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EVALUATING OF PHYSICAL PREPAREDNESS AMONG YOUNG STUDENTS AGED 18–20

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Abstracts

Topicality. First results of testing attested that by individual tests considerable amount of students (more than 50 % of under studies) cannot carry out minimal standards. Such incompetence may appear because of using inadequate methods of development of evaluation criteria. **The Goal of the Research** consisted in development of the standards of physical readiness' evaluation among young students aged 18–20. **Methods of the Research.** The indices of students' physical readiness were determined by the method of pedagogic testing. We carried out an analysis of the accordance of valid standards with the current state of young students' physical readiness. Using the "three-sigmarule" were developedes timated standards of physical preparedness. On the basis of the data, which were determined by the research of the large quantity of a similar quota, we suggest evaluating the result which agrees with the arithmetic mean of the excerpt (X) as the mark «3». The marks «4» and «2» are the result which agrees with the values $+1\sigma$ i -1σ . The marks «5» and «1» are the result which agrees with the value $+2\sigma$ i -2σ . **Results of the Research.** Were developed standards of the evaluation of physical readiness which correspond to the level of physical preparedness of modern youth. **Conclusions.** On the basis of the testing's results of the level of students 'physical readiness (year 2017) we have ascertained that more than a half of the results by particular standards doesn't exceed the minimal mark. It indicates that the present methodology for the evaluation of the 18–20 aged youth' physical readiness doesn't allow evaluating the physical qualities impartially. The suggested methodology of the standards' working out is based on the «three-sigma rule». The standards for the evaluation of physical readiness worked out by the author's methodology ensure the opportunity for around 95 % of the students to accomplish the tests within the limits of the evaluative scale.

Key words: males, females, physical preparedness, standards.

Юрій Фурман, В'ячеслав Мірошніченко, Олександра Брезденюк. Оцінка фізичної підготовленості студентської молоді 18–20 років. Актуальність. Перші результати тестування фізичної підготовленості студентів засвідчили, що за окремими тестами значна кількість осіб (понад 50 % досліджених) не можуть виконати мінімальні нормативи. Така невідповідність може виникати за відсутності об'єктивних критеріїв оцінки фізичних якостей. **Мета дослідження** полягала в розробці методики нормативів оцінки фізичної підготовленості студентської молоді. **Методи дослідження.** Методом педагогічного тестування визначали показники фізичної підготовленості студентів 18–20 років. Проведено аналіз відповідності чинних нормативів фізичної підготовленості реальним можливостям молоді проявляти фізичні якості. Користуючись «правилом трьох сигм», розроблено оцінні нормативи фізичної підготовленості. На основі даних, установлених дослідженням великої кількості однорідного контингенту, пропонуємо оцінювати результат, який відповідає середньому арифметичному вибірці (X) у «3» бали. Результат, який відповідає значенню $+1\sigma$ i -1σ , відповідає оцінці «4» i «2» бали відповідно, $+2\sigma$ i -2σ – «5» i «1» бал. **Результати роботи.** Розроблено нормативи оцінки фізичних якостей, які відповідають рівню фізичної підготовленості сучасної молоді. **Висновки.** На підставі результатів тестування рівня фізичної підготовленості студентів (2017 р.) установлено, що за окремими нормативами більшість результатів не перевищують мінімальний бал. Це вказує на те, що наявна методика оцінки фізичної підготовленості молоді 18–20 років не дає змоги об'єктивно оцінити фізичні якості. Запропонована методика розробки нормативів ґрунтується на основі «правила трьох сигм». Розроблені за авторською методикою нормативи оцінки фізичної підготовленості забезпечують можливість близько 95 % студентів виконати тести в межах оцінної шкали.

Ключові слова: юнаки, дівчата, фізична підготовленість, нормативи.

Юрий Фурман, Вячеслав Мирошнichenko, Александра Брезденюк. Оценка физической подготовленности студенческой молодежи 18–20 лет. Актуальность. Первые результаты тестирования физической подготовленности студентов показали, что по отдельным тестам значительное количество лиц (более 50 % исследованных) не могут выполнить минимальные нормативы. Такое несоответствие может возникать при отсутствии объективных критериев оценки физических качеств. **Цель исследования** – разработка нормативов оценки физической подготовленности студенческой молодежи 18–20 лет. **Методы исследования.** Методом педагогического тестирования определяли показатели физической подготовленности студентов 18–20 лет. Анализируется соответствие

существующих нормативов физической подготовленности реальным возможностям молодежи проявлять физические качества. Пользуясь «правилом трех сигм», разработаны оценочные нормативы физической подготовленности. На основе данных, установленных путем исследования большого количества однородного контингента, мы предлагаем оценивать результат, который соответствует среднему арифметическому выборки (X) в «3» балла. Результат, который соответствует значению $+1\sigma$ и -1σ , соответствует оценке в «4» и «2» балла, $+2\sigma$ и -2σ – «5» и «1» балл соответственно. **Результаты работы.** Разработаны нормативы оценки физических качеств, которые соответствуют уровню физической подготовленности современной молодежи. **Выводы.** На основании результатов тестирования уровня физической подготовленности студентов (2017 г.) мы установили, что по отдельным нормативам большинство результатов не превышают минимальный балл. Это указывает на то, что существующая методика оценки физической подготовленности молодежи 18–20 лет не позволяет объективно оценить физические качества. Предложенная методика разработки нормативов основывается на основе «правила трех сигм». Разработанные по авторской методике нормативы оценки физической подготовленности обеспечивают возможность около 95 % студентов выполнить тесты в пределах оценочной шкалы.

Ключевые слова: юноши, девушки, физическая подготовленность, нормативы.

Introduction. Ministry of youth and sports of Ukraine published the order №4665 of 15.12.2016 «About the sanction of Procedure of carrying annual evaluation of physical readiness among Ukrainian population», where new criteria of evaluation of physical readiness among different groups of population are published, in particular for young students [7]. First results of testing attested that by individual tests considerable amount of students (more than 50% of under studies) cannot carry out minimal standards. Such incompetence may appear because of using inadequate methods of development of evaluation criteria. Attempts to find in literary sources the methods by which the norms of evaluation of testing the physical readiness were developed didn't bring any results.

In our previous publications we did a critical analysis of norms of evaluation of physical readiness which were valid since 2003 to 2017 year [3; 8]. There we indicated that every year a considerable amount of students doesn't carry out the minimal standards by individual tests. Moreover, by single tests (e.g. 100 m race for girls) only a few the first, the second and the third year students carry out the standard which agrees with the mark 5 and individuals carry out the standard which agrees with the mark 4 [3]. As the first results of evaluation of young students' readiness show, current standards should be discussed as well.

The aim of the research consisted in development of the standards of physical readiness' evaluation among young students aged 18-20.

Materials and methods of the research. *Partakers.* The research was conducted on the base of Vinnytsia State Pedagogical University named after Mykhailo Kotsiubynsky with the students aged 18–20 who were the first, the second and the third year students of all the departments but the department of physical education and sport. All the under studies don't go in for sports, are in the main medical group and have given a written agreement for taking part in the researches. 728 boys and 1047 girls took part in the research.

The organization of the research. The indices of students' physical readiness were determined by the method of pedagogic testing. The testing of physical qualities was conducted within the framework of annual evaluation of physical readiness of Ukrainian population, accordingly to the order of Ministry of youth and sports of Ukraine [7]. The testing was conducted in the end of the academic year (since April to June of 2017). The statistical treatment of derived results was fulfilled. We determined simple mean deviation and root-mean-square deviation by results of every test. We carried out an analysis of the accordance of valid standards with the current state of young students' physical readiness. On the basis of literary sources' analysis we suggested the methods for development of standards for evaluation of physical readiness, which allowed to determine the standards for the evaluation of physical qualities. The results which we got, we compared with current standards.

According to the order «About the sanction of Procedure of carrying annual evaluation of physical readiness among Ukrainian population» the endurance of girls was determined by the test «2000 m race», and the endurance of boys was determined by the test «3000 m race» in measurement units (min, sec). Explosive force was determined by the test «long jump from place» in centimeters accurate to integral values.

Force endurance was determined by the tests «push-ups» and «pull-ups» by the amount of completed numbers. Active flexibility was determined by the test «torso forward inclination from a sitting position» in

centimeters accurate to integral values. Speed endurance was determined by the test «100 m race» in seconds accurate to one decimal. Promptitude was determined by the test «4 x 9 m shuttle run» in seconds accurate to one decimal. According to the demands, under studies were choosing one of the tests of their own free will for testing of their force capacities: boys – «pull ups» or «long jump from place», girls – «push-ups» or «long jump from place». The testing was carried out by the technology which agreed with the Instruction about the organization of conducting the annual evaluation of physical readiness of Ukrainian population [7].

Statistical processing of the data obtained during the research was carried out with the help of mathematical statistics methods. Such figures as the arithmetical mean (\bar{X}) and root-mean-square deviation (σ) were defined.

There appeared the issue of choosing the methods of physical readiness' standards for achieving of our goal. These methods should provide the objectivity of physical qualities' evaluation. Analysing literary sources we haven't discovered the description of the technology by which the standards for the evaluation of physical readiness of Ukrainian population.

Developing the author's methodology, we used the recommendations of A.H. Dembo [1] for the evaluation of human's physical development. Creating anthropometric standards, the author used the range $\pm 1\sigma$ from the arithmetic mean of set of variate values as a mean level of a quality. This set of variate values was determined by the study of the large quantity of a similar quota. The author recommended to evaluate the results which were within limits of the range from $+1\sigma$ to $+2\sigma$ as an «above the average» level; the results which were within limits of the range from -1σ to -2σ as a «below the average» level; the results which were within limits of the range from $+2\sigma$ to $+3\sigma$ as a «high» level; the results which were within limits of the range from -2σ to -3σ as a «low» level. This working out is based on the “three-sigma rule”, according to which the interval $\pm 1\sigma$ from the arithmetic mean includes 68,27 % of the whole excerpt; the interval $\bar{X} \pm 2\sigma$ includes 95,45 % of the whole excerpt; the interval $\bar{X} \pm 3\sigma$ includes 99,73 % of the whole excerpt [2].

We adapted the above-mentioned methods for the development of physical readiness' standards. On the basis of the data, which were determined by the research of the large quantity of a similar quota, we suggest evaluating the result which agrees with the arithmetic mean of the excerpt (\bar{X}) as the mark «3». The marks «4» and «2» are the result which agrees with the values $+1\sigma$ i -1σ . The marks «5» and «1» are the result which agrees with the value $+2\sigma$ i -2σ . Thus, we get the result when the standard for the mark «5» may be completed by the 2,27 % of the students; the standard for the mark «4» and «1» may be completed by 13,59 % of the students; the standard for the mark «3» and «2» may be completed by 34,14% of the students. Only 2,27 % of the students won't be able to complete the standard for the mark «1».

The results of the research. Using the author's methodology, we developed standards of the evaluation of physical readiness of young students for boys (table 1) and girls (table 2).

Table 1

Tests and Standards for Assessing Physical Preparedness of Males Aged 18–20

Scale of assessment, points	Tests, standars					
	running on 3000 m, min, sec	pull ups, times	long jump from place, cm	running on 100 m, sec	shuttle run 4 × 9 m, sec	torso forward inclination from a sitting position, cm
5	12,07	16	256	13,0	8,9	18
4	13,03	13	240	13,8	9,4	15
3	13,59	9	224	14,6	9,9	11
2	14,55	5	209	15,4	10,4	7
1	15,51	2	193	16,2	10,9	4

Comparing the author's working out with valid standard, we establish the following distinctions. The 3000 m race standards for boys established by us don't essentially differ from the valid ones. In substitution the author's 2000 m race standards for girls (table 2) have a wider range. Thus, the minimal evaluation as the

mark «2» meets the result 12, 30 (min, sec) by valid standards, whereas the standard suggested by us meets the result 13, 48 (min, sec).

Table 2

Tests and Standards for Assessing Physical Preparedness of Females Aged 18–20

Scale of assessment, points	Tests, standars					
	running on 2000 m, min, sec	push ups, times	long jump from place, cm	running on 100 m, sec	shuttle run 4 × 9 m, sec	torso forward inclination from a sitting position, cm
5	10,22	16	206	15,6	10,1	24
4	11,02	12	188	16,5	10,7	20
3	12,26	8	171	17,4	11,3	15
2	13,48	4	153	18,3	11,9	10
1	15,10	1	136	19,3	12,5	5

The standards for the test «pull-ups» suggested by us (for boys, table 1) also have a wider range. Thus, the minimal evaluation as the mark «2» by valid standards meets the result 10 times, whereas the standard as the mark «2» suggested by us meets the result 4 times.

The author's standards by the test «long jump from place» both for boys and for girls don't essentially differ from the valid ones.

The essential distinctions from the valid standards are observed by the test «100 m race». It particularly relates to girls. The standard recommended by us which agrees with the mark «5», is 15,6 (sec), whereas the valid standard is 14,8 (sec). The standard for the mark «2» for girls agrees with the result 18,3 (sec), whereas the valid standard is 17,0 (sec).

The essential distinction may be observed in the standards to the test «push-ups» for girls (table 2). By the author's working out one should do 16 push-ups for the mark «5» and 4 push-ups for the mark «2». A valid standard as the mark «5» supposes 25 push-ups for the mark «5» and 15 push-ups for the mark «2». In this way one can state that the valid standards of the test «push-ups» are essentially overestimated.

Comparing the author's working out of the standards for the test «4 x 9 m shuttle run» for boys and girls, we state somewhat bigger range of the author's standards.

Such a tendency is observed in the standards for the test «torso forward inclination from a sitting position».

Discussion The evaluation of students' physical readiness uncovered the imbalance between the received results and the standards which are recommended by the Ministry of youth and sports of Ukraine. Thus, for instance, our studies have discovered that the average value of our girls by the test «push-ups» is 8 times. According to the valid standards, girls can get the minimal mark for 15 times. Such a considerable distinction indicates that more than a half of the students of the institutes of higher education don't even get a minimal mark. The average value of the results of the students' testing (100 m race) turned out to be lower than a minimal standard as well.

At the same time the average value by the tests «torso forward inclination from a sitting position» and «4 x 9 m shuttle run», established by the students (girls), almost agrees with the standard for the mark «3» which we regard as normal.

The same general tendency remains among the students (guys) who have been tested.

The imbalance of the results of testing by particular standards which we have discovered indicates that the authors of the standards have used the methodology which doesn't bring impartial results. Besides, the absence of the standard for the mark «1» restricts the range of the standards, which increases such a negative tendency.

The standards which have been worked out by the author's methodology give an opportunity about 95 % of the students to keep within the evaluative scale, since the range of $\pm 2 \sigma$ includes 95,45 % out of all the values. We have already used this methodology by the working out of the model of physical readiness [4].

We haven't discovered any scientific publications which show the attempts to improve the valid tests. It may be because the valid standards are in effect only during one year. Instead there were attempts to improve the system of the evaluation of student's physical readiness, functioning since the year 2003 to the year 2017. Thus, M.I. Puzdemir and co-authors [5] have developed the 2000 score evaluative scale by 10 tests for the evaluation of the I–II year students' physical readiness. It's impossible to compare their working out with ours, since the functioning system of the evaluation has the «5» – score scale for every standard and the «25» – score scale for the evaluation of the level of physical readiness by the sum of the tests (for persons of 8–20years).

We also were raising an issue of the discrepancy between the standards and the abilities of the students in our previous publications [3]. But this publication has concerned the tests and the standards functioning since the year 2003 to the year 2017 [6].

Conclusions. On the basis of the testing's results of the level of students 'physical readiness (year 2017) we have ascertained that more than a half of the results by particular standards doesn't exceed the minimal mark. It indicates that the present methodology for the evaluation of the 18-20 aged youth' physical readiness doesn't allow evaluating the physical qualities impartially. The suggested methodology of the standards' working out is based on the «three-sigma rule». The standards for the evaluation of physical readiness worked out by the author's methodology ensure the opportunity for around 95% of the students to accomplish the tests within the limits of the evaluative scale.

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