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Original Article

Influence of injury prevention complex technology on the knowledge level of medical and biological subjects and the injury risk of future specialists in physical education and sports

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Abstract

Purpose: to develop a comprehensive technology for injury prevention and determine the impact of its application on the level of knowledge of medical and biological subjects on the example of anatomy and the risk of injury of future specialists in physical education and sports engaged in climbing. **Material and methods.** The control group included 44 students involved in rock climbing. The experimental group included 40 students involved in rock climbing. To determine the impact of the developed technology on the risk of injury, the following indicators were determined: risk (incidence) of injury, chance of injury, relative risk and odds ratio. Determination of the level of knowledge in the subjects of the medical-biological cycle was carried out according to the following characteristics: less than 50% of correct answers (bad), 50-60% of correct answers (satisfactory), more than 60% of correct answers (good). The reliability of the influence of the application of the developed technology on the level of students' knowledge of anatomy according to the Chi-square and Monte Carlo tests was determined. **Results**. Prior to the experiment, students in both control and experimental groups were dominated by anatomy marks in the category of "less than 50% correct answers". In the experimental group after the experiment, the majority of students (81.4-81.6%) took tests at the average level of knowledge. The experimental group also included students (18.2-18.6%) who took tests with a high level of knowledge (more than 60% correct answers), while the control group did not have such students after the experiment; in the control group the change in the level of knowledge of students as a result of the experiment is not significant, in the experimental group - significant at $p < 0.001$. The application of the developed technology of injury prevention reduces the risk of finger injuries: low complexity in 2,3 times; medium complexity - 3,3 times, $P = 0,03$; high complexity - 8,1 times, $P = 0,011$). **Conclusions.** The application of the developed technology of injury prevention reduces the risk of finger injuries and helps to improve the level of knowledge in the subjects of medical and biological cycle on the anatomy.

Key words: **trauma, anatomy, knowledge, prevention, students**

Introduction

Professional training of future specialists in physical education and sports has its peculiarities (Kozina, Borysenko, Grynyova, Masych Ushmarova, 2021; Kanishchev, Kozina, Grynyova & Masych., 2021). Thus, a student majoring in "Physical Culture and Sports" should combine the development of intelligence with physical improvement at a high professional level (Xiaofei, Korobeinik, Kozina, 2021). The acquisition of theoretical knowledge includes the study of subjects of medical and biological cycle (anatomy, physiology, biochemistry, biomechanics, sports medicine), subjects of psychological and pedagogical cycle (pedagogy, psychology, etc.), special cycle subjects (theory and methods of Olympic and professional sports, basics of sports training, introduction to the specialty, basics of research work, teaching sports in higher education institutions, etc.), theoretical and practical disciplines in physical therapy and rehabilitation (massage, physical therapy). The acquisition of practical skills and abilities in the chosen sport and in basic sports includes such subjects as "Theory and methods of the chosen sport". "Theory and methods of sports games", "Theory and methods of athletics", "Theory and methods of gymnastics", etc. In addition, students of this specialty must also have an internship in sports schools and universities. Thus, the future specialist in physical education and sports faces a rather difficult task: to combine the acquisition of theoretical knowledge with physical improvement, which requires a scientifically sound training process to ensure recovery after exercise and implement it in practice.

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That is why the process of training specialists in physical education and sports is built in such a way that students have a large number of practical disciplines in various sports along with the chosen one (Goossens et al., 2019). In practical classes, students learn technical skills, develop physical qualities, and learn to conduct classes not only in the chosen sport, but also in others. Therefore, the schedule of students - future specialists in physical education and sports is built in such a way that in one day there can be 2-3 pairs of practical classes in different sports, and in the evening - training in the chosen sport. This puts a heavy burden on the cardiovascular system, which overtraining creates the conditions for injury.

At present, there is a tendency in vocational pedagogical education to personally oriented learning (Kozina et al., 2018). This approach involves not only taking into account the individual psychological characteristics of students in the learning process, but also creating conditions for maintaining and strengthening the health of future professionals. Preserving and strengthening the health of students concerns future professionals in all specialties. Physical education and sports are no exception. After all, the future specialist in physical education and sports must acquire the necessary knowledge not only at the mental level, but also to acquire the necessary skills and abilities in certain sports and physical activity. At the same time, one of the sports is one in which the future specialist specializes from childhood, it is the chosen sp (Gavrysh, Ushmarova, & Kholtobina, 2021), ort, and there are other sports that the student must master. This creates conditions for increasing the risk of injury to students - future professionals in physical education and sports. The schedule of classes for future specialists in physical education and sports includes not only practical classes on mastering skills, methods of teaching basic sports, but also training in plowing in the afternoon. That is, the future specialist in physical education and sports faces a rather difficult task: to combine the acquisition of theoretical knowledge with training and improvement in various motor activities and in the chosen sport. It is known that in order to master a sport, it takes at least five years of regular regular training at a high level of dedication. And in order to become a specialist in a particular pedagogical field, you must also master the method of teaching (Xiaofei, W., 2020)

At present, there is a tendency in vocational pedagogical education to personally oriented learning. This approach involves not only taking into account the individual psychological characteristics of students in the learning process, but also creating conditions for maintaining and strengthening the health of future professionals. Preserving and strengthening the health of students concerns future professionals in all specialties. Physical education and sports are no exception. After all, the future specialist in physical education and sports must acquire the necessary knowledge not only at the mental level, but also to acquire the necessary skills and abilities in certain sports and physical activity. At the same time, one of the sports is one in which the future specialist specializes from childhood, it is the chosen sport, and there are other sports that the student must master. This creates conditions for increasing the risk of injury to students - future professionals in physical education and sports. The schedule of classes for future specialists in physical education and sports includes not only practical classes on mastering skills, methods of teaching basic sports, but also training in plowing in the afternoon. That is, the future specialist in physical education and sports faces a rather difficult task: to combine the acquisition of theoretical knowledge with training and improvement in various motor activities and in the chosen sport. It is known that in order to master a sport, it takes at least five years of regular regular training at a high level of dedication. And in order to become a specialist in a particular pedagogical field, you must also master the method of teaching. For specialists in physical education and sports - is to master the methods of teaching and sports training. Sports training is often associated with increased injuries. That is why the future specialist must also have the means to prevent injuries both for personal development and for future teaching as a physical education teacher and coach in the chosen sport.. For specialists in physical education and sports - is to master the methods of teaching and sports training. Sports training is often associated with increased injuries. That is why the future specialist must also have the means to prevent injuries both for personal development and for future teaching as a physical education teacher and coach in the chosen sport.

As the educational level increases, so does the individualization of the learning process. The field of physical culture and sports is no exception. In countries such as the United States, Europe and others, the trend towards a personal approach to physical education is realized in physical culture by allowing students to choose their own sports to improve motor skills, health and psychological well-being (Ayvazo & Ward, 2011; Ball et al., 2008; Berliner, 2004; Cochran-Smith & Zeichner, 2005; Depaepe et al., 2013; Griffin & Butler, 2005). This places new demands on the construction of the process of professional training of future specialists in physical education and sports, as the individual approach also involves the prevention of student injuries.

This places certain requirements on the training of specialists in physical education and sports. The modern specialist in physical education and sports must have not only basic sports at the primary-secondary level, but also be a perfect specialist in a particular sport and have the means to prevent injuries (Ingersoll et al., 2014; Iserbyt et al., 2017 ; Launder & Piltz, 2013). This is necessary to ensure a strategy of individual approach to the process of physical education, which is a necessary prerequisite for injury prevention.

The implementation of an individual approach to ensuring the conditions of injury prevention consists in the following provisions: determining the chosen sport in the early stages of learning (Kozin et.al., 2020, 2021); improvement in the chosen sport based on the individual characteristics of students - athletes.

In a study by Xiaofei et. al., (2021) developed an algorithm for implementing an individual approach to training future professionals in physical education and sports, which is the basis of injury prevention. The algorithm contains the following provisions: 1 - determination for each student of the sport that is most suitable for its improvement based on previous sports experience, motor skills and psychophysiological capabilities; 2 - building a program of professional training of students, which includes classes in leading sports, starting from the first year of study; 3 - construction of classes in the chosen sport, taking into account the individual characteristics of students with motor abilities and psychophysiological functions.

The construction of classes in the chosen sport in the developed program (Xiaofei, 2021) is carried out taking into account the individual characteristics of students with motor abilities and psychophysiological functions (Kozina et al., 2021), which are determined by factor analysis. The formation of groups of athletes for individual work is also carried out with the help of hierarchical cluster analysis of testing indicators. On the basis of individual factor values ??and cluster analysis, individual characteristics of athletes and individual training programs in the chosen sport are compiled. The use of interactive and information technologies influences consciousness, which allows to intensify the active attitude of future physical education teachers to the learning process, and thus provides an individual approach to the training process. Also, a special method of informational influence on consciousness during sports training of students has shown effectiveness (Kozina, Koval, Kovtun, Temchenko, 2015; Xiaofei, 2021). The effectiveness of this technique consists in the high pedagogical effect of using the developed training program for future physical education teachers, which is expressed in a significant increase in testing in the chosen sport, psychophysiological capabilities and pedagogical skills in the chosen sport without loss of skills in basic sports.

Thus, the professional training of future specialists in physical education and sports has its own specifics, which makes the content of the learning process fundamentally different from the education of students of all other specialties. This refers to the combination of the need to master special theoretical knowledge with professional development in the chosen sport and in basic sports, which involves the development of physical qualities, motor skills, building a training process based on modern scientific advances using an individual approach. It also involves the prevention of injuries, which is an urgent task today.

Purpose: to develop a comprehensive technology for injury prevention and determine the impact of its application on the level of knowledge of medical and biological subjects on the example of anatomy and the risk of injury of future specialists in physical education and sports engaged in climbing.

Material and methods

Participants and randomization

The control group included 44 students involved in rock climbing. The experimental group included 40 students involved in rock climbing. To determine the impact of the developed technology on the risk of injury, the following indicators were determined: risk (incidence) of injury, chance of injury, relative risk and odds ratio.

Characteristics of injury prevention technology for students - future specialists in physical education and sports

In the theoretical and methodological direction of the classes the following tasks were set:

• Knowledge of the laws of biomechanics of the musculoskeletal system and its applied aspects in physical culture and sports;

• Fundamentals of preventive approach and understanding of the principles of effective and injury-safe training;

• Knowledge of the laws of movement in the main synergistic patterns and their practical application in the work of the coach and in independent sports;

• The relationship between functional human anatomy and the dynamics of popular exercises;

• Possession of special sets of leading exercises that highlight the target muscle group and form the optimal technique.

To master the biomechanical technology of injury prevention, the concepts of motor stereotypes, the reasons for the formation of "ineffective" movement, the principles of individual selection of methods of correction were also considered.

Thus, the whole process of training was built from understanding the basics of anatomy, biomechanics, the principle of sensory correction and levels of movement organization to model thinking in training.

As a result, students were given the task to learn to understand the movement "from within", to train / train according to the principles and laws of biomechanics (which means - both effectively and without injury).

The peculiarity of the theoretical and methodological direction was that classes were held both in classrooms and in special rooms for fitness and physical therapy with the use of popular equipment for maximum application of the transmitted information

Fig. 1. Illustration of classes on mastering the theoretical and methodological direction of biomechanical technology for injury prevention of students - future professionals in the field of physical culture and sports

In order to form a theoretical foundation for students in the process of formation and improvement of technical skills, an author's video manual on the basics of biomechanics of the musculoskeletal system was developed. The author's video manual is an illustration with an explanation of the biomechanical patterns of proper formation of motor skills and injury prevention.

As a result, students were given the opportunity to get a lot of interesting, relevant information and applied techniques for work and independent training.

The method of determining the impact of the application of injury prevention technology on the success of students' education in the subjects of medical and biological cycle

To determine the impact of biomechanical technology on the success of students in medical and biological cycle (on the example of anatomy) was tested students - climbers who participated in the study (control group was 44 people, experimental - 40 people) on the level of knowledge of medical subjects -biological cycle: anatomy, physiology, biochemistry, biomechanics. To determine the level of knowledge, the subjects of the medical-biological cycle were chosen because the knowledge of these subjects is basic for the coach. Knowledge of anatomy, physiology, biochemistry, biomechanics allows us to understand the changes that occur in the body during exercise of various directions. Knowledge of anatomy allows you to understand which muscles provide certain exercises. Thanks to the knowledge of the subjects of medical and biological cycle, the coach can build training programs individually for each athlete, based on his functional state.

To determine the level of knowledge in the subjects of the medical-biological cycle, we used questions typical of European universities, in particular - at Charles University in Prague. This university has 4 medical faculties and a faculty of physical education and sports. European requirements for assessing students 'knowledge were chosen to check the degree of compliance of students' knowledge with European requirements.

Testing was performed twice: before the start of the experiment and after its completion (August 2020 - July 2021). Determining the level of knowledge in the subjects of medical and biological cycle was carried out in two ways: 1 - on a 100-point scale; 2 - according to the following characteristics: less than 50% of correct answers (bad), 50-60% of correct answers (satisfactory), more than 60% of correct answers (good).

Statistical analysis

Determining the impact of the use of biomechanical technology on the level of knowledge of students in the subjects of medical and biological cycle (for example - anatomy) was carried out using the following methods of mathematical statistics:

1. Calculation of "simple statistics". The arithmetic mean, standard deviation, was calculated by standard mathematics co-statistical formulas used in the processing of scientific data.
2. Determining the number of students who provided correct answers to questions in each subject (for example - anatomy) by characteristics (levels of knowledge), was carried out in absolute terms and as a percentage of the number of students in each group (control and experimental) before and after experiment.
3. Determining the reliability of the influence of a group of students (control, experimental) on the level of knowledge of students (less than 50% correct answers, 50-60% correct answers, more than 60% correct answers) before and after the experiment was performed by Chi-square test and test Monte Carlo.

To determine the impact of the developed technology on the risk of injury, the following indicators were determined: risk (incidence) of injury, chance of injury, relative risk and odds ratio using the computer program SPSS-17, Crosstabs option (Kozin, 2021).

Results

The use of student injury prevention technology has had a positive effect on the level of knowledge in the subjects of medical and biological cycle (Table 1).

*Table 1*The number of correct answers to questions on anatomy in the control and experimental groups before the experiment

Group	Control	Number of correct answers	Less than 50%	50-60%	More than 60%	Total
		Number	29	15	0	44
		Expected quantity	28.8	14.7	0.5	44,0
		% in Group	65.9%	34.1%	0.0%	100,0%
		% in anatomy	52.7%	53.6%	0.0%	52,4%
		% of the total	34.5%	17.9%	0.0%	52,4%
	Experimental	Number	26	13	1	40
		Expected quantity	26.2	13.3	0.5	40,0
		% in Group	65.0%	32.5%	2.5%	100,0%
		% in anatomy	47.3%	46.4%	100.0%	47,6%
		% of the total	31.0%	15.5%	1.2%	47,6%
Summery		Number	Number	55	28	1
		Expected quantity	Expected quantity	55.0	28.0	1.0
		% in Group	% in Group	65.5%	33.3%	1.2%
		% in anatomy	% in anatomy	100.0%	100.0%	100.0%
		% of the total	% of the total	65.5%	33.3%	1.2%

It should be noted that in both the control and experimental groups before the experiment, the largest number of answers to questions on the subjects of the medical-biological cycle (anatomy) was found at the level of "less than 50% of correct answers (bad)".

*Table 2*Dependence of the level of answers to anatomy questions on a group of students before conducting an experiment on Chi-square tests

Indexes	Value	Degrees of freedom	Asymptotic significance (2-sided) (p)	Significance of Monte Carlo (2-sited)		
				p	99% confidence interval	
					Lower border	Upper border
Pearson's Chi-square	1.119a	2	0.572	0.815b	0.805	0.825
The relationship of plausibility	1.502	2	0.472	0.815b	0.805	0.825
Fisher's exact criterion	1.071			0.815b	0.805	0.825
Linear-linear connection	0.095c	1	0.758	0.836b	0.827	0.846
Number of admissible observations	84					

Notes: a For a cell count of 2 (33.3%), a value less than 5 is assumed. The minimum expected number is 0.48.
b Based on a sample of 10000 tables with a starting value of 1156607048.
c Standardized statistic, 0.308.

Thus, questions on anatomy before the experiment at the level of "less than 50% correct answers" in the control group were 65.9% of students in the experimental group - 65.0% (Table 1). The differences between the Chi-square test and the Monte Carlo test between the groups before the experiment are not significant ($p > 0.05$) (Table 2).

After the experiment in the control group, the results of determining the level of knowledge of students in the subjects of medical and biological cycle (anatomy) remained virtually unchanged ($p > 0.05$) (Tables 3, 4). In the experimental group, the level of knowledge of the subjects of the medical-biological cycle (anatomy) significantly improved after the experiment ($p < 0.001$). Thus, according to the level of knowledge "less than 50% of correct answers" in anatomy in the control group was 77.3% of students, while in the experimental - 0% of students. According to the level of knowledge "50-60% of correct answers" in the control group were 22.7% of students, in the experimental group according to this level of knowledge were 72.5% of students; according to the level of knowledge "more than 60% of correct answers" in the control group was 0% of students, in the experimental - 27.5% of students (Table 3).

The following tendency is characteristic for answers to questions on anatomy. Prior to the experiment, the number of students who have a course in anatomy at each level of knowledge, both in the control and experimental groups, coincides with the expected number (Table 1). After the experiment, the number of students who have each course at the level of knowledge "less than 50% of correct answers" in the control group was more than expected, in the experimental - less than expected (Table 3). Conversely, the number of students who have a course in "anatomy" at the levels of knowledge "50-60% of correct answers" and "more than 60% of correct answers" in the control group was less than expected, in the experimental - more than expected (Table 3). In the control group, significant changes in the level of knowledge of students in the subjects of medical and biological cycle did not occur. That is, without special consolidation in practice, the level of knowledge of students in the control group remained low.

Table 3 The number of correct answers to questions on anatomy in the control and experimental groups after the experiment

Group	Control	Number of correct answers	Less than 50%	50-60%	More than 60%	Total
		Number	34	10	0	44
		Expected quantity	17.8	20.4	5.8	44
		% in Group	77.30%	22.70%	0.00%	100,00%
		% in anatomy	100.00%	25.60%	0.00%	52,40%
		% of the total	40.50%	11.90%	0.00%	52,40%
	Experemental	Number	0	29	11	40
		Expected quantity	16.2	18.6	5.2	40
		% in Group	0.00%	72.50%	27.50%	100,00%
		% in anatomy	0.00%	74.40%	100.00%	47,60%
		% of the total	0.00%	34.50%	13.10%	47,60%
Summery		Number	Number	39	11	84
		Expected quantity	Expected quantity	39	11	84
		% in Group	% in Group	46.40%	13.10%	100.00%
		% in anatomy	% in anatomy	100.00%	100.00%	100.00%
		% of the total	% of the total	46.40%	13.10%	100.00%

Table 4 Dependence of the level of answers to anatomy questions on a group of students after conducting an experiment on Chi-square tests

Indexes	Value	Degrees of freedom	Asymptotic significance (2-sided) (p)	Significance of Monte Carlo (2-sited)		
				p	99% confidence interval	
					Lower border	Upper border
Pearson's Chi-square	54.189a	2	0.000	0.000b	0.000	0.000
The relationship of plausibility	71.855	2	0.000	0.000b	0.000	0.000
Fisher's exact criterion	64.776			0.000b	0.000	0.000
Linear-linear connection	49.325c	1	0.000	0.000b	0.000	0.000
Number of admissible observations	84					

Notes: a For the number of cells 0 (0.00%) a value less than 5 is assumed. The minimum estimated number is 5.24.

b Based on a sample of 10,000 tables with an initial value of 1507486128.
c Standardized statistics - 7,248. a A value of less than 5 is assumed for the number of cells 0 (0.00%). The minimum estimated number is 5.24.
b Based on a sample of 10,000 tables with an initial value of 1507486128.
c Standardized statistics - 7,248.

The positive impact of the application of the developed technology of injury prevention on the level and risk of injuries based on the results of injuries of students of the experimental and control groups was revealed (Kozin, 2020, 2021).

Discussion

The technology used in the experimental group has three directions: theoretical and methodological, analytical and practical. We believe that the organic combination of three areas of one technology has helped to improve the level of knowledge of students in the subjects of medical and biological cycle (anatomy). Theoretical and methodological direction included theoretical classes with methodological direction. This provided the conditions for students to become interested in the subjects of the medical-biological cycle, as the goal of in-depth study of these subjects was to prevent injuries. A creative approach is needed to prevent injuries. A creative approach to injury prevention involves a deep understanding of the medical and biological foundations of the training process. This encourages students to master the basics of anatomy, physiology, biochemistry, biomechanics, as the purpose of studying these subjects. And so we see an increase in the level of knowledge of students in the experimental group as a result of the experiment. The analytical direction of injury prevention technology included the analysis of movement technique. This encouraged students to identify the muscles involved in motor activities. The analysis also involved mastering modern methods of studying the features of various aspects of movement, namely - the speed of movement of individual parts of the body, angles in the joints and more. All this involved a deep study of anatomy, physiology, biomechanics, biochemistry. Therefore, the students of the experimental group as a result of the experiment increased the level of knowledge in the subjects of medical and biological cycle, in particular - in anatomy, which is presented in this study.

The practical direction of injury prevention technology involved the use of special exercises. This created the conditions for combining theoretical knowledge, ability to analyze and combine the results of their own observations and research with the formation of motor skills and abilities to achieve the goal - prevention of injuries in physical culture and sports. Thus, it can be noted that the application of injury prevention technology, which consists of three areas (theoretical, methodological, analytical and practical), had a positive impact on the level of knowledge of students in medical and biological cycle, in particular - in anatomy, presented in this research.

If before the experiment the students of both control and experimental groups were dominated by assessments of the category "less than 50% of correct answers" (more than 70% of both control and experimental groups provided answers to questions on subjects of medical and biological cycle at this level), after the experiment in the experimental group, no student took the tests at the lowest level of knowledge, and in the control group the number of students who took the tests at the lowest level remained more than 70% (77.3-77.5%). The differences between the control and experimental groups before the experiment were not significant ($p > 0.05$); the differences between the control and experimental groups after the experiment were significant ($p < 0.001$).

The low results of testing students of both control and experimental groups before the experiment using the technology of injury prevention students - future specialists in physical education and sports, we can explain that, first, the testing was applied European requirements for the level of knowledge of future professionals; secondly, by the fact that the subjects of the medical-biological cycle were chosen for testing. The subjects of the medical-biological cycle are the most difficult for students to master, but at the same time without knowledge of these subjects it is impossible to understand the changes that occur in the human body during training loads, and, accordingly, control the training process.

In the experimental group after the experiment, the majority of students (81.4-81.6%) took tests at the average level of knowledge (50-60% of correct answers). The experimental group also included students (18.2-18.6%) who took tests with a high level of knowledge (more than 60% correct answers), while the control group did not have such students after the experiment. It should also be noted that the testing was conducted after the completion of the study of these subjects by students, ie the final knowledge was tested. This, in turn, requires in-depth knowledge of the students, that is, those left after studying each course. And the achievement of deep knowledge, which remains long after the completion of each course - is an important and difficult task for both students and teachers.

Summary Based on the results obtained by students' answers to questions on the subjects of medical and biological cycle, we can note the positive impact of the application of injury prevention technology on the level of professional knowledge of students - future specialists in physical education and sports.

Evidence on the effectiveness of the application of the practical direction of injury prevention technology in physical culture and sports (Coppack et al., 2011; LaBella et al., 2011; Pasanen et al., 2008; Parkkari et al., 2011; Steffen et al., 2013). In addition, these data were supplemented by the idea of applying a practical direction to climbing, in which our work was not conducted randomized trials on injury prevention programs.

Our study confirmed the theory of Bernshtein (Bernshtein, 1967), which shows that the basis of injury prevention is the effective organization of movement control by the central nervous system. The results of research allowed Bernstein (Bernstein, 1967) to look at the theory of reflexes from another point of view.

Bernstein (Bernstein, 1967) introduced the concept of "model of the right future", considering it as a form of reflection of the living organism of the world. The second form is the reflection of the past and present.

Along with this, the brain "reflects" (constructs) the situation of the future, has not yet become a reality, which provided its biological needs motivate to realize. Only awareness of the image of the desired future can be the basis for the design of the task and programming its solution. The model of the future is probabilistic. From this point of view, our work confirmed Bernshtein's theory (Bernshtein, 1967) regarding the probability of a model of the future with respect to the fact that injuries have a certain probability and cannot be programmed. Bernstein (Bernstein, 1967) proposed a completely new principle of motion control, calling it the principle of sensory correction. Corrections made to motor impulses based on sensory information about the course of movement are meant. The result of any complex movement depends not only on the actual control signals, but also on a number of additional factors. A common feature of these factors is to make changes in the planned course of movement. The movement, even the most elementary, is always built "here and now", and does not follow automatically (each time the same thing) following the stimulus that caused it (Thompson et al. 2011; Schöffl et al. 2015).

From this point of view, our work confirmed Bernshtein's theory (Bernshtein, 1967) with the provisions on the need to use integrated technology for injury prevention to improve the mechanism of sensory correction.

Conclusions

1. The positive impact of the application of the developed technology of injury prevention on the level and risk of injuries based on the results of injuries of students of the experimental and control groups was revealed.
2. The positive impact of the developed technology on the level of professional knowledge of students enrolled in the program "Physical Culture and Sports" was revealed.

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