Body Structure and Composition of Canoeists and Kayakers: Analysis of Junior and Teenage Kazakhstan National Canoeing Team

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Abstract. *The somatic build, biological age, general state of health, mental predisposition and physical fitness are the criteria for selection of individuals in competitive sport. The present study aims to analys the differences in body structure and composition of canoeists and kayakers and derive conclusions regarding the criteria for selection of individuals incompetitive sport. This article considers an individual approach to the study of the mental and physical criteria of oarsman skill. The solution to the problems of rowing development seems to us possible only with a comprehensive study and the ability to control rowers with the help of psychological processes during their preparation and performances at competitions. The main idea of the research is aimed at an individual approach of studying the rowers mastery criteria. The study identified apparent influence effectiveness of the oarsman prelaunch status on his performances at the competitions. Our chosen direction to optimize the training process on canoe and kayak in combination with the objective quantitative characteristics of its health-improving efficiency is today quite promising for further improvement of athletes' performance at competitions. Rowers, who have high rates of mental and physical fitness, perform the application results and set records.*

Keywords: psychological and physical criteria, highly skilled oarsmen, pre-start conditions, sports training, performance, individual approach, sports activities.

Introduction

Humans have been using boats since time immemorial. They were used for travelling, hunting and fighting. Depending on the actual conditions of living, various types of boats were built, including canoes, used until today by Native Americans from the Iroquois, Sioux and Apache tribes, and kayaks (qayaqs), used by the Eskimos[1]. In fact, the boat is an example of how humans have adapted to the surrounding conditions. The difference between canoes and kayaks is that the former are intended for relatively placid waters of rivers and lakes, while kayaks are intended for sea waters (hence their plating, manoeuvrability and speed).

Canoeing became an Olympic discipline only during the Olympics in Berlin in 1936 and the first world championships took place in 1938 in Sweden. Canoeing is divided into flat-water (classical) and white-water canoeing. Classical canoeing consists of kayaking and Canadian canoeing. Kayaking and canoeing are technical sports. In order to do such sports, special equipment apart from human strength is required: kayaks, Canadian canoes and paddles. Flat-water canoeing races involve single seat kayaks (K-1), double seated kayaks (K-2), four seated kayaks (K-4) as well as single kneeling Canadian canoes (C-1), double kneeling canoes (C-2) and four person kneeling canoes (C-4)[2] [2]. The kayak is a covered-deck boat equipped with a cockpit where the competitor sits facing forward. The Canadian canoe, on

[1] J. Steinbright, *Qayaqs and Canoes: Native Ways of Knowing*. Achorage, Alaska, Alaska Native Heritage Center. 2002.
[2] W. Nealy, *Kayak: The animated manual of intermediate and advanced Whitewater technique,* Birmingham, Alaska, Menasha Ridge Press, 1986.

the other hand, is an open boat where, in contrast to the kayak, no steering devices are allowed. In a canoe, the competitor is in a kneeling position and uses a single bladed paddle, whereas in the case of a kayak, a double bladed paddles is used[3].

An individual approach to the study for the preparation of mental and physical criteria for the skill of oarsmen of canoes and kayaks allows a more profound assessment of the level[4] of their training and performance, to carry out the necessary training loads adjustment which significantly improve the effectiveness of training and athletic performance, avoid overfatigue and pathological shifts in the body of oarsmen[5].

Professional sport is considered as one of the experimental activities of a person. In this case, we consider rowing on kayaks and canoes that characterized by the following features:

- very high intensity of competitive activities, increased density of sports results, which causes an increase in the requirements for quality, stability and reliability of physical, technical, mental and tactical skills of oarsmen, as well as moral and volitional preparedness and stability of athletes to the conditions of competitive activity;

- increased requirements for the level of special mental and physical preparedness of oarsmen, determines the need to find effective ways to improve athletic skill in rowing on canoes and kayaks.

In connection with the foregoing[6], the searching problem for rational distribution variants of mental and physical loads of different directions at certain stages of the training activity of oarsmen in canoes and kayaks with the goal of achieving planned training effects becomes urgent. Correctly found variants of rational distribution of mental and physical loads in rowers will lead them to a successful performance in high rank competitions.

An individual approach to the study of mental and physical criteria for the rowers skill in kayaks and canoes allows ensuring compliance with such fundamental principles of training as the availability of correction and the training process, eliminating fatigue, the variety of the training intensity in accordance with the oarsman functional condition. It is important to note that, without individual personal information about the state of the mental and physical condition of the oarsman, it is impossible to control the training process.

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[3] J.H. Mitchell, W. Haskell & P. Snell, "Van Camp SP. Task Force 8: classification of sports", in *J Am Coll Cardiol,* VL (2005), no. 8, , p. 1364–7.

[4] I. Smanov, A. Boranbayeva, K. Berkimbayev, K. Arymbayeva & K. Azhibekov "Approaches to Online Learning: a Study of the Factors affecting Teachers in a Fully Online Faculty", in *Astra Salvensis,* VI (2018), no. 11, p. 631-640.

[5] T. Botagariev, S. Kubieva, N. Mambetov, G. Zherkechbaeva, Z. Suleimenova, Y. Zhetimekov, A. Gabdullin & Zh. Azamatova, "Determining Factors and Ways to Improve Physical Education for the First and Second Year Female Students", *Astra Salvensis,* VI (2018), no. 11, p. 517-530.

[6] O. Budzinskaya, "Competitiveness of Russian Education in the World Educational Environment", in *Astra Salvensis,* VI (2018), no. 11, p. 517-530.

The improvement of the management training process system in rowing on kayaks and canoes largely depends on the objective knowledge of the competitive activity structure and the oarsman individual preparedness. An important role in the oarsmen preparation is the consideration of their general pattern of the formation of sportsmanship and individual belonging to this sport. Significant tasks in the preparation of highly skilled rowers on kayaks and canoes in terms of improving mental and physical criteria are improving sports results, increasing the period of active sports activities, creating conditions that are associated with creative attitude to the training.

Increasing athletic skill and maintaining the oarsmen health are the use of such training load, which is adequate to the level of their individual preparedness. The implementation of all training loads in the rowers preparation should be based solely on the data of individual comprehensive control, as the use of its tools allows us to identify the mental and physical criteria for managing and finding effective ways in the training process.

Implementation of individual complex control over the training process of paddlers, analysis of the relationship between the volume and intensity of individual training loads and their effect, the development of individual models of the rowers' condition contribute to achieving high results in rowing on canoes and kayaks. For highly qualified oarsmen, the main qualities are the mental and physical readiness of the performances at the competitions. In the special scientific and methodical literature on rowing on kayaks and canoes, the problem of mental and physical training has not yet been fully resolved. Only certain questions of their preparation were reflected as extremely important criteria in the management of the training process of oarsmen.

Material & methods

The work hypothesis is that an individual approach to the study of the mental preparation and physical criteria for the skill of highly skilled rowers on kayaks and canoes will optimize the level of their training and performance, as well as make the necessary adjustment of training loads. Due to the timely receipt of objective information and making corrective actions, we will be able to solve the problems of the sports development of rowers qualitatively.

According to the data that gave above, the aim of the study was to develop a system for the individual process of training highly skilled rowers on kayaks and canoes, taking into account their mental and physical criteria for mastery. To achieve this goal, the following methods were used: analysis and study of special scientific and methodological literature on the problem under study; generalization of best practices based on the results of interviews, oral and questionnaire surveys of rowing experts (research scientists, trainers); pedagogical and psychological observations during the period of training camps and rowers' performances in major international competitions; analysis of planning documents for the training process, training programs for training rowers, their training diaries and competition reports; control testing; pedagogical experiment; methods of mathematical statistics.

Results

Based on the results analysis of the study and our own practical experience, can be stated that the high achievements of oarsmen on kayaks and canoes are an incentive, a driving force for its further development. Rowers wishing to become highly qualified and eminent athletes should use their perfect training system in their training activities. The difference between the training of highly skilled rowers from the less qualified is the increase in training physical and restorative-psychic means. A trainer, an athlete, as well as an observing physician should constantly monitor scientific developments in rowing on kayaks and canoes, study all possible physical and mental bases of rower development. Obtained observations to fix in order to improve the efficiency of training paddlers.

In the course of research of mental and physical criteria of the skill of rowers on kayaks and canoes, we received the following indicators. After a questionnaire survey, all respondents noted the importance and the need for individual training of highly qualified oarsmen to improve their sports skills.

The majority of respondents (72,3%) believe that at the sports stage improvement of the parties, the main content of the oarsmen training should be aimed at improving the physical, mental, tactical aspects of the training process. Most of the respondents noted that at the stage of sports improvement, the focus should be on physical (35,5%) and technical (33.4%) and psychological (31.1%) training.

The received test data, in our opinion, basically reflects the real state of affairs that has developed in the practice of kayak and canoeing. And this is the benchmark in the rationing of the training process for oarsmen. The emphasis on physical and rowers mental training of high qualification, in our opinion, is connected, first of all, with shortcomings in the training of mental behavior at the initial stages of their preparation and with frequent performances at various competitions, where not only the physical readiness of performance at high-ranking competitions , but also the mental preparation of oarsmen.

According to the survey of trainers and rowing kayaks and canoes specialists, can be concluded that individual pedagogical control of oarsmen's preparedness is currently being carried out, but there is no clearly expressed system. Basically, two forms of individual control of oarsmen are used: stage and current, conducted with different frequency. At different preparation stages, the preferential direction of individual control over its various sides of readiness changes. Absence for various reasons of a clear individual control system of the preparedness and rowers condition significantly worsens the effectiveness of the preparation process.

As a result of the survey conducted by specialists in canoe and kayak rowing, the importance of in-depth study of the physical and mental criteria for the training of highly skilled oarsmen was confirmed with a view to its further correction. The analysis of pedagogical observations revealed the state of individual training of highly skilled oarsmen, as well as ways to improve their quality. Investigated protocols of observations showed that the highly skilled paddlers

training process at the stage of sporting perfection depends on the prelaunch attitude of the paddler.

Pre-start status of athletes is of interest to many coaches and sports psychologists for a long time[7]. Mental experiences of athletes are extremely complex and diverse, as sports competition is very emotional. The emergence of these or other conditions is determined by many factors, among which the main and influencing the expressiveness of pre-start excitement of athletes are: the importance and rank of the competition; presence of strong competitors; behavior of people surrounding the athlete, especially the coach; individual mental features (properties of the nervous system and temperament). In connection with this, three types of emotional states of athletes are distinguished: combat readiness; pre-start fever and prelaunch apathy[8].

Thus, the following indicators refer to the number of external manifestations of the athlete's mental state before the start: the change in facial expressions, posture, gestures, general motor activity, the activity of certain external secretion glands (secretion of saliva, sweat, tears), changes in the characteristics of individual movements speed, strength, direction, coordination), as well as changes in the intonational characteristics of speech, etc. Each pre-start status of the athlete is peculiarly manifested externally. Because of this, according to the peculiarities of the athlete behavior before the start, according to the external manifestations of his mental state, one can judge what the level of his neuropsychic tension is what his pre-start state is.

To clarify the issue of increasing or decreasing the pre-start excitements with increasing sports qualifications and sports experience and their dependence on the type of competition for our study, we selected control and experimental rowing team. Groups were formed from sports masters of the international class - 4 oarsmen with sports experience over 6 years, masters of sports - 4 rowers with sports experience over 5 years and 6 rowers candidates for master of sports - with a sporting experience of 3 years.

To characterize the pre-start status, the subjects recorded the following parameters: tremor of the right arm for 30 seconds by the method described by S.M. Oy using an electro-thermometer; pulse rate on the radial artery for 60 sec. palpation, after 3-4 minutes. Relaxed position. The registration of the tremor frequency of the hand and pulse rate occurred on training days 10 minutes prior to training and on competition days for 40-30 minutes and for 10-5 minutes before the start. According to the literature data, pre-start shifts are especially noticeable in the last hours or even tens of minutes before the start.

Pedagogical observation of the behavior of athletes was carried out on an equal basis, their conversations were recorded, a special survey was conducted to determine the prelaunch status.

The analysis of the obtained data showed that the presented quantitative parameters can be characterized as follows. At the initial stage of the study, out of

[7] E.P. Ilyin, *Psychology of sports*, SPb, Peter, 2012.

[8] P. Maryan, "Improvement of the physical preparedness of canoe oarsmen by applying different modes of training loads", in *Journal of Physical Education and Sport*, XXX (2017), p. 8.

the seven oarsmen of the experimental group, one rower was assigned to a state of combat readiness and three oarsmen were assigned to groups with prelaunch fever and prelaunch apathy. The study of the dynamics of the control group gave approximately the same data as in the experimental group. The results of both groups before the pedagogical experiment are presented in Figure 1.

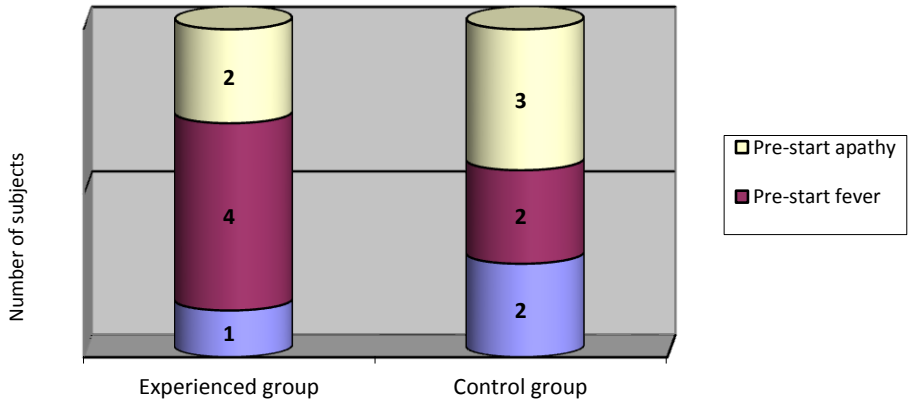

Figure 1 - Diagram of the distribution of oarsmen forms pre-start state before the pedagogical experiment.

To determine the mental state of the athlete before the start, we proposed to add 20-25 unfinished words at your discretion. These unfinished words were shown to him on a sheet of paper. It looked like this: "I present you with a few unfinished words (syllables), your task is to write them as soon as possible so that the whole words that are usually used by people and found in the literature turn out." The whole task is given for no more than 3 minutes. We recommend the following unfinished words for presentation to athletes: Analysis of the words thus obtained allowed us to judge the main content of the oarsman's thoughts before the start, his mental state, the features of motivation and mood.

The preparedness analysis of highly qualified rowers through pedagogical observations made it possible to identify a large number of errors in performances at high-ranking competitions. The deterioration of physical and mental indicators indicates the onset of fatigue. This is a consequence of the lack of oarsmen functional training. Also, one of the reasons for the insufficient level of physical and mental preparedness of highly qualified oarsmen is, in our opinion, irrational planning of their loads in training and lack of control over their level and efficiency of the training process.

Pre-start emotional arousal states often occur long before the competition. This requires the organization and conduct of activities aimed at reducing mental tension. In our study, we used such influencing methods: mental self-regulation, a change in the direction of consciousness, the removal of mental stress by discharge, the use of respiratory and physical exercises, etc. The effectiveness of these methods of regulation was applied selectively and according to the individual characteristics of the oarsmen. As our experiment showed, in many cases it is most

effective not to distract the oarsman's attention from the forthcoming activity, but rather to switch his attention, muscular activity from painful reflections to the abstract side of work, understanding difficulties through their analysis, clarifying instructions and tasks, testing and testing sports equipment, mental repetition of the exercise.

In many cases, the removal of tension can be achieved through substituting activities. Types of discharge of nervous tension in different athletes are different: some are discharged through motor acts, others are through speech.

As a physical method of discharge, warm-up and conducting of RPC can be used. With apathy, it can lead an athlete into a state of combat readiness, with excessive excitation - to calm. It should be borne in mind that with very pronounced pre-start reactions, warm-ups further increase excitement. Therefore, it is necessary to take into account the individual characteristics of the paddler and to select appropriate methods of influence, both on his physical side and on the mental side. When regulating a strong mental excitement, it is necessary to provide a "golden mean", since a too weak discharge leaves a strong excitement, and too strong a discharge contributes to an even stronger excitation, that is, self-excitation.

The regulating effect of a warm-up or PEF was determined by the quality and type of exercises used for paddlers: the more the warm-up is similar to the exercises of the forthcoming competition, the more it increases the pre-start excitement. Preliminary work, differing in character from the forthcoming activity, reduced the excitement of the oarsman. We found that it is most expedient to use the warm-up, exercise therapy and methods of autogenic training in a comprehensive way to relieve the rowers of the tension that has arisen. The use of different respiration regimes was also effective. Changing and alternating breath, the athlete also changed his mode of mental activity. During observations of the use of breathing exercises, we have found that they are one of the simple and reliable methods for regulating the mental states of oarsmen.

Thus, the methodological methods proposed by us in changing the pre-start conditions of oarsmen yielded the following results. As a result of recording the tremor frequency, and pulse rate are performed within 40-30 minutes and for 10-5 minutes before the start they gave positive changes in the indicators of the mental activity of oarsmen. According to the data, pre-start shifts are especially noticeable in the last tens of minutes before the start. So, in 14 oarsmen who took part in the experiment, pre-start reactions most often appeared immediately before the start (41.3%) or 1-2 hours before the start (42.8%). Pre-start status also changed during the preparation for the competition. This circumstance we took into account and provided timely support to the athlete. We found out that those oarsmen who were referred to such forms of pre-start conditions as pre-start fever and starting apathy, had smaller physical indices that showed in training. This was all reflected in the speeches at the competitions and on their results.

When analyzing the material obtained, a clearly expressed dependence is revealed in that the pre-launch conditions of oarsmen greatly influence the effectiveness of performances at the competitions. The study results of the

experimental and control groups after the pedagogical experiment are presented in Figure 2.

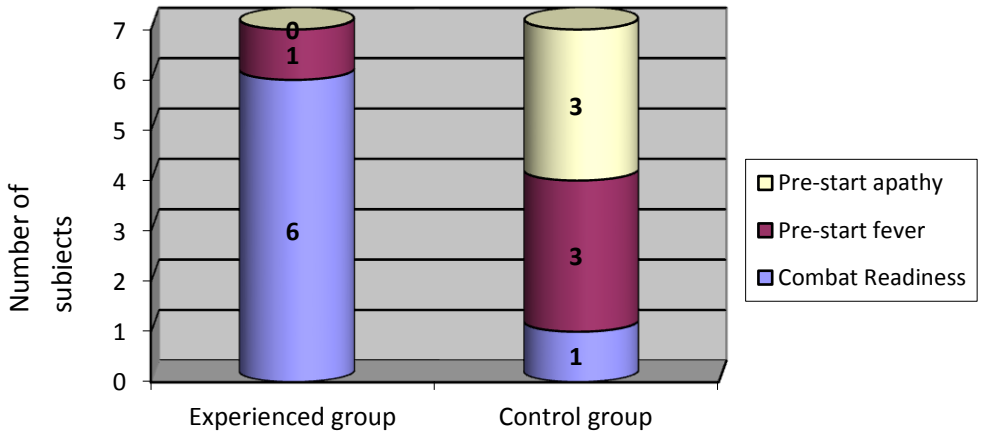

Figure 2 - Diagram of the oarsmen distribution of forms during the pre-start state after the pedagogical experiment.

Analysis of the obtained data showed that the initial stage of the study, one rower out of the seven oarsmen within experimental group, was assigned to a state of combat readiness and three oarsmen were assigned to groups with prelaunch fever and prelaunch apathy. The dynamics study of the control group gave approximately the same data as in the experimental group.

All the collected data were subjected to the procedure of standard mathematical statistics[9]. Statistical data (average data and standard deviations) are presented in Table 2.

All the collected digital data were processed according to standard mathematical statistics[10]. Statistical data are presented in Table 2.

Table 2 - Changes in athletic performance at the Youth Games of the R.K. at the oarsmen in the process of research (Kazakhstan, Uralsk, 26-30.06.2017; C1, C2, C3, n = 14)

F.I. athlete	Distance (m)			P
	200	500	1000	
IMSC / control group				
H.T.	0,39,58/0,40,28	1,51,34/1,52,05	4,21,29/4,22,09	>0,05
K.I.	0,40,03/0,40,56	1,52,18/1,52,58	4,22,01/4,22,58	>0,05
IMSC / experimental group				
E. S.	0,39,27/0,38,55	1,52,29/1,51,58	4,20,00/4,19,03	<0,01
E. T.	0,39,55/0,39,03	1,52,45/1,51,38	4,22,32/4,21,56	<0,01

[9] E.V. Vrublevsky, O.E Likhacheva & L.V. Vrublevskaya, *Final qualification work: preparation, design, protection: Textbook,* Moscow:,Physical Culture and Sport, 2006.

[10] A. Ahatov, I.V. Rabotin, *Psychological preparation of athletes. Educational and methodological manual*, KamGAFKSiT, 2008.

MS / control group				
E.S.	0,49,03/0,49,60			>0,05
G.M.	0,48,10/0,49,55			>0,05
MS / experimental group				
M.A.	0,49,60/0,38,55			<0,01
A.A.	0,49,23/0,48,34			<0,01
CCM / control group				
X.F.			3,51,23/3,52,32	>0,05
G.L.			3,52,03/3,52,56	>0,05
T.C.			3,53,23/3,54,01	>0,05
CCM / experimental group				
R.B.			3,51,33/3,50,23	<0,01
A.C.			3,55,12/3,52,04	<0,01
K.K.			3,52,19/3,50,56	<0,01
Note - The first value is the result shown in the training camp; the second meaning is during the performance at the competitions.				

According to the results of performances at the competitions, the athletes of the experimental group won: 10 gold, 2 silver and 1 bronze medals. By the end of the main stage of the experiment, in comparison with its beginning, the subjects of the experimental group statistically significantly improved their indices of physical and mental results ($P < 0.01$).

Conclusions

The study allowed us to draw the following conclusions: Competitive kayakers are and should be significantly taller than canoeists. Junior canoeists have a greater proportion of mesomorphic element and a smaller proportion of ectomorphic element than kayakers. Both groups are characterised by a similar proportion of endomorphic element. The lower part of the body in kayakers is more developed than in canoeists. The two groups differ in body composition. Canoeists were more dehydrated than kayakers. The differences between somatic parameters of juniors and Olympic Games competitors may be the result of age and fitness level.

A comparative analysis of the initial and final results of the rowers' competitive activity on kayaks and canoes of high qualification states that in the process of research the most significant changes occurred in the experimental group of physical and mental fitness. As a result of the pedagogical experiment, a significant improvement in all indicators of the physical and mental fitness of the athletes of the experimental group was obtained.

The obtained data were characterized by the optimal degree of nervous and emotional arousal in the oarsman, the upswing of strength, energy and activity was felt, he had a kind of inspiration, while in the oarsmen of the control group the preparedness remained approximately at the initial level. As a result of the experiment in the experimental group, rowers showed more stable signs of prelaunch status and they were assigned to the combat readiness group. In the control group, no special changes were observed. The decrease in the rank of the paddlers of the control group revealed a worsening of the result in

relation to the athletes of the experimental group. This confirmed the increase in the ranks of the athletes of the experimental group. The obtained data confirmed the positive influence of the developed technique. The confident knowledge of the trainers of the knowledge of the importance of the correct formation of the method of motor activity ensured the increased interest of oarsmen in the need for self-knowledge and self-improvement.