falls out. The rhythmic breakdown of a measure gives the dancer the opportunity to "play" with time, feeling its acceleration and deceleration: the dancer can break away from the general tempo, then return to it, then rejoin the unified temporal structure of the dance. Thus, two interrelated aspects are of great importance in the modification of the temporal structure: permanence and modification. They are in a dynamic interaction, and this is what opens up wide possibilities for balancing between these extreme positions. If you stick to a constant rhythm and space, the dance will be monotonous and boring. Most of the time, modifications do not go beyond the spatial and temporal structure that has already been established. But within the structure, a new one is defined: you can listen to new rhythms, see new spatial outlines. When the struggle between the old and the new structure of the dance begins, the dance enters a state of instability. Then the old structure can completely crumble and give way to a new one; it is this new structure that will be clearly visible, and it is this structure that the dancers will preserve, creating a new basis for modifications [92].

Dance is not just about building a spatio-temporal structure. It is a dynamic process, and as it unfolds, it requires constant management by the dancers. Thus, the dancers create the spatio-

temporal structure of the dance, maintain and modify it. In this context, the dancers act as creators of a work of art that consists of their own movements, which they enjoy. In dance, there is a unity of action and perception: perception and activity are not mutually exclusive, but reinforce each other. This mutual support of perception and movement is consistent with our understanding of the nature of beauty, which is based on the idea of the unity of perception and behaviour in a social context.

The simplest forms of dance in the light of the concept of choreographic creativity look like forms of behaviour. In dance, we see the art of movement, which is directed and modified by dancers in the process of its unfolding. An important question remains: can we comprehend artistic creativity? The traditional study of literature, painting, sculpture, etc. isolates and emphasises some aspects of creativity, while dance emphasises others. We should study the most essential aspects of creativity: creativity in its movement and creativity in its social role [80].

In order to describe what happens in dance, we hold the following view: dance begins with aesthetic behaviour, because perception and behaviour in dance are closely linked. The spatial and temporal structure of dance is created by the dancers themselves, and this creation is possible only if there are temporal and spatial elements that they perceive in the dance. Perception and movement are one. Artistic behaviour in dance is a continuous perception of the movements of other dancers with simultaneous modification of one's own movements. The same behaviour is inherent in animals: some birds "dance" by correlating their movements with those of their mates. But animals do not create a spatio-temporal structure.

In order to create this structure, it is necessary to know the temporal and spatial constructions in advance: the dancer must know where he or she will be at any given moment. A simple reaction to the partner's actions will always be too late. Planning and predictability

of movements plays a crucial role in dance. The performer calculates their movements in such a way as to be in the right place at the right time. To dance is to perform a constant transformation. The appearance of a dance model in the mind leads to certain changes in it. The decisive role is played by the subject of the movement, who combines the creator, transmitter and receiver of the message. Thus, the concept of "aesthetic behaviour" in dance was formed. The peculiarity of this behaviour lies in the fact that dance is not a simple action or response, but manifests itself in a continuous "game" according to the rules set by the participants themselves. The rules set some limits within which the dancer is allowed to experience new and exciting combinations of movements. The power over oneself belongs to the dancer. But here, simple expression does not evoke aesthetic experience, but rather fear: will it be possible to retain this power? That is why artistry and playfulness are important in aesthetic behaviour. It allows us to dose excitement, thrill, and the degree of novelty, and it is this behaviour that makes the experience of beauty in dance extremely exciting [79].

It is necessary to consider the relationship between artistic manifestations and their social context. Until recently, it was believed that creativity takes place in solitude. But group dance opens up the possibility of creativity that cannot be carried out as a purely personal act, since group dance requires the unanimous consent of all its participants. This consent is manifested in a spatial and temporal structure that can be considered a unifying norm. Thus, dance unites a community of people. Strong and weak dancers merge in a single movement. Submission to a common norm does not mean the oppression of an individual, because a single spatio-temporal structure not only allows individual variations, but also requires them. This is especially true for small dance groups. If the group is large, the movements of its individual members fall under the dictates of the general rhythm, and then they cannot independently influence it.

Then the dance turns into a military march, which does not allow for improvisation and forces you to act in a monotonous way [83; 90].

Human body movements are one of the acts of creativity. In order to become a way of communication, dance creativity requires feedback, which is provided through the corresponding body movements of other people. But communication becomes real only when the movements of each dancer reproduce their inner mental state, becoming their expressive means of expression. Therefore, the social nature of dance will certainly help to reveal each person, help to find opportunities for communication, pleasure and personal growth.

Communication is closely related to dance activity. We can distinguish between non-verbal communication, which is characterised by the use of wordless behaviour and communication as the main means of transmitting information, organising interaction, forming an image, an opinion about the interlocutor, and exerting influence on another person, and verbal communication, which is communication with words, the exchange of information and emotional interaction between people or groups through language. Non-verbal communication usually occurs involuntarily, unconsciously. Although people control their speech to a certain extent, it is possible to assess the correctness and sincerity of linguistic information by analysing facial expressions, gestures, and intonation.

As a rule, special training is required to understand non-verbal elements of communication. A person learns non-verbal means of conveying information earlier than verbal ones. An infant begins to distinguish between the emotional states of the mother, reacts to the intonation of the voice, facial expressions, gestures, and touches. In adults, when in contact with strangers, the first impression is made through non-verbal communication (visual contact, expression, empathy - the ability to empathise). One of the important parameters

that characterise non-verbal communication is interpersonal space - the distance that is unconsciously established in the process of direct communication between people. The closer the relationship between people, the smaller the spatial distance between them in the process of communication. This distance depends on national standards of behaviour, social status, age, and psychological characteristics. A distance that is too close, as well as a distance that is too far away, negatively affects the effect of communication. Old acquaintances and relatives communicate "closely". Increasing interpersonal space can cause unpleasant feelings. Interlocutors who are interested in each other reduce the distance of communication, while mentally anxious interlocutors try to increase the distance [81; 92].

Interpersonal space affects visual contact (eye contact). The most informative element of a person's appearance is the face. That is why visual contact is extremely important in non-verbal communication. Fixing your gaze on another person means not only interest, but concentration. However, staring at a person for a long time makes them feel embarrassed and can be perceived as a sign of hostility. Mutual eye contact is easier to maintain when discussing pleasant matters. How closely communication partners look at each other can help you to find out what kind of relationship they have. We tend to look at those we admire longer, avoiding eye contact in a situation of rivalry [89].

Any form of communication is a form of joint activity, people always communicate in the process of a certain activity. Combining the dance activity of one person with another forms a joint dance. In dance activity, not only subject-object (a person is the subject of the dance), but also subject-subject relations (a person is a person) are formed. The essence of communication in dance lies in the interaction of subjects of joint activity. Communication can be seen as a side, a condition of dance or as a separate type of activity. But the connection between communication and dance activity lies in the fact that it is

through communication that dance is organised. Developing a plan for joint activity in dance requires each person to understand their goal (partner, group interaction), the means of implementation (compositions, movements), and the distribution of functions to achieve it.

The specificity of communication in dance is to create the possibility of organising and coordinating the actions of individual participants. Thus, dance activities are enriched, new connections and relationships between dancers are developed and formed [88].

Based on the above functions, three aspects of communication can be distinguished in dance: communicative (information exchange), interactive (interaction) and perceptual (dancers' understanding of each other). Communication in dance is not only the reception and transmission of information, but also the relationship between at least two partners, where each is an active subject of interaction. In addition to the exchange of information, there is an orientation towards the partner, i.e., the motives, goals, and attitudes of the other subject are analysed.

4.2. Choreographic activity as a form of psychomotor activity

The leading postulate of choreographic art is improvement of motor functions. After all, the components of choreography are physical data (step, jump, turn, flexibility, artistry, musicality, coordination).

Psychomotor action is a key aspect of human activity. It is the carrier of everything that makes up a person's creative activity. Psychomotor action combines thoughts, feelings, imagination and physical behaviour into a single whole. A psychomotor action is a volitional act of human behaviour aimed at achieving a specific goal. The characteristic features of an action are its volitional origin and the presence of a goal. You can act internally and externally. In practice, physical movements and internal action are closely related. The right combination of physical movements and mental processes that occur

in our minds give rise to harmonious actions, correct actions that evoke the right emotions. Such actions determine organic human behaviour.

The components of psychomotor action are assessment, adaptation to the partner in bodily space, and interaction and influence on the partner. Assessment is the first moment of a conscious action. Adaptation to the partner in bodily space and interaction and influence on the partner begins immediately after the assessment, at the very moment when a specific goal has arisen in the mind. When adapting to influence a person, we have to act based on our subjective perceptions of the qualities and properties of the partner and his/her body space. For example, I push away from him/her, I am attracted to him/her, I adapt to the partner from above, below, on an equal footing, etc.

A psychomotor action is always aimed at achieving a specific goal. That is, we influence the object or subject to which the action is directed. Muscular freedom, which has both internal and external aspects, helps us to act correctly and expressively. By taking into account what the body is telling us and combining it into a single whole, we can reconnect with needs, conflicts, feelings and failures - all of which are manifested through body movements. Using muscles that were previously unknown and inaccessible to us opens the way to change: the body itself provides us with all the tools we need for self-discovery. The language of the body and soul is extremely easy to understand. The first step to understanding it is to recognise the signals of the muscles, which are expressed in subtle movements saturated with the energy of feelings and thoughts. However, this is not an easy task, because it is necessary to feel your body in a new way, to pay maximum attention to those aspects of physicality that a person has been ignoring for a long time. The body reflects what is happening to us both on the conscious and subconscious levels.

By learning this language, we can understand what the body is telling us. First of all, you need to familiarise yourself with the structure of your own body [91].

An essential feature of the concept developed in the study of human psychomotor skills is the idea that rhythm is an integral part of harmonious development. A person's self includes his or her body, through which he or she can express inner, spiritual qualities through physical movements. Physical movements are distributed in a certain space and time, have their own range and expressiveness, they are characterised by beauty and amplitude, direction and tempo, and rhythm is a complex characteristic of bodily movements. It is determined by the functional characteristics of the central nervous system and has a motor nature.

The emotional and sensual colouring that psychomotor activity receives from dance releases tension and anxiety. A person adapts to regulated activities due to their own plasticity. This psychomotor ability is formed during the training of the sense of rhythm, promotes a flexible transition to solving complex motor tasks, during which dynamic intuition works. Psychomotor action, like music, is distributed over time. For this purpose, movements must be emotionally expressive and musically rhythmic. It is in such movements that body and spirit merge.

Dance and psychomotor behaviour perform similar functions related to rhythm, semantics of movements and communication - the process of exchanging information, including facts, ideas, opinions, emotions. These functions are presented in different ways in different types of dance. The close distance in a couple dance, the presence of touching, face-to-face positioning, and the intersection of the partners' personal spaces, which have an ellipsoidal shape, indicate close personal communication between the partners. Group dance implies not very close distance and intersection of partners' personal spaces, and this is seen as the realisation of intra-group relations. Individual

dance, which is performed alone, without addressing a real or imaginary partner, is seen as autocommunication, which aims at self-knowledge and self-regulation [90].

One of the fundamental tenets of dance theory is psychologism in describing, researching and interpreting the physiological, cultural and social experience of the individual. In contemporary psychology, the emphasis is shifting from using dance as a means of psycho-physical regulation to using it as a means of establishing, maintaining and correcting interpersonal relationships. The central issue is the placement of emphasis in different areas of dance activity and the expansion of approaches to the realisation of personal self-development.

The dance interaction of partners is, in essence, a non-verbal interaction - a non-verbal interaction, a contact in which the behaviour of partners represents different levels of conformity, harmony, integrity: from complete duplication of each other's behaviour to complete inconsistency. This contact reveals three main components of interpersonal relationships: sympathy-antipathy, respect-disrespect, and closeness-distance. Dance interaction partners present these components of relationships to each other, which are subject to their own analysis and change. Thus, dance is used for social and psychological interaction.

Considering dance activity as a special form of psychomotor activity, we are approaching the problem of harmony of body and soul, as it opens up the possibility of theoretical substantiation and analysis of adequate methodological techniques that can be used to achieve harmony in the development of social, cognitive, emotional and physical life [82].

Psychomotor activity as an integral characteristic of a personality is manifested in increased muscle sensitivity, an individual way of expressing emotions in dance, and the expansion of non-verbal interaction. Psychomotor activity is necessarily present in dance

activity, emotional expression (facial expressions, postures, expressive movements, gestures), experiences and moods, instrumental choreographic actions. Psychomotor skills express human states and typological features (extraversion-introversion, properties of the nervous system).

When introducing the concept of "psychomotor skills" into scientific use, Sechenov raised the question that psychology should study living movement in a living body. What does this mean? Firstly, it means that movement is constantly changing, and therefore the motor centres of the brain cannot be considered to be responsible only for the motor part of perception and action. Secondly, the human body, which is the core of the psyche, should be considered as a living organism that has its own field of activity, bodily space. Thus, the body becomes a full-fledged participant in any psychomotor action that unfolds in space and time.

Therefore, psychomotor researchers focused on the study of motor reactions, while it remained a mystery how a person moves, what mental properties they put into movement, because in addition to the ability to perceive, think, feel and move to meet their own physical needs, a person changes the general idea of themselves and other people. In other words, they are able to expand the boundaries of their bodily space through psychomotor skills. Thus, the purpose of studying dance activity in the context of the dancer's psychomotor activity is to expand the informational content of dance. This goal is achieved through the study of one's own psychomotor activity: learning the possibilities of one's own bodily space, developing skills in modelling psychomotor action, self-knowledge and self-improvement in optimised behavioural patterns [82].

Familiarisation with the basics of human psychomotor activity takes place through a combination of psychomotor and choreographic exercises not only in dance, but also in other types of activity: motor, visual, artistic, etc. Thus, the structuring of the movement is extrapolated

(spread from one part of the plane to another part of the same plane) in different ways, ensuring the development of human psychomotor activity. In dance, there is a targeted impact on self-development of the individual through internal sensations (experiences and feelings) and awareness of the meaning of the concepts of "body diagram", "body space", "body image", "psychomotor action", "psychomotor activity"; acquaintance with the practical application of the basics of choreography in the context of psychomotor activity; equipping with practical skills of expressive movements and development of psychomotor abilities: flexibility, plasticity, strength, tempo.

The study of dance psychomotor skills is implemented in three stages: the development of sensitivity to internal motor impulses containing reflex, voluntary and emotional components; interpersonal interaction through the performance of choreographic, pantomimic, and visual actions aimed at expanding bodily space; the creative process of non-verbal interaction in dance through interaction with group partners within the bodily space.

The study of dance activity as a form of psychomotor activity is based on the following conceptual provisions:

- psychomotor activity is an integrated human ability aimed at mentally conditioned mental and motor actions to determine the form, content and methods of solving cognitive tasks;
- internal factors of psychomotor activity regulation are speech, feelings, images, and external factors are space, topics and rhythm of activity;
- psychomotor action is studied as a unity, which implies the coherence of mental (thoughts, emotional states, images) and motor (macro- and micro-movements) components of choreographic activity that unfold in space and time;
- the integrity of a person as a subject of cognition is ensured by corporeality (body image), where the body is the core of the psyche, and the bodily space is the field of orientation and

search actions, as well as actions with the body as a tool for cognition;

- bodily experience is important as a sensory individual load, on the basis of which the foundation of psychomotor activity, mental operations and cooperation is formed;
- muscle freedom allows to create a positive body image, a person feels the organic integrity of internal cognitive and emotional activity, and thus, in the conditions of expanded bodily space, mechanisms of self-development work.

The introduction of practical psychomotor skills into dance activities requires psychologists and choreographers to have the necessary knowledge and skills. How can this be achieved? A choreographer, like a psychologist, has to learn and teach others the skills of psychomotor activity, the ability to control their own body, and the search for resources of bodily space. In addition to learning the capabilities of one's own body, it is necessary to master the content of the basic concepts that make up the cognitive component of psychomotor development: "psychomotor action", "bodily space", "body diagram", "psychomotor abilities", "body image" [82].

4.3. Localisation of psychological and physiological mechanisms to dance art

Dance activity is associated with the ultimate tension of functional systems. Therefore, the main issues of dance physiology are physiological mechanisms of adaptation of the body to physical activity and physiological characteristics of different types of dances. The basis of dance physiology is anatomy, physiology, biochemistry, biomechanics, and psychology.

In order to improve the quality of dancers' training, it is necessary to know the physiological mechanisms of the body's adaptation to the environment, which is constantly changing.

The systematic use of dance exercises also results in functional and structural changes in the body. For effective dance training, it is necessary to know the age and gender characteristics of a person, to be able to make a physiological analysis of the training process, to know the reserve capabilities and mechanisms of self-regulating functions and adaptive capabilities of the body. Without this, it is impossible to train dancers.

It is known that muscle work is the natural lever that changes the intensity of the body's activity and influences human growth and development, ensuring comprehensive harmonious development. Therefore, the organisation of a rational training system is necessary only on the basis of in-depth knowledge of age-related physiology and the physiology of motor activity. Choreographers need to master modern knowledge of physiology and psychology, and this knowledge forms the basis of a physiological way of thinking. This way of thinking allows us to determine the physical level and performance of those who train, to form a rational dance technique, and to manage the acquisition of skills by dancers. The choreographer must choose the right means and forms for training, carry out professional selection and predict the results, prevent overwork and overstrain of dancers [90].

What is the structure of physiological thinking? First of all, the maximum approximation of the content of training and dance load to the conditions of creative activity; secondly, the choice of physiological indicators that change more and more clearly in the process of dosed and limit loads; thirdly, modelling the means of directing influence on the physiological development of the body; fourthly, modelling the body's states during muscle activity.

Physiologists who have studied the development of the brain and its functions have objectively proven that any dance movement provides brain exercise. Human motor activity has a very wide range: from the muscle coordination required for manual work or moving

the whole body in space to the subtle movements of the fingers while writing. The physiological basis of sensations is the transmission of nerve impulses from receptors to the corresponding parts of the brain. The flow of nerve impulses that control this activity, unlike sensory systems, goes from the motor area of the large hemispheres to the periphery, i.e. from the brain to the muscular structures of movement. The physiological structures responsible for the nervous regulation of postures and movements are located in the relevant parts of the central nervous system - from the spinal cord to the cerebral cortex. There is a strict hierarchy in their location that reflects the gradual improvement of motor functions in the course of evolution [82].

According to Bernstein's theory of leveled construction of movements, dance activity consists of chains of movements and psychomotor actions. They are built according to the system of levels of movement construction. In this theory, levels are understood as morphological parts of the nervous system: the spinal cord and medulla oblongata, subcortical centres and cerebral cortex. This system is created in accordance with the participation of certain parts of the central nervous system in motor activity. Depending on the semantic part of the motor task, seemingly similar psychomotor actions can be regulated differently, depending on the purpose of the level: background or leading, main. The following five levels are distinguished in the movement control system:

- Level A - determines muscle tone and participates in the support of any movement together with the other levels. The movements it controls are smooth and enduring. The actions of this level are not arbitrary at all;
- level "B" - movements of this level are characterised by a tendency to stereotypes and periodicity. An example is the arbitrary movements of the face and body.
- level "C" - is responsible for building movements adapted to the spatial properties of objects (all types of locomotion, i.e.

a set of movements that help to move in space and fine motor skills, etc.)

- level "D" - this level ensures the organisation of actions with objects, all types of actions with tools and manipulative movements.
- level "E" - the highest level of organisation of movements and is peculiar only to humans. The role of this level is always leading. The level provides motor actions that are intellectual in nature (performing movements when writing, articulatory movements when pronouncing words, etc.

The biological processes of human development do not occur in isolation from its social functions, outside the significant influence of social relations. The influence of natural factors on the development of a person's physical potential is objective, but its specificity lies in the fact that it can increase or decrease depending on the activity of a person who can consciously influence the course of this objective process based on knowledge of its laws and essence.

In this respect, dance is a social factor of expedient influence on the process of physical improvement of a person, and provides a directed development of his/her vital physical qualities and abilities. Thus, dance unites the social and biological.

Peculiarities of development and awareness of choreographic abilities

It has been found that the specificity of the art of choreography is that the essence of any dance work and artistic image is formed by the plasticity of the human body, it has been revealed that the basis of choreographic talent is formed not by physiological or psychological characteristics, but by their complex combination.

People are not born with abilities. He or she is born with aptitudes. There is no such thing as a predisposition to certain types of activity, such as choreography, music, etc. Abilities are a consequence of

the development of the potential in an activity. From the very beginning of dance classes, children develop an understanding of the harmony of body lines, as well as such qualities as musicality of movements and a "sense of posture".

Choreographic abilities are a complex individual and personal multi-level formation, based on choreographic skills, knowledge, abilities, inclinations, as well as a system of basic components, which are directly musical and motor capabilities (sense of rhythm, artistic and aesthetic orientation, general motor activity as the main condition for plastic and emotional expressiveness); a set of motivational and personal properties (emotionally coloured interest in choreographic art, high motivation for achievement) that contribute to the actualisation of specific potential capabilities of the individual; intellectual and creative potential (the relationship between convergent and divergent thinking as an individual's ability to analytic and synthetic activity associated with the ability to find new, non-standard and original solutions to motor tasks) [89].

The peculiarities of their correlations create and determine the individual level of development of an individual's choreographic creativity, and they also form a peculiar orientation of attitudes and interests.

From the perspective of the theory of integral personality, choreographic abilities.

I. G. Sosnina considers it as a complex multilevel and multicomponent formation, including:

a) dispositions (peculiarities of the structure of the body and its parts and psychodynamic properties);
b) general abilities (high emotional and volitional regulation, creativity of thinking);
c) special choreographic abilities (artistry, dancing, emotional satisfaction from dance movements, motivation to succeed in

the profession, subtle differentiation of movements by force, amplitude and speed).

There are different criteria for classifying abilities: by the dominant mental process (sensorimotor, mnemonic, perceptual, thinking, imaginative, communicative), by subject area (scientific (humanities, mathematics, linguistics), creative (artistic, musical, literary) and engineering).

Also, certain levels of choreographic abilities are identified: actual, potential, pre-professional [90].

Choreographic abilities can be defined as one of the types of special abilities that are associated with the achievements of a person in choreographic activity. They contain sensory-perceptual, emotional and psychomotor components that manifest themselves in heightened sensitivity to intellectual, creative and musical-motor manifestations, are associated with imagination and a high level of production of new unique plastic images, feelings and will, and allow an individual to realistically assess newly created situations, solve problems, and construct completely new creative material.

Choreographic giftedness combines a sense of the unity of plastic and musical intonation and the ability to capture and reproduce the revealed external manifestations or internal state of the character in the production in one's own movements.

O. Soboleva considers choreographic giftedness as a creative potential that includes the following main components:

- acmeological abilities, as a personality's orientation towards self-realisation, self-development, self-realisation, self-disclosure, self-affirmation;
- psychomotor abilities such as plastic expressiveness, muscle relaxation, body control, the ability to saturate movements with thoughts and feelings;
- musical abilities, in which the sense of rhythm is in the first place;

- autopsychological abilities such as self-attitude, self-perception, etc;
- cognitive abilities (intelligence);
- cognitive abilities, which in the acmeological context reflect the interaction of self-awareness and professional activity;
- social and perceptual abilities that reflect the self-esteem of the individual in interpersonal interaction;
- artistic abilities, which involve the mental reflection of affective (emotional) character, passion, sensuality, conscious expression in the mimicry of a sign and the modality of emotional support of an action;
- creative abilities;
- empathic abilities - understanding of relationships, feelings, mental states of another person in the form of empathy [92].

Emotionally expressive movements based on the effective reproduction of images are the activity that creates the best conditions for the development of choreographic creativity. It is important to note that choreographic creative abilities are individual human properties that allow for the creation of qualitatively new, unique actions, movements or images for an individual [89].

It is possible to reveal and identify certain regularities of creative choreographic individuals through their gradual, systematic inclusion in creative choreographic activity. The core of creative expression is the motor and emotional perception of a musical piece and its plastic and intonational embodiment. The effectiveness of creative action depends on a person's musical and motor experience, emotional interest in diverse choreographic activity, and the ability to improvise and interpret. The speed of mastering the methods of creative actions is determined by: general motor activity, cognitive interest in choreographic art, the level of development of the sense of rhythm, their needs.

The development of choreographic abilities is subordinated to the basic laws of the development of abilities. The components of creative choreographic abilities are revealed at the preparatory (for reading and comprehending a work) and performing (for interpreting the artistic intent and conveying an emotional mood to the audience) stages of choreographic activity. Creative abilities at the level of staging are manifested in the harmony of the created choreographic work, primarily through creative improvisation and aesthetic rethinking of images, principles and ideas. One of the most important mechanisms for the formation and development of choreographic talent and a factor in the transition from the performing to the staging level is the awareness of creative abilities and systematic, purposeful development in activity.

The specifics of the development of choreographic abilities largely depend on the experience of choreographic activity. The greater the experience of choreographic activity, the higher the level of reflection (self-knowledge) of the development of abilities [91].

The analysis of scientific sources shows that choreographic talent is characterised by such indicators as artistry, improvisation, precision and coherence of movements, the ability to interpret and feel one's own body, fantasise and the desire to realise one's own ideas, and think outside the box. The main factor in the development of choreographic abilities is the awareness of one's own abilities and the ability to develop them in creative activity. Self-knowledge in the context of the development of choreographic abilities is perceived as trying on various creative images and experiences, evaluating oneself and others in certain circumstances and the ability to construct various new images in terms of character, plot and worldview. A special sign of self-knowledge of the abilities of a choreographically gifted person will be the consolidation of the value of creative activity in his/her mind and awareness of the prospect of continuous improvement of creative potential.

One of the conditions for the development of choreographic abilities is the awareness of the procedural characteristics of the activity performed. The skills developed in choreographic activity include stretching, swings, press, isolation of movements, turns, twine, exercises at the machine, jumps. It can be traced that the basis of the operational-cognitive component of choreographic abilities is formed by individual exercises that they perform during choreographic performances and rehearsals. It has been found that significant experience in choreographic activity contributes to a higher level of operational and cognitive characteristics of ability development. Ballet dancers who have been involved in choreographic activities since childhood have such qualities as determination, perseverance, confidence, systematicity, diligence, desire, scrupulousness, and communication skills. All of the skills highlighted are related to choreographic activity. A prerequisite for creativity is the ability to transfer individual skills and operations to other types of human activity and the awareness of the possibility of improving and developing abilities. The development of these abilities requires constant work on oneself and self-confidence. That is, a condition for the formation and development of choreographic abilities is the awareness of one's reference component. The result of developed abilities in choreographic activity is the operational and cognitive component of ability reflection, and the awareness of one's own significant role in the development of abilities and personal qualities contributes to the rapid development of the individual [82].

Evaluative factors in the creative thinking of a dance performer.

The specificity of creative thinking lies in the fact that in dance it is bifurcated under the influence of psychophysiological processes that occur simultaneously. These processes run along the line of the dance image and the line of the dancer's life. They are interconnected and have a mutual influence on each other. Penetrating

each other, the thought processes balance, attract, repel each other, forming a unity and a complex experience in which the dancer's "I" and the image's "I" are united, becoming inseparable. The dancer's "I" is the animation of the traces of the experiences of his or her life. The "I" of the image is a thought act that is associated with being in the dance hall, in front of the audience, a partner [88].

Creative satisfaction is associated with good technical music performance and a sincere and deep experience of the image. Creative dissatisfaction is manifested in deficiencies in technique, poor sense of music, and inconsistency with a partner. A good dance combined with creative satisfaction brings joy to the audience, creates a mood full of positive emotions. In addition, at the moment of satisfaction with the dance, there is a feedback of emotional outpouring from the audience to the dancer, giving him or her the opportunity to correctly assess his or her dance and feel creative satisfaction. Creative dissatisfaction is manifested in a drop in mood, the arms and legs become naughty, and movement requires a strong-willed effort. Konstantin Stanislavsky said: "Talent is a happy combination of many creative abilities of a person combined with creative will. You cannot create against the will, it is necessary that a person wants to create or knows how to arouse this will to create" [88]. The ability to arouse the creative will in oneself is a great skill, and without it, one cannot speak of talent. The mechanism of creativity is arranged in such a way that the emotions caused by the emotional drive of the dance give rise to movement, which is coloured in the necessary tone, and only then is a new volitional process born. If in the process of creativity the dancer begins with the comprehension of each movement of the dance as a whole, the images he creates will become vital, plastic, musically expressive, and multifaceted.

The key to success in dance is the inseparable unity of playful emotions, passions and rational thinking. Talent lies in the ability to maintain control of the intellect over emotions. A sense of proportion

and restraint of emotions can take a back seat when a dancer unleashes his or her stage temperament. But a talented performer never loses control of them [89].

At rehearsals, this process goes differently. The specificity of rehearsal work requires first mastering the movement technique and dance pattern, and only then the search for the image begins. Thinking turns into a complex psychological act that includes components of analysis, synthesis, generalisation, and abstraction [82].

The nature of the mental is a constant subject of scientific debate. On the one hand, it is obvious that all mental phenomena are the result of the brain. They are based on the physiological processes of excitation and inhibition that take place in the central nervous system and are organised on the principle of unconditional (innate) and conditional (acquired) reflexes. In this sense, we can say that the psyche is a property of highly organised matter, which consists in reflecting the world around us. The psyche is a complex system of reactions to external and internal stimuli. At the same time, these mental reactions are ambiguous. They include features of the human body mediated by human activity, its past experience and orientation. In addition, there is a whole layer of mental phenomena, such as premonitions, insights, clairvoyance, which indicate the ability of the psyche to create its own subjective world, an ideal world. This world cannot be explained by the reflexive nature, because the psyche not only reflects the surrounding material reality, but also creates a "second" ideal reality. This is, in particular, the psychological meaning of creativity, when the ideal result of mental activity contains the real attitude of a person to the world around him or her, as well as to what was in his or her past experience [90].

The content of a person's mental life consists of mental processes, mental states and personality traits. With the help of mental processes of sensation, perception, representation, memory,

reflection, and thinking, a person cognises the world around him or her and is able to predict the future. With the help of attention, emotions, feelings, will, speech, and psychomotor skills, a person manages his or her own activities. Cognitive and regulatory processes last for moments or tens of minutes. They are included in complex types of mental activity. Mental states, in particular, performance or depression, anxiety or creative inspiration, are longer and more complex: they take hours, days, weeks. States affect the nature of mental processes.

Personality traits are even more stable. They can accompany a person throughout their life. These are manifestations of temperament, character, abilities, and personality orientation [81].

And if music helps to understand and analyse the structure of dance, gives a sense of rhythm, understanding of the image in dance, then consciousness, meaningful learning of movements and their technique allows you to gain motor experience, to approach the heights of mastery.

CONCLUSION

The monograph presents a theoretical generalization and a new solution to the scientific task, which consists in the development and scientific substantiation of the individualization of the training process based on the consideration of the mental state of athletes. The analysis of literature sources shows that the mental states of athletes have been studied by researchers to a greater extent in connection with pre-competitive and competitive activities. As a result, the states of "combat readiness", "pre-start fever" and "pre-start apathy" were studied and described.

When studying the pre-competitive mental states of athletes, researchers focused on finding general patterns and signs that, in their opinion, should determine the mental readiness of an athlete to compete in any sport. Subsequent experimental researches and practice of sports activity made it possible to make sure that in order to assess the degree of correspondence of the mental state of a sportsman to the specificity and specific tasks of training it is not enough to use separate knowledge of even informative indicators, motor and vegetative manifestations of the operational pre-activity state (for example, tremor or heart rate) - it is necessary to take into account their interrelation and unification of the active components of the mental state, which ensure obtaining a positive and conscious in a certain.

Increasing the effectiveness of training activity is conditioned by specific signs of the mental state, which depends on the requirements clearly understood by the athlete to the regulatory functions of the psyche and meet the goals and objectives of the training session. These signs are determined by the following factors:

- the specifics and focus of the training session, i.e., the predominant focus on the formation, development and improvement of one of the listed qualities: speed-strength, endurance or complex coordination;

- conditions of training activity: normal or increased load, variability or relative stability, absence or presence of risk, etc.;
- specific training tasks and requirements to the peculiarities of exercises: achievement of the maximum result, improvement of skills or physical qualities, development of exercise technique, development of tactical decisions, etc.

The informativeness of psychomotor factors of a sportsman's mental state is determined by the necessity of the predominant regulation of specific parameters of movements and motor actions. Thus, adequate mobilization of sportsmen before "endurance" training is provided by the growth of situational anxiety, while keeping at a low, close to the background level of indicators of personal anxiety (30,2 and 30,4 points, $p<0,05$). At the same time before "speed and power" training - on the contrary, due to the growth of personal anxiety (in basketball players, acrobatic track jumpers and boxers - 47,6-47,2 and 48,1 points ($p<0,05$)) at the same time keeping situational anxiety at a lower level. At the same time, exceeding the background values of personal anxiety is a sign of a mental state that contributes to success in performing high-speed power exercises, but hinders it in endurance work.

Differences in the mental state of an athlete, which contributes to the achievement of the maximum result in training, which requires a predominant manifestation of endurance or speed and power qualities, are characterized by multidirectional shifts (in relation to the background) of indicators of accuracy, speed and stability of self-regulation, autonomic activation and self-assessment. For example, before jumping on an acrobatic track, the accuracy of movements is much more important for an athlete than when they perform strength exercises. Therefore, the indicators of the dosed tapping test in athletes-jumpers are equal to 10.03 units, and in acrobats-jumpers - 6.7 units. ($p<0.01$); time of keeping balance at jumps is equal to 58.6 s,

and at performance of power acrobatic exercises - 68.5 s ($p<0.05$); vegetative activity (bioelectropotentiometry) in the first - 46.4 mlA, and in the second - 32.2 mlA ($p<0.01$); at the same time, conscious self-assessment by the level of situational anxiety, on the contrary: was higher in power acrobats (42.1 points) and significantly lower (36.8 points, $p<0.05$) in acrobatic tumblers. That is, at a considerable level of anxiety the successful performance of a jumping acrobatic exercise cannot be achieved. The principle of minimizing the costs of regulating training activity has been established, which is manifested in the fact that the parameters of self-regulation important for ensuring the performance of specific exercises improve, and the insignificant ones deteriorate.

Among the signs of the mental state of readiness to realize the maximum available result, the leading role belongs to the indicators characterized by the originality of the motor settings formed during previous training sessions and updated immediately before the exercise: to maximize or save energy costs, efforts, pace, result, accuracy, etc. The degree of conformity of such settings to the conditions of activity and possibilities of sportsmen largely determines the positive or negative influence of the pre-activity mental state on the result of training.

When aimed at improving the efficiency of motor activity, current and operational diagnostics of the mental state of athletes are prognostically informative complexes that include: indicators of self-assessment of mood, well-being, desire to train, satisfaction with the previous day and readiness for competitions; indicators of bioelectropotentiometry and psychomotor skills that reflect specific regulatory functions: accuracy of dosage of time intervals, pace of movements and efforts (in rowers); accuracy of reaction to a moving object; speed of operational search, stability of reaction and balance (in acrobatic track jumpers); maximum frequency of movements, reaction speed (in sprinters).

Operational diagnostics and correction of the mental state of athletes, directly during training, can be carried out by a developed and experimentally tested diagnostic complex consisting of dynamometry, tapping test and bioelectropotentiometry. This complex reflects the severity and interrelation of the athlete's power, speed and energy settings.

It is established that the ratio of these attitudes is an important, individual for each athlete sign of the mental state, which promotes or hinders the achievement of the desired result in solving specific training tasks in each type of exercise.

The system of individual correction of the training process due to the operational control of the set of mental signs of the athlete by taking into account their changes before performing exercises, allowed to combine individual and activity principles in the process of managing training sessions.

The prospect of further research should be the study of the mental state of athletes specializing in sports where performance is determined by the quality of exercise (rhythmic gymnastics, sports dancing, etc.) and where self-regulation is focused on the accuracy of movement control. The study of the mental state of athletes at different stages of their training is also promising.

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ADDITIONS

ADDITION A

Indicators of situational anxiety and BEP, contributing to the successful performance of decathletes in competitions (m; n=14)

a) The first day of all-around

Indicators	Types of all-around												
	Running 100m	Long jump			Shot Put			High jump					Running 400 m
	1	1	2	3	1	2	3	1	2	3	X-I	X	1
ART	30-50	35-40			38-45			45-50					40-43
BEP	50-70	30	35	40	35	55	48	50		45	55	55	35-38

b) The second day of the all-around

Indicators	Types of all-around												
	Running 100m	Discus throwing			Pole vaulting					Javelin throwing			Running 1500 m
	1	1	2	3	1	2	3	X-I	X				1
ART	25-28	30-33			32-48					40-43			28-40
BEP		30	35	40	80	70	75	90	90	35	60	60	25-32

ADDITION B

INTERCORRELATIONS OF PSYCHOLOGICAL, PSYCHOPHYSIOLOGICAL AND PEDAGOGICAL INDICATORS OBTAINED AS A RESULT OF A LABORATORY EXPERIMENT WITH YOUNG FEMALE ATHLETES BEFORE EXERCISE

	Indicators	Indicator numbers															
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
1			328	323	549	485	335	255	347	300	431	-343	126	-146	162	-137	-276
2				182	457	636	402	160	834	465	287	017	265	-281	051	-501	412
3					490	656	297	188	254	477	527	181	440	086	325	-152	-037
4						682	269	151	599	602	422	-298	613	-137	420	-177	194
5							516	333	785	723	658	158	553	-246	-278	-308	306
6								310	574	419	373	-143	137	-343	-162	-254	436
7									417	636	605	152	508	-472	-112	121	304
8										606	373	007	507	-419	035	-338	589
9											832	124	714	-435	266	003	365
10												078	437	-333	247	-038	072
11													-079	036	058	216	065
12														-190	297	-033	499
13															287	-146	-239
14																382	-301
15																	-382
16																	

Continuation of Addition B

	Indicators	Indicator numbers															
		17	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
1		035	062	019	-133	020	247	138	144	068	042	021	159	257	516	449	-047
2		205	096	219	-054	-080	-005	-102	365	308	204	-029	163	311	083	045	102
3		130	-084	-174	-081	186	-203	088	-029	008	-005	059	218	354	245	268	576
4		289	-412	-165	-185	-253	-030	-020	003	048	051	222	375	187	283	217	187
5		383	-049	081	150	066	111	197	381	175	033	012	264	368	233	255	375
6		246	193	051	-101	-010	-095	-084	420	146	012	080	125	041	564	551	217
7		659	-178	066	219	269	054	219	084	278	268	496	652	171	-019	-064	137
8		460	-159	113	-017	-108	049	015	393	268	145	159	317	193	259	251	181
9		657	-045	-170	132	029	115	258	191	210	140	450	659	325	002	-065	340
10		504	032	-015	241	210	114	292	402	382	248	292	519	380	019	-024	140
11		-008	306	121	431	515	116	316	196	195	105	-402	-197	327	-347	-253	246
12		641	-455	-141	-160	-041	-136	-020	-347	003	126	521	723	251	100	023	499
13		-366	-055	088	-076	-160	023	-123	-116	-133	-087	-562	392	186	169	196	077
14		-165	076	-187	-123	-103	-061	018	032	-268	-306	080	328	332	088	088	407
15		-180	288	-214	173	021	162	267	-203	-294	-241	320	327	-014	-162	-111	260
16		533	-331	239	-038	124	-115	-202	054	436	463	108	206	118	095	016	024

Continuation of Addition B

	Indicators	Indicator numbers															
		17	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
17			-474	-034	026	-057	062	-017	013	261	151	523	551	046	-086	-096	030
18				051	184	103	122	184	339	-166	-298	-197	-139	176	-106	-027	276
19					212	628	-175	-422	217	300	274	-178	009	295	-070	-030	-172
20						323	810	744	428	072	-087	-103	-189	-132	-625	-600	-269
21							-294	-028	106	277	256	-108	036	208	-152	117	126
22								769	367	-099	-247	-037	-213	-262	540	519	349
23									298	-100	-245	017	-173	-290	-397	-392	-052
24										411	068	-267	-227	085	-069	-006	-321
25											934	-262	007	458	-032	-084	-398
26												-196	096	491	003	-088	-333
27													774	-350	-058	-077	259
28														302	015	034	407
29															083	049	197
30																965	217
31																	300
32																	

Note: 1. The parameters to be determined are given in Table 2.1.

2. Zeros and commas before the values of the correlation coefficients are omitted.

3. The correlation coefficients are underlined at $p<0.05$.

ADDITION C

Intercorrelations of psychological, psychophysiological and pedagogical indicators obtained as a result of a laboratory experiment in young athletes after exercise ($\bar{x} \pm m$; n=21)

№	Indicators	Indicator numbers															
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
	S-z		328	323	549	485	335	255	347	300	431	-343	126	-146	163	137	-084
	N-th			182	457	636	402	160	824	465	288	017	265	-281	-051	-591	266
	BVZ				490	656	297	189	254	477	527	181	440	086	325	-152	016
	PPT					682	269	151	599	602	422	-298	613	-137	421	-177	458
	VPR						516	333	785	723	658	158	553	-246	278	-308	354
	GdZ							310	574	419	375	-143	137	-343	-162	-254	383
	S-ya (after loading)								417	634	605	152	508	-472	-112	221	330
	N-th (after loading)									606	373	-004	507	-419	035	-338	541
	NVPM										832	124	714	-435	266	003	429
	ZDR											072	438	-333	247	-038	189
	BEP (start)												-079	036	058	216	-049
	T (operating time)													-190	297	-033	532
	N														286	-146	-252
	ST															382	-072
	ZOT																-268
	Czech republic																

Note: 1. The defined parameters are presented in Table 2.1.

2. Zeros and commas before the values of the correlation coefficients are not given.

3. Correlation coefficients are underlined at $p<0.05$.

ADDITION D

Intercorrelations of psychological, psychophysiological and pedagogical indicators obtained as a result of a laboratory experiment in young athletes before load ($\bar{x} \pm m$; n=27)

№	Indicators	Indicator numbers															
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
1.	S-z		617	674	427	549	531	629	631	432	570	-240	106	218	-272	-040	107
2.	N-th			435	359	439	415	476	667	406	249	-251	242	363	-253	177	101
3.	BVZ				454	486	507	594	626	329	201	-319	-038	203	-012	-004	-091
4.	PPT					769	596	394	438	342	242	-206	-055	122	-168	259	157
5.	VPR						717	397	403	590	443	-186	-061	106	-336	-016	323
6.	GdZ							412	325	406	310	187	-046	188	-396	-047	-042
7.	S-ya (after loading)								696	328	501	-059	132	159	-120	-112	-046
8.	N-th (after loading)									436	300	-030	048	179	-102	148	113
9.	NVPM										680	045	-021	021	-285	-091	211
10.	ZDR											106	056	004	-263	-362	-008
11.	BEP (start)												-220	-201	-201	-100	-199
12.	T (operating time)													-068	241	189	-275
13.	N														-453	-103	144
14.	ST															289	-048
15.	ZOT																-017
16.	Czech republic																

Continuation of Addition D

№	Indicators	Indicator numbers															
		17	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
1.	CR (selection)		-458	-103	102	145	-070	097	-146	-111	-054	077	031	-045	-120	-120	-072
2.	% error			072	-224	244	-327	-223	131	129	005	275	285	137	285	290	277
3.	MT				020	410	-154	-558	-115	-181	-139	-166	-190	-099	-224	-216	043
4.	MTn					-015	768	775	034	-165	-142	248	075	-239	-510	-498	-192
5.	MTr						-594	-214	-182	-172	-127	097	253	353	-044	-015	050
6.	A-I							738	179	011	-006	180	-053	-408	-372	-380	-098
7.	A-2								140	017	001	366	246	-116	-264	-258	-097
8.	T-T $_{Max}$									087	-172	083	111	048	-021	-007	040
9.	T-T $_{Wholesale}$										914	075	245	277	-040	-050	-229
10.	T-T $_{Wholesale/Max}$											-002	201	303	-099	-109	-313
11.	Dean $_{Max}$												811	-050	-211	-178	335
12.	Dean $_{Wholesale}$													528	-139	-107	170
13.	Dean $_{Wholesale/Max}$														109	119	-119
14.	BEP $_{max}$															996	448
15.	BEP (end of work)																479
16.	T (hour BEP $_{max}$)																

Note: 1. The defined parameters are presented in Table 2.1.

2. Zeros and commas before the values of the correlation coefficients are not given.

3. The correlation coefficients are underlined at $p<0.05$ and $p<0.01$.

ADDITION E

Intercorrelations of psychological, psychophysiological and pedagogical indicators obtained as a result of a laboratory experiment in young athletes after exercise ($\bar{x} \pm m$; n=16)

№	Indicators	Indicator numbers															
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
	S-z		617	674	427	549	531	630	632	432	576	-240	106	218	-272	-040	003
	N-th			435	359	440	415	476	668	406	249	-251	242	363	-251	177	075
	BVZ				454	486	507	594	626	320	201	-319	-038	203	-012	-004	-117
	PPT					769	596	389	438	343	243	-206	-055	122	-148	259	195
	VPR						717	397	403	591	443	-186	-062	106	-334	-012	251
	GdZ							413	325	406	310	-187	-046	188	-396	-047	-034
	S-ya (after loading)								695	328	502	-059	132	159	-120	-112	-131
	N-th (after loading)									436	300	-030	048	179	-102	148	127
	NVPM										680	045	-021	021	-285	-091	025
	ZDR											106	056	004	-264	-362	-134
	BEP (start)												-220	-200	-202	-100	-273
	T (operating time)													-068	241	189	-230
	N														-453	-103	188
	ST															289	-042
	ZOT																106
	Czech republic																

Continuation of Addition F

№	Indicators	Indicator numbers															
		17	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
	S-z	191	303	095	181	026	141	073	-212	-095	-118	119	-096	-266	254	266	236
	N-th	260	-064	108	137	-016	166	031	-343	-032	-093	245	-078	-359	440	465	469
	BVZ	031	451	084	015	-045	093	-043	-057	-052	-129	-097	-321	-343	393	383	055
	PPT	164	108	-019	-190	-016	-076	-089	077	-147	-324	143	028	-072	338	359	042
	VPR	183	186	018	-143	136	-153	-118	-109	-198	-275	043	-135	-210	261	275	070
	GdZ	108	266	220	-214	220	-226	-304	179	006	-213	015	-013	-020	365	394	164
	S-ya (after loading)	-114	222	-048	090	-077	191	099	-141	165	-004	-154	-229	-146	412	424	083
	N-th (after loading)	343	-032	061	275	053	217	164	-289	129	085	180	-073	-281	329	441	142
	NVPM	029	118	079	244	201	088	131	-343	-195	-211	078	016	-077	258	268	186
	ZDR	-184	245	-128	177	062	-139	216	-234	-076	-162	-149	-066	059	292	293	145
	BEP (start)	-167	-002	222	360	413	-063	121	-050	-221	-062	-123	-158	-170	-450	-434	190
	T (operating time)	-072	017	-144	-048	-242	165	059	141	082	-087	433	226	-090	261	259	744
	N	136	102	032	089	-297	295	045	-257	-001	-085	-354	-455	-246	286	284	119
	ST	-099	-067	-408	-111	-278	093	186	388	-091	-011	218	185	034	-073	-101	-104
	ZOT	039	-004	-056	038	-170	114	066	101	014	061	531	199	-280	-160	-150	100
	Czech republic	598	-559	-321	075	-198	162	267	-264	-106	012	-001	-039	-056	-159	-166	-227

Continuation of Addition F

№	Indicators	Indicator numbers															
		17	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
	CR (selection)		-647	-139	222	-129	199	257	047	-013	085	363	259	-029	-146	-135	-001
	% error			348	-200	194	-272	-378	-011	-119	-095	-251	-402	-306	057	049	039
	MT				-051	628	-453	-669	-075	022	185	065	098	045	-132	-106	024
	MTn					-121	724	753	-284	-311	-059	269	-085	411	-296	-276	079
	MTr						-751	-504	-169	-010	133	068	084	053	-224	-198	-094
	A-I							836	-100	-141	-151	092	-138	-291	103	099	178
	A-2								-162	-246	-169	157	-128	-335	-143	-135	043
	T-T $_{Max}$									161	-133	211	339	254	003	017	084
	T-T $_{Wholesale}$										811	-041	338	484	372	371	-021
	T-T $_{Wholesale/Max}$											064	327	343	-109	-110	-247
	Dean $_{Max}$												672	-104	189	-146	448
	Dean $_{Wholesale}$													660	-041	-019	137
	Dean $_{Wholesale/Max}$														166	158	-236
	BEP $_{max}$															996	448
	BEP (end of work)																479
	T (hour BEP $_{max}$)																

Note: 1. The defined parameters are presented in Table 2.1.

2. Zeros and commas before the values of the correlation coefficients are not given.

3. The correlation coefficients are underlined at $p<0.05$ and $p<0.01$.

ADDITION G

Intercorrelations of signs of the mental state of athletes obtained as a result of natural experiment (men) before passing the distance ($\bar{x} \pm m$; n=14)

№	Indicators	Indicator numbers													
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
	Ped. Score		-181	546	126	-117	-088	620	205	-148	293	065	011	370	-041
	MOVE			077	811	040	844	091	-158	-049	-104	206	094	-190	-211
	QUO2				414	-358	445	171	044	-372	238	-173	241	267	270
	$VO2_{/kg}$					070	910	395	621	007	040	168	111	078	038
	HR						-255	418	008	546	260	387	-241	-321	301
	O2 p s							105	052	-231	-158	060	244	099	-122
	N/kg								177	296	199	225	070	059	109
	S-z									300	598	522	035	151	171
	N-th										669	522	254	198	567
	BT											630	159	055	522
	ZTP												293	074	509
	Ud.ot.tov.													617	116
	Ud.ot.tr.														121
	GdZ														

Continuation of Addition G

№	Indicators	Indicator numbers															
		17	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
	Ped. Score	270	198	295	128	294	223	556	343	496	044	006	088	006	641	153	004
	MOVE	227	-479	-562	196	005	086	-311	-132	-423	065	061	131	011	-621	002	-267
	QUO2	257	163	245	-239	-552	039	549	260	552	-026	319	-204	332	236	312	-119
	VO2/kg	393	-351	-457	101	-372	152	114	064	-112	-137	214	-363	241	-465	060	-208
	HR	141	-104	-140	241	105	-007	-436	-375	-425	-394	-103	-144	070	-040	-226	256
	O2 p s	318	-350	-409	038	-278	121	055	108	-075	086	156	-198	089	-470	182	-274
	N/kg	385	097	067	096	282	254	223	268	158	305	115	349	047	234	187	006
	S-z	199	231	311	349	201	047	012	358	032	124	227	095	121	103	056	031
	N-th	285	266	128	155	075	274	555	397	397	249	269	324	308	118	312	059
	BT	388	164	087	167	096	067	183	215	127	087	275	004	257	358	118	002
	ZTP	042	035	129	137	074	203	452	343	596	165	045	010	137	077	034	116
	Ud.ot.tov.	051	009	171	294	019	193	012	052	191	699	114	164	450	097	303	181
	Ud.ot.tr.	355	269	141	350	273	220	385	420	267	503	099	121	176	311	331	049
	GdZ	189	067	358	187	131	245	355	394	251	134	258	396	287	187	061	330

Continuation of Addition G

№	Indicators	Indicator numbers															
		17	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
	Lane.		208	080	002	002	032	187	056	153	055	274	028	191	043	212	067
	ART			571	087	064	286	467	037	394	272	061	219	045	266	421	137
	BEP				183	197	149	102	166	190	295	047	067	144	547	097	105
	RVV(x)					381	141	227	015	155	028	095	208	059	165	093	160
	RV (but)						484	504	132	322	459	367	375	520	011	334	043
	T-T $_{Max}$							403	109	017	004	110	073	063	125	280	009
	T-T $_{Wholesale}$								612	897	014	015	059	037	338	405	292
	T-T $_{1/2}$									574	065	347	110	298	025	078	078
	T-T $_{Wholesale/Max}$										033	064	097	115	477	284	327
	Dean $_{Max}$											073	231	571	183	208	155
	Dean $_{Wholesale}$												034	854	053	051	136
	Dean $_{Wholesale/Max}$													182	048	236	003
	H Din $_{Doz}$														040	121	065
	Czech republic															122	019
	Czech Republic																088
	Shh																

Note: 1. The defined parameters are presented in Table 2.1.

2. Zeros and commas before the values of the correlation coefficients are not given.

3. Correlation coefficients are underlined at $p<0.05$.

ADDITION H

Intercorrelations of signs of the mental state of athletes obtained as a result of natural experiment (men) after passing the distance ($\bar{x} \pm m$; n=19)

№	Indicators	Indicator numbers															
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
	Ped. Score		055	-042	-463	014	316	022	534	441	-426	-097	493	068	-187	099	600
	Place in the 1000 m race			109	-066	-265	-038	-095	124	-167	268	140	495	370	-075	405	017
	A place in strength. Preparation.				-133	309	304	388	-138	-083	125	-326	050	-221	246	-289	-057
	Place (cross 5000 m)					239	-384	101	-074	242	-034	140	-091	111	383	030	-338
	GDZ						176	616	105	515	-230	-118	164	142	339	-124	302
	ZTP							200	422	443	014	-052	023	-077	-158	-044	-030
	BT								205	349	-051	-002	-010	076	429	-151	260
	N-th									706	-067	-350	303	-150	-024	-174	227
	S-z										-252	-130	138	028	096	-085	230
	ART											-350	-116	-412	209	-343	-303
	MOVE												-082	808	-016	816	033
	QUO2													415	-277	474	173
	$VO2_{/kg}$														031	903	334
	HR															-227	310
	TRANSMISSION																083
	N/kg																

Continuation of Addition H

№	Indicators	Indicator numbers												
		17	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**
	Ped. Score	014	075	-253	010	042	236	061	223	-297	-082	078	-276	-482
	Place in the 1000 m race	-117	-253	-025	-031	227	-067	-057	-130	-138	207	148	060	-108
	A place in strength. Preparation.	-646	125	-121	045	-218	-149	-105	-096	-191	113	454	033	216
	Place (cross 5000 m)	-141	138	145	-124	-211	-138	525	-264	220	018	-119	313	106
	GDZ	-244	175	031	291	-303	270	246	-092	-075	427	563	-002	232
	ZTP	-270	-161	-059	380	333	336	342	092	013	172	106	100	128
	BT	-465	148	334	368	-348	213	206	010	122	397	398	114	339
	N-th	038	-079	053	356	276	306	114	112	-084	-215	-217	-221	-215
	S-z	-096	157	-015	300	055	320	370	129	-167	-084	016	-077	-230
	ART	088	-143	-071	239	295	152	-268	-219	-009	003	032	444	420
	MOVE	070	-312	171	-315	-312	-352	005	-141	521	249	-030	159	-005
	QUO2	-276	-044	505	273	028	508	304	260	076	459	471	-105	-394
	$VO2_{/kg}$	-045	-348	-042	-161	-340	-079	174	-079	380	410	239	-040	-250
	HR	-093	-246	227	-046	-371	-139	106	-688	-069	-077	-055	197	330
	TRANSMISSION	-163	-356	-179	-135	-193	-016	162	033	460	413	187	080	-289
	N/kg	161	-163	-010	-033	-208	017	-255	-064	-406	-172	067	-539	-344

Continuation of Addition H

№	Indicators	Indicator numbers										
		17	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**
1.	T-T $_{Max}$		057	-124	-403	025	-056	030	-240	-288	-065	263
2.	T-T $_{Wholesale}$			361	869	170	421	064	374	406	-023	108
3.	T-T $_{doses}$				300	-331	132	113	-108	-209	044	-004
4.	T-T $_{Wholesale/Max}$					245	479	023	425	477	-071	-147
5.	RV $\bar{x}$						198	069	188	153	241	-234
6.	RV no							-214	005	153	-431	-522
7.	Dean $_{Max}$								574	007	518	385
8.	Dean $_{Wholesale}$									817	375	402
9.	Dean $_{Wholesale/Max}$										119	260
10.	Dose Settings $\bar{x}$											586
11.	Ding $_{doses}$ no											

Note: 1. The defined parameters are presented in Table 2.1.

2. Zeros and commas before the values of the correlation coefficients are not given.

3. Correlation coefficients are underlined at $p<0.05$.

ADDITION I

Intercorrelations of signs of the mental state of athletes obtained as a result of natural experiment (women) after passing the distance ($\bar{x} \pm m$; n=19)

№	Indicators	Indicator numbers														
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
1.	Ped. Score		328	-111	-329	-503	653	-439	076	-034	-005	548	-138	331	442	-061
2.	Place in the 5000 m race			315	-233	-214	485	-314	-386	355	293	303	-029	165	-211	-352
3.	Place in special. Forces. Preparation.				276	-137	184	-153	-197	-043	416	-332	-417	-286	483	-587
4.	Place (2000 m cross)					-466	-224	440	-416	-586	551	-512	109	-659	-109	165
5.	GDZ						-492	-309	365	264	-285	-006	-115	191	-142	-390
6.	ZTP							-375	-221	552	-218	172	-419	-131	269	-220
7.	BT								-398	-213	-180	-305	250	-302	-265	652
8.	N-th									128	-324	-289	242	278	158	056
9.	S-z										-680	051	-324	-023	-189	-204
10.	ART											021	279	048	-017	-165
11.	MOVE												-103	666	104	-019
12.	QUO2													420	-611	709
13.	$VO2_{/kg}$														019	216
14.	HR															-398
15.	TRANSMISSION															

Continuation of Annex L

№	Indicators	Indicator numbers											
		16	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**
	N/kg		-502	-524	429	-337	-060	485	-666	-671	-445	-483	-016
	T-T $_{Max}$			-020	070	-361	-213	-591	933	840	331	385	-326
	T-T $_{Wholesale}$				-668	939	002	-061	-005	010	080	528	080
	T-T $_{1/2}$					-646	127	-031	143	118	-050	-603	-563
	T-T $_{Wholesale/Max}$						098	133	-312	-266	-031	358	196
	RV $\bar{x}$							-546	-070	143	447	-349	006
	RV no								-642	-844	-831	012	391
	Dean $_{Max}$									910	372	261	-354
	Dean $_{Wholesale}$										720	120	-509
	Dean $_{Wholesale/Max}$											-109	-463
	Dose Settings $\bar{x}$												480
	Ding $_{doses}$ no												

Note: 1. The defined parameters are presented in Table 2.1.

2. Zeros and commas before the values of the correlation coefficients are not given.

3. Correlation coefficients are underlined at $p<0.05$.

AUTHORS

TYTOVYCH
ANDRIY OLEKSANDROVICH

Candidate of Sciences in Physical Education and Sports, Associate Professor of the Department of Choreography and Sports Disciplines, Sumy State Pedagogical University named after A.S. Makarenko

HOLOVCHENKO
OLEKSIY IVANOVYCH

Candidate of Sciences in Physical Education and Sports, Associate Professor of the Department of Choreography and Sports Disciplines, Sumy State Pedagogical University named after A.S. Makarenko

Наукове видання

ТИТОВИЧ Андрій Олександрович
ГОЛОВЧЕНКО Олексій Іванович

ОСОБЛИВОСТІ ПСИХІЧНИХ СТАНІВ СПОРТСМЕНІВ І ТАНЦІВНИКІВ ТА ЇХ КОРЕКЦІЯ ДЛЯ ПІДВИЩЕННЯ ЗМАГАЛЬНОЇ ЕФЕКТИВНОСТІ

(FEATURES OF THE MENTAL STATES OF ATHLETES AND DANCERS AND THEIR CORRECTION TO INCREASE COMPETITIVE EFFICIENCY)

Монографія

Відповідальний за випуск *О.Ю. Кудріна*
Комп'ютерна верстка *В.А. Замошнікова*

Підписано до друку 24.02.2025.
Формат 60×84/16. Гарнітура Book Antiqua.
Папір офсетний. Друк офсетний. Ум. друк. арк. 10,35.
Ум. фарб.-відб. 10,35. Обл.-вид. арк. 7,59.
Тираж 100 пр. Вид. № 11.

Суми: СумДПУ імені А.С. Макаренка
40002. м. Суми, вул. Роменська, 87
Свідоцтво ДК № 231 від 02.11.2000 р.

Виготовлювач:
ФОП Цьома С.П. 40002, м. Суми, вул. Роменська, 100.
Тел.: 066-293-34-29.

Свідоцтво суб'єкта видавничої справи:
Серія ДК, № 5050 від 23.02.2016.