MOTOR PERFORMANCE OF ADOLESCENT GIRLS IN THE CONTEXT OF SOCIO-ECONOMIC CHARACTERISTICS OF THE REGION

Pavol **ČECH**[ABCDE], Martin **JESENSKÝ**[ABF], Lenka **TLUČÁKOVÁ**[ABE], Pavel **RUŽBARSKÝ**[AEF], Ľubomír **PAUČÍR**[AEF], Tibor **KLAČEK**[AEF]

The University of Prešov, Faculty of Sports

Keywords:
- Eurofit test
- unemployment
- average salary
- physical abilities
- somatic indicators

Abstract:
Introduction: Monitoring of the region's macroeconomic, microeconomic and social indicators as a factor of performing physical activity of the general population is adequately described abroad. However, there is no relevant information on the status of the selected issue in the light of the specifics of Slovakia. **Aim of research**: The aim of the study was to analyse motor performance of adolescent girls in the context of the socio-economic status of the region where they live. **Material and methods**: A total of 290 female students aged 14 - 15 years living in the districts of the Prešov region with low and high socio-economic status participated in this study. The participants were subjected to measurement of somatic indicators and tested in Eurofit test battery to assess their motor performance. The differences in the monitored indicators between the groups with the low and high socio-economic status were interpreted using Student's T-test for independent samples. **Result**: Participants from the district with the high socio-economic status appeared to have a significantly better performance in the sit-and-reach test, standing broad jump, handgrip test, sit-ups, 10x5 meter shuttle run and endurance shuttle run. Conversely, differences in the flamingo balance test, plate tapping and bend arm hang were not identified as statistically significant. **Conclusion**: As indicated by the results, it seems that the socio-economic status of the region is an important factor affecting motor performance of adolescent girls.

INTRODUCTION

The present time provides a wide range of leisure opportunities. Physical activity in any form should be an integral part of one's everyday life. Nevertheless, the volume of performed physical activities is constantly decreasing. Efforts to support physical activity focused on identification of its determinants and designing procedures that could effectively promote regular physical activity [Seefeldt et al. 2002]. In the field of socio-economic inequality, research results are often contradictory. Seefeldt et al. [2002] consider the problem of ambiguity of results as the lack of consistency in designs, analyses and evaluations of factors affecting the lives of inactive individuals. According to Voss et al. [2008], children coming from low-income families have less access to sport facilities but are no less physically active. On the contrary, Brodersen et al. [2007] found that a lower volume of physical activity and sedentary lifestyle are typical for adolescents coming from families with a lower socio-economic status (SES). The study by Mota et al. [2010] points out that girls with a higher SES were more physically active than their peers with a lower SES.

Bohr et al. [2013], Mota & Esculcas [2002] present that the prevalence of overweight and unhealthy lifestyle connected with insufficient physical activity are more typical for

children from families with a lower SES while children from families with a higher SES have positive attitude to physical activities, a higher level of motor performance and a greater participation in organised sports. This was also confirmed by the study by Hanson & Chen [2007] who reported that a lower SES is associated with poorer dietary habits and lower volume of performed physical activity. Therefore, monitoring of motor performance in the context of SES of the populations is still an up-to-date and important issue.

AIM

The purpose of the study was to analyse motor performance of adolescent girls in the context of socio-economic status of the region where they live.

MATERIAL AND METHODS

The research group consisted of 290 girls aged 14 – 15 years. The group included girls attending schools in districts with the high and the low socio-economic status of population in the Prešov region. The SES of districts was assessed based on the data available in databases of the Statistical Office of the Slovak republic; the variables taken into account were average salary and the unemployment rate in percentage in the district. The group with the high SES of the population according to the selected criteria (S1) was composed of the Districts of Prešov (n = 106) and Poprad (n = 49), while districts with a low SES of population (S2) included the Districts of Svidník (n = 78), Medzilaborce (n = 22) and Snina (n = 35). Basic statistical parameters of somatic characteristics of participants from the particular districts are listed in Table 1.

Firstly, the participants were subjected to measuring basic somatic characteristics of body height using a stadiometer anchored directly to a wall with an accuracy of 0.1 cm and body weight using a Bosogramm 4000 digital health scales with an accuracy of 0.1 kg.

Subsequently, diagnostics of the level of physical abilities started using the Eurofit motor test battery, following the instructions published by the authors Moravec et al. [2002]. The level of balance ability was assessed based on the results of the flamingo balance test (FL). Participants‘ frequency ability was evaluated using the plate tapping test (PT) and flexibility using the sit-and-reach test (SAR) with an accuracy of 0.5 cm. Strength in its various forms was measured in the standing broad jump test (SJT) with an accuracy of 1 cm, which assesses explosive strength of lower limbs; furthermore, the level of upper limbs‘ strength was tested by the handgrip test (HG) using a Lafayette dynamometer; strength of iliac-lumbar muscles was evaluated based on the results achieved in sit-ups for 30 seconds (SU) and, finally, the level of upper limbs‘ static strength was tested using the bend arm hang test (BAH) when we recorded time in the prescribed position with an accuracy of 0.1 second. Participants’ speed ability was tested in the 10x5 meter shuttle run test (SRT) when we recorded the time needed to run the prescribed trajectory using a handheld stopwatch with a record accuracy of 0.1 second. In conclusion, we tested participants’ endurance ability using the endurance shuttle run (ESR) when we recorded the number the run lengths. Testing was carried out using a flow method which provided a sufficient rest interval so that the results would not be influenced by performances in previous motor tasks.

The obtained results were further subjected to a statistical assessment. To analyse the results, we used the mean as the value from the measures of central tendency and the standard deviation as the measure of data dispersion. To assess the significance of differences in participants’ motor performance in relation to the SES of the region where they live, we carried out the Student’s t-test for independent samples. To evaluate the equality of variances, we used Levene’s F test. The statistical significance of differences was assessed with a 5 % probability of rejection of the null hypothesis ($\alpha = 0.05$). The statistical analysis was carried out using Statistica 12 software.

Table 1. Basic descriptive characteristics of the research group divided according to the district of permanent residence.

research group	district	variable	n	x	SD	min	max
S1 (n = 155)	PP	DA	49	15.55	0.24	15.10	15.98
		BH	49	167.0	6.3	156.0	182.9
		BW	49	57.3	9.6	40.6	88.7
		BMI	49	20.5	2.7	16.6	30.3
	PO	DA	106	15.49	0.39	14.16	15.94
		BH	106	165.8	6.4	152.5	182.0
		BW	106	57.5	9.5	39.7	92.7
		BMI	106	20.9	3.1	15.2	33.9
S2 (n = 135)	SV	DA	35	15.72	0.24	15.15	15.98
		BH	35	163.8	5.7	150.0	175.0
		BW	35	54.2	7.2	39.0	71.5
		BMI	35	20.2	2.7	16.0	26.3
	ML	DA	22	15.16	0.63	14.11	15.98
		BH	22	164.0	5.6	153.0	171.8
		BW	22	53.7	9.9	38.9	74.2
		BMI	22	19.9	3.4	15.0	27.0
	SK	DA	78	15.52	0.28	14.93	15.98
		BH	78	163.6	6.1	151.5	177.0
		BW	78	55.3	6.8	39.6	72.7
		BMI	78	20.7	2.7	16.1	30.4

Legend: S1 – sample with the high socio-economic status of population; ***S2*** – sample with the low socio-economic status of population; ***SV*** – District of Snina; ***ML*** – District of Medzilaborce; ***SK*** – District of Svidník; ***DA*** – decimal age; ***BH*** – body height; ***BW*** – body weight; ***BMI*** – body mass index; ***n*** – number; ***x*** – mean ***SD*** – standard deviation; ***min*** – the minimum recorded value; ***max*** – the maximum recorded value

The results presented in the article are the part of VEGA 1/0840/17 project titled „The socio-economic status and the state of infrastructure for physical activities as determinants of primary school students´ physical activity patterns and their physical and motor development“.

RESULTS AND DISCUSSION

As indicated by the results, the girls from districts with a high SES are significantly taller and they also have a higher body weight in comparison to their peers from regions with a low SES. Similarly, in the group from districts with a high SES we recorded significant differences ($p < 0.05$) in motor tests identifying flexibility, the level of strength in its various forms except for static strength of the upper limbs and the level of speed and endurance abilities. Furthermore, we also recorded a better performance in the plate tapping test, which measures the level of upper limb frequency speed, in favour of the girls living in the districts with a high SES. However, this difference was not significant at the selected level of significance ($p > 0.05$).

The students living in the districts with a low SES only achieved a better performance in the balance test (FL) and test of static strength of upper limbs (BAH). Nevertheless, differences in these tests were not significant.

Table 2. Results of the statistical analysis of differences between the screened samples with the different SES (t-test for independent samples).

				Levene's test		t-test for independent samples				
									95% CI	
		x	SD	F	Sig.	t	df	Sig.	Lower limit	Upper limit
DA	S1	15.5	0.35	1.313	0.253	0.068	288	0.946	-0.08278	0.08870
	S2	15.5	0.39							
BH	S1	166.2	6.40	0.448	0.504	-3.350	288	0.001	-3.86365	-1.00388
	S2	163.7	5.90							
BW	S1	57.5	9.50	5.973	0.015	-2.715	284.83	0.007	-4.66209	-0.74327
	S2	54.8	7.43							
BMI	S1	20.8	2.94	0.003	0.953	-0.957	288	0.339	-0.98933	0.34182
	S2	20.4	2.79							
FL	S1	5.2	3.77	0.332	0.565	-1.147	288	0.252	-1.34198	0.35383
	S2	4.7	3.51							
PT	S1	11.8	1.51	20.910	0.000	1.497	214.71	0.136	-0.11547	0.84540
	S2	12.1	2.45							
SAR	S1	14.7	10.28	1.035	0.310	8.945	288	0.000	8.20028	12.82701
	S2	25.3	9.63							
SJT	S1	161.6	23.97	0.910	0.341	-2.577	288	0.010	-13.06375	-1.74939
	S2	154.2	24.92							
HG	S1	31.0	6.72	3.193	0.075	-3.956	288	0.000	-5.53802	-1.85792
	S2	27.3	9.14							
SU	S1	21.3	4.22	15.227	0.0001	3.132	212.4	0.002	0.80918	3.55642
	S2	23.5	7.08							
BAH	S1	23.3	18.13	0.384	0.536	0.551	288	0.582	-2.91882	5.18577
	S2	24.4	16.66							
SRT	S1	21.2	2.34	1.646	0.201	2.989	288	0.003	0.27653	1.34300
	S2	22.1	2.25							
ESR	S1	31.1	12.60	14.596	0.000	3.615	229.63	0.000	3.10341	10.54151
	S2	38.0	18.45							

Legend: S1 – sample with the high socio-economic status of population; ***S2*** – sample with the low socio-economic status of population; ***DA*** – decimal age; ***BH*** – body height; ***BW*** – body weight; ***BMI*** – body mass index; ***FL*** – flamingo balance test; ***PT*** – plate tapping; ***SAR*** – sit-and-reach test; ***SJT*** – standing broad jump; ***HG*** – handgrip test; ***SU*** – sit-ups for 30 seconds; ***BAH*** – bend arm hang; ***SRT*** – shuttle run 10x5m; ***ESR*** – endurance shuttle run; ***x*** – mean; ***SD*** – standard deviation; ***F*** – test criterion of Levene´s test; ***t*** – test criterion of Student´s t-test; ***df*** – degrees of freedom; ***Sig.*** – significance

While the SES has been shown to be an important determinant of health and physical activity in adults, results for children and adolescents are less consistent [Drenowatz et al. 2010]. Concerning performing physical activity in terms of recommended health standards, Drenowatz et al. [2010] reported significant differences in the parameter of a number of steps per day with respect to SES. A higher volume of realized activities was found in pupils with a higher SES. Lower SES children, however, had higher body mass and BMI compared to higher SES groups ($p < 0.05$) and physical activity no longer remained significant when further controlling for BMI. When evaluating SES, the authors built on the total annual income of a family. The research was carried out on primary school pupils (n = 271) with average age of 9.6 years. As indicated by the results, SES of the region appears to be a significant factor affecting motor performance of adolescent girls. These results are consistent with conclusions published by Bohr et al. [2013], who analysed motor performance of junior high-school students in Illinois (n = 954, students of 6^{th} – 8^{th} grade of junior high-school). In

this research, girls with lower SES achieved poorer results in Fitnessgram tests and achieved the targeted heath zones with a lower probability than those with a higher SES. Similar results were also found in the study by Klein et al. [2015], who conducted their research on primary school students divided into age groups (n = 1389; students of 1st, 4th, 7th and 10th grade). They observed a higher level of motor performance in the high SES group compared to participants with moderate and low SES. When comparing with German standards, they found a better performance in the realized tests in the high SES group; performances in the moderate SES group varied only slightly in comparison to the standards and the low SES group did not show any differences when compared with the standards.

CONCLUSIONS

In summary, the results show that the socio-economic status of the region is an important factor determining motor performance of adolescent girls. Girls living in the region with higher SES showed a higher level of speed, endurance and dynamic speed than their peers from regions with low SES. In the coordination and strength-endurance manifestations, no differences in the levels of performance between the monitored groups were found.

REFERENCES

1. Bohr A.D., Brown D.D., Laurson K.R., Smith P.J.K., Bass R.W. (2013), *Relationship between socioeconomic status and physical fitness in junior high school students*, "Journal of School Health", vol. 83, no. 8, pp. 542–547.
2. Brodersen N.H., Steptoe A., Boniface D.R., Wardle J. (2007), *Trends in physical activity and sedentary behaviour in adolescence: ethnic and socioeconomic differences*. "British journal of sports medicine", vol. 41, no. 3, pp. 140-144, ISSN 1473-0480.
3. Drenowatz C, Eisenmann C.E, Pfeiffer K.A., Welk G., Heelan K., Gentile D, Walsh D., (2010). *Influence of socio-economic status on habitual physical activity and sedentary behavior in 8- to 11-year old children*. "BMC Public Health", vol. 10, no. 214.
4. Hanson M.D., Chen E. (2007), *Socioeconomic Status and Health Behaviors in Adolescence: A Review of the Literature,* "Journal of Behavioral Medicine", vol. 30, no. 3, pp. 263-285, ISSN 1573-3521.
5. Klein M., Fröhlich M., Pieter A., Emrich E., (2015), *Socio-economic status and motor performance of children and adolescents*, "European journal of sport science", vol. 16, no. 2, pp. 229-236, ISSN 1746-1391.
6. Moravec R., Kampmiller T., Sedláček J. a kol., (2002). *EUROFIT: Telesný rozvoj a pohybová výkonnosť školskej populácie na Slovensku*. Bratislava: Slovenská vedecká spoločnosť pre telesnú výchovu a šport. Druhé vydanie. ISBN 80-89075-11-8.
7. Mota J., Esculcas C., (2002). *Leisure-time physical activity behavior: Structured and unstructured choices according to sex, age and level of physical activity*. "International Journal of Behavioral Medicine", vol. 9, no. 2, pp. 111-121, ISSN 1532-7558.
8. Mota J., Santos R., Pereira M., Teixeira L., Santos M.P., (2010). Perceived neighbourhood environmental characteristics and physical activity according to socioeconomic status in adolescent girls. "Annals of human biology", vol 8, no. 1, pp. 1-9, ISSN 1461-5033.
9. Seefeldt V., Malina R.M., Clark M.A., (2002). *Factors affecting levels of physical activity in adults*, "Sport Medicine", vol. 32, no. 3, pp. 143-168, ISSN 1179-2035.
10. Voss L.D., Hosking J., Metcalf B.S., Jeffery A.N., Wilkin T.J., (2008). *Children from low-income families have less access to sports facilities, but are no less physically active: cross-sectional study (EarlyBird 35)*, "Child: Care, Health and Development", vol. 34, no. 4, pp. 470-474, ISSN 1365-2214.