

Original Article

Comparative Study on the Level of Strength in the Students of the Physical and Sports Education Program at Pre-and Post-Covid Promotions

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The purpose of the research was to highlight the level of segmentary force of the students admitted to admission for the Bachelor's program physical and sports education at two promotions of students admitted in the first year at the Faculty of Movement, Sports and Health Sciences in Bacau. The hypothesis of the thesis assumed that the comparative analysis of the strength indicators at the level of the students admitted to the faculty could identify influences between two periods of admission, pre or post COVID compared to the values of the minimum standards. The research methods used were: scientific documentation, comparative study, testing method, statistical-mathematical and graphic. The research was carried out at two promotions of students admitted in the first year, respectively those in the academic year 2019-2020 and 2021-2022. The tests were applied on the segmental force indicators on a sample of 60 first-year students for each academic year.

## 1. Introduction

Muscular strength “represents the substrate of human movement as a consequence of the interaction between the organism and the environment in which it lives” (Sbenghe, 2002). Essentially, the strength of the human body (and not that which constitutes a mechanical characteristic of the movement of any body) consists of the capacity to make efforts to overcome, maintain or yield in relation to external or internal resistance, through the contraction of one or more muscle groups (Dragnea, 1996).

The definition given to aptitude by the explanatory dictionary of the Romanian language is “the individual psychic attribute, which conditions the performance in good conditions of a job, of an action; application, inclination”, and Roșca and Zörgö (1972), define aptitudes as the psychic and physical attributes that

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allow a person to successfully perform certain forms of activity. By contraction, the muscle transforms chemical energy into mechanical energy, which ensures the development of muscular effort (Rață, 2004; Rață & Rață, 2006).

Therefore, we can say that skills are characterized by the fact that they are psychological attributes of the personality. Muscular strength represents “the cause of all movements. Strength has not yet been measured, but only its effects through the deformation or displacement of objects”. “Research works have highlighted the connection between the level of physical development, health status and biomotor potential, the authors considering the ratio between motor and anthropometric development as a basic criterion in assessing health status. The results of this research constitute concrete arguments that physical exercise in the university environment represents an indispensable condition for obtaining superior results in professional training” (Stoica, 2002).

"In the process of training the young generations, the biological parameters and functional possibilities of the human body related to the possibilities of growth (the process of accumulation and quantitative amplification - increasing body size and gradual increase in weight and volume) and development (the set of functional changes, qualitative improvements - differentiation in the morphological and functional characteristics of cells and tissues, the progressive improvement and adaptation of devices and systems, the complex evolution and their coordinated integration into a unitary whole of the body), can be positively influenced, favorably modified, therefore, under the influence of the organized practice of physical exercises" (Dobrescu, 2008).

The adolescent evaluates his chances of success and makes plausible predictions regarding his own motor performances. Regarding motor qualities, these progress (especially in male subjects), although schools work quite little for this objective. The favorable premises for the development of speed, strength, resistance are insufficiently exploited. The motor skills and abilities learned and consolidated in the previous stages must be perfected, seeking to cover as well as possible the area of existing motor activities (educational, competitive, leisure, bodily expressions, etc.) (Lepădatu, 2008).

However, the structure and content of the curriculum also determine some particularities of teaching physical education in relation to professional demands. In this sense, Colibaba (1968) (in a material submitted to the Ministry of Labor) supports the following desideratum: “the character that the work (profession) takes on must determine in vocational schools the character of the exercises (rules) used in physical education lessons. In order for physical exercises to have a favorable influence on the development of the body, we must know in detail the aspects of work, the psychological and hygienic aspects of productive activity.”

The role assigned to physical education and sports in contemporary society is also reflected in the curricula, which group instructional-educational activities through which the university operates to educate the younger generation. We can say that the subject sheets ensure the conditions for a unified preparation of all students, but at the same time offer the possibility for decision-makers at the

faculty level to customize the training paths according to the students' abilities and interests (Leonte, 2012).

Also, the gymnastics exercises used by teachers during classes have an accessible, particularly rich and varied content, throughout the years of study. However, what matters is the execution of the movements that must effectively train the muscles, tendons, joints and the entire locomotor system, both for the development of strength and for the development of other inherent motor qualities (Popescu, 1995).

## **2. Material and methods**

The purpose of the research was to highlight the level of segmental strength of students admitted to the Physical and Sports Education bachelor's degree program in two promotions of students admitted in the first year at the Faculty of Movement, Sports and Health Sciences in Bacău.

The hypothesis of the work assumed that the comparative analysis of strength indicators at the level of students admitted to the faculty in question could identify the dynamics of segmental strength indicators and the influences between two periods of admission, ante or post COVID compared to the values of the minimum standards.

The research methods used were: scientific documentation, comparative study, testing method, statistical-mathematical and graphical.

The research was conducted on two promotions of students admitted in the first year, respectively those from the academic year 2019-2020 and 2021-2022.

The tests were applied to segmental strength indicators on a sample of 60 first-year students for each academic year in the study. They were registered in the first semester of the discipline General Basics of Gymnastics at the Faculty of Exercise, Sport and Health Sciences in Bacău.

The tests applied consisted of: pull-ups on the fixed bar, push-ups, trunk lifts for abdominal strength, trunk extensions as follows:

- For the contraction force of the abdominal muscles in male subjects, raising the legs from hanging on the fixed ladder to the point of grip, and in females to 90°.

- For the contraction force of the back muscles, raising the trunk in extension to 35-40° from lying face down with the legs fixed.

- For the contraction strength of the upper limbs (triceps), push-ups from the forward support position on the ground for females and with the feet resting on the gymnastics bench for male subjects, until the chest is 10 cm from the ground.

- For the contraction strength of the upper limbs (biceps), tractions from hanging on the bar with a reverse grip (supination) for male subjects, and for females from hanging with the feet resting on the gymnastics box,

All deadlifts were assessed by the number of repetitions.

The norms for the maximum evaluation according to the ideal profile developed by the faculty's gymnastics department were as follows:

- Push-ups: females 10, males 14.
- Tractions: females 10, males 10.

- Abdominals: females 10, males 5.
- Extensions: males 15, females 12.

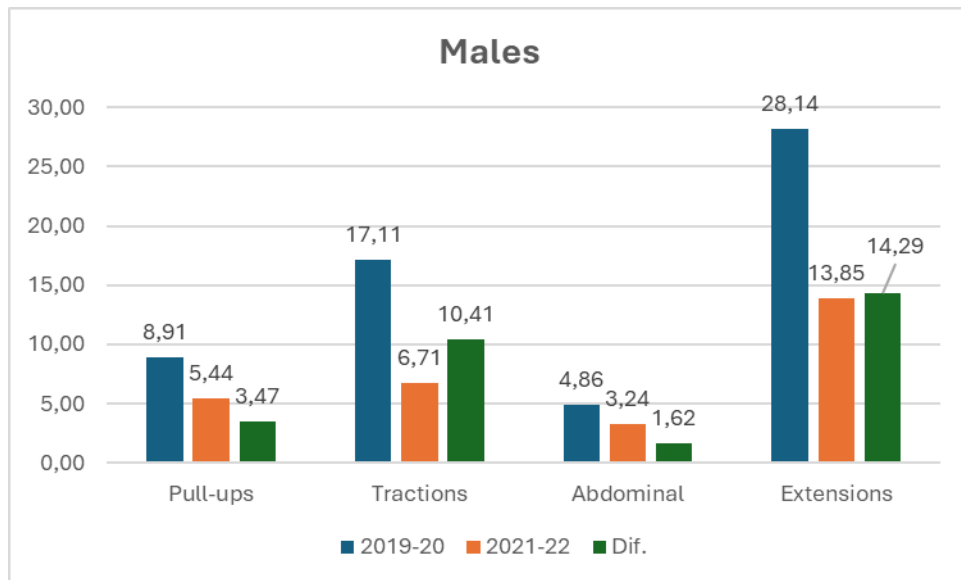
### 3. Results and Discussions

The results demonstrated value differences at the level of the researched groups, with a differential dynamic from one promotion to another in the vast majority of indicators. Compared to the minimum standards imposed, there were important differences in achieving the scales in all samples, they being more evident in the post-COVID generation.

In the case of males in all samples, there is a tendency for the values obtained by the pre-Covid promotion to be higher than the other experimental group. The smallest differences were obtained in abdominal strength (1.62 repetitions) and tractions (3.47 repetitions).

For the push-up test, the difference is 10.41 repetitions, it is evident for the pre-Covid group, even more so in the extension test where the largest difference is obtained, 14.29 repetitions for the same experimental group.

The values recorded by the sample of males demonstrate an adequate preparation for the university level of the profile, at least from a physical point of view, highlighting those from the pre-Covid promotion. The results recorded by the other group through the lower values obtained from the tests are a consequence of the Covid period of physical inactivity which has repercussions on the motor potential of the admitted candidates, in the case of our research.

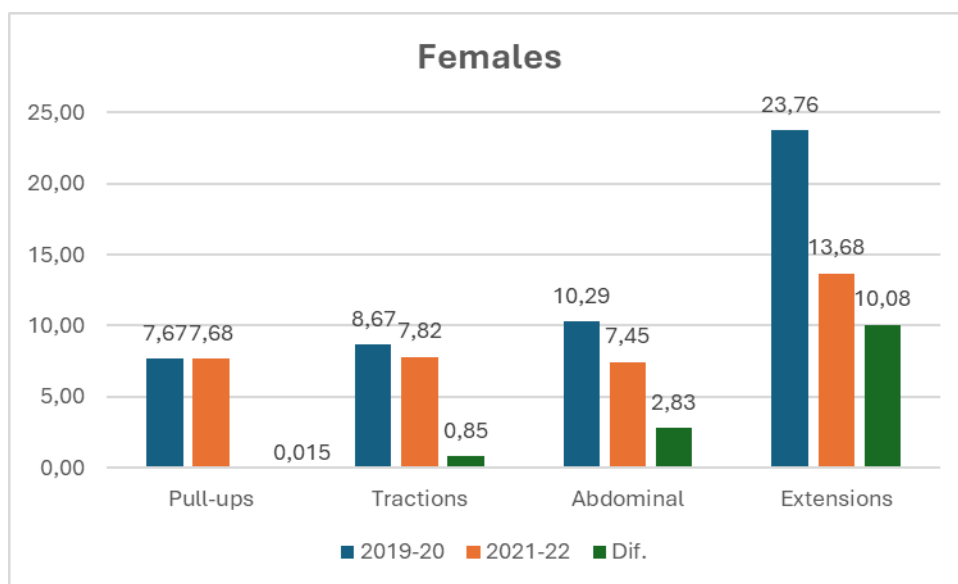


**Figure 1.** Results compared to standards in male subjects

In the female' group, in most of the tests, close values are found for the two samples studied, with slight higher trends for the pre-Covid promotion. Thus, we find small differences in the push-up tests (0.85 repetitions) and in abdominal

strength (2.83 repetitions) obtained in favor of the 2019-20 promotion. Back strength records the largest difference in this group with 10.08 repetitions. In contrast, a slight increase in the value for pull-ups is observed in the post-Covid group (0.015 repetitions).

The values recorded by the female subjects sample also demonstrate optimal physical preparation for the university level of the profile, with significantly higher values for the pre-Covid promotion. Although the conclusion that the Covid period had an impact on the motor behavior of young people, in the case of our research in the female' group, a faster adaptation and a better concern for sports form are found.



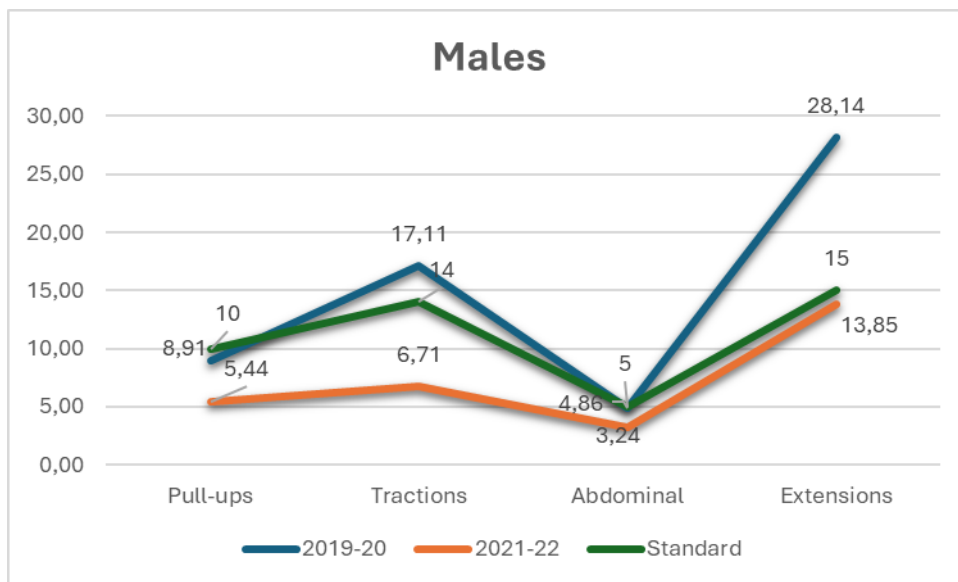
**Figure 2.** Results compared to standards in female subjects

By making a comparative analysis with the standards imposed by the faculty's gymnastics department in our research, it is found that the values recorded in the pre-Covid group are significantly closer for male subjects.

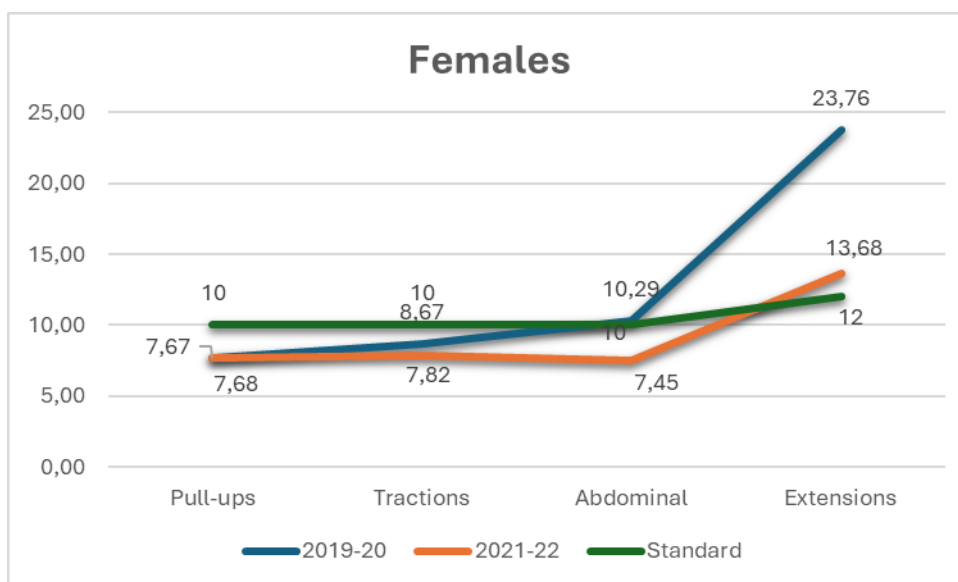
Thus, in pull-ups, the 2019-20 class achieves 8.91 repetitions, much closer to the imposed value of 10, compared to the 5.44 repetitions of the other group. Also, in the abdominals, they manage to obtain an average of 4.86 repetitions compared to the imposed standard of 5, compared to the 3.24 repetitions obtained by those in the post-Covid group.

For push-ups, the first group recorded an average of 17.11 repetitions, significantly higher than the standard of 14, while the male subjects in the second group have an average well below the standard (6.71 repetitions).

The biggest difference was recorded in back strength where the 15 repetitions standard was far exceeded (28.14 repetitions) by the 2019-20 class compared to the other group (13.85 repetitions).



**Figure 3.** Results compared to standards in male subjects



**Figure 4.** Results compared to standards in female subjects

At the female subjects level, the study compared to the standards imposed by the faculty's gymnastics department highlights that in three applied tests, values close to both experimental groups are obtained.

Thus, in pull-ups, both promotions obtain values below the standard (10 repetitions) of 7.68 repetitions for the post-Covid candidates and 7.67 repetitions for the pre-Covid ones. Also, in push-ups, values below the standard are obtained,

respectively 8.67 repetitions for the female subjects in the pre-Covid group and an average of 7.82 repetitions for the post-Covid group.

For the abdomen, the first group recorded an average of 10.27 repetitions, slightly above the imposed scale (10), while the female subjects in the second group have an average well below the standard (7.45 repetitions).

And in the case of female subjects, the biggest difference was recorded in back strength where the 12 repetitions scale was far exceeded (23.76 repetitions) by the 2019-20 promotion compared to the other group (13.68 repetitions).

### ***Discussions***

Each faculty in the field of Physical Education has its own criteria, scales and performance tests. Although these differ from one faculty to another, their object is the same, to evaluate the motor potential of the candidates who will face the requirements regarding the modeling and training of future trainers in the field.

In a paper with a similar theme, it is stated that students in the Physical Education and Sports bachelor's program become aware of the importance of muscular training activities during their studies (Dobrescu & Ailuşoaei, 2019).

## **4. Conclusions**

The research results demonstrated value differences at the level of the researched groups, with a differential dynamic from one promotion to another in the vast majority of indicators. Compared to the minimum standards imposed, there were significant differences in achieving the scales in all samples, the most evident being in the post-COVID generation.

In the case of male subjects, in all samples, there is a tendency for the values obtained by the pre-Covid promotion to be higher than the other group tested. The lower results recorded by the other group come as a consequence of the Covid period, which has an impact on the motor potential of the research subjects

In the group of female subjects, in most samples, close values are found for the two researched samples with slight higher trends for the pre-Covid promotion. Although the conclusion that the Covid period has had an impact on the motor behavior of young people, in the group of female subjects, a better concern for sports form is found.

By making a comparative analysis with the imposed standards, it is found that for male subjects the values recorded in the ante Covid group are significantly closer and for female subjects only in three applied tests are values close to both experimental groups obtained.

The comparative analysis of the strength indicators at the level of students admitted to the profile faculty identified an important dynamic of the segmental strength indicators and the influences between two periods of admission, ante or post COVID compared to the values of the minimum standards, confirming the research hypothesis.

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