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Differences in Some Anthropological Characteristics between Croatian and Lithuanian Students and Comparison with Eurofit Standards

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Abstract

The aim of this study was to determine differences in some anthropometric characteristics and motor abilities of students at the Faculty of Teacher Education and students of the Lithuanian Academy of Physical Education. The results were compared using the Euro-fit standards. The sample consisted of 148 students of the Faculty of Teacher Education and 206 students of the Lithuanian Academy of Physical Education from Kaunas. The age of students of both faculties ranged between 19-22 years. The sample of variables consisted of three measures used to assess the anthropometric characteristics, and five tests for the assessment of motor skills. Descriptive statistics were calculated based on the collected data, while ANOVA was used for the purpose of determining the difference in measured variables between two student groups. From the results obtained, it can be concluded that there were no statistically significant differences in measured anthropometric characteristics, but statistically significant differences in favour of the Lithuanian students were obtained for balance and repetitive speed in favour of the students of Faculty of Teacher Education. However, in light of the Euro-fit standards, it can be concluded that the results for both groups of students fall into the category of below average results in all tests. It is however important to emphasize that the results of this study show that both Croatian and Lithuanian students are in the category of normal values of body mass index.

Key words: *anthropometric characteristics; BMI; faculty; motor skills*

Introduction

Anthropometric characteristics and motor abilities undoubtedly have a significant impact on defining human psychosomatic status, and can have a major impact on the development of other human dimensions. The level of development of anthropometric characteristics and motor skills play an important and unique role in the process of human growth and development (Kondrič, Mišigoj-Durakovic, Metikoš, 2002). If we want to retain these levels of characteristics and skills, if not at the high, at least at the satisfactory level, it is essential that a person moves and is physically active. Physical activity is an integral part of every human life from its earliest years onwards and its multiple uses were scientifically proven in many studies (Katzmarzyk, Craig, 2006; Emeljanovas et al., 2010; Gruodite et al., 2011). There are various forms of physical activity and one of them is during physical education classes that stretch over one's education, from pre-school to college (Fučkar Reichel et al., 2008). Both in Croatia and around the world, monitoring and diagnostics of students' anthropometric characteristics and motor abilities is the foundation from which the procedures for defining the situation, goals and tasks, and planning and programming the exercise process are derived (Samson et al., 2000; Maaroos, Landor, 2001; Rousanoglou et al., 2008). In order to maximize the effectiveness of physical activity in a physical education class, it is important to determine an individual's ability. Since the individualization is the adjustment of the programme of physical exercise to individual characteristics of a subject in order for predefined goals to be achieved, knowledge of the anthropological status is an essential prerequisite for the implementation of individual work (Findak, 1999). Oja and Tuxworth (1995) prepared a manual "Eurofit for adults. Assessment of health-related fitness", with the ultimate goal of studying and maximizing one's abilities in each of the components. In addition to highlighting the importance of testing the abilities, the focus is on comparing the test results with other individuals in the same or a similar population group in order to determine the abilities which call for improvements and consequently for which the programme of work can be changed. Accordingly, the aim of this study was to determine the differences in some anthropometric characteristics and motor abilities of students at the Faculty of Teacher Education in Zagreb, Croatia and students at the Lithuanian Academy of Physical Education, and to compare the obtained results against the Eurofit standards.

Methodology

For the purposes of this study, the sample consisted of 148 students of the Faculty of Teacher Education Zagreb and 206 Lithuanian students from the Academy of Physical Education Kaunas. The students' age ranged from 19-22 years. The subjects were students in the first and second year of study who attended physical education classes 2 hours per week. The sample of variables consisted of three measures to assess the anthropometric characteristics (BH - body height, BW - body weight and BMI - body mass index), and five tests for the assessment of motor skills (FLAM - flamingo test, HTP - hand tapping plate, SIU – sit ups, SLJ – standing long jump, SAR

- sit and reach). In flamingo test, examiner counts the number of falls in 60 seconds of balancing. In hand tapping test, subject moves the preferred hand back and forth between the discs over the hand in the middle as quickly as possible. This action is repeated for 25 full cycles (50 taps). In next test, sit-ups, the subject must perform as many sit-ups as he/she can in 30 seconds. Performing standing long jump subject has three attempts and tries to jump as far as possible, landing on both feet without falling backwards. In sit and reach test, the score is recorded to the nearest centimeter or half inch as the distance reached by the hand.

Tests of motor skills are part of the battery of tests known as Eurofit Physical Fitness Test Battery, which was designed by the Council of Europe 1988. The collected data were analyzed using the software package Statistica 7.0.

The descriptive statistics arithmetic mean, minimum and maximum scores, standard deviation, skewness, kurtosis and Kolmogorov-Smirnov test for normality of distribution were used to calculate the results for both groups of subjects. ANOVA was used in order to determine the differences in the measured variables between the two groups of students.

Results and Discussion

By comparing the results of the arithmetic mean of the two groups of students, it is evident that students of the Lithuanian Academy of Physical Education, achieved better results in test for assessing balance (flamingo), however, students from Faculty of Teacher Education achieved better results in the test for evaluating repetitive speed (hand tapping). An interesting fact is that there were no significant differences in body height, body weight and BMI between the students, even though Lithuanian students attended the Academy of Physical Education. Students of the Academy of Physical Education achieved better results in the following tests: standing long jump and raising the trunk in 30 seconds, but the differences were not large enough to be significant. KS test results showed that the distribution did not deviate significantly from the normal distribution.

Table 1. *Descriptive indicators of Faculty of Teacher Education students (N-number of entities, Mean, Min-minimum score, Max-maximum score, St. Dev.- standard deviation, Skew- asymmetry coefficient, Kurt- coefficient of elongation, K-S-D- normality of distribution)*

	Valid N	Mean	Min	Max	St.Dev.	Skew	Kurt	K-S-D
HTP	**148**	**10.7578**	**7.0100**	**19.0000**	**1.79080**	**1.47215**	**4.384680**	**d=.10117**
SIU	148	24.9122	0.0000	37.0000	5.35912	-1.15586	4.207859	d=.11486
FLAM	**148**	**13.4595**	**3.0000**	**32.0000**	**5.85119**	**0.83810**	**0.563531**	**d=.11876**
BH	148	167.5203	156.0000	183.0000	5.61881	0.24726	-0.310703	d=.05825
BW	148	59.8919	45.0000	85.0000	7.95235	0.78520	0.323030	d=.12296
BMI	148	21.3209	17.6471	31.6032	2.47227	1.13096	1.860265	d=.09812
SAR	148	12.3131	0.6667	24.6667	5.32698	0.04761	-0.581332	d=.04844
SLJ	148	168.5518	117.6667	217.3333	20.61081	0.06525	-0.314873	d=.03981

Legend: HTP- hand tapping plate, SIU- sit ups, FLAM- flamingo, BH- body height, BW- body weight, BMI- body mass index, SAR- sit and reach, SLJ-standing long jump

Table 2. *Descriptive indicators of the Academy of Physical and Health Education students (N-number of entities, Mean, Min-minimum score, Max-maximum score, St. Dev.- standard deviation, Skew- asymmetry coefficient, Kurt-coefficient of elongation, K-S-D- normality of distribution)*

	Valid N	Mean	Min	Max	St.Dev.	Skew	Kurt	K-S-D
HTP	**206**	**12.1335**	**9.60**	**16.3000**	**1.14713**	**0.908908**	**1.337306**	**d=.10717**
SIU	206	25.2670	13.00	37.0000	4.32255	-0.276585	0.275113	d=.08295
FLAM	**206**	**9.8883**	**1.00**	**25.0000**	**4.56414**	**0.462121**	**0.166330**	**d=.09218**
BH	206	167.9592	152.00	186.0000	5.74245	0.161271	0.221167	d=.07484
BW	206	58.8209	36.00	97.0000	8.51537	0.920328	1.937344	d=.12268
BMI	206	20.8326	12.3115	33.0565	2.68895	0.978259	2.308252	d=.09807
SAR	206	12.2913	-9.0000	26.0000	6.82750	-0.438309	-0.057148	d=.06561
SLJ	206	170.5000	115.0000	215.0000	18.19240	-0.340863	0.210015	d=.05700

Legend: HTP- hand tapping plate, SIU- sit ups, FLAM- flamingo, BH- body height, BW- body weight, BMI- body mass index, SAR- sit and reach, SLJ-standing long jump

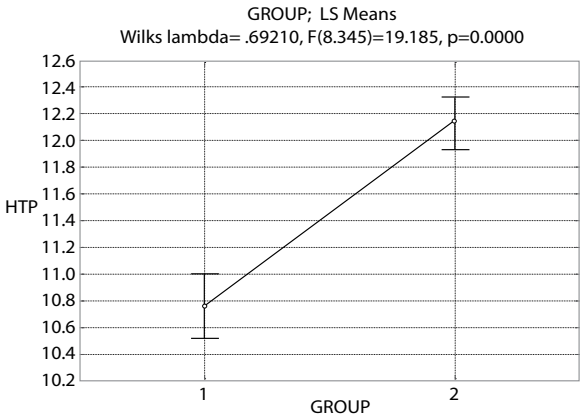

Figure 1. *Arithmetic mean of the student's results achieved on the HTP test*

Legend: HTP- hand tapping plate, FLAM- flamingo, Group 1-Faculty of Teacher Education students; Group 2- Academy of Physical Education students

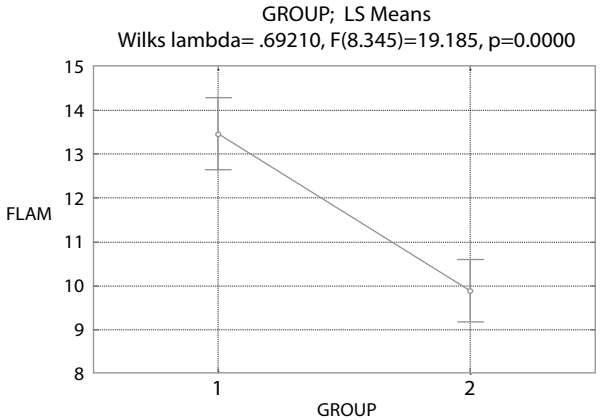

Figure 2. *Arithmetic mean of the student's results achieved on the FLAM test*

Figures 1 and 2 two reveal a statistically significant difference between groups on the hand plate tapping and flamingo tests. Wilk's Lambda confirms that there is a statistically significant difference between group centroids which is 0.69 on both tests (hand tapping and flamingo).

Table 3. *ANOVA between two groups of students*

	SSEffect	DfEffect	MSEffect	SS Error	Df Error	MS Error	F	P
HTP	**162.98**	**1.0**	**162.98**	**741.18**	**352**	**2.11**	**77.4**	**0.00**
SIU	10.8	1.0	10.8	8052.2	352	22.9	0.474	0.4916
FLAM	**1098.33**	**1.0**	**1098.33**	**9303.19**	**352**	**26.43**	**41.557**	**0.000**
BH	17	1.0	17	11401	352	32	0.5	0.47460
BW	99	1.0	99	24161	352	69	1.44	0.231063
BMI	20.5	1.0	20.5	2380.7	352	6.8	3.04	0.082307
SAR	0.04	1.0	0.04	13727.41	352	39.00	0.001	0.974173
SLJ	327	1.0	327	130294	352	370	0.88	0.347998

Legend: HTP- hand tapping plate, SIU- sit ups, FLAM- flamingo, BH- body height, BW- body weight, BMI- body mass index, SAR- sit and reach, SLJ-standing long jump

Univariate analysis of variance was used to compare the results of the Faculty of Teacher Education students and the students of the Lithuanian Academy of Physical and Health Education. It can be seen that there are statistically significant differences in only two variables. Deviations are related to the tests: hand tapping in favour of Croatian students and a flamingo in favour of Lithuanian students. One of the reasons for poorer results of flamingo test among Croatian students is that the balancing test "flamingo" had never been performed prior to the testing. Certainly the results would have been much better if the students had a period for becoming familiar with the test, rather than only three attempts before the test measurements.

Table 4. *Eurofit norms according to European Council of 1988.*

	Insufficient	Poor	Fair	Good	Very good	Excellent
HTP	>12.4	12.4 – 11.6	11.5 – 10.5	10.4 – 9.8	9.7 – 9.3	< 9.3
SIU	<24	24 – 26	27 - 28	29 - 31	32 – 33	>33
FLAM	>10	10-7	6-5	4-3	2	< 2
SAR	<10	10-15.9	15.9-20.5	20.5-26	26-31	>31
SLJ	<171	171-185	186-195	196-207	208-222	>222

Legend: HTP- hand tapping plate, SIU-sit ups, FLAM-flamingo, SAR- sit and reach, SLJ-standing long jump

According to discriminative indicators, students of the Faculty of Teacher Education performed better in the hand tapping test than students of the Lithuanian Academy of Physical and Health Education. However, according to Eurofit standards, it can be concluded that the results of Croatian students fall into the category "fair", while Lithuanian students fall into the category "poor".

For both groups, the results of the dynamic forces tests, sit-ups in 30 seconds, fall into the second category, "weak". Devastating results of the test were given in the

research by Heimer et al. (2004), which is very disturbing because the strength of the abdomen is associated with a high risk of mortality. Considering that this research is focused on the student population, the data are alarming. In the test of balance (flamingo), the Lithuanian students achieved statistically significant results; however, they are in the category of "weak", while Croatian students did not achieve satisfactory results on this test. The results of the test for assessing the flexibility in their values fall into the category of "poor", for both groups. Test of explosive power (standing long jump), showed a very poor level of development of these abilities for both groups of students, and also falls into the category "insufficient". Values of BMI's for both Lithuanian and Croatian students are in the normal range (18.5 to 24.99, according to the WHO), which is a very important fact, since due to their lifestyles children and young people have a problem with being overweight. Of high importance is the age of the subjects, as in their research, Heimer et al. (2004) found that for women, increased body weight occurs at the age of 40.

Conclusion

With respect to the first objective of this study, it can be concluded that the differences were not statistically significant in the measured anthropometric characteristics, while statistically significant differences were found in motor skills, specifically in balance and repetitive speed between the students of the Faculty of Teacher Education and the students of the Lithuanian Academy of Physical Education.

However, it can be concluded that the results of Croatian students were worse in flamingo test because Eurofit tests are not represented in Croatia. Rather, for evaluating balance the test bench standing on one leg is used (open or closed eyes) where maximum retention of balance to failure in three attempts is calculated.

As for the second goal of this paper, which focused on the comparison of the results obtained against the Eurofit standards, it can be concluded that both, Croatian and Lithuanian students were below average on all tests which is very worrying because this is a population that will work with younger generations figuring as role models, and therefore they should promote a healthy and active life. Such devastating results of the students' motor skills can be attributed to a meagre scheduling of physical education in colleges (2 hours per week) and the excessive demands of study that does not stimulate, but rather demotivate and limit self-dealing or organized physical activity. The only positive thing that can be pointed out in this research is the fact that both, Croatian and Lithuanian students, were in the category of normal for body mass index, which means that they regulate body weight with proper nutrition even though they are not involved in sports from which it can be assumed that they move sufficiently.

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Razlike u nekim antropološkim karakteristikama između hrvatskih i litvanskih studentica i njihova usporedba s Eurofit standardima

Sažetak

Cilj je ovog istraživanja utvrditi razlike u nekim antropometrijskim karakteristikama i motoričkim sposobnostima studentica Učiteljskoga fakulteta u Zagrebu i studentica litvanske Akademije za tjelesnu i zdravstvenu kulturu, te dobivene rezultate usporediti s Eurofit standardima. Uzorak ispitanika činilo je 148 studentica Učiteljskoga fakulteta u Zagrebu i 206 studentica litvanske Akademije za tjelesnu i zdravstvenu kulturu iz Kaunasa. Dob studentica obiju fakulteta kretala se između 19 i 22 godine. Uzorak varijabli sastojao se od tri mjere za procjenu antropometrijskih karakteristika i pet testova za procjenu stanja motoričkih sposobnosti. Na osnovi prikupljenih podataka izračunata je deskriptivna statistika, dok je u svrhu utvrđivanja razlika u izmjerenim varijablama između dviju grupa studentica, korištena ANOVA. Iz dobivenih se rezultata može zaključiti da nisu dobivene statistički značajne razlike u mjerenim antropometrijskim karakteristikama, dok su dobivene statistički značajne razlike u ravnoteži, u korist litvanskih studentica, i repetitivnoj brzini, u korist hrvatskih studentica. Međutim, pogledom na Eurofit standarde može se zaključiti da rezultati obiju grupa studentica pripadaju kategoriji ispodprosječnih rezultata u svim testovima. Na temelju dobivenih rezultata važno je naglasiti kako se i hrvatske i litvanske studentice nalaze u kategoriji normalnih vrijednosti indeksa tjelesne mase.

Ključne riječi: *antropometrijske sposobnosti; fakultet; ITM; motoričke sposobnosti.*