

Physical and motor development of the students enrolled at the University of Warmia & Mazury in Olsztyn, Poland, in relation to their financial and urbanization status

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Annotation:

Purpose: The purpose of this study was to assess the state of development of physical and motor characteristics of youths aged 19-20 years, students of the University of Warmia and Mazury in Olsztyn, in view of their place of residence and monthly income. **Materials and Methods:** The study was conducted at the end of the summer term 2012 at the mandatory physical education classes. Attended by 361 youth from 250 randomly selected student groups full-time study. Status of physical development of the respondents rated in terms of height, weight, body mass index. To test the level of motor development has been used 13 tests. **Results:** It was found that the place of residence and monthly income does not affect the body mass index. Residence also has no effect on growth, while the monthly livelihood of more than 2000 zlotys per month influence. In the vast majority of motor tests are not observed links between the results and the residence of students, with the exception of the test - lifting the neck barbell over his head back and forth. Monthly livelihoods are significantly different from most of the subjects in the motor tests: long jump from their seats, raising the neck barbell over his head back and forth, Cooper test (12 min.) On the rowing ergometer 1 and 3 min. In such tests as: Burpee test, throw the medicine ball (4 kg) forward and behind his back, pulling up on the bar, the best performance among students with high incomes. **Conclusions:** It is likely that the monthly livelihood students significantly stronger associated with the physical development of students as compared to their places of permanent residence. The blurring of differences in the physical and motor development of students of different degree of urbanization may arise from the specificity of Warmia and Mazury, which are the least developed areas and having the highest unemployment rate in Poland.

Keywords:

students, physical, motor development, urbanization, financial.

Подставки Роберт, Бориславски Кристоф, Урбанска-Гизинска Рената. Фізичний та руховий розвиток студентів (Університет Вармії і Мазур в Ольштині, Польща) в залежності від майнового і урбанізаційного статусу. **Мета:** Метою даного дослідження було оцінити стан розвитку фізичних і рухових якостей юнаків віком 19-20 років, студентів університету Вармії і Мазур в Ольштині, з урахуванням їх місця проживання і щомісячного доходу. **Матеріали і методи:** Дослідження проводилося в кінці літнього семестру 2012 року на обов'язкових уроках фізкультури. Приймали участь 361 юнак, що випадково вибрані з 250 студентських груп очного навчання. Статус фізичного розвитку респондентів оцінили за показниками росту, ваги, індексу маси тіла. Для тестування рівня рухового розвитку було використано 13 тестів. **Результати:** Було встановлено, що місце проживання також не впливає на показники росту, в той час як щомісячні кошти до існування понад 2000 злотих на місяць роблять вплив. У переважній більшості рухових тестів не спостерігається зв'язків між результатами і місцем проживання студентів, за винятком тесту - піднімання грифа штанги над головою вперед і назад. Щомісячні статки до існування істотно впливають у більшості піддослідних в рухових тестах: стрибок у довжину з місця, піднімання грифа штанги над головою назад-вперед, тест Купера (12 хв.), на гребному ергометрі 1 і 3 хв. В таких тестах як: Берпі тест, кидок набивного м'яча (4 кг) вперед і за спину, підтягування на перекладині, кращі показники у студентів, які мають великі доходи. **Висновки:** Цілковито імовірно, що щомісячні кошти до існування студентів значно сильніше пов'язані з фізичним розвитком студентів порівняно з місцями постійного проживання. Розмивання відмінностей у фізичному і руховому розвитку студентів різного ступеня урбанізації можуть виникнути із специфіки Вармії і Мазур, які є найменш розвинутими районами і мають найвищий рівень безробіття у Польщі.

студенти, фізичне, рухове, урбанізація, фінансове.

Подставки Роберт, Бориславски Кристоф, Урбанска-Гизинска Рената. Физическое и двигательное развитие студентов (Университет Вармии и Мазур в Ольштыне, Польша) в зависимости от имущественного и урбанизационного статуса. **Цель:** Целью данного исследования было оценить состояние развития физических и двигательных качеств юношей в возрасте 19-20 лет, студентов университета Вармии и Мазур в Ольштыне, с учетом их места жительства и ежемесячного дохода. **Материалы и методы:** Исследование проводилось в конце летнего семестра 2012 года на обязательных уроках физкультуры. Принимали участие 361 юноша случайно выбранных из 250 студенческих групп очного обучения. Статус физического развития респондентов оценили по показателям роста, веса, индекса массы тела. Для тестирования уровня двигательных качеств было использовано 13 тестов. **Результаты:** Было установлено, что местожительства также не влияет на показатели роста, в то время как ежемесячные средства к существованию более 2000 злотых в месяц оказывают влияние. В подавляющем большинстве двигательных тестов не наблюдается связей между результатами и местом жительства студентов, за исключением теста - поднимание грифа штанги над головой вперед и назад. Ежемесячные средства к существованию существенно различаются у большинства испытуемых в двигательных тестах: прыжок в длину с места, поднимание грифа штанги над головой назад-вперед, тест Купера (12 мин.), на гребном эргометре 1 и 3 мин. В таких тестах как: Берпи тест, бросок набивного мяча (4 кг) вперед и за спину, подтягивание на перекладине, лучшие показатели у студентов, имеющих большие доходы. **Выводы:** Вполне вероятно, что ежемесячные средства к существованию студентов значительно сильнее связаны с физическим развитием студентов по сравнению с местами постоянного проживания. Размывание различий в физическом и двигательном развитии учащихся разной степени урбанизации могут возникнуть из специфики Вармии и Мазур, которые являются наименее развитыми районами и имеющие самый высокий уровень безработицы в Польше.

студенты, физическое, двигательное, урбанизация, финансовое.

Introduction

Human processes of development depend on genetic potential as well as the surrounding environment. The nature of the organism's response to the stimuli of the environmental factors is the function of the factor type, their intensity, duration, the body's resistance and their

specific structures [1].

A person's biological development depends largely on a group of factors among which socioeconomic status [2] with urbanization as its key element deserves special attention [3, 4]. Most researchers believe that there are significant differences in the physical development of individuals depending on their place of residence, be this city, a small town or a rural area [5].

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Accelerated maturation of children living in the city may result from better care and living conditions such as proper nutrition, adequate hygiene and professional health care [6].

Fulfilment of every person's basic needs depends to a large extent on the amount of income per family member. Therefore, an individual's monthly budget exerts an influence on his or her personal development [7]. In consequence, a lower monthly budget per family member generates additional obstacles to the involvement in physical activity, which may include transport difficulties, inability to pay coaches' fees or provide safe environment on sporting facilities, which can be particularly observed in inner cities [8]. By way of contrast, children raised in privileged environments are marked by an accelerated biological development in comparison to the children growing up in less educated and lower income environments [9]. For this reason, while assessing the influence of environmental factors on the level of a person's motor development it can be stated that individuals of upper and middle class origin are favourably conditioned in comparison to individuals of working class and rural origin [10].

Biological condition of every single individual as well as the whole populations is expressed by their physical, mental and social health [11, 12]. In the economically developed societies motor fitness is a reliable measure of a person's biological state [10]. Motor fitness has grown significantly in importance over the recent decades as a result of continuous decrease in the level of human physical activity, particularly in the societies of economically developed countries [13]. The level of motor fitness is largely determined by a person's physical activity [14]. Numerous research studies indicate that the amount of more intensity physical efforts both in the professional field and in other activities is dramatically decreasing, which results in a handicap of people's biological features and their adaptive abilities, or even leads to heightened susceptibility to falling in with a range of so called diseases of civilization [15]. This negative phenomenon has been also observed among university students [16, 17].

The data concerning students' motor fitness has been well documented in the Polish [18, 19, 20] and foreign scientific literature [21, 22, 23]. However, there is a considerably smaller amount of research on the level of students' motor fitness conducted regularly over a specific period of time (e.g. over a decade) [24] and in relation to selected socioeconomic factors [25].

The research on the relationships between the level of motor abilities of students beginning their studies and selected environmental factors is worth exploring since the time spent at university is the last stage of learning during which university authorities are given an opportunity to promote habits of an active lifestyle. This seems to be of primary importance in view of the fact that it is the intelligentsia that plays a leading role in promoting health culture and in shaping correct pro-health attitudes both in the individual and public health.

The aim of the research conducted with the students of the University of Warmia & Mazury as participants was to diagnose the level of motor and physical development of men aged 19-20, taking into consideration their place of permanent residence and their monthly budget.

Materials and Methods

Ethics

The research was carried out with prior consent from the Ethical Committee of UWM on student volunteers who agreed to participate in the study, which they confirmed by signing a written statement.

Participants

The research on the level of physical and motor development was conducted in 2012 at the end of spring semester during obligatory physical education classes and comprised only 1st-year male students enrolled at the University of Warmia & Mazury in Olsztyn (UWM). The research involved 361 students of full-time studies from 26 students groups randomly selected out of 250. As a result the participants were 19-20-aged students (mean age 19.7) who constituted over 96% of all the students allocated in selected 26 groups. Only those students who were absent on the day of the research were excluded from the experiment.

The majority of the students came from rural areas (32.7%), and the others from small and big towns (21.9% and 19.4% respectively). Nearly half of the participants (47.37%) had less than 1000 PLN at their disposal and a monthly budget of almost two-fifths of them (36.29%) ranged from 1000 – 1500 PLN a month. Slightly more than 11% of the participants had financial means between 1500-2000 PLN, and a smaller percentage of the subjects (5.26%) had their means over 2000 PLN per month (Table 1).

It should be also noted that 1st-year students were deliberately selected as a sole study group as the research carried out in 2012 complemented the cross-sectional studies conducted biannually since 2000, the aim of which is to observe the level of 1st-year students' physical development and motor fitness [20].

Tools and procedures

In order to determine the level of physical development of the subjects, their basic anthropometric features such as body mass and height were measured using the RADWAG scale, on the basis of which their BMI was calculated. Thirteen motor tests such as: the standing long jump [cm], 4x10 m shuttle run [s], the skipping with clapping of hands – 8 s [number of claps], sit-ups – 30 s [number of sit-ups], the medicine ball (4 kg) forward throw [cm], the medicine ball (4 kg) backward throw [cm], pull-ups on bar [s], the downward bend from standing position [cm], 1 and 3 min. Burpee tests [number of cycles], and the forward-backward arm rotation over head holding a bar [cm] were applied to precisely assess the students' level of motor abilities. The accuracy and reliability of the motor tests specified above have been confirmed by numerous studies on this subject [26, 27]. Each of the students was instructed on the proper technique of executing every motor task during the lessons preceding the actual test

dates and given ample time to practice them. Prior to performing the actual tests the participants took part in a 10-minute warm-up. For clearer interpretation of the results, we used the following categories to describe the residential environment: village or small town (< 20,000 inhabitants), big town (20,000 – 50,000 inhabitants), small city (50,001 – 100,000 inhabitants), and big city (> 100,000 inhabitants).

Statistical analysis

The variance analysis was used in order to assess the relationships between the level of physical and motor development and selected environmental factors (the place of permanent residence and the monthly budget). The Duncan test was used to compare means of the specific environmental factors. Statistical calculations were performed and the results were analyzed using the Statistica PL v. 10 Software package.

Results

Neither the place of permanent residence nor the students' monthly budget significantly differentiates

the subjects' body mass and their BMI. The place of permanent residence does not significantly differentiate their body height either, however, the students' monthly budget does. The students who have more than 2000 PLN (4) at their disposal are significantly taller than those whose monthly budget is below 2000 PLN (1, 2, 3). In addition, the students whose financial means were in the range of 1000-1500 PLN (2), were significantly taller than their peers whose means were below 1000 PLN (1), and between 1500-2000 PLN per month (3). In all the categories of the analyzed factors BMI values were about the norm (Table 2).

As can be seen from table 3, in the majority of cases the place of permanent residence does not significantly differentiate the results obtained in the motor tests applied in the study. Only in the case of the flexibility test i.e. the forward-backward arm rotation over head holding a bar trial, the men residing in small towns (2) scored better than those living in big towns (3) (Table 3).

Table 1.

Urbanization and financial status of examined students

Place of permanent residence											
Village	Agglomeration (number of inhabitants)								Total		
	Small town (<20,000)		Big town (20-50,000)		Small city (50-100,000)		Big city (>100,000)				
N	%	N	%	N	%	N	%	N	%	N	%
118	32.7	79	21.9	70	19.4	51	14.1	43	11.9	361	100.0
Monthly budget											
<1000 PLN		1000-1500 PLN		1500-2000 PLN		>2000 PLN		Total			
N	%	N	%	N	%	N	%	N	%		
171	47.4	131	36.3	40	11.1	19	5.2	361	100.0		

Table 2

Statistical characteristics of the students' anthropometric features in relation to their place of permanent residence and monthly budget (bold-faced - differences significant $p < 0.05$)

Place of permanent residence $\bar{X} \pm SD$ (min - max)						
Features	Village	Small town	Big town	Small city	Big city	<i>p</i>
Body height (cm)	178.39±6.64 (164-196)	184±6.89 (164-200)	179.63±6.07 (164-202)	181.25±6.63 (165-203)	178.86±6.87 (164-197)	0.0883
Body mass (kg)	75.61±10.40 (58-105)	84.0±8.99 (58-100)	75.41±10.20 (55-110)	74.98±8.39 (60-90)	73.44±8.023 (60-96)	0.7551
BMI [kg/m ²]	23.74±2.79 (18.72-30.42)	24.82±2.58 (18.02-31.02)	23.36±2.83 (19.20-34.72)	22.86±2.61 (18.59-29.05)	22.95±2.01 (18.99-27.68)	0.1693
Monthly budget $\bar{X} \pm SD$ (min - max)						
Features	<1000 PLN (1)	1000-1500 PLN (2)	1500-2000 PLN (3)	>2000 PLN (4)	<i>p</i>	
Body height (cm)	178.81±6.64 (164-203)	180.18±6.86 (164-202)	178.43±6.60 (164-190)	182.89±6.32 (175-197)	0.0262 4> 1,2, 3 2 > 1,3	
Body mass (kg)	74.61±9.57 (58-110)	75.79±9.14 (58-105)	73.64±11.07 (55-105)	76.11±7.94 (65-92)	0.5229	
BMI [kg/m ²]	23.35±2.82 (18.02-34.72)	23.32±2.24 (18.59-30.42)	23.13±3.34 (19.20-33.14)	22.77±2.27 (18.59-25.66)	0.8114	

Table 3

Statistical characteristics of the students' motor abilities in relation to their place of permanent residence (**bold-faced** - differences significant $p < 0.05$)

Motor test	Place of permanent residence $\bar{X} \pm SD$ (min - max)					p
	Village 1	Small Town 2	Big Town 3	Small city 4	Big city 5	
Standing long jump [cm]	213.84±24.82 (156-280)	201.5±23.38 (146-273)	217.1±22.80 (147-270)	220.65±21.98 (174-275)	210.95±23.82 (165-260)	0.1750
Sit-ups – 30 s [number of sit-ups]	24.27±4.19 (14-35)	25.0±4.8309 (10-33)	23.64±3.38 (10-33)	25.22±3.01 (19-32)	22.93±3.78 (15-29)	0.0909
Zig-zag run [s]	25.18±2.42 (20.01-33.4)	26.72±2.75 (11.2-30.25)	25.52±2.81 (21-37)	25.14±2.34 (20.02-30.5)	25.34±2.12 (22.12-32.25)	0.2444
4x10 m shuttle run [s]	10.77±1.27 (3.66-14.6)	11.58±1.14 (9.2-15.4)	10.46±1.57 (2.74-13.84)	10.54±0.99 (8.58-14.28)	10.64±1.15 (6.12-13.12)	0.4754
Skipping – 8 s [number of claps]	28.57±4.95 (16-44)	24.00±4.29 (13-40)	29.04±4.13 (20-37)	28.16±4.54 (16-44)	26.91±3.55 (20-34)	0.1489
Downward bend from standing position [cm]	9.52±6.79 (-13-24)	7.0±7.07 (-15-25)	9.66±6.69 (-17-25)	10.08±6.52 (-3-25)	7.91±7.26 (-10-26)	0.5618
Forward-backward bar rotation [cm]	92.37±12.64 (66-127)	110.05±14.35 (63-130)	89.57±11.11 (62-115)	94.63±11.82 (76-120)	92.07±12.49 (71-133)	0.0029 2>3
Rowing ergometer 12 min [m]	2380.05±407.97 (1349-3254)	2770.5±341.42 (1345-2980)	2451.16±350.55 (1561-3130)	2446.08±347.17 (1788-3100)	2409.12±362.14 (1456-3254)	0.6838
3 min. Burpee tests [number of cycles]	58.65±9.45 (29-81)	69.00±7.50 (36-73)	60.64±7.65 (41-82)	59.90±7.24 (42-77)	58.02±8.82 (29-80)	0.2924
1 min. Burpee tests [number of cycles]	25.03±5.15 (13-40)	32.50±4.55 (15-35)	25.84±4.64 (16-40)	25.37±4.12 (16-36)	24.53±4.45 (14-36)	0.5114
Medicine ball (4 kg) backward throw [cm]	1021.54±216.54 (112-1550)	1060.0±233.31 (119-1638)	1040.53±217.40 (620-1750)	1017.06±179.66 (580-1420)	966.28±195.37 (110-1320)	0.1539
Medicine ball (4 kg) forward throw [cm]	825.76±152.35 (310-1220)	800.0±176.77 (480-1360)	844.64±193.78 (200-1300)	832.73±192.25 (109-1230)	816.40±166.09 (310-1250)	0.2895
Pull-ups on bar [number of pulls]	6.24±4.13 (0-18)	10.0±4.79 (0-20)	6.76±4.51 (0-18)	6.65±4.88 (0-19)	4.67±3.66 (0-16)	0.1624

As can be shown in table 4, the students monthly budget significantly differentiated the level of their motor abilities in the majority of the motor tests including: the standing long jump, the forward-backward arm rotation over head holding a bar, the Cooper's test (12 min.) on a rowing ergometer, 1 and 3 min. Burpee test, the medicine ball (4 kg) forward and backward throws, and pull-ups on a bar. Fluctuations of the results obtained by the students were mainly gradient in character, i.e. the higher urbanization status the better stores in the above tests. In the other tests such as: sit ups– 30 s, the zig-zag run, the 4x10 m shuttle run, the skipping with clapping of hands – 8 s, and the downward bend from standing position no significant differences were observed (Table 4).

Discussion

The influence of socioeconomic status on the

biological development of young people in the 1980s was the subject of numerous studies including Wolański et al. [28]. This research indicated the difference in the level of physical and motor development between the individuals living in rural and city environment [29, 30]. Similar results were obtained in the research by Mleczo [31], who indicated that 15-19-aged male residents of the city were characterized by a significantly higher body fat than their peers from rural areas, which in consequence marked them with a significantly lower level of aerobic capacity. The author in question proved that the subjects' financial means are one of the key factors determining eating habits and the level of physical activity of young men. Further research by Mleczo, on the other hand, showed the blurring of differences in the motor and somatic development of 15-19-aged male residents of

Table 4

Statistical characteristics of the students' motor abilities in relation to their monthly budget (bold-faced - differences significant $p < 0.05$)

Motor test	Monthly budget $\bar{X} \pm SD$ (min - max)				p
	<1000 PLN (1)	1000-1500 PLN (2)	1500-2000 PLN (3)	>2000 PLN (4)	
Standing long jump [cm]	212.01±22.27 (146-275)	218.03±24.76 (156-280)	221.40±23.97 (170-273)	231.00±19.76 (200-270)	0.0013 4>1
Sit-ups – 30 s [number of sit-ups]	23.74±4.17 (10-32)	24.12±4.01 (14-35)	24.28±5.08 (13-33)	25.84±3.76 (17-31)	0.2092
Zig-zag run [s]	25.33±1.88 (21.0-31.03)	25.30±2.15 (21.0-32.91)	24.88±3.62 (20.0-37)	24.59±4.16 (20.0-32.25)	0.6533
4x10 m shuttle run [s]	10.77±1.68 (2.74-17.85)	10.74±0.91 (9.12-14.6)	10.53±1.22 (9.05-13.84)	10.31±1.39 (6.12-13.12)	0.4558
Skipping – 8 s [number of claps]	28.07±4.49 (13-44)	28.08±4.56 (16-44)	29.15±3.71 (21-38)	29.63±5.12 (22-37)	0.2748
Downward bend from standing position [cm]	8.86±6.39 (-17-26)	9.69±7.16 (-15-25)	10.38±6.64 (-13-25)	13.11±8.08 (-10-25)	0.0504
Forward-backward bar rotation [cm]	91.89±12.29 (69-126)	91.65±11.42 (62-123)	99.90±14.53 (76-127)	102.16±16.07 (79-133)	0.0000 4,3>1,2
Rowing ergometer 12 min [m]	2300.65±366.17 (1345-3224)	2494.52±328.92 (1349-3254)	2521.23±379.34 (1456-3130)	2570.00±369.63 (2000-3254)	0.0000 4>1
3 min. Burpee tests [number of cycles]	56.40±8.45 (29-82)	61.15±6.76 (29-80)	61.35±9.45 (39-79)	63.11±8.25 (51-80)	0.0000 4,3,2>1
1 min. Burpee tests [number of cycles]	23.69±4.57 (13-40)	26.09±4.24 (13-39)	26.83±5.11 (18-39)	27.21±4.63 (22-36)	0.0000 4,3,2>1
Medicine ball (4 kg) backward throw [cm]	970.94±205.79 (110-1470)	1030.45±179.85 (119-1550)	1183.33±261.24 (690-1750)	1190.53±137.98 (890-1450)	0.0000 4,3>1,2
Medicine ball (4 kg) forward throw [cm]	789.18±151.33 (200-1220)	846.06±158.10 (109-1200)	972.25±190.77 (540-1360)	976.32±208.31 (650-1320)	0.0000 4,3>1,2
Pull-ups on bar [number of pulls]	5.67±4.12 (0-19)	6.22±4.12 (0-20)	7.63±5.26 (0-18)	9.63±5.60 (1-20)	0.0004 4>1,2

Małopolska, Poland [32], which was also confirmed in the research by Jaworski et al. [33]. They revealed that the place of permanent residence did not significantly differentiate the level of selected coordination abilities of the students enrolled at the Academy of Physical Education in Cracow in the years 2006-2008. According to the authors of the above research the reason behind this tendency can be civilization upgrading of rural areas in Poland and economic growth of these areas, as a result of which the financial status of rural families has been improved, being parallel with the impoverishment of urban families particularly in small towns.

The role of the place of permanent residence (urbanization level) in human biological development is unquestionable and thus has been highlighted in numerous studies [5, 34, 35, 36]. It should be noted, however, that socioeconomic status of the Poland of 1980s is incomparable to the Poland after 2000, which the research studies above indicated [32, 33]. A similar phenomenon can be observed in the developing countries of Africa such as Botswana. The research conducted with secondary school students as participants showed that the students marked by low socioeconomic status living in so called rural villages devoted more time to physical activity, which resulted in their smaller relative body mass, overweight/obesity [37].

The research conducted worldwide over the last

decades shows that negative influence of low physical activity of children and youngsters on the level of their motor abilities is recorded both in the economically developed [38, 39, 40, 41] and underdeveloped regions [42, 43]. This negative phenomenon observed over the last two decades refers not only to children and adolescents but also to young people between 19 and 28 years old [44], including university students [22, 45, 46, 47]. Polish students can be classified as physically inactive individuals irrespective of their place of permanent residence [48], which results from their very low level of physical activity, virtually restricted to participation in obligatory Physical Education classes [18, 19, 20].

In addition, it should be also taken into account that the place of permanent residence is firmly correlated with other socioeconomic factors such as educational background and the kind of occupation. In the light of the above relationships, environmental conditioning of men's somatic development and motor fitness should be analyzed in terms of integrative interaction of a group of factors [49]. According to Conley & Glauber [50], most research have revealed that body mass is significantly, or minimally correlated with adult men's socioeconomic status including industrial category. In the opinion of researchers, however, there is a difference in ecosensitivity between the features under investigation such as body mass, body height and BMI index calculated on the basis

of these parameters. An individual's body height is under a strong influence of cumulative and irreversible effects of environmental factors which affect him or her throughout his or her life. That is why body height is to a greater extent genetically determined than body mass whereas relative body mass and dependent on it BMI undergo other physiological mechanisms regulating their values. For this reason these parameters are more sensitive to the current environmental stimuli and their values may increase over relatively shorter periods of time.

A stronger impact of socioeconomic factors is more discernible in underdeveloped regions with a high unemployment rate [51] such as Warmia & Mazury. The financial status of the majority of families dwelling in towns of 20 up to 40,000 of inhabitants is similar to those residing in the country as a result of the blurring of differences in the region characterized by 30% unemployment rate and agriculture and tourism oriented economy. Moreover, a marginal number of bigger agglomerations (only two cities of 150-200,000 inhabitants) are under a strong influence of the surrounding agriculture and tourism oriented environment.

This observation has been confirmed by the research conducted with UWM students as participants on the relationships between the 1st-year students' body height and mass and their BMI, and the place of permanent residence, which was carried out biannually between 2000-2006. It revealed that in 2000, 2002 and 2006 no differences in the level of subjects' body fat were observed irrespective of their place of permanent residence. Only in 2004 significant differences were observed showing that the students residing in the country were marked by significantly higher BMI values (24.1 kg/m²) in comparison with their peers from small towns (BMI – 22.9 kg/m²), big towns (22.8 kg/m²), and big cities (22,9 kg/m²), whereas the values of the slimness indicators did not significantly differ in all the years [52]. Inverse relationships between adiposity and urbanization have been previously reported in Swedish [53], American [54], Canadian [55] and Danish [35] male populations. Cross National Student Health Survey (CNSHS), consisting of 5,900 records of university students from seven countries in Europe including Germany, Poland, Bulgaria, Spain, Lithuania, Denmark, and Turkey, indicated that the students coming from Eastern European countries (Poland, Bulgaria and Lithuania) showed a tendency toward lower BMI as compared with the Southern and Western Europe countries (Germany, Denmark and Spain) (max. difference of 2.5 kg/m², $d=0.78$), with 72-84% BMI in the normal category. No considerable differences, on the other hand, were observed in the body height of men [56]. The research conducted with the students from Thailand revealed that they were marked by lower mean values of body mass (0.93 kg) and higher values of body height (1.54 cm) in comparison to their peers coming from highly developed countries [57]. In contrast, the research on the influence of SES on the level of somatic development of 11-18-year-old adolescents from South-Eastern Nigeria showed that the parameters of the boys' body mass and height were

strongly correlated with the SES factors such as: parents' educational background and their monthly budget. This means that the individuals with a higher status were characterized by higher values of body height and lower values of body mass thus slimmer [58]. The above data revealed that students who live in underdeveloped regions of the countries marked by a smaller national gross per one person are generally slimmer in comparison to those coming from developing and developed countries. On the other hand, the research conducted in Nigeria confirmed the assumption put forward by Jopkiewicz [49], in which he opts for integrated influence of a group of factors. The Global Database on BMI indicators relating to the differences in urban-rural areas from about 100 countries and regions which comprised about 88% of the world population showed that males residing in urban areas were characterized by significantly higher obesity and pre-obesity rates than their rural counterparts, with mean differences of 2.2% [59]. The analysis of the level of motor fitness in relation to the students' place of permanent residence showed that out of the 13 motor tests applied in the study, in the majority of cases no significant differences in the level of specific motor abilities were observed except for one test which aimed at measuring the mobility by means of the shoulder girdle forward - backward arm rotation over head holding a bar trial. Therefore, it should be stated that the place of permanent residence is a factor which does not differentiate the level of motor fitness of 19-20-aged students residing in the region of Warmia & Mazury.

The effect of blurring of the differences between more developed and underdeveloped areas, which was observed in our research, can result from the improvement of living conditions in the country and the apparent deterioration of such conditions in the urban areas. Such an assumption was confirmed by the earlier research conducted with the UWM students as participants. The first research carried out in 2000 showed that the only significant differences in the results obtained by the students referred to the downward bend from standing position trial in favour of the men residing permanently in the country [20], whereas the research in 2002 showed significant differences in the following tests: 4x10 m shuttle run, the skipping with clapping of hands – 8 s, 1 min. Burpee test, the medicine ball (4 kg) backward throw, as well as the pull-ups on a bar [60]. In contrast, the research conducted in 2004 [61] and 2006 [62, 63, 64, 65], showed no differences in the tests measuring flexibility, strength, speed and endurance abilities. A similar tendency of blurring of the differences in the level of motor fitness in the men living in the rural and urban areas was observed between 2000 and 2006 [66, 67].

Unlike in the results above there is a noticeable relationship between the level of the students' motor fitness and their monthly budget. Out of the 13 motor tests, 8 cases showed statistically significant differences. What is more, these relationships indicated that the increase in the monthly budget positively affects the level of the students' motor abilities in particular in the strength

tests such as: the standing long jump, the medicine ball backward and forward throws, pull-ups on a bar; the hybrid tests [68] including speed-strength and endurance-strength (1 and 3 minute Burpee tests respectively) [69] as well as endurance tests (Cooper test [12 min.] on a rowing ergometer).

For the reason that adult individuals' motor fitness depends on their level of physical activity, which is influenced by a range of environmental factors such as sociocultural, psychological, and biological [70, 71], and on the basis of the results above it can be assumed that students' monthly budget affects their level of physical activity in a gradient manner, and therefore determines their motor fitness more significantly in comparison to their place of permanent residence.

Conclusions

- The place of permanent residence does not differentiate significantly the students' height, body mass and their BMI, nor the results obtained in the majority of motor tests except for the forward-backward arm rotation over head holding a bar trial.
- The students' monthly budget was shown to differentiate only the students' height, which was the highest in the students with over 2000 PLN a month

at their disposal. The monthly budget, however, significantly differentiates the level of the majority of motor abilities examined in the tests such as: the standing long jump, the forward-backward arm rotation over head holding a bar trial, Cooper test (12 min.) on a rowing ergometer, 1 and 3 min. Burpee tests, the medicine ball (4 kg) backward and forward throws, and pull-ups on a bar. This dependence is gradient in nature, in favour of those individuals who have a more substantial monthly budget at their disposal.

- The blurring of differences in the level of physical and motor development of the students marked by distinct urban status may result from the specificity of Warmia & Mazury, which is one of the poorest and most underdeveloped regions in Poland with the highest unemployment rate nationwide.
- The fact that the relationship between the students' monthly budget and the results obtained in the majority of motor tests was gradient in nature might be explained by a more intensive physical activity, hence more costly physical activity observed among more affluent individuals.

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