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**ASSESSMENT OF UPPER BODY STRENGTH IN THE**  
**ROMANIAN YOUNG POPULATION**

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*Abstract*

We all know that general fitness is a reliable indicator for the health of young people and a predictor of health in later life, which is a main concern for The Council of Europe. There are several test batteries for the assessment of physical fitness, but in the current literature, we have not found a database for upper body strength in the population aged 19-29 years. This paper aims, on the one hand, to investigate an important sample of the Romanian population to find out the level of musculoskeletal fitness and, on the other hand, to create a database for the segment of population aged 19-29 years to which future studies in the field can relate or compare. In order to determine the level of upper body strength, a component of musculoskeletal fitness, we applied the modified push-ups from ALPHA-FIT Test Battery for Adults. The experiment was conducted for a period of five months, between 15.10.2016-15.02.2017, on a group of 620 subjects, 350 males (56.77%) and 268 females (43.23%) aged 19 to 29 years, of Romanian nationality, students at the Polytechnic University of Bucharest. To analyse the data obtained for male and female subjects, we divided the results into 4 quartiles (poorest quartile, second quartile, third quartile, best quartile), according to the Alpha test table of reference values.

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## 1. Introduction

Physical condition related to the health status is characterised by the ability to perform effective everyday activities and by highlighting the features and capacities associated with a low probability of premature onset of diseases attributed to physical inactivity (Drăgulin, 2004, p. 43).

In the world, there are many test batteries, but the most common ones are: FitnessGram Battery, Amateur Athletic Union Test Battery (AAUTB), YMCA Youth Fitness Test (YMCA); in Canada, the Canadian Association for Health, Physical Education and Recreation Fitness Performance Test (CAHPERFPT) and the Canadian Physical Activity, Fitness and Lifestyle Approach (CPAFLA); in Europe, the EUROFIT and ALPHA-FIT Test Battery. The trials of these tests that assess upper body strength are: push-ups (maximum of correct repeats), push-ups (maximum of repeats for 30 seconds), pull-ups, modified pull-ups, arm hang up and arm curl.

We opted for the ALPHA-FIT Test Battery, the modified push-ups, because it assesses upper body strength in conditions of short-term coordination, imbalance and ambidexterity, since the subject's weight is distributed on both arms, either on the dexterous or non-dexterous one. During the test, the subject has to coordinate the arms with the torso and the lower body for 40 seconds. As we have observed in the research of Calatayud et al. (2014), there are changes in the muscular activity, which is superior in unstable push-ups compared to standard push-ups.

## 2. Problem Statement

The importance and necessity of the study are proven by the fact that the future evolution and development level of any society are conditioned by the quality of education and formation of the young generation from the physical, mental, moral, aesthetical, professional points of view, etc. The current conditions of society, in which technology is progressing continuously in almost all activity fields, make increasingly lower the necessity of physical requirements for the daily activities of the individual, and as such, these conditions lead to the risk of sedentariness, obesity and poor physical condition.

The novelty brought by this paper is that it creates a database which is representative for the young Romanian population (19-29 years) regarding upper body strength, data that ALPHA-FIT does not provide for this age group. The national and international research, which uses test batteries related to ALPHA-FIT health and implicitly tests upper body strength, investigates strength in another age group, namely that of children and teenagers, as follows: Cvejić, Pejović and Ostojić (2013) for children and teenagers, Santos and Mota (2011), Bianco et al. (2015) for teenagers, Ruiz et al. (2011) for the age group 6-11 and 12-18 years, Xaba (2014) for those aged 12-13 years. A paper creating data for the young population of Romania, but which investigates flexibility, is that of Florescu et al. (2016).

## 3. Research Questions

To what extent can the database related to the musculoskeletal aspect and the fitness level of the young population aged 20-29 be complemented by applying the ALPHA-FIT Test Battery and ALPHA-FIT questionnaire?

## 4. Purpose of the Study

The purpose of this paper is, on the one hand, to investigate an important sample of the Romanian population to establish the level of their musculoskeletal fitness by means of the modified push-ups from ALPHA-FIT Test Battery for Adults and, on the other hand, to create a database for the segment aged 19-29 to which future studies in the field can refer or be compared.

## 5. Research Methods

### 5.1. Research subjects and location

The investigated sample consisted of 620 subjects, 350 males (56.77%) and 268 females (43.23%) aged 19 to 29 years, of Romanian nationality, students at the Polytechnic University of Bucharest.

Participants in this study were healthy people, who had no injuries that might have worsened during testing.

Before the evaluation, the subjects were verbally informed on the testing particularities and the types of assessment used. All subjects agreed to how the study would be conducted.

Testing was performed within a 5-month period, between 15 October 2016 and 15 February 2017, in the Sports Complex of the Polytechnic University of Bucharest. The selection process was random. The environment in which evaluation took place provided optimal conditions for the study. Evaluation was done in a single stage for each subject.

### 5.2. Research techniques used

For the evaluation of upper body strength, a component of musculoskeletal fitness, we applied the modified push-up test from ALPHA-FIT Test Battery for Adults (Sunı, Husu, & Rinne, 2009, p. 18).

### 5.3. Research design

This is an ascertaining study with a cross-sectional design. The obtained results were centralised in worksheets, the data being summarised and statistically interpreted using Microsoft Office Excel. We also used the questionnaire method. For a better representation, the graphical and tabular methods were used.

## 6. Findings

To analyse the data obtained for male and female subjects, we divided the results into four quartiles (poorest quartile, second quartile, third quartile, best quartiles), according to the ALPHA-FIT Test Battery for reference values. Table 01 contains the results for upper body strength, which were divided into quartiles for the 620 subjects (male and female) aged between 19 and 29 years.

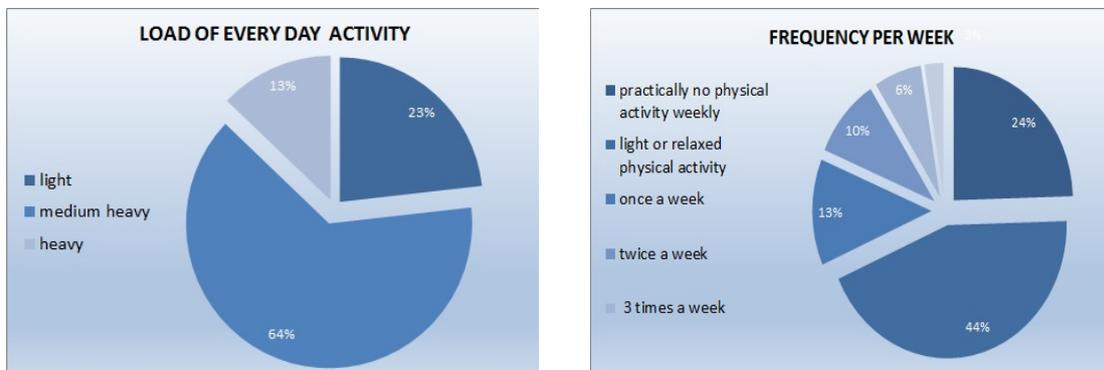
**Table 01.** Quartile percentage value for the modified push-up test

Fitness category	Males aged 19-29 years	Females aged 19-29 years
Poorest quartile	7	5
Second quartile	13	11.5

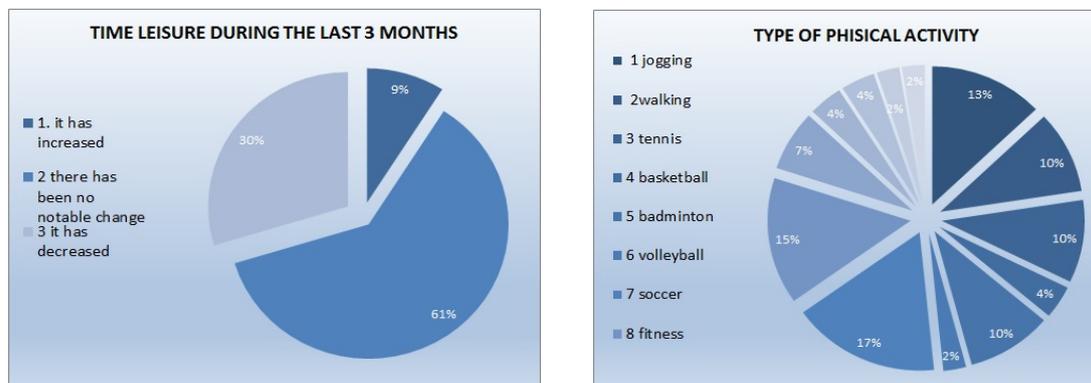
Third quartile	15	13
Best quartile	22	17

To establish as objectively as possible the level of upper body strength in the young population, we made the distribution of frequencies for each number of modified push-ups executed in the given time unit. For this, we statistically calculated the data frequency and then we converted it into percentages.

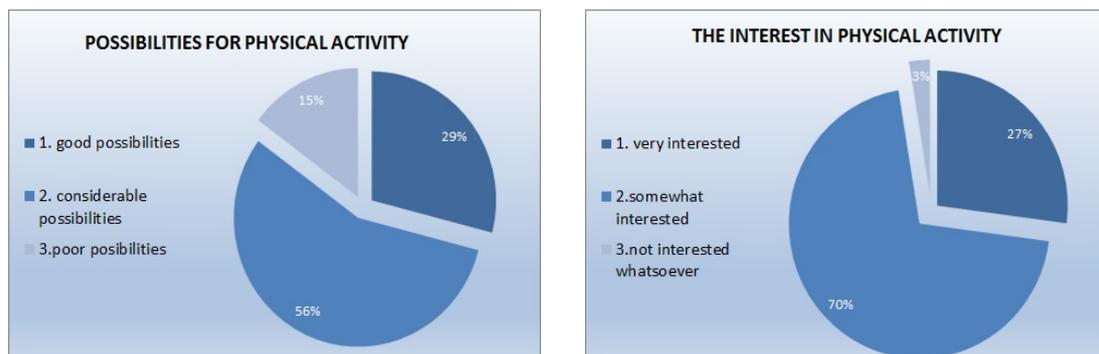
In order for the study to be complex, the physical activity questionnaire from ALPHA-FIT Test Battery for Adults was applied to the 620 subjects. The questionnaire (Figures 01 and 02) consists of 5 items, of which 4 are closed and one is open: the load of everyday activity, the frequency of physical activity, the type of physical activity, if the leisure time for physical activity has changed in the last 3 months, the possibilities of practicing physical activities in terms of time, money, facilities, instruction, as well as the interest in them.



**Figure 01.** The opinions of subjects on ALPHA-FIT physical activity - Questions 1 and 2



**Figure 02.** The opinions of subjects on ALPHA-FIT physical activity - Questions 3 and 4



**Figure 03.** The opinions of subjects on ALPHA-FIT physical activity - Questions 5 and 6

Analysing the data obtained for the modified push-up test, we have noticed that Romanian subjects, both male and female, perform in the poorest quartile, respectively 5 and 7 executions, quite weak if compared to those of the Swedish population, but the 20 years older (aged between 40 and 49 years) recorded quadrille values of 8 repeats for females and 10 for males. If we analyse in depth the population that recorded these poor results, we can see that it has a fairly low percentage of 0.37% in the female population and 2% in the male population.

Concerning the second and third quartiles, the Romanian population recorded low results equal to those of the Swedish population aged between 30 and 39 years. Male subjects recorded 13 executions for the second quartile and 15 executions for the third quartile. Female subjects recorded 11.5 executions within 40 seconds for the second quartile and 13-14 for the third quartile, a suitable result for this level and the age of 19-29 years.

Favourable and adequate results for the young Romanian population are recorded in the best quartile row, with values between 15 and 17 executions and a percentage of 10% for female subjects, and 18-22 executions with a percentage of 20% for male subjects.

The physical activity questionnaire applied to the 620 young people is from ALPHA-FIT Test Battery for Adults (Suni, Husu, & Rinne, 2009, p. 25). Data was processed and reported as a percentage for each item.

68.87% of the investigated subjects, the age group 19-29 years, state that their daily activity is medium heavy, 23.22% consider it to be light, and only 12.91% consider it to be heavy.

Young people involved in physical activity (which refers to all leisure-time physical effort lasting at least 20 minutes at a time during the last 3 months) with a frequency of once a week practice light or relaxed physical activity in a proportion of 43.88%, 12.90% practice it about once a week, 9.68% twice a week, 6.45% three times a week and 2.58% at least four times a week. 24.51% of young people do not practice physical activities weekly.

Among the physical activities practiced by young people, the highest percentages are represented by soccer - 17%, fitness - 15%, jogging - 13%, followed by tennis, badminton and walking - with 10% each, cycling - 7%, basketball, swimming and aerobic dance in a proportion of 4% each, and volleyball, handball and roller skating - with 2% each.

Asked whether the leisure time for physical activity changed during the last 3 months compared to earlier, 61.30% responded that there has been no notable change, 28.67% of respondents said that leisure time has decreased and only 9.03% reported that leisure time has increased.

The possibilities (time, money, facilities, instruction) and interest of the young people in being physically active on a regular basis in the current life situation are as follows: 56.17% have considerable possibilities, 29% have good possibilities, and 14.83% have poor possibilities, and with respect to the expressed interest, 70.32% are somewhat interested, 27.1% are very interested and 2.58% are not interested whatsoever.

## **7. Conclusion**

From the data interpretation, we can see that young people have a moderate level of upper body strength, as a musculoskeletal fitness component. The results of the applied questionnaire indicate that the

young people's time and interest in physical activities are insufficient, meaning that sedentariness and premature ageing threaten this age segment.

Following the study, we conclude that the Romanian young population is not heading in the right direction in terms of physical fitness and health, if we take into account the diseases related to the lack of physical activity.

This study can be seen as a warning and therefore preventive measures should be taken, such as proposing the introduction of physical education lessons at least once a week in the university in all study years and promoting physical activity of any kind and its beneficial effects.

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