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Physical performance of the students of music schools

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Key words: physical performance, musical instruments, Eurofit test

Abstract

Introduction. Broadly understood physical performance constitutes a basis for the techniques of playing musical instruments. All motoric skills are meaningful here as they account for the widely interpreted movement and intellectual efficiency.

Material and methods. The study included 393 students from randomly selected music schools in Poland and Germany. The level of physical performance was assessed by means of the Eurofit test in each of the schools.

Summary. Among the students of both sexes, the average values obtained in the analysed tests did not reveal many differences. Average results achieved in the agility run revealed a decreasing tendency in grades 1 – 4 and an increasing trend in grades 5 and 6. An exception were boys' results obtained in the cardiorespiratory test in grades 3, 4 and 6, which considerably differed from the results of other students involved in the study and in the muscle endurance test (functional strength) with the average results of boys tending to increase over subsequent years. It should be also emphasized that in the upper limbs speed test the results obtained by the girls of grade 5 definitely surpassed the level of other students.

Introduction:

An artist-musician should be characterized by the physiological, psychological, biochemical and emotional aspect which results from the tension of the autonomous system. These elements are included in the space whose effect is the aesthetic interpretation and transitory emotional workmanship of the artwork. The widely understood physical fitness constitutes a basis for the techniques of playing musical instruments. All motoric skills become meaningful here as they account for the broadly interpreted motor activity and intellectual efficiency [1, 2].

A physically fit individual is considered to be someone characterized by a relatively big resource of physical exercises, high efficiency of the respiratory, circulatory, secretion and thermoregulation system, certain regularities of the physique as well as the lifestyle that affirms physical activity [Osiński 1991]. Motor activity consists of the potential aspect with its internal conditions (predispositions, abilities) such as to be able, want, can and the effective aspect being an external manifestation (effects and recommended tests), namely, the process and result. Motor skills reflect motor efficiency which in turn is expressed by strength, speed, endurance and co-ordination. Strength stands for the properties which allow an individual to overcome external resistance or to counter this resistance with a muscle contraction. As opposed to other abilities, a high level of strength is not required or even unwelcome in musical performance. Speed means these properties which enable a person to perform specific tasks within a short time. Endurance describes individual abilities to make long-term efforts at a certain intensity so they indicate the level of resistance to fatigue. Co-ordination abilities are subject to movement control and adjustment functions. What is more, they characterize the ability to accurately conduct motor functions, which are complex in terms of spatiotemporal relations, the capacity to counter and adapt to new, sometimes even unexpected, circumstances. As regards motor functions in practice, these abilities overlap and are complementary. However, combining a give type of human motor behaviours with a specific kind of motor skills is only based on a certain advantage, representativeness of a

given category. In case of musical performance, this is a high level of motor co-ordination, endurance and speed, and to a lesser extent strength.

The purpose of the study was to determine the level of physical fitness of the students who play musical instruments.

1. **Materials**

393 individuals were recruited from randomly selected music schools in Poland and Germany. All the students who obtained the consent of the legal guardian or parent in case of minors, the direct teacher or school principal and who had been students of a music school for at least one year were allocated for the study. All subjects were divided into classes depending on the leading instrument and within a class depending on gender, age and period of playing an instrument. Accordion students accounted for class I, Western concert flute students – class II, grand piano students – class III, guitar students – class IV, violin students – class V, and cello students – class VI. The age of the subjects was determined according to the following rule: if a person was 11 years, 5 months and 28 days old, he or she was allocated for the group of 11-year-old children whereas if a person was 11 years, 5 months and 29 days old, he or she was allocated for 12-year-old students. The fitness analysis considered completed years and months of life in accordance with the requirements specified by Dobosz [3]. Finally, 190 girls (K) and 203 boys (M) were qualified for the statistical analysis. The average age of girls was 14.25 years and the experience of playing an instrument was 7.25 years. In the group pf boys, the figures were 14.44 and 7.40 respectively. The most girls practiced playing the grand piano (44 subjects) and the least girls played the Western concert flute (21 subjects). As for boys, the largest number of them practiced playing the guitar (42 people) whereas the Western concert flute was the least played instrument (23 subjects). Violin students had the longest experience of playing the instrument (10.2 years) while those who played the flute demonstrated the shortest period (4.6 years). Among boys, these were respectively: the violin (10.2 years) and the Western concert flute (11.94 years).

2. **Method and research tools**

The studies were conducted from 10 September to 20 December 2016 by a team of six under the guidance of the author. The research was performed in each of the schools involved in the study using the Eurofit test according to the adopted order [4], Table 1. Following a 5-7-minute warmup under the guidance of a member of the research team, each of the subjects started the first test. The break between tests was not longer than 3 minutes.

Table 1. Type and order of Eurofit tests

Order of tests	Category	Factor
1	Balance	Balance of the whole body
2	Agility	Agility
3	Strength	Explosive strength
4		Static strength
5	Endurance	Strength of body trunk
6		Functional strength
7	Speed	Agility run
8		Speed of upper limb movements
9	Cardiorespiratory endurance	Cardiorespiratory endurance

Source: Mucha [2016]

3. **Results**

Among the girls of grade 1, the average numbers of points scored in the diagnostic test of balance, agility, trunk muscle endurance and cardiorespiratory endurance were: 2.76, 3.8, 11.24 and 23.08. As regards boys of the same grade the figures were: 3.2, 3.02, 10.51 and 25.45. The girls of grade 2 had: 2.1, 2.5, 11.85 and 24.1 respectively, whereas the boys: 1.17, 2.26, 14.91 and 25.6. As regards grade 3, the girls achieved the following results: 3.58, 4.02, 10.92 and 25.92, while the boys: 3.63, 4.42, 12.97 and 34.81 respectively. Among the girls of grade 4 the results were: 3.06, 3.4, 10.61 and 25.0, and among the boys: 2.71, 2.8, 12.19 and 44.54 respectively. The girls of grade 5 scored: 2.8, 2.47, 11.08 and 25.77, and the boys: 2.05, 2.1, 13.79 and 42.0 respectively. As regards grade 6, girls had: 3.04, 3.73, 10.39 and 24.17, whereas boys: 2.38, 3.15, 12.0 and 42.34, Table 2, Figure 1.

Among the girls of grade 1, the average numbers of points scored in the diagnostic test of explosive strength, static strength, functional endurance, strength endurance, speed and upper

limb speed were as follows: 108.2, 11.36, 116.12, 245.16 and 114.6. Boys of the same grade scored: 108.82, 13.17, 171.08, 231.34 and 110.17. The girls of grade 2 had the following results: 108.55, 14.9, 119.75, 235.7 and 102.0, while the boys had: 113.26, 18.3, 165.0, 237.6 and 101.69 respectively. Among the girls of grade 3, the figures were: 108.09, 19.82, 114.75, 233.04 and 108.12, and among the boys: 113.57, 25.92, 216.18, 223.68 and 101.05. The girls of grade 4 scored: 109.2, 24.27, 129.31, 226.61 and 101.68, whereas the boys: 111.61, 39.78, 280.57, 210.0 and 105.07 respectively. Among the girls of grade 5 the figures were as follows: 109.44, 25.5, 131.58, 233.69 and 241.86, and among the boys: 114.05, 41.64, 277.25, 221.15 and 95.38 respectively. The girls of grade 6 had the following results: 107.91, 22.82, 129.04, 225.95 and 101.86, and the boys' results: 112.96, 36.42, 281.57, 223.96 and 101.61 respectively, Table 3, Figure 2.

Table 2. Average results of tests 1, 2, 5, 9 of the Eurofit fitness test of girls and boys of grades 1-4 (n) 393

Grade	**Gender**	**Test number**			
		1	2	5	9
I	K	2.76	3.8	11.24	23.04
	M	3.2	3.02	10.51	25.45
II	K	2.1	2.5	11.85	24.1
	M	1.17	2.26	14.91	25.6
III	K	3.58	4.02	10.92	25.92
	M	3.63	4.42	12.97	34.81
IV	K	3.06	3.4	10.61	25.0
	M	2.71	2.8	12.19	44.54
V	K	2.8	2.47	11.08	25.77
	M	2.05	2.1	13.79	42.0
VI	K	3.04	3.73	10.39	24.17
	M	2.38	3.15	12.0	42.34

Source: author's own research

Table 3. Mean values of tests 3, 4, 6, 7, 8 of the Eurofit fitness test of girls and boys of classes I-VI (n) 393

Class	Gender	Test number				
		3	4	6	7	8
I	K	108.2	11.36	116.12	245.16	114.6
	M	108.82	13.17	171.08	231.34	110.17
II	K	108.55	14.9	119.75	253.7	102.0
	M	113.26	18.3	165.0	237.6	101.69
III	K	108.09	19.82	141.75	233.04	108.12
	M	113.57	25.92	216.18	223.68	101.05
IV	K	109.2	24.27	129.31	226.61	101.68
	M	111.61	39.78	280.57	210.0	105.07
V	K	109.44	25.5	131.58	233.69	241.86
	M	114.05	41.64	277.25	221.15	95.38
VI	K	107.91	22.82	129.04	225.95	101.86
	M	112.96	36.42	281.57	223.96	101.61

Source: author's own research

Fig. 1. Average values in tests 1, 2, 5, 9 of the Eurofit Test Battery achieved by girls and boys of grades 1-6 (n) 393

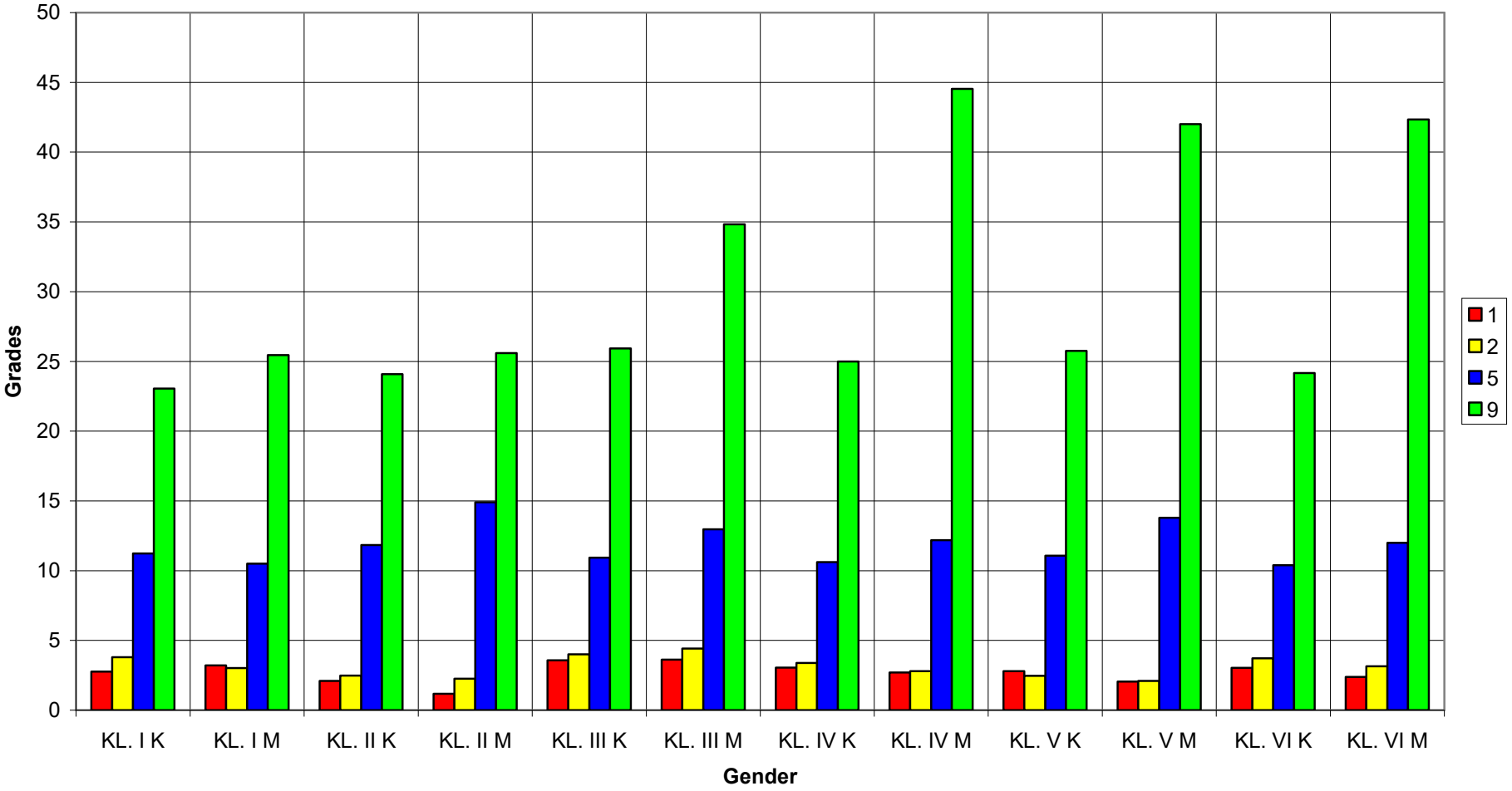
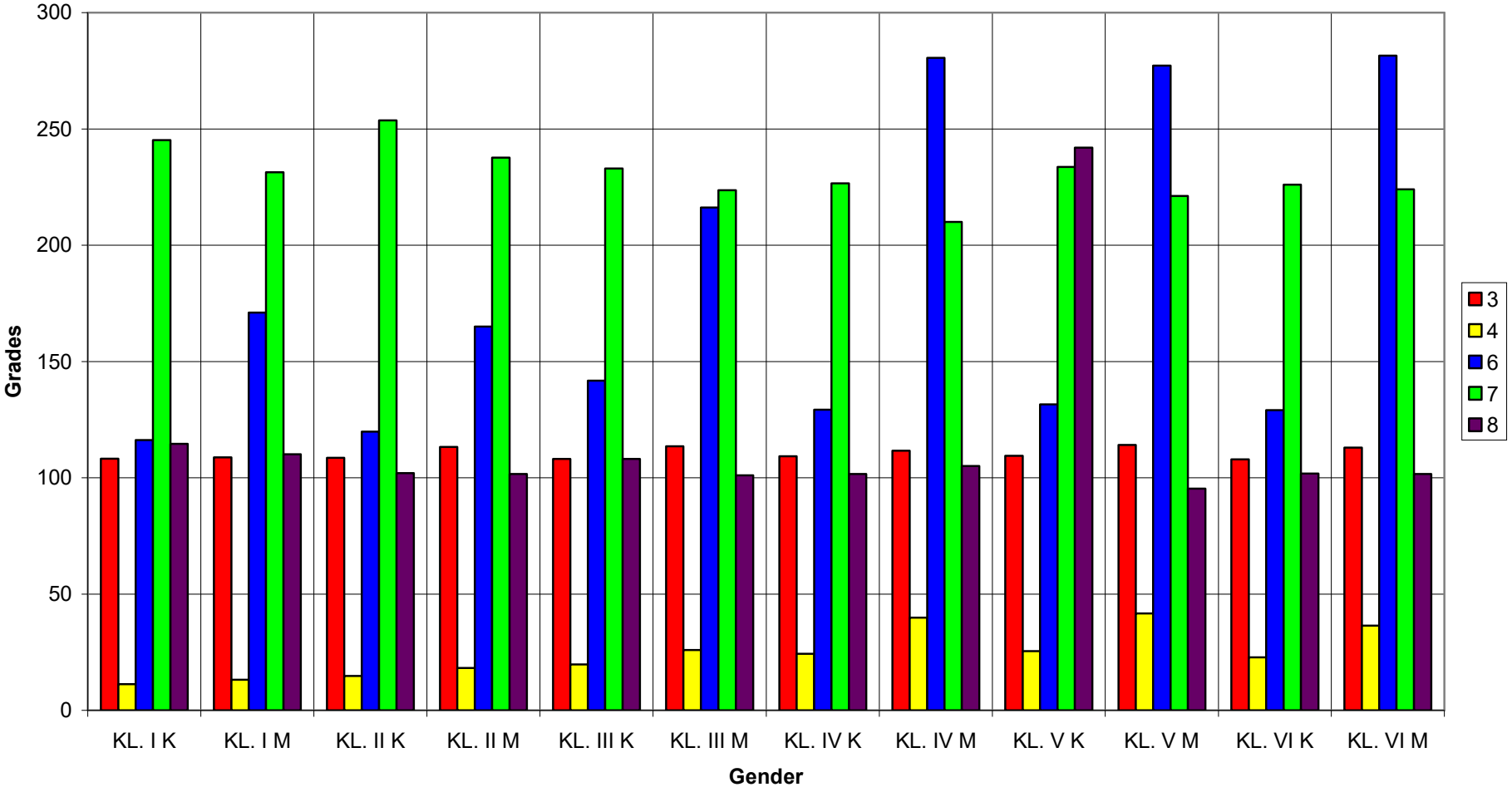


Fig. 2. Average values in tests 3, 4, 6, 7, 8 of the Eurofit Test Battery achieved by girls and boys of grades 1-6 (n) 393



4. **Discourse**

The studies conducted by Nawrocka and Wołyńska–Ślężyńska [5] revealed that 31% of the study group of students of music school aged 12-18 years did not pursue any physical activity except for PE lessons, 78% of violin students and 60% of piano players complained about different types of pain. Similar conclusions were drawn by Heming [6] and Drabik [7] based on their studies, blaming poor physical performance of musicians for all psychosomatic problems. Drabik believes that physical performance is the measure of health. The research conducted by Dudkiewicz [8] on the sample group of 114 mature musicians and young students of music school revealed that 62% of students did exercise once a week - 41%, twice a week – 21%, and nearly 50% led a sedentary lifestyle. The most common types of exercise included swimming – 23.7% and running – 18.4%. 12.5% of men chose team games and 11.4% of women decided on gymnastics, fitness, yoga, Pilates and horse riding. 29.7% of students did not participate in sports activities and 39% took part in physical education classes on a regular basis. Kwarecki et al. [9] have observed that these forms of exercise which involve the body segments already overburnt at professional work, should not be practiced. The authors of the study would like to pay special attention to dance as a form combining the profession of musician and physical activity. Dance develops body awareness, the ability of moving and stage presence which expresses self-confidence of an artist.

It should be noted that the largest mean values in the diagnostic test of balance were observed among the boys of grade 3 and the smallest among the students of grade 2. The biggest mean values of the flexibility test were observed in boys of grade 3 and the lowest in Class 5. The biggest mean values of the agility test were observed in the boys of grade 3 and the smallest ones in grade 5. The highest average results of the explosive strength test were achieved by the boys of grade 2 and the lowest by the girls of grade 4. The boys of grade 4 had the best mean values of the cardiorespiratory endurance test and the girls of grade 1 had the worst results in the same test. The biggest mean values of the diagnostic explosive strength test were observed in the boys of grade 5 and the smallest ones in their female counterparts of grade 6. The largest mean values in the static strength test were observed among the boys of grade 5 and the smallest among the girls of grade 1. The highest average results of the functional strength test were revealed by the boys of grade 4 and the lowest by the girls of grade 1. The highest average results of the speed test were observed in the girls of grade 2 and the lowest in the boys of grade 4. The girls of grade 5 had the best mean values of the upper limb speed test

and the boys of the same grade had the worst results. The average values of the cardiorespiratory endurance test achieved by students of both sexes increased over the next years and the remaining results did not reveal any significant differences. However, the mean results of other analysed tests turned out to be higher in girls than in boys.

5. **Summary**

Among the students of both sexes, the average values obtained in the analysed tests did not reveal many differences. Average results achieved in the agility run revealed a decreasing tendency in grades 1 – 4 and an increasing trend was observed in grades 5 and 6. An exception were the boys' results obtained in the cardiorespiratory test in grades 3, 4 and 6, which considerably differed from the results of other students involved in the study and in the muscle endurance test (functional strength) with the average results of boys tending to increase over the subsequent years. It should be also emphasized that in the upper limb speed test the results obtained by girls of grade 5 definitely surpassed the level of other students.

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