

## National and regional component of physical education curricula for schoolchildren in Kazakhstan and Russia

TULEGEN BOTAGARIYEV<sup>1</sup>, MIKHAIL KOLOKOLTSEV<sup>2</sup>, ELENA ROMANOVA<sup>3</sup>, PETR TISSEN<sup>4</sup>,  
NATALYA USTSELEMOVA<sup>5</sup>, KHOREN TONoyAN<sup>6</sup>, OLEG BAYANKIN<sup>7</sup>, SVETLANA KUBIYEVA<sup>8</sup>,  
NUROLLA MAMBETOV<sup>9</sup>, LARISA STEPANOVA<sup>10</sup>, NATALIA TRETYAKOVA<sup>11</sup>

<sup>1,8</sup>Department of Physical Culture and Sport, Aktobe Regional University named after K. Zhubanov, KAZAKHSTAN

<sup>2</sup>Department of Physical Culture, Irkutsk National Research Technical University, RUSSIA

<sup>3</sup>Department of Physical Education, Altai State University, RUSSIA

<sup>4,10</sup>Institute of Physical Culture and Sports, Orenburg State Pedagogical University, RUSSIA

<sup>5</sup>Department of Physical Culture, Nosov Magnitogorsk State Technical University, RUSSIA

<sup>6</sup>Department of Physical Training, Educational and Scientific Complex of Special Training, Moscow University of the Ministry of Internal Affairs of the Russian Federation, RUSSIA

<sup>7</sup>Institute of Physical Culture and Sports, Altai State Pedagogical University, RUSSIA

<sup>9</sup>Department of Physical Culture and Basic Military Training, Atyrau State University named after Kh. Dosmukhamedov, KAZAKHSTAN

<sup>11</sup>Department of the Theory and a Technique of Physical Culture, Russian State Professional and Pedagogical University, RUSSIA

Published online: March 31, 2021

(Accepted for publication March 15, 2021)

DOI:10.7752/jpes.2021.02107

### Abstract:

*Research aim:* to give a comparative assessment of the secondary school-age students' PE educational programs national-regional component use effectiveness of the Republic of Kazakhstan and Russia. *Research materials and methods.* The work was carried out during the 2018-2019 academic year in secondary schools in Aktobe (Republic of Kazakhstan) and Orenburg (Russia). In both countries, the school's PE curriculum consisted of three lessons per week. Two of them were conducted according to the training programs. The programs of the third variable lesson of physical culture contained an ethno-pedagogical component in the form of national outdoor games and national sports performing elements. The monitoring of physical development and physical fitness of 200 Kazakh and 200 Russian students of the 7<sup>th</sup> grade aged 12-13 was carried out. *Research results.* The PE curricula implementation with a national and regional component inclusion has shown high efficiency. In both countries, students have a significant increase in physical fitness indicators. All the motor tests values, anthropometric and physiometric characteristics of Russian schoolchildren were higher than those of Kazakhstan, with the exception of the upper limb muscles speed and strength qualities in boys (the «ball throwing» test). National outdoor games use in the variable component of PE lessons increased the schoolchildren's indicators of physical condition and motivation in both countries, increased the motor density of the lesson and the health-forming orientation effectiveness of the subject. *Conclusions.* There are minor differences between the sections content and the hours' distribution in the annual curriculum of the discipline «Physical Culture for grade 7» in general education schools of the Republic of Kazakhstan and Russia. There are also differences in the national and regional component of the variable lesson of PE content. In both countries, the same positive result of students' in grade 7 physical and functional fitness monitoring was established. The curriculum of the variable PE lesson in both countries should be supplemented with exercises aimed at developing the lagging children's motor physical qualities.

**Key Words:** physical culture, school curriculum, national and regional component, students, physical condition

### Introduction

One of the school system tasks in different countries is to create health-saving and health-forming learning conditions. Childhood and adolescence refers to the most important period of human ontogenesis. At this stage of life, when the processes of growth and biological maturation of the body are actively taking place, a special place in the educational process is occupied by the choice of children's physical activity optimal mode (Lonsdale et.al., 2016).

Physical education is an effective means of health promotion and optimization of students' mental capacity (Talović et.al., 2015; Potop et.al., 2017; Zurita-Ortega et.al., 2019).

Reform of students' physical education has not yet fully meets the requirements of successful future competitiveness in the labor market and creative activities (Velikanov, Ryzhov, 2016). A significant part of students' health does not fully meet the standards of a modern person's future professional, social and reproductive function (Tikhomirova et.al., 2019).

Some authors have attributed the children's poor health presence to PE educational programs low efficiency (Drachuk et.al., 2018; Furman et. al., 2018).

The modern system of school physical education began to take into account the individual characteristics of physical development (Luo et.al., 2018) and the functional state of the young organism (Pedro Delgado et.al., 2019). Lessons are conducted taking into account the students' constitutional and typological characteristics (Boutcher, 2018; Miroshnichenko et.al., 2019) .

In the world practice, school programs of children's complex physical activity are becoming popular, which provide for five areas coordination: high-quality physical education at school during the school day, students' physical activity before and after school, teachers' and families' participation in increasing children's motor activity. Similar models of physical education have shown high efficiency (Kriemler et.al., 2011). There is evidence of increased motivation among students after encouraging physical activity in and out of school (Dobbins et.al., 2013; Zorio-Ferreres et. al., 2018; Jessica et. al., 2020). Opportunities for students' and PE teachers' online training on the topics of physical activity development began to be realized. The use of the Internet and information and communication technologies can be as effective as face-to-face training (Vinogradov et. al., 2017).

As a rule, the PE curricula in general education institutions are compiled without taking into account the territorial characteristics of the children's, adolescents' and young people's physical health, the influence of natural and climatic, environmental, medical and social factors of the place of residence and education in the region (Peresyphkina et.al., 2020). We believe that it is correct to use the national-regional component in the curriculum of the school PE lesson. In the literature there is information about improving students' physical education effectiveness, when the variable part of the school curriculum of «Physical Culture» discipline is based on national outdoor games and sports elements implementation. The implementation of such a program in the Republic of Kalmykia (Russia), in comparison with traditional educational programs, significantly increased their students' physical fitness (Shushunov, 2008). The effectiveness of folk outdoor games use in the PE lesson to improve the students' from the Ust-Orda Buryat District of the Irkutsk region, Russia, motor qualities level, was reliably established (Sverdlova, Kolokoltsev, 2012).

It is reliably ascertained that it is relevant to conduct comparative studies of PE curricula of students, living in the Republic of Kazakhstan and Russia to assess the effectiveness of ethno-pedagogical technologies use, taking into account the natural-climatic and social conditions of living, lifestyle and other factors characteristics to improve the students' physical condition in the neighboring countries territory. In the scientific literature, these issues are not sufficiently covered. Knowledge of these issues will improve the motor quality and health of school-age children.

**Research aim:** to give a comparative assessment of the secondary school-age students' PE educational programs national-regional component use effectiveness of the Republic of Kazakhstan and Russia.

### Material & methods

In the 2018-19 academic year, the physical development and physical fitness of 200 Russian and 200 Kazakh seventh grade students aged 12-13 (100 boys and 100 girls each) were monitored in Orenburg (Russia) and Aktobe (Republic of Kazakhstan). The surveys were conducted in parallel in the two countries at the beginning and at the end of the school year.

To assess the students' physical fitness, control tests were conducted for speed, endurance, strength, flexibility, and agility. We used European and American physical fitness tests: running at 60 m, s; running at 1000 m, min/s; running broad jump, cm; pull-up on a high crossbar (boys), number of times; modified pull-up on a low crossbar (girls), number of times; throwing a ball weighing 150 g, m; cross-country skiing at 2 km, min/s (Council of Europe. Testing physical fitness: Eurofit experimental battery-provisional handbook, 1983; PCFSN. The president's challenge: Physical fitness test, 2011). According to standard methods, an anthropometric and physiometric survey of the students was conducted. To characterize the morphofunctional indicators, the following parameters were measured:

- body length (cm);
- body weight, kg;
- vital capacity of the lungs (ml);
- right and left hands strength (kg);
- heart rate (HR) at rest, beat/min
- systolic blood pressure (SBP) and diastolic blood pressure (DBP), mm Hg;

- vital capacity (VC), l ;
- hand dynamometry, kg (Handgrip Strength Test, kg)

The indices were calculated as follows: body mass index: BMI = body mass/body length<sup>2</sup>, kg/m<sup>2</sup> (WHO Global Database on Body Mass Index (BMI), 2017), life index = VC / body weight, ml/kg (Ikonomi et.al., 2016), IRob = (HR x SBP) / 100 c.u. (Robinson, 1967).

The comparative pedagogical analysis of PE educational programs of children aged 12-13 in the Republic of Kazakhstan and in Russia is carried out. In both countries, the school's PE curriculum consisted of three 45-minute lessons a week. Two of them were conducted according to the topics of the training programs. The topics of the third variable PE lesson program contained a national-regional component with national outdoor games and national sports elements. The variable lessons were entirely based on ethno-pedagogical technologies use.

PE teachers in Russia used the author's program «Physical culture in the 7th grade» by V. I. Lyakh (Lyakh, 2012) in the educational process. The variable lesson program contained the national component, consisting of the Russian mobile games execution: «classes», «Russian lapta», «leap frog» («chekharda») or «jumping over the back», «uzhische» (two students twist the rope, the third through it). In the winter period of the year sledding relay and throwing snowballs at a target were used.

In the Republic of Kazakhstan, PE teachers used the program «Physical Culture for grades 5-9» (Physical culture. The curriculum for grades 5-9 of general education schools. National Academy of Education named after Y. Altynsarin of the Republic of Kazakhstan, Astana, 2013). The variable lessons topics contained a national component based on Kazakh national types of outdoor games performance: «alaman-Baiga» (horse racing resemblance), «kyz-kuu» (chasing a girl), «tenge alu» (raise the object on the run, and, rounding the rack, return to your team), «kokpar» (fighting for a sheep on horseback).

A survey on ethnopedagogical technologies use in the lesson was conducted. 110 school PE teachers (60 people in Russia and 50 in the Republic of Kazakhstan) took part in the survey. The obtained research results were subjected to the generally accepted statistical processing (Ustseleмова & Ilyina, 2015). The work performed does not infringe on the rights and does not endanger the well-being of students and teachers in accordance with the ethical standards of the Committee on the Rights of the Child of the Helsinki Declaration of 2008. The consent of parents to conduct a survey of children was obtained.

## Results

In the schools of both countries, 102 hours a year are planned for "Physical Culture" discipline mastery. There are differences in the hours distribution in all sections of the discipline. In Russia, 21 hours are allocated for track and field athletics, in Kazakhstan – 19 hours. For sports games 18 and 25 hours are allocated, for ski training 18 and 11, for gymnastics 18 and 17 hours, respectively. In Kazakhstan schools, 5 hours of swimming are planned, in Russian schools, 6 hours of martial arts. In Kazakhstan schools, 25 hours are planned for a variable lesson with elements of ethnopedagogy, in Russia - 21 hours per year.

The effectiveness of students' educational material learning was evaluated by monitoring the children's motor qualities and physical development. Table 1 shows the results of physical fitness testing of Russian and Kazakh students aged 12-13 at the pedagogical observation beginning.

**Table 1. Students' from Russia and Republic of Kazakhstan motor tests results at the beginning of the research (M±m)**

| Motor tests  | Boys           |                    | Girls          |                    |
|--|----------------|--------------------|----------------|--------------------|
|  | Russia (n=100) | Kazakhstan (n=100) | Russia (n=100) | Kazakhstan (n=100) |
| Running at 60 m, sec   | 10,08±0,06     | 10,4±0,08*         | 10,5±0,07      | 11,7±0,05*         |
| Running broad jump, cm   | 334,2±5,93     | 315,4±5,81*        | 321,0±0,47     | 296,5±7,9*         |
| Running at 1000 m, min/sec   | 5,9±0,05       | 4,82±0,09*         | 4,9±0,05       | 6,21±0,03*         |
| Throwing a ball, m   | 25,3±0,53      | 26,5±0,66          | 18,4±0,10      | 19,8±0,12*         |
| Pull-up on a high crossbar (boys),<br>Modified pull-up on a low crossbar (girls),<br>number of times | 7,6±0,50       | 4,5±0,47*          | 17,0±0,07      | 14,5±0,51*         |
| Cross-country skiing at 2 km, min/sec  | 14,6±0,07      | 14,99±0,08*        | 15,5±0,07      | 15,88±0,07*        |

Note. \* - statistically significant differences between the students' in Russia and the Republic of Kazakhstan indicators values (p < 0.05)

Russian boys (Table.1) showed all motor abilities, with the exception of the speed and strength qualities of the upper extremities muscles (test «throwing the ball»), were significantly higher than in Kazakhstan (p < 0.05). The greatest difference between the indicators values in boys was noted in tests for the strength of the upper extremities muscles («pull-up on a high crossbar») and general endurance («running at 1000 m»).

The Russian girls' motor abilities were higher than those of Kazakh girls ( $p < 0.05$ ). The greatest percentage of the difference in the indicators values was noted in the tests for general endurance (26.7%), muscle strength of the upper extremities (14.7%) and speed (test «running at 60 m») - 11.4%.

Table 2 presents a comparative description of the Russian and Kazakh students' physical development indicators at the pedagogical observation beginning.

With almost the same body weight of the students ( $p > 0.05$ ), Russian boys are 2.3 cm taller ( $p < 0.05$ ). In Russian boys, such indicators were higher: the vital capacity of the lungs values by 4.1%, left hand strength by 8.7%, right hand strength by 10.1%, and arterial systolic pressure by 1.2% than in Kazakh boys ( $p < 0.05$ ). The resting heart rate values and the Robinson index in the examined Russian boys were 3.5% and 2.4% lower (respectively) than in the Kazakh boys ( $p < 0.05$ ). This fact indicates the best reserve capabilities of the Russian students' cardiovascular system to perform physical activities.

**Table 2. Students' in Russia and the Republic of Kazakhstan anthropometric and physiometric indicators at the beginning of pedagogical observation ( $M \pm m$ )**

| Indicators   | Boys           |                    | Girls          |                    |
|--|----------------|--------------------|----------------|--------------------|
|  | Russia (n=100) | Kazakhstan (n=100) | Russia (n=100) | Kazakhstan (n=100) |
| Body length, cm  | 162,4±0,32     | 160,1±0,2*         | 157,9±0,16     | 155,0±0,19*        |
| Body weight, kg  | 51,9±0,25      | 52,1±0,19          | 50,9±0,1       | 51,6±0,1*          |
| Body mass index (Quetelet index) II, kg/m <sup>2</sup> | 19,7±0,09      | 20,3±0,10*         | 20,6±0,09      | 21,5±0,11*         |
| Vital capacity of the lungs l                          | 2,55±0,08      | 2,45±0,006*        | 2,1±0,05       | 1,99±0,05*         |
| Vital capacity, ml/kg                                  | 49,8±0,09      | 47,6±0,11*         | 42,0±0,07      | 40,1±0,66*         |
| Right hand strength, kg                                | 22,8±0,09      | 20,5±0,10*         | 19,5±0,08      | 18,9±0,11*         |
| Left hand strength, kg                                 | 21,8±0,10      | 19,9±0,12*         | 17,8±0,10      | 16,9±0,12*         |
| Heart rate, beat/min                                   | 73,06±0,09     | 75,6±0,13*         | 88,3±0,15      | 89,4±0,12*         |
| Arterial systolic pressure, mmHg                       | 120,0±0,15     | 118,6±0,17*        | 110,0±0,17     | 115,2±0,15*        |
| Arterial diastolic pressure, mmHg                      | 80,2±0,12      | 79,8±0,11          | 80,1±0,012     | 82,0±0,09*         |
| Robinson index Индекс Робинсона, r.u.                  | 87,6±0,21      | 89,7±0,13*         | 97,1±0,16      | 102,9±0,13*        |

Note. \* - statistically significant differences between the students' in Russia and the Republic of Kazakhstan indicators values ( $p < 0.05$ )

The results analysis showed that the Russian boys' BMI index value was 3% less and vital capacity index was 4.4% more than in Kazakhstan ( $p < 0.05$ ). Russian girls were 2.9 cm taller, their bodies' weight was less than 0.7 kg (Tab.2), than Kazakhstan girls ( $p < 0.05$ ), the Latter have a significantly greater 4.4% on the value of the Quetelet index II.

Russian girls' lung capacity was significantly higher by 5.3%, a vital index by 4.5%, the left hand strength by 5.3% and the right hand strength by 3.2% than that of students of the Republic of Kazakhstan. The heart rate at rest indicators value and the Robinson index was less by 1.2% and 5.6%, respectively, than in Kazakh students (girls) ( $p < 0.05$ ). Table 3 shows the physical fitness indicators values of boys in Russia and the Republic of Kazakhstan after a pedagogical experiment.

**Table 3. Boys' in Russia and the Republic of Kazakhstan physical fitness indicators before and after the pedagogical experiment ( $M \pm m$ )**

| Motor tests  | Russia (n= 100)       |                      |            | Kazakhstan (n= 100)   |                      |            |
|--|-----------------------|----------------------|------------|-----------------------|----------------------|------------|
|  | Before the experiment | After the experiment | Growth (%) | Before the experiment | After the experiment | Growth (%) |
| Running at 60 m, sec                               | 10,08±0,06            | 9,98±0,05            | 0,9        | 10,4±0,08             | 10,3±0,08            | 0,9        |
| Running broad jump, cm                             | 334,25±5,9            | 348,1±4,7*           | 4,1        | 315,4±5,8             | 329,1±5,9*           | 4,3        |
| Running at 1000 m, min/sec                         | 5,9±0,05              | 5,8±0,05             | 1,7        | 4,82±0,09             | 4,78±0,09            | 0,8        |
| Throwing a ball, m                                 | 25,3±0,5              | 27,6±0,5*            | 9,1        | 26,5±0,6              | 30,4±0,7*            | 14,7       |
| Pull-up on a high crossbar (boys), number of times | 7,6±0,50              | 8,2±0,5*             | 7,8        | 4,5±0,4               | 8,2±0,6*             | 82,2       |
| Cross-country skiing at 2 km, min/sec              | 14,6±0,7              | 14,1±0,5             | 3,5        | 14,99±0,8             | 14,29±0,5            | 4,7        |

Note. \* - statistically significant differences between the students' in Russia and the Republic of Kazakhstan indicators values ( $p < 0.05$ )

After the pedagogical experiment, Russian and Kazakh boys showed a significant increase in the upper limb muscle strength values, the lower limb muscles dynamic strength, and the speed and upper limb muscles strength qualities ( $p < 0.05$ ). In a comparative analysis of physical preparedness growth indicators of Russian and Kazakhstan boys no significant differences were established, except high gain (82,2 %) increased power capabilities values of Kazakh boys in a «pull-ups» test. There was no significant

improvement in the results of the boys from both countries in the motor tests for speed («running 60 m») and general endurance («running 1000 m»). The results of girls' in Russia and the Republic of Kazakhstan physical fitness indicators monitoring after the pedagogical experiment are presented in Table 4.

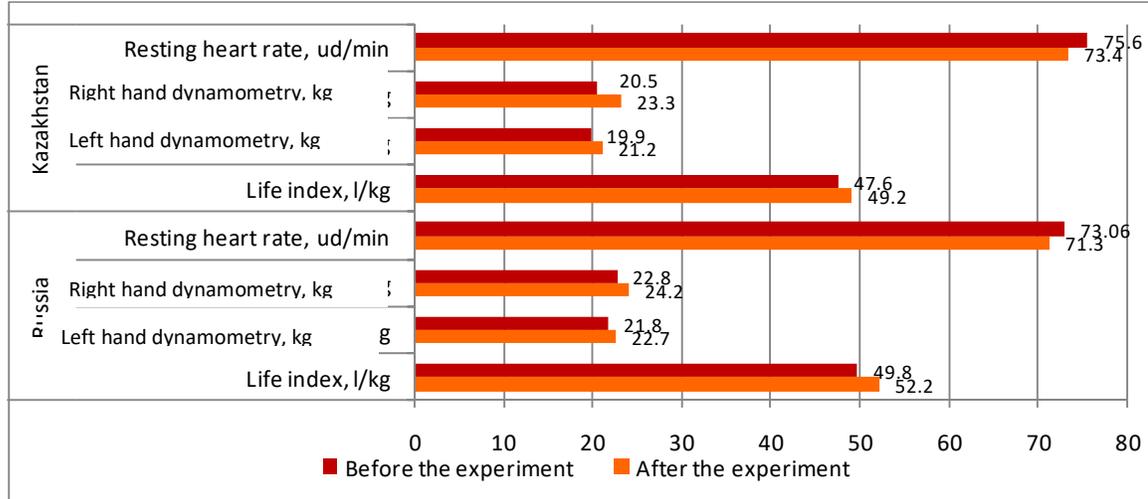
**Table 4. Girls' in Russia and the Republic of Kazakhstan physical fitness indicators before and after the pedagogical experiment (M±m)**

| Motor tests  | Russia (n= 100)       |                      |            | Kazakhstan (n= 100)   |                      |            |
|--|-----------------------|----------------------|------------|-----------------------|----------------------|------------|
|  | Before the experiment | After the experiment | Growth (%) | Before the experiment | After the experiment | Growth (%) |
| Running at 60 m, sec                                       | 10,5±0,07             | 10,3±0,05            | 1,9        | 11,7±0,05             | 11,6±0,08            | 0,8        |
| Running broad jump, cm                                     | 321,0±4,7             | 338,±4,4*            | 5,5        | 296,5±7,9             | 316,3±6,9*           | 6,7        |
| Running at 1000 m, min/sec                                 | 4,9±0,05              | 5,0±0,05             | 2,0        | 6,21±0,03             | 6,20±0,03            | 0,2        |
| Throwing a ball, m   | 18,4±0,10             | 23,7±0,1*            | 28,8       | 19,8±0,1              | 24,6±0,2*            | 24,2       |
| Modified pull-up on a low crossbar (girls), количество раз | 17,0±0,07             | 19,8±0,05*           | 16,5       | 14,5±0,5              | 18,2±0,6*            | 25,5       |
| Cross-country skiing at 2 km, min/sec                      | 15,5±0,7              | 15,2±0,5             | 1,9        | 15,88±0,7             | 15,36±0,5            | 3,3        |

Note. \* - statistically significant differences between the students' in Russia and the Republic of Kazakhstan indicators values (p < 0.05)

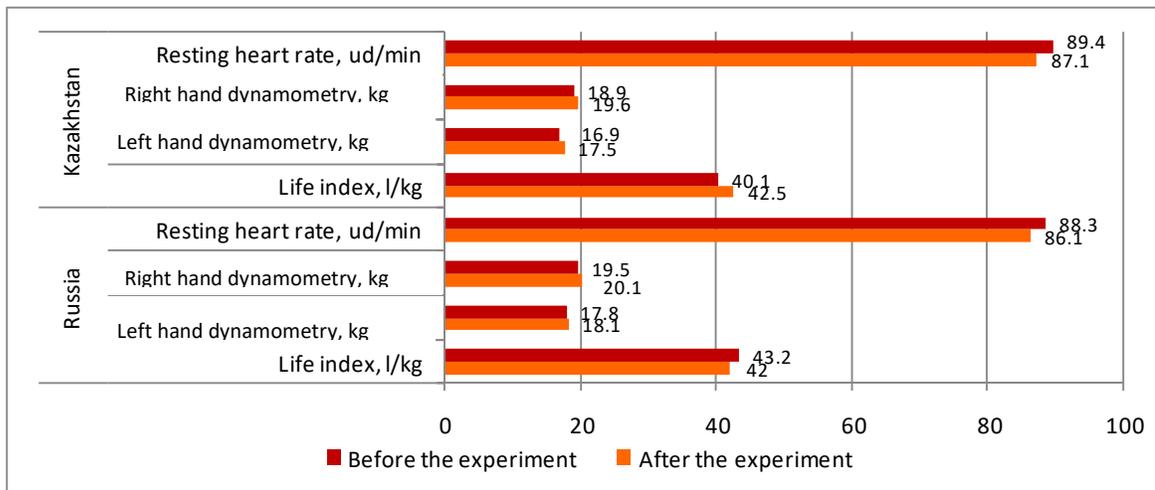
After the pedagogical experiment the Russian and Kazakh girls showed significant increase in lower extremities dynamic muscle strength values, upper limbs muscles speed-power qualities and the muscles of the upper extremities (p < 0.05). There is no significant improvement in the students' (girls') results of both countries in «speed» and «endurance» motor qualities. In the comparative analysis of the physical fitness indicators increase of Russian and Kazakh girls, no significant differences were found.

After the pedagogical experiment, along with positive changes in the students' motor qualities indicators values in the Republic of Kazakhstan and Russia, there was an improvement in the children's body functional characteristics, as shown in Fig.1 and 2.



**Fig. 1. Functional indicators of Russian and Kazakh boys before and after the pedagogical experiment**

By the end of the pedagogical experiment, there is a decrease in the resting heart rate in Russian and Kazakh students, compared with this indicator value at the research beginning. At the end of the school year, a decrease in the Robinson index was found in Russian boys by 5.9%, in girls by 4.8 % and in Kazakh boys and girls - 2.8 and 3.5%, respectively.



**Fig. 2. Functional indicators of Russian and Kazakh girls before and after the pedagogical experiment**

According to the results of the survey, it was found that 86.4% of Russian and 88.5% of Kazakh PE teachers use a national-regional component in the educational process.

### Dicussion

Recently, young students' hypokinesia (Potop et.al., 2017; Zhang et.al., 2019) is one of the reasons for the state of health deterioration, the decline in the professional, social and reproductive function of modern man (Tikhomirova et.al., 2019) and the activity of the body functional systems (Pedro Delgado et.al., 2019). Therefore, the search for new technologies of physical education in general schools is an urgent direction (Velikanov, Ryzhov, 2016).

The analysis of our research in both countries shows that the national-regional component use in the school curriculum in the Republic of Kazakhstan and Russia, allowed significantly improve physical and functional training indicators to the end of the experiment, and increase the children's interest and motivation to increase the motor density of school PE lesson and physical and recreational nature of the subject efficiency.

Our data are consistent with the research results in Kalmykia (Russia). According to the author, the ethno-pedagogical technologies implementation in the physical education of children contributed to a significant increase in school students' speed by 4.1 %, strength abilities by 11.4% and endurance by 7.1% (Shushunov, 2008). The folk outdoor games use in PE classes in high school allowed schools in the Ust'-Orda Buryat District of the Irkutsk Region (Russia) and the Republic of Sakha Yakutia increasing the students' motor qualities and physical health level (Sverdlova, Kolokoltsev, 2012; Gulyaeva, 2015).

The decrease in the resting heart rate in Russian and Kazakh students, established by us at the end of the pedagogical experiment, is consistent with the results obtained by other authors (Svyatova et.al., 2018). A decrease in the resting heart rate and a decrease in the Robinson index is a sign of an increase in the young people's cardiovascular system functional reserves associated with human physical activity (Moy et.al., 2018). According to our survey, it was found that more than 86.0% of Russian and 88% of Kazakh teachers include a local educational component in PE lessons. This orientation of PE lessons provided an increase in interest in extracurricular forms of physical activity among students. Among the students of the two countries surveyed, 83% indicated that they have developed an interest in national outdoor games and sports even outside of school hours. Improving the students' motor activity through games outside of school is established in studies by other authors (Dobbins et.al., 2013), which is consistent with our data.

### Conclusions

Despite the same annual number of academic hours, there are differences in the content of the topics sections and the hours distribution in «Physical Culture in the 7th grade» subject curricula in schools of the Republic of Kazakhstan and Russia. The fundamental difference is only in its own national and regional component of the variable PE lesson use in each country.

At the end of the pedagogical experiment, it was found that PE classes with ethno-pedagogical technologies use in the lesson in the Republic of Kazakhstan and Russia had a positive result of improving the students' physical fitness and functional indicators. Students from both countries showed a significant increase in the upper limb muscle strength values, the lower limb muscles dynamic strength, and the upper limb muscles speed and strength qualities. In all Russian boys and girls, all anthropometric and physiometric characteristics,

the reserve capacity of the cardiovascular system to perform physical activity, the motor qualities values, with the exception of the speed and strength qualities of the muscles of the upper extremities in boys, were significantly higher than in Kazakh students.

The national outdoor games and types of national sports elements inclusion in the variable PE lesson increased the physical health indicators values, students' of both countries interest and motivation to perform motor activities in the lesson, which may indicate the correct organization of physical education in the Republic of Kazakhstan and in Russia.

The educational PE programs of secondary school aged children studied by us on the basis of the national-regional component in the educational process use the should be supplemented with exercises aimed at lagging physical qualities development, in particular, «speed» and «endurance», have sufficient effectiveness and can be recommended to teachers of other educational institutions.

**Conflicts of interest.** The authors declare no conflict of interest.

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