

## INFLUENCE OF SELECTED SOCIOECONOMIC FACTORS ON SWIMMING SKILLS OF YOUNG POLISH WOMEN AGED 19-20

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### ABSTRACT

The aim of the study was to assess the influence of selected environmental factors on the level of swimming skills exhibited by young Polish women. Swimming skills were expressed as the ability to swim, the distance swum, and the familiarity with selected swimming strokes. The research was conducted with 298 young Polish women aged 19-20 as participants, all of them residing in Warmia and Mazury Province, Poland. A diagnostic survey was conducted using an anonymous questionnaire. Out of the analyzed environmental factors only the place of permanent residence and an available monthly budget were found to have significantly ( $p = 0.0001$ ) influenced measures of swimming skills (i.e. the ability to swim, the distance swum, and the familiarity with selected swimming strokes, respectively). The increasing level of urbanization and a higher monthly budget positively influenced the women's performance in swimming as there were only few women who were unable to swim even a single meter. Moreover, the latter factor also positively affected the number of swimming strokes the study participants could perform. The remaining factors (i.e. parents' educational background, the distance between the place of residence and the nearest lake, and the proximity of beaches at the nearest lake) revealed a complete lack of relationships with the swimming skill measures.

**Keywords:** Skills, Socioeconomic and Strokes.

### INTRODUCTION

Human processes of adaptation such as acquiring swimming skills depend on a person's personal qualities as well as the factors coming from the immediate and general environment. The nature of a person's reaction to the influence of environmental factors depends on the type of the factor, its intensity, duration, and a given person's susceptibility (Malinowski, 1980).

Socioeconomic factors such as the level of income, parents' educational background, urbanization status, physical culture, traditions and social behaviors, all of which belong to the group of exogenous environmental factors (Wolański, 2005), play a major role in human development (Goldstein, 1971; Lindgren, 1976; Tanner, 1986). Urbanization is arguably one of the major socioeconomic factors (Eiben, Barabás, Kontra, and Pantó, 1996; Eveleth and Tanner, 1990). A person's physical development can be influenced by the place of residence, be this a large or small urban area or a rural environment (Komlos, 1994). The accelerated growth and maturity of children from large urban environments is associated with better care and living conditions (e.g. diet, hygiene, medical care) (Eiben and Mascie-Taylor, 2004). Researchers also point out the influence of urban stimuli affecting the nervous system and sensory organs (e.g. TV, cinema, the Internet, advertisements) (Jopkiewicz and Suliga, 2008).

Income levels are relative indicators of a material status of a given family or socioeconomic group (Roche and Sun, 2003). The actual state of wealth and consumption is expressed by an average income per family member. Variations in the general level of income and expenses result in different ways of managing finances (Lindgren, 1976; Tanner, 1962).

Social factors play an equally important role in human ontogenesis, as it is believed that from the moment a child is born it is subjected to the influence of the domestic environment (Bogin, 1999). To illustrate this, children of white collar workers tend to be of more ectomorph build and grow taller than their village peers, who are characterized by a stockier, more mesomorph build. The highest values of somatic features and the quickest maturation have been observed in the children raised by parents with a higher education background (Eiben and Pantó, 1988). Individuals who grow up in privileged upper-class or middle-class communities are fitter than their peers from working-class (tradesmen, factory workers) or backwater rural areas (Jopkiewicz and Suliga, 2008).

The biological state of individuals and populations is expressed by their physical, mental, and social health (Eiben, 1998; Tanner, 1994), motor fitness being its most important indicator (Eiben and Pantó, 1986). Environmental factors also significantly influence the level of various forms of physical activity engaged in by a person. Numerous studies have been conducted in this field; however, as Ford and colleagues (Ford, Merritt, Heath, Powell, Vashburn, Kriska, and Haile, 1991) and Eiben and Mascie-Taylor (2004) point out, there is very few data published on the physical habits of individuals from low socioeconomic backgrounds. Since there is a strong relationship between

physical activity and a person's level of motor fitness, the amount of physical activity performed by an individual can be estimated by studying the general level of motor fitness (Eiben and Pantó, 1986).

Swimming skills can be regarded as an indirect measure of health-related fitness (Chase, Sui, and Blair, 2008; Podstawski, Boraczyńska, Skibniewska, and Kolankowska, 2013). Ineffective swimming skills may be connected with an increased risk of problems with proper physical development as well as a low level of physical fitness and capacity as a result of a sedentary lifestyle (hypokinesia) (Broman et al., 2006; Cider, Svealv, Tang, Schaufelberger, and Anderson, 2006; Gwinup, 1987, Westby, 2001). An adequate level of swimming skills is very useful in life and beneficial for a person or even populations (Barss, 1995; Asher, Rivara, Felix, Vance, and Dune, 1995; Brenner, Saiuja, and Smith, 2003). This seems to have been proved by numerous instances of drowning, which have been recorded among ethnic minorities living in developed countries as a result of their inability to swim (Martin and Witma, 2010; Quan, Crispin, Bennett, and Gomez, 2006). A similar research referred to a heightened risk of drowning of children living in low and middle income countries who were incapable of swimming (Borse, Hyder, Bishai, Baker, and Arifin, 2011; Royal Life Saving Society, 2012; World Health Organization, 2008, Yang, Nong, Li, Feng, and Lo, 2007).

Swimming as one of the forms of physical activity is correlated with specific socioeconomic factors which are characteristic of a given environment. On the basis of a limited range of research, socioeconomic status has been shown to be a prime factor in achieving proficiency level in swimming skills as children who are raised in middle and upper-class families are more likely to have regular access to swimming facilities (Ponessa, 1992). Apart from this, the lack of opportunities to practice basic swimming skills may contribute to a fear of drowning and result in a loss of swimming self-efficacy, particularly among women (Berukoff and Hill, 2010). Studies on swimming skills are mostly aimed at presenting the percent of people representing different social groups defined in terms of the following factors: age, gender, ethnical or national background (McCool, Ameratunga, and Robinson, 2008; Moran, 2008). There are much fewer studies dedicated to the relationships between selected environmental factors and high school or university students' swimming skills. Swimming skills of high school students were assessed in New Zealand (Moran, 2008, 2010), and Spain (Berukoff, and Hill, 2010), whereas the research on the university students' skills was conducted in Norway (Moran et al., 2012), New Zealand (Moran et al., 2012), Australia (Moran et al., 2012; Petrass, Blitvich, McElroy, Harvey, and Moran, 2012), Japan (Moran et al., 2012), and Poland (Podstawski et al., 2013). However, most of the above research was carried out with the students of Physical Education and Sports Sciences, thus individuals whose overall physical development is more advanced than the average including their swimming skills. Moreover, few studies mentioned above show the relationship between the students' swimming skills and their socioeconomic status (SES) (Burekoff and Hill, 2010; Moran, 2008). No studies concerning the influence of environmental factors on the swimming skills of selected social groups were found in Polish literature.

Therefore, the assessment of young Polish female students' swimming skills in relation to selected environmental factors constitutes a topic that is worth exploring. For the reason that it is this social group that will shape and promote attitudes of a healthy lifestyle. In fact, it is the intelligentsia that breeds the biggest number of managerial staff, administrative and political executives, who significantly affect the scale of progress in shaping health-conscious attitudes, including acquiring an adequate level of swimming proficiency. The aim of the conducted studies was to assess the influence of selected environmental factors (as independent variables) on the level of swimming skills (demonstrated by the ability to swim, the distance able to be swum, and the capacity to demonstrate different formal swimming strokes as dependent variables) exhibited by young Polish women.

## **METHOD**

### Participants

The research was conducted in 2011 during obligatory physical education classes at the University of Warmia and Mazury (UWM) in Olsztyn. The studies involved 298 first-year female students aged 19-20 as participants. The research was carried out in compliance with prior consent from the Ethical Committee of the UWM. The volunteers willingly agreed to participate in the study. First-year female students were specifically chosen on the grounds that it is still possible to shape and alter their attitudes and habits towards swimming. What is more, female students constitute a vast majority of all the students attending the UWM (over 70%). In addition, this study complements cross-sectional studies on healthy lifestyle and motor fitness of the students entering the UWM, which have been conducted as part of the program „Health – Conscious University” (Podstawski, 2006; Podstawski, Górnik, Kolankowska, 2013; Podstawski, Górnik, Kolankowska, Boraczyński, and Boraczyńska, 2013). All the women from randomly selected groups were interviewed and it was determined that every single student was a permanent resident of Warmia and Mazury Province. Such a sample can be considered reasonably homogenous. A detailed analysis of the cohort is presented in Table 1.

Table 1  
STUDY GROUP CHARACTERISTICS

<b>Permanent Place of Residence</b>											
<b>Village</b>		<b>Small town</b>		<b>Big town</b>		<b>Small city</b>		<b>Big city</b>		<b>Total</b>	
N	%	N	%	N	%	N	%	N	%	N	%
82	27.52	133	44.63	55	18.46	11	3.69	17	5.7	298	100
<b>Mother's Educational Background</b>											
<b>Primary school</b>			<b>Secondary school</b>			<b>Higher Education</b>			<b>Total</b>		
N		%	N		%	N		%	N		%
32		10.74	159		53.36	107		35.91	298		100
<b>Father's Educational Background</b>											
<b>Primary school</b>			<b>Secondary school</b>			<b>Higher Education</b>			<b>Total</b>		
N		%	N		%	N		%	N		%
30		10.07	156		52.35	112		37.58	298		100
<b>Students' Monthly Budget</b>											
<b>&lt;1000 zł</b>		<b>1000-1500 zł</b>		<b>1500-2000 zł</b>		<b>2000&lt; zł</b>		<b>Total</b>			
N		%	N		%	N		%	N		%
182		61.07	105		35.23	11		3.69	0		0
											298
											100
<b>Distance to Nearest Lake</b>											
<b>To 1 km</b>		<b>1 - 2.5 km</b>		<b>2.5 – 5 km</b>		<b>5 - 10 km</b>		<b>Total</b>			
N		%	N		%	N		%	N		%
48		16.11	106		35.57	107		35.91	37		12.42
											298
											100

The place of permanent residence is one of the variables included in Table 1. For clearer interpretation of 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). Table 1 reveals that most of the surveyed 1<sup>st</sup> year students lived in small towns (44.63%), with significantly fewer residing in villages (27.52%) and big towns (18.46%). Merely 6% of the respondents (5.7%) resided in big cities and even fewer in small cities (3.69%). Over half of the women in the sample had mothers and fathers who had completed only secondary school (53.36% and 52.35% respectively). Fewer parents (mothers – 35.91% and fathers - 37.58%) had a higher education background, while parents with only primary education constituted the lowest percentage (mothers - 10.74% and fathers - 10.07%). The monthly budget of most women (61.07%) did not exceed 1000 PLN (313 USD) with over 1/3 of the students (35.23%) having 1000 – 1500 PLN (313 – 469 USD) at their disposal. Only 4% of the respondents (3.69%) reported a monthly budget of 1500-2000 PLN (469 – 625 USD) and none of the women possessed a monthly budget of over 2000 PLN (625 USD). A similar percentage of students (approx. 35%) indicated that the distance between the place of residence and the nearest lake was 1 – 2.5 km and 2.5 – 5 km. Far fewer women lived less than 1 km and between 5 and 10 km away from the nearest lake (16.11% and 12.42% respectively).

**Instrumentation**

The students were surveyed by an anonymous questionnaire. We assessed whether the number of participants was sufficient so that the group could be considered representative, taking into account the previous selection criteria (i.e. a homogenous group residing in Warmia and Mazury Province and composed of 1<sup>st</sup> year female university students, aged 19-20). The following formula (1) was used for this purpose:

$$n = \frac{\mu_a^2}{4d^2}, \tag{1}$$

Where:  $d$  – the maximum (acceptable) error of estimation,  $\mu_{\alpha}$  – the value from the normal distribution table  $N(0.1)$  at the accepted confidence coefficient  $1 - \alpha$ . We assumed that for the accepted confidence coefficient  $1 - \alpha = 0.90$  ( $\mu_{\alpha} = 1.64$ ), the average estimation error does not exceed 5% (Kreffit AND Choszcz, 2000). Formula (1) enabled to calculate that the minimum number of women who ought to be surveyed was 269, and therefore fewer than the number of people involved in our experiment (298). Thus, the sample was found to be representative for the population of UWM female students and appropriate for such kind of survey. The level of the women's swimming skills was estimated by the students themselves. Due to a small number of respondents who regard their swimming skills as "good" or "very good", these categories were grouped together. By familiarity with strokes we understand the range of swimming styles the students were capable of swimming. The survey results were processed statistically by means of Statistica Pl Software using statistics module and non parametric chi-square test (Rabiej, 2012) so as to verify the research hypothesis which was based on assumption whether the socioeconomic factors which were accepted for the research had a significant influence on the swimming skills showed by the women participating in the research.

## RESULTS

The results concerning the relationships between the analyzed environmental factors and swimming abilities have been presented in tables 2 – 7. Table 2 presents the influence of the father's educational background on female students' swimming skills.

Table 2  
INFLUENCE OF FATHER'S EDUCATIONAL BACKGROUND ON SWIMMING SKILLS

Influence of Father's Educational Background on Swimming Ability								
Criteria	Primary school		Secondary school		Higher education		Total	
	N	%	N	%	N	%	N	%
Cannot swim	24	80.00	108	69.68	81	72.32	213	71.71
Swims poorly	6	20.00	44	28.39	27	24.11	77	25.93
Swims well/very well	0	0.00	3	1.93	4	3.57	7	2.36
Total	30	100.00	155	100.00	112	100.00	297	100.00
Degrees of freedom							4	
Chi-square value							2.8188	
Probability (p) of exceeding the calculated value of chi-square statistics							0.59	
Influence of Father's Educational Background on Distance Swum [M]								
0 m	24	80.00	108	69.23	81	72.32	213	71.48
<50 m	6	20.00	37	23.72	19	16.96	62	20.80
50-100 m	0	0.00	9	5.77	9	8.04	18	6.04
>100 m	0	0.00	2	1.28	3	2.68	5	1.68
Total	30	100.00	156	100.00	112	100.00	298	100.00
Degrees of freedom							6	
Chi-square value							5.7527	
Probability (p) of exceeding the calculated value of chi-square statistics							0.45	
Influence of Father's Educational Background on Ability to Swim Given Strokes*								
Cannot swim	24	80.00	108	63.91	81	68.64	213	67.19
Front crawl	0	0.00	8	4.73	6	5.09	14	4.42
Butterfly	0	0.00	1	0.59	1	0.85	2	0.63
Backstroke	2	6.67	3	1.78	4	3.39	9	2.84
Breaststroke	4	13.33	29	17.16	18	15.25	51	16.09
Own style	0	0.00	20	11.83	8	6.78	28	8.83
Total*	30	100.00	169	100.00	118	100.00	317	100.00

Degrees of freedom	10
Chi-square value	10.4028
Probability (p) of exceeding the calculated value of chi-square statistics	0.41

p>0.05 signifies the lack of significant differences (no influence)

The results of the statistical analyses indicated that the probability (p) of exceeding the calculated value of chi-square statistics was shown to be greater than 0.05 for all the analyzed dependent variables (swimming skill level: p = 0.59; the distance swum: p = 0.45 ; familiarity with strokes: p = 0.41). Based on the above we can state that the father's educational background did not influence the swimming skills of these female students (Table 2).

Table 3

INFLUENCE OF MOTHER'S EDUCATIONAL BACKGROUND ON SWIMMING SKILLS

Influence of Mother's Educational Background on Swimming Ability									
Criteria	Primary school		Secondary school		Higher education		Total		
	N	%	N	%	N	%	N	%	
Cannot swim	23	71.88	119	75.32	71	66.36	213	71.71	
Swims poorly	8	25.00	36	22.78	33	30.84	77	25.93	
Swims well/very well	1	3.12	3	1.90	3	2.80	7	2.36	
Total	32	100.00	158	100.00	107	100.00	297	100.00	
Degrees of freedom								4	
Chi-square value								2.7904	
Probability (p) of exceeding the calculated value of chi-square statistics								0.59	
Influence of Mother's Educational Background on Distance Swum [M]									
0 m	23	71.88	119	74.84	71	66.36	213	71.48	
<50 m	7	21.87	30	18.87	25	23.36	62	20.80	
50-100 m	2	6.25	7	4.40	9	8.41	18	6.04	
>100 m	0	0.00	3	1.89	2	1.87	5	1.68	
Total	32	100.00	159	100.00	107	100.00	298	100.00	
Degrees of freedom								6	
Chi-square value								3.5925	
Probability (p) of exceeding the calculated value of chi-square statistics								0.73	
Influence of Mother's Educational Background on Ability To Swim Given Strokes*									
Cannot swim	23	71.88	119	68.00	71	64.55	213	67.19	
Front crawl	0	0.00	9	5.14	5	4.55	14	4.42	
Butterfly	0	0.00	1	0.57	1	0.91	2	0.63	
Backstroke	0	0.00	4	2.29	5	4.55	9	2.84	
Breaststroke	5	15.62	24	13.71	22	20.00	51	16.09	
Own style	4	12.5	18	10.29	6	5.44	28	8.83	
Total*	32	100.00	175	100.00	110	100.00	317	100.00	
Degrees of freedom								10	
Chi-square value								8.4249	
Probability (p) of exceeding the calculated value of chi-square statistics								0.59	
p>0.05 signifies the lack of significant differences (no influence)									

Table 3 presents the influence of the mother's educational background on the students' swimming skills. In the case of the mother's education it was calculated that the probability (p) of exceeding the calculated value of chi-square statistics was greater than 0.05 for all dependent variables. (swimming skill level: p = 0.59 ; the distance swum [m] p = 0.73; familiarity with strokes: p = 0.59). These results indicate that the mother's educational background did not influence the swimming skills of female students (Table 3).

Table 4

INFLUENCE OF THE PLACE OF PERMANENT RESIDENCE ON SWIMMING SKILLS

Criteria	Influence of the Place of Permanent Residence on Swimming Ability											
	Village		Small town		Big town		Small city		Big City		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Cannot swim	60	73.17	99	75.00	35	63.63	7	63.64	12	70.59	213	71.71
Swims poorly	21	25.61	30	22.73	19	34.55	4	36.36	3	17.65	77	25.93
Swims well/very well	1	1.22	3	2.27	1	1.82	0	0.00	2	11.76	7	2.36
Total	82	100	132	100	55	100	11	100	17	100	297	100
Degrees of freedom										8		
Chi-square value										11.0033		
Probability (p) of exceeding the calculated value of chi-square statistics										0.20		
Influence of the Place of Permanent Residence on Distance Swum [m]												
0m	69	84.15	104	78.20	35	63.64	5	45.45	0	0.00	213	71.48
< 50m	11	13.42	26	19.50	16	29.09	6	54.55	3	17.64	62	20.80
50-100 m	2	2.44	2	1.50	4	7.27	0	0.00	10	58.82	18	6.04
> 100 m	0	0.00	1	0.75	0	0.00	0	0.00	4	23.53	5	1.68
Total	82	100.0	133	100.0	55	100.00	11	100.00	17	100.00	298	100.00
Degrees of freedom										12		
Chi-square value										39.1344		
Probability (p) of exceeding the calculated value of chi-square statistics										≈0.0001		
Influence of Mother's Educational Background on Ability To Swim Given Strokes*												
Cannot swim	62	68.89	90	66.18	40	67.80	9	75.00	12	60.00	213	67.19
Front crawl	6	6.67	5	3.68	3	5.08	0	0.00	0	0.00	14	4.42
Butterfly	1	1.11	0	0.00	1	1.69	0	0.00	0	0.00	2	0.63
Backstroke	2	2.22	1	0.74	2	3.39	1	8.33	3	15.00	9	2.84
Breaststroke	11	12.22	25	18.38	9	15.25	2	16.67	4	20.00	51	16.09
Own style	8	8.89	15	11.03	4	6.78	0	0.00	1	5.00	28	8.83
Total*	90	100.0	136	100.0	59	100.00	12	100.00	20	100.00	317	100.00
Degrees of freedom										20		
Chi-square value										23.3606		
Probability (p) of exceeding the calculated value of chi-square statistics										0.27		
p>0.05 signifies the lack of significant differences (no influence)												

The chi-square statistical analysis of the results presented in table 4 revealed that when accounting for the place of permanent residence the value of the probability (p) of exceeding the calculated value of chi-square statistics was greater than 0.05 for two of the three analyzed dependent variables i.e., swimming skill level (p = 0.20) and familiarity with given swimming strokes (p = 0.27). A significant influence of the place of permanent residence on the distance swum [m] was observed (p = 0.0001). It was noted that the increase in the level of urbanization resulted in a decrease in the number of women who were unable to swim even a single meter (village – 84.15%, small town – 78.20%, big town – 63.64%, small city – 45.45%, and big city – 0%). In comparison, the number of women able

to swim but no further than 50 m increased with the exception of big city residents (village – 13.42%, small town – 19.50%, big town – 29.09%, small city – 54.55%, and big city – 17.64%). On the whole, swimmers who were capable of swimming the furthest, i.e. 50 – 100 m and over 100 m, resided predominantly in cities (Table 4).

Table 5

INFLUENCE OF MONTHLY BUDGET [ZŁ] ON SWIMMING SKILLS

Influence of Monthly Budget on Swimming Ability									
Criteria	<1000		1000-1500		1500-2000		Total		
	N	%	N	%	N	%	N	%	
Cannot swim	135	74.18	71	68.27	7	63.64	213	71.71	
Swims poorly	46	25.27	29	27.88	2	18.18	77	25.93	
Swims well/very well	1	0.55	4	3.85	2	18.18	7	2.36	
Total	182	100.00	104	100.00	11	100.00	297	100	
Degrees of freedom							4		
Chi-square value							16.0532		
Probability (p) of exceeding the calculated value of chi-square statistics							0.0029		
Influence of Monthly Budget on Distance Swum [m]									
0 m	169	92.85	44	41.90	0	0.00	213	71.48	
<50 m	12	6.60	47	44.77	3	27.27	62	20.8	
50-100 m	1	0.55	14	13.33	3	27.27	18	6.04	
> 100 m	0	0.00	0	0.00	5	45.46	5	1.68	
Total	182	100.00	105	100.00	11	100.00	298	100	
Degrees of freedom							6		
Chi-square value							27.8563		
Probability (p) of exceeding the calculated value of chi-square statistics							≈0.0001		
Influence of Monthly Budget on Ability To Swim Given Strokes*									
Cannot swim	133	71.12	72	62.07	8	57.14	213	67.19	
Front crawl	5	2.67	8	6.89	1	7.14	14	4.42	
Butterfly	0	0.00	2	1.73	0	0.00	2	0.63	
Backstroke	3	1.60	4	3.45	2	14.29	9	2.84	
Breaststroke	29	15.51	20	17.24	2	14.29	51	16.09	
Own style	17	9.09	10	8.62	1	7.14	28	8.83	
Total	187	100	116	100	14	100	317	100	
Degrees of freedom							10		
Chi-square value							35.5640		
Probability (p) of exceeding the calculated value of chi-square statistics							≈0.0001		
p>0.05 signifies the lack of significant differences (no influence)									

The influence of the monthly budget available to the students on their swimming skills is presented in Table 5. The probability (p) of exceeding the calculated value of chi-square statistics was greater than 0.05 for swimming skill level, but there were significant differences in respect of the distance swum and familiarity with different swimming strokes (p = 0.0029, p = 0.0001, and p = 0.0001 respectively). Along with the increase in monthly budget, the number of women incapable of swimming any distance decreased (< 1000 PLN – 74.18%, from 1000 to 1500 PLN – 68.27%, and from 1500 to 2000 PLN – 63.64%). On the other hand, the number of women who declared they were able to swim less than 50 m was the highest among students having 1000 – 1500 PLN per month at their disposal, and the lowest for those having less than 1000 PLN. Women with the highest monthly budget (1500 – 2000 PLN) stated that they were able to swim the furthest (from 50 to 100 m – 27.77% and over 100 m – 45.46%).

When looking into the familiarity with specific swimming strokes, the increase in the monthly budget resulted in a higher percentage of women who were able to swim the front crawl (<1000 PLN – 2.67%, from 1000 to 1500 PLN – 6.89%, and from 1500 to 2000 PLN – 7.14%) and backstroke (<1000 PLN – 1.60%, from 1000 to 1500 PLN – 3.45%, and from 1500 to 2000 – 14.29%). The number of women who admitted swimming their “own style” decreased (<1000 PLN– 9.09%, from 1000 to 1500 PLN– 8.62%, and from 1500 to 2000 PLN – 7.14%). Interestingly, the percentage of women who were able to swim the butterfly (1.73%) and breaststroke (17.24%) was also the highest in the case of the students’ monthly budget ranging from 1500 to 2000 PLN (Table 5).

Table 6

INFLUENCE OF THE DISTANCE BETWEEN THE PLACE OF RESIDENCE AND THE NEAREST LAKE

Criteria	Influence of Distance to Nearest Lake on Swimming Ability									
	< 1km		1 - 2.5km		2.5 - 5km		5 - 10km		Total	
	N	%	N	%	N	%	N	%	N	%
Cannot swim	33	68.75	75	70.75	78	73.58	27	72.97	213	71.71
Swims poorly	14	29.17	27	25.48	27	25.48	9	24.33	77	25.93
Swims well/very well	1	2.08	4	3.77	1	0.94	1	2.70	7	2.36
Total	48	100	106	100	106	100	37	10	297	100
Degrees of freedom									6	
Chi-square value									2.2155	
Probability (p) of exceeding the calculated value of chi-square statistics									0.90	
Influence of Distance to Nearest Lake on Distance Swum [M]										
0 m	33	68.75	78	73.58	72	67.29	30	81.08	213	71.48
<50 m	13	27.09	22	20.76	24	22.43	3	8.11	62	20.80
50-100 m	1	2.08	5	4.72	8	7.48	4	10.81	18	6.04
>100 m	1	2.08	1	0.94	3	2.80	0	0.00	5	1.68
Total	48	100.00	106	100.00	107	100.00	37	100.00	298	100.00
Degrees of freedom									9	
Chi-square value									9.8961	
Probability (p) of exceeding the calculated value of chi-square statistics									0.36	
Influence of Distance to Nearest Lake on Ability to Swim Given Strokes*										
Cannot swim	34	69.39	78	72.22	75	62.50	26	70.27	213	67.19
Front crawl	0	0.00	4	3.70	5	4.17	5	13.51	14	4.42
Butterfly	0	0.00	0	0.00	2	1.66	0	0.00	2	0.63
Backstroke	1	2.04	1	0.93	6	5.00	1	2.70	9	2.84
Breaststroke	10	20.41	15	13.89	21	17.50	5	13.51	51	16.09
Own style	4	8.16	10	9.26	11	9.17	0	0.00	28	8.83
Total *	49	100	108	100	120	100	37	100	317	100
Degrees of freedom									15	
Chi-square value									21.9262	
Probability (p) of exceeding the calculated value of chi-square statistics									0.11	
p>0.05 signifies the lack of significant differences (no influence)										

Table 6 illustrates the results concerning the influence of the distance of the nearest lake from the place of residents on the level of swimming skills. Statistical analysis revealed the probability (p) of exceeding the calculated value of chi-square statistics to be greater than 0.05 for all analyzed dependent variables, which was interpreted as there are no significant relationships between the proximity of the nearest lake and the students’ swimming skills (swimming skill level: p = 0.90; the distance swum: p = 0.36; familiarity with given strokes; p = 0.11). These results suggested



that the distance between the nearest lake and the place of residence did not influence the analyzed women's swimming skills (Table 6).

Table 7

INFLUENCE OF THE PRESENCE OF BEACH ON SWIMMING SKILLS

Influence of the Presence of Beach on Swimming Ability								
Criteria	City Beach		Wild Beach		No Beach		Total	
	N	%	N	%	N	%	N	%
Cannot swim	106	72.11	93	72.09	14	66.67	213	71.71
Swims poorly	36	24.49	35	27.13	6	28.57	77	25.93
Swimswell/very well	5	3.40	1	0.78	1	4.76	7	2.36
Total	147	100	129	100	21	100	297	100
Degrees of freedom							4	
Chi-square value							2.8914	
Probability (p) of exceeding the calculated value of chi-square statistics							0.58	
Influence of the Presence of Beach on Distance Swum [m]								
0 m	105	71.43	96	73.85	12	57.14	213	71.48
<50 m	31	21.09	27	20.77	4	19.05	62	20.80
50-100 m	9	6.12	6	4.62	3	14.29	18	6.04
> 100 m	2	1.36	1	0.77	2	9.52	5	1.68
Total	147	100.00	130	100.00	21	100.00	298	100.00
Influence of the Presence of Beach on Ability to Swim Given Strokes*								
Degrees of freedom							6	
Chi-square value							11.9777	
Probability (p) of exceeding the calculated value of chi-square statistics							0.06	
Cannot swim	103	66.03	94	67.63	16	72.73	213	67.19
Front crawl	8	5.13	5	3.59	1	4.55	14	4.42
Butterfly	0	0.00	2	1.44	0	0.00	2	0.63
Backstroke	5	3.21	4	2.88	0	0.00	9	2.84
Breaststroke	23	14.74	25	17.99	3	13.64	51	16.09
Own style	17	10.90	9	6.47	2	9.09	28	8.83
Total *	156	100	139	100	22	100	317	100
Degrees of freedom							10	
Chi-square value							5.9850	
Probability (p) of exceeding the calculated value of chi-square statistics							0.82	
p>0.05 signifies the lack of significant differences (no influence)								

Table 7 deals with the influence of the proximity of beaches on swimming skills. Once again, the probability (p) of exceeding the calculated value of chi-square statistics was greater than 0.05 for all the analyzed dependent variables (swimming skill level: p = 0.58; the distance swum: p = 0.06; familiarity with given swimming strokes: p = 0.82). This suggested that the proximity of beaches did not significantly influence the respondents' swimming skills (Table 7).

## DISCUSSION

Swimming is a very popular form of physical activity among people of all age groups. Scientific studies have revealed that this activity provides numerous health benefits when performed at recreational levels (Bartles et al.,

2007; Berger and Owen, 1992; Broman et al., 2006; Cider et al., 2006; Gwinup, 1987; Hall, Skevington, Maddison, Chapman, 1996; Tomas-Carus, Gusi, Hakkinen, Leal, and Ortega-Alonso, 2008; Westby, 2001). Regular swimming training improves a person's general fitness capacity and significantly reduces the risk of long-term illnesses. People who swim regularly are half as likely to die prematurely when compared to those who are physically inactive (Chase et al., 2008; U. S. Department of Health and Human Services, 2008).

Research on the influence of selected environmental factors including socioeconomic status on the swimming skills of young women constitutes valuable information for comparison with other research in this field conducted worldwide. Contrary to other authors' research on the influence of socioeconomic factors on general physical activity and fitness, our studies showed that in the majority of cases the factors such as parent's educational background, the distance between the place of permanent residence and the nearest lake, and the proximity of beaches exert no influence on the swimming skills of young adult female students. However, it was noted that a monthly budget did affect the distance a young woman could swim and her familiarity with various strokes. In addition, a current place of permanent residence also differentiated the distance she could swim ( $p < 0.0001$ ).

Nevertheless, it should be noted that our findings may have been extensively affected by a general low level of physical activity exhibited by the population of young Polish women, which could have made their socioeconomic status irrelevant. Out of 10 European nations, the population of physically active Poles was second to last (6%), which is far behind the leaders – the Finns (45%). Not surprisingly, the percentage of people who are overweight or obese is systematically increasing. For example, in 2010 there were over half a million Polish people characterized as severely obese ( $BMI > 35$ ) (Starosta, 2010). Currently, approximately 6.5 million Poles have a BMI of over 30, and it is estimated that anywhere from 280,000-300,000 suffer from morbid obesity ( $BMI > 40$ ) (Kołakowska, 2012). The low level of physical activity may be connected with the increased automatization of work and transport, which may have had a detrimental effect on the specific performance level of motor skills, which the low level of swimming skills observed in our study subjects may illustrate.

No significant influence of the socioeconomic status and ethnicity on the swimming skills was observed in the research conducted with 15-19-year-old students from New Zealand (Moran, 2010). Another aspect which might be considered is the socioeconomic status of the study sample. Socioeconomic status and demographic variables have been shown to significantly influence the level of swimming skills in certain social groups (Irwin, Irwin, Ryan, and Drayer, 2009a; Irwin, Irwin, Ryan, and Drayer, 2009b; Waller and Norwood, 2009). African-American and Hispanic-Latino children in the U.S.A. were found to be more at risk of drowning (57.5% and 56.2% respectively) than their European-American peers (30.9%) (Irwin et al., 2009a). Age, ethnicity, and socioeconomic factors were significantly associated with 4-17 aged children who have low swimming skill level.

At present, Warmia and Mazury Province is characterized by the highest level of unemployment in Poland, which may be connected with its under-developed industry and commerce. A high level of unemployment is directly associated with the region's very low income level. As a result, students residing in the country do not differ markedly in respect of their swimming skills as compared to those living in the city. An average standard of living in both area is similarly low, making it impossible for the families to afford swimming lessons. Studies conducted by Ponessa (1992) showed that socioeconomic status was a key factor influencing swimming proficiency. In general, children who grow up in middle- and upper-class families have more opportunities for learning to swim as they have greater access to pools and lakes as well as instructors and coaches. Our research supported these findings because the increase in monthly budget at the students' disposal was positively associated with two out of three indicators of swimming skills analyzed in our study (i.e. the distance swum and familiarity with different swimming strokes). On the other hand, the overall level of swimming skills exhibited by our study group can be considered quite low. This may be accounted for by the fact that in this sample even the highest range of monthly budget (1500-2000 PLN= 313 – 469 USD) is relatively low when compared to an average monthly income in the European Union.

University students' performance in swimming is primarily connected with their opportunity to practice swimming as a child (Brenner et al., 2009; Moran et al., 2012), and therefore indirectly with the availability of swimming facilities during their childhood (Berukoff and Hill, 2010). Meanwhile, a considerably low level of economic development in the region of Warmia and Mazury was reflected in a small number of indoor swimming pools, aquatic parks and spas promoting physical activity in aquatic environment. The majority of indoor swimming pools were constructed over the past decade. Only a few years ago there was only one indoor swimming pool in the capital city of this region, Olsztyn, the population of which amounts 180,000 inhabitants. At present, the city boasts five pools and the number of swimming pools in the whole region totals nineteen. The lack of adequate swimming facilities which prevailed over the years could have resulted in an increased demand for such facilities especially among young people and their willingness to acquire and upgrade their swimming skills. This could pertain to university students in particular, as they are given such an opportunity for free as part of their university education. The availability and access to swimming pools was found to be positively associated with physical activity (Humpel, Neville, and Laislie, 2002).

Judging from the place of origin, which was mostly rural or small town, the women participating in our study could have had limited access to adequate sports facilities so they were unable to learn to swim during their childhood. Polish children who attend primary schools in large cities take part in obligatory swimming lessons in the course of their 2<sup>nd</sup> grade. Even though such lessons last only one semester, some of our study participants had learned basic swimming skills during their mandatory 2<sup>nd</sup> grade swimming lessons. The lack of such classes available to the village and small town residents may have resulted in poorer swimming skills of the children growing up in such places.

Warmia and Mazury Province is often called “The Land of a Thousand Lakes” because of the fact that approximately 3000 bodies of water are located throughout this region. Moreover, along the shores of those lakes there are 214 public beaches available to its residents. Because of this, one would expect the swimming skill proficiency of the inhabitants to be above average. Interestingly enough, this was not observed in our participants. The reason behind this may be that lakes are not optimal for acquiring swimming skills due to the short summer weather. Research regarding the use of beaches revealed only moderate interest in swimming as expressed by university students who preferred engaging in social activities (Podstawski, Klimczak, Kolankowska, and Gizińska, 2013; Podstawski, Kolankowska, Gizińska, Klimczak, and Górnik, 2013). The region’s climate does not facilitate swimming in lakes (due to only three months of summer weather) and is described by meteorologists as changeable, unpredictable, and contrastive (Woś, 1999). Although the vast majority of lakes contain unpolluted water, not everyone enjoys or tolerates swimming in the typical cool temperatures. Moreover, open water swimming (in lakes, rivers, seas, or oceans) can account for approximately 85% of all drowning incidents (Bennett, Quan, Williams, and Chung, 2011; Gardner, 2007). For that reason, learning to swim in indoor pools is considered much safer and reduces the risk of drowning by up to 88% (Brenner et al., 2009). Studies conducted by Burekoff and Hill (2010) and McCool et al. (2008) showed that women are more afraid of drowning than men, which could have contributed to the less proficient performance in swimming observed in our study.

According to researchers dealing with the physical activity of university youth, the first year of studies often brings about changes in lifestyle (Alpar, Senturan, Karabacak, and Sabuncu, 2008; Zulaikha et al., 2011). This can potentially lead to long term habits and the willingness to perform physical activity, if aided by effective activation programs (Jodati, Shakuire, Nazari, and Raufie, 2007) such as ones that encourage students to improve their swimming skills. The opposite can also occur. Currently, UWM possesses very good conditions for learning to swim because of a new swimming complex, which was made available to students at the beginning of 2012. Students who take part in obligatory P.E. classes during their studies are given a perfect opportunity to attend swimming lessons. One can hope that these positive changes will be directly reflected by the increase in the level of university students’ swimming skills as well as the popularity of this sport.

## CONCLUSIONS

Overall, the swimming skills exhibited by the study participants were found to lack proficiency, which may be associated with the low income of the region’s inhabitants. Out of the environmental factors under investigation, only the place of permanent residence and an available monthly budget were significantly related to any of the dependent swimming skill measures (i.e. the ability to swim, the distance swum and the familiarity with swimming strokes respectively). The increasing level of urbanization and higher monthly budgets positively influenced the women’s performance in swimming as there were few women who were unable to swim even a single meter. Moreover, the latter also positively affected the number of strokes the participants could swim or with which they were familiar. The remaining factors under this study (i.e. the parents’ educational background, the distance between the place of residence and the nearest lake, and the proximity of beaches at the nearest lake) revealed a complete lack of differences in the proficiency of swimming skills. In the light of the above findings, the authors of this work firmly believe the studies ought to be continued to include additional factors such as age, sex, and ethnicity, so that their results could be applied in practice to facilitate the improvement of young people’s swimming skills.

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