

# Weekday and weekend moderate to vigorous physical activity of young musicians in the context of public health recommendations

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## Abstract

**Introduction:** Physical activity is very important for the proper mental and physical development of children and youths, especially for the development of the locomotor system. The students of music schools are a unique group of children and youths, because of specific loads on the organs of locomotion, associated with the playing of musical instruments. They can therefore be exposed to a variety of health problems, particularly in the case of insufficient physical activity.

**Objective:** The aim of the presented study was to assess the level of physical activity of music schools' students on weekdays and weekends against the parameters of physical efforts beneficial to health.

**Method and materials:** The study involved 225 musicians from the Katowice School of Music, Complex of I and II degrees, aged 10–18 years (138 girls and 87 boys). The level of physical activity was assessed on the basis of moderate to vigorous rates (MVPA).

**Results:** Both on weekdays as well as at the weekends, boys presented a higher level of physical activity of at least moderate intensity (MVPA), which also resulted in a greater total weekly pro-health physical activity. Both boys and girls dedicated significantly more time to beneficial pro-health efforts physical health at weekends ( $p < 0.01$ ). The percentage of young musicians who meet accepted (in this study) standards for the optimal amount of physical activity in both groups was dramatically low (3.6% of girls and 11.5% of boys).

**Conclusion:** Both boys and girls from the music schools often undertake moderate to vigorous physical activity (MVPA) at the weekends. The boys more often than the girls made pro-health physical efforts of moderate and high intensity.

## Key words

Physical activity, instrumentalists, recommendations, moderate to vigorous physical activity (MVPA), children

## INTRODUCTION

The connection between the deficiency of exercise (hypokinesia) and premature mortality and the incidence of many diseases has been confirmed in epidemiological studies for many years [1, 2]. However, still, a much too low level of physical activity in highly civilized societies can be observed. Currently, a particular problem of public health is insufficient physical activity of children and youths, which is one of the main causes of overweight, obesity, posture defects, and low level of physical fitness in younger and younger generations [3, 4, 5].

Too little physical activity among children and adolescents is a result of constant technological progress, as well as their parents' low awareness of the role of regular exercise in maintaining health. Yet, physical activity plays a key role in the proper mental and physical development of children and youths, especially for the developing locomotor organs. The recommendations of international organizations stress the need to perform physical activity regularly, preferably daily. According to the World Health Organization's recommendations for children and young people, this means

taking moderate to vigorous physical activity for at least 60 minutes per day [6]. In other recommendations, taking moderate to vigorous exercises for at least 30 minutes per day is considered to be the minimum level of healthy physical activity (Canadian Society for Exercise Physiology, 2011).

Students of music schools create a unique group of children and youths, mainly because of specific loads imposed on their musculoskeletal system, associated with playing different kinds of instruments. In this way, they are often exposed to a variety of health problems, mostly of a musculoskeletal character [7, 8, 9, 10]. An important part of the prevention of disorders of the musculoskeletal system for young musicians is the performance of health-oriented physical activity. It should be emphasized that students of music schools spend the majority of their out-of-school time – especially during school days – on mastering the playing of an instrument. This is due to frequent artistic performances which often take place on Saturdays and Sundays, and also to strong competition that usually exists among artists. Musicians, like other artists, are aware from an early age that in their profession it is particularly important to 'be the best'.

For many young musicians it is often difficult to simultaneously display an optimal artistic performance, and to maintain an adequate level of physical activity. Since the literature on physical activity among young musicians in the context of public health recommendations is relatively scarce, this particular issue deserves to be explored. Therefore, the

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aim of the presented study is to assess the level of physical activity of students of music schools on weekdays and at weekends, against the recommended parameters of physical efforts beneficial for health.

## MATERIAL AND METHODS

The study involved 225 musicians (instrumentalists) from the Katowice School of Music, Complex of I and II degree, aged 10–18 years (138 girls and 87 boys). The study was conducted in 2012 in music schools in Katowice and involved only those musicians who learn to play a musical instrument during the cycle of general education. General education music schools (Ogólnokształcące Szkoły Muzyczne – OSM) have different core curriculum from non-arts education institutions, and it does not include the minimum amount of physical education classes.

The level of physical activity was assessed on the basis of moderate to vigorous rate (MVPA). The MVPA screening measure is recommended for clinical practice with adolescents [11]. The study was conducted by a trained interviewer, who presented the students with a brief definition of physical activity and described the characteristic reactions of the human organism to physical efforts of varying intensity. The students then indicated how much time (in minutes) they spent on the efforts of moderate to vigorous intensity during the following days of the week.

In the assessment of physical activity, the time spent on playing a musical instrument was not taken into account, because, despite the fact that playing an instrument is an effort that increases energy expenditure, its intensity is in the range of 1.8–3.0 MET, depending on the type of instrument [12]. Physical effort should be beneficial to health and cause certain physiological reactions (increased heart rate, increased body temperature, etc.), and their intensity should exceed 4 MET. In addition, musical performance techniques and the associated muscle work do not allow playing an instrument to qualify as a pro-health activity.

The declared physical activity of the surveyed students of music schools was interpreted on the basis of pro-health physical activity recommendations for children and adolescents aged 5–18 years. There were two criteria for the level of pro-health physical activity:

- Optimum: daily, at least 60 minutes per day, moderate physical effort (4–6 MET) or vigorous effort (> 6 MET);
- Minimum: daily, at least 30 minutes per day, moderate physical effort (4–6 MET) or vigorous effort (> 6 MET).

When self-assessing one's physical activity, the respondents also gave information such as number of years and the frequency and duration of playing a musical instrument daily.

**Statistical analysis.** For the assessed variables, descriptive statistics basic parameters were calculated: the arithmetic mean ( $\bar{x}$ ) and standard deviation (SD). To evaluate the differences between girls and boys, the Mann Whitney test was used, and for the differences between age groups, the Kruskal-Wallis test. The significance of differences in the mean results of physical activity between weekdays (school) and weekends was evaluated using the Wilcoxon test. Furthermore, the percentages of respondents who met the recommendations for the minimum and for the desired

level of physical activity were calculated. It was examined whether they were dependent on gender and age by using the Chi-square test. Statistical analyses were performed on SPSS IBM. P-value was set at a 5% level of significance.

## RESULTS

Analysis of the data revealed that both boys and girls practice playing a musical instrument regularly, for an average of about 6 days a week (Tab. 1). Respondents were not differentiated by the length of their practice (6–7 years). During the day, boys devoted somewhat more time to playing an instrument, but the differences were not statistically significant. However, significant differences were observed in the case of moderate to vigorous parameters of physical activity. Both during the weekdays and during the weekends, boys presented a higher level of physical activity of at least moderate intensity (MVPA) (Tab. 1).

**Table 1.** Diversity in the level of selected variables in relation to the gender of respondents.

Variables	Boys (N=87)		Girls (N=138)		P
	$\bar{x}$	SD	$\bar{x}$	SD	
Age [years]	13.92	2.05	14.04	2.60	0.748
Height [cm]	166.49	12.79	160.58	8.90	<b>0.000</b>
Weight [kg]	57.93	14.61	50.17	10.03	<b>0.000</b>
Period of time of playing an instrument [years]	6.57	2.59	6.96	2.74	0.364
Frequency of playing [days in the week]	6.25	1.20	6.05	1.272	0.128
Daily amount of time spent playing [minutes]	102.9	61.08	88.8	44.82	0.203
Daily amount of time of MVPA [minutes]	59.18	29.76	53.75	30.80	0.069
MVPA on weekdays [minutes]	47.14	34.13	35.47	20.81	<b>0.008</b>
MVPA at weekends [minutes]	78.63	54.99	50.51	41.28	<b>0.000</b>

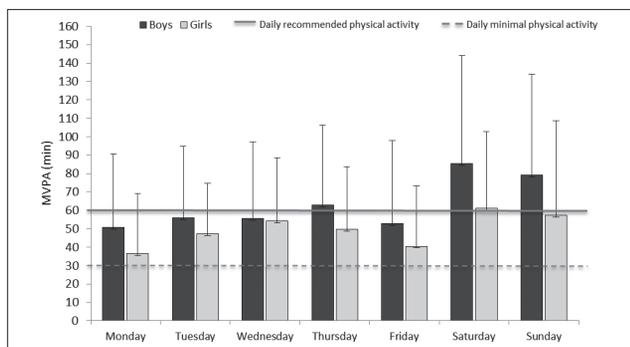
The data in three age groups was also analysed, corresponding with the consecutive levels of education: 10–12 years (primary school), 13–15 years (lower-secondary school), and 16–18 years (secondary school) (Tab. 2). The significance of differences in the evaluated somatic characteristics of the participants, and in the periods of time of playing an instrument, appears to be obvious. Nevertheless, it should be emphasized that significant differences exist in the frequency of playing practice (days in the week), and in the daily amount of time spent on playing. Older musicians practice playing an instrument more frequently ( $p < 0.05$ ), and for longer periods of time ( $p < 0.001$ ) (Tab. 2). However, it seems that these factors did not have impact on the undertaking of health-oriented physical activity by the study participants. Although with the increasing age the amount of time devoted to MVPA was reduced, no significant associations were found between physical activity on weekdays and during weekends (Tab. 2). For this reason, subsequent analyses, related to both weekdays and weekend physical activity, present differences, based only on the gender of the study participants.

The MVPA undertaken by the respondents during consecutive days of the week was also analysed (Fig. 1). The smallest volume of physical activity was found on Mondays

**Table 2.** Diversity in the level of selected variables in relation to the age of respondents.

Variables	10–12 years (N=66)		13–15 years (N=91)		16–18 years (N=68)		p
	x	SD	x	SD	x	SD	
Height [cm]	151.8	8.676	166.1	7.93	169.4	9.09	<b>0.000</b>
Weight [kg]	41.61	7.87	55.86	10.93	60.80	10.31	<b>0.000</b>
Period of time playing an instrument [years]	4.59	1.52	6.67	2.23	9.15	2.19	<b>0.000</b>
Frequency of playing [days in the week]	5.86	1.23	6.18	1.28	6.32	1.19	<b>0.027</b>
Daily amount of time spent playing [minutes]	65.14	46.31	100.93	48.35	113.56	50.59	<b>0.000</b>
Daily amount of time of MVPA [minutes]	327.3	229.1	324.3	209.8	247.6	156.2	0.151
MVPA on weekdays [minutes]	41.04	30.88	43.10	28.4	34.7	20.48	0.132
MVPA at weekends [minutes]	67.18	51.55	63.63	50.54	51.15	41.94	0.188

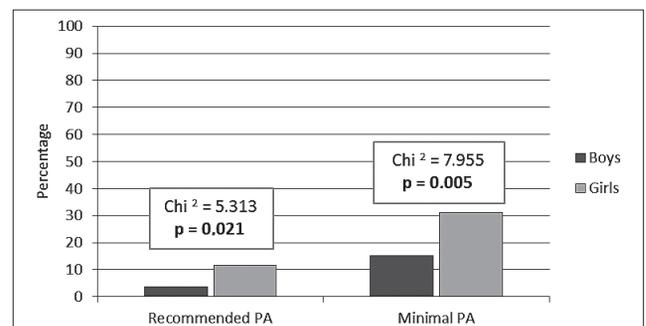
and Fridays. For the evaluated elementary and junior high school students, physical education classes were scheduled on Tuesdays and Thursdays, and for high school students, on Tuesdays, Wednesdays and Thursdays. This probably resulted in a higher level of physical activity on these days. However, the average values of MVPA on the consecutive days of school differed from the WHO recommendations. This was particularly evident in girls, who did not reach on any schooldays the target level necessary for the improvement of health, according to the WHO guidelines, (Fig. 1).

**Figure 1.** Moderate to vigorous physical activity of boys and girls in consecutive days of the week.

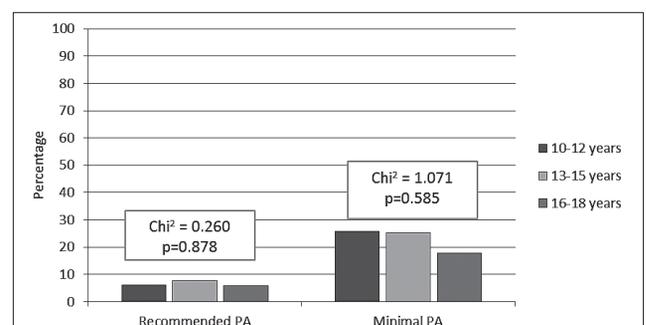
The main aim of the analyses was to assess the pro-health disparities in physical activity undertaken on weekdays and at the weekends (Fig. 2). Both boys and girls dedicated significantly more time to beneficial pro-health physical efforts on days off school ( $p < 0.01$ ). The girls, however, declared much lower levels of physical activity than the boys, even at the weekends, making their physical activity efforts less than the recommended duration (Fig. 2).

**Figure 2.** Weekly and weekend MVPA physical activity of surveyed boys and girls.

In the next step of the analysis, the percentages of the subjects meeting the recommended and minimum levels of physical activity we determined for the children and youths (Fig. 3, 4). Higher levels of physical activity among the boys, resulting from previous analyses, also translated into significantly higher than in the girls' percentage of those who met the recommendations of the desired and minimum physical activity (Fig. 3). It should be noted that the percentage of young musicians who, in the presented study, met the accepted standards for the optimal amount of physical activity, was dramatically low in both groups of participants (3.6% of girls and 11.5% of boys).

**Figure 3.** Percentages of the study musicians who meet the recommended and the minimum level of pro-health physical activity.

Previous analyses indicated no correlations between the age groups and the parameters of weekdays and weekend physical activity. This was also translated into the percentages of musicians who complied with the recommendations for pro-health physical activity of children and adolescents. No statistically significant differences were found between the assessed age groups (Fig. 4).

**Figure 4.** Percentages of the study musicians in the three age ranges who meet the recommended and the minimum level of pro-health physical activity.

## DISCUSSION

In recent years, special attention has been paid to the low level of physical activity among children and adolescents. The increasing interest in the problem of the deficit in exercise among the modern generation results from the growing amount of evidence concerning the dangerous consequences, both health and social, of hypokinesia [13, 14].

A specific group of children and young people are students of music schools who spend most of their out-of-school time playing a musical instrument. For this reason, most of them are not interested in taking physical activity in their free time. Furthermore, in the community of instrumentalists some forms of physical activity are considered to easily cause injuries (especially activities using equipment, and the so-called contact sports). Such information is often passed down from generation to generation, as playing a musical instrument is often a family tradition. At the same time, due to the specific loads resulting from playing of an instrument, musicians are exposed to a variety of problems involving the locomotor organs; problems that can lead to functional limitations and structural changes, and even to the necessity to change profession.

The literature often compares the level of physical activity undertaken by children and young people on weekdays and at the weekend [15, 16, 17, 18]. This is due to a different schedule which includes a few hours of classes in a week, spent at school desks.

In the presented study, both boys and girls presented a much greater volume of weekend physical activity, compared to weekdays. Other results were obtained in many studies. Numerous studies have emphasized the lower level of moderate and vigorous physical activity at the weekends [19, 20, 21, 22, 23].

Students at music schools can probably devote more time to physical activity only on Saturdays and Sundays. On weekdays their time is filled with daily chores, especially mastering the playing of an instrument. The conditional mood used above, results from the declarative (subjective) nature of the assessment of the subjects' physical activity. It was assumed, however, that the results of the presented study reveal a logically evident trend in the behaviour of young musicians which differs from the current state of knowledge on the leisure behaviour of their peers. This was the inspiration to conduct further research.

In the presented study, significant differences between the level of pro-health physical activity among boys and girls were also observed, both on weekdays and at weekends. In this case, the boys were much more physically active than the girls. Similar results were obtained in a number of international studies in other populations of children and adolescents [23, 24, 25, 26, 27, 28, 29, 30].

Gender differences were also found in the percentages of pro-health standards of physical activity in which special attention was paid to the regularity of physical efforts. It should be noted that in both groups the degree of fulfillment of the pro-health recommendations was highly unsatisfactory, and was only 3.6% among girls and 11% among boys. Although the average of daily MVPA activity among boys was over 60 minutes, it is overestimated by the high weekend physical activity. In the

recommendations for pro-health physical activity, at least 60 minutes of MVPA efforts undertaken in each day of the week are advised.

The problem of under-active children and adolescents is observed worldwide [30, 31, 32, 33, 34]. The results of the Healthy Lifestyle in Europe by Nutrition in Adolescence (HELENA) project, conducted in 2006–2008, in which moderate to vigorous physical activity of more than 2,000 children and young people from nine countries in Europe was assessed; 60-minute effort of at least moderate intensity was undertaken daily by 56.8% of boys and 27.5% of girls [35].

Low levels of free-time physical activity of young instrumentalists presented in the study could be offset by the increased number of physical activities realized by music schools. However, recent regulations concerning general education curricula for schools of art, which include music schools, omitted the minimum amount of physical education classes. In addition, among the teaching staff of music institutions and among the parents of young musicians, it is often believed that overload or muscle pain caused by excessive exercise may cause the risk of weaker disposition of instrumentalists during artistic performances. For this reason, it is often the case that physical education classes are filled with simple exercises, without the use of equipment and usually of low intensity, as these are considered to be safe. These actions make the classes boring and are often avoided by the instrumentalists, creating a vicious circle. It is also the cause of a large number of year-long medical exemptions from physical education classes.

In this light, the results of the presented study indicate that among students the deficiency of exercise (hypokinesia) is extremely pronounced. At the same time, the prevention of problems with locomotion is extremely important, and it should contain regular physical activity.

One limitation of the presented study lies in the fact that the subjective method of physical activity assessment was applied. In the future, more objective measurement tools, monitoring the physical activity, such as accelerometers could be considered.

## CONCLUSIONS

1. Only a small percentage of the young musicians who participated in the presented study undertook the recommended pro-health physical activity.
2. Both boys and girls from the music schools often performed moderate to vigorous physical activity (MVPA) at weekends.
3. Boys more often than girls made pro-health physical efforts of moderate and high intensity.
4. There is a potential need to educate young musicians, their parents and teachers from music institutions about the benefits of pro-health physical activity, to educate young musicians, their parents and teachers from music institutions about the benefits of pro-health physical activity, and its potential for prevention of problems with the locomotor organs, which are common among musicians.

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