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Physical, Recreational and Tourist Activity of the Inhabitants of the Poznań Metropolis

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Fizyczna i rekreacyjno-turystyczna aktywność mieszkańców metropolii Poznań

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Introduction

Metropolises are the main service, innovation, science, and culture centres as well as transport nodes where over 85% of all the world's innovation is created. Lately, the concept of a "smart city," a city that is intelligent and sustainable, gains more and more significance across scientific literature and practice with growing emphasis on the term "smart and age-friendly city and communities." One of the reasons for that are adverse demographic changes connected to mass aging of populations, including the population of Poland.

Smart cities give their inhabitants access to recreation sites, green areas, sports and recreational facilities, and recreation events so the inhabitants, regardless of their age and socio-economic situation, can easily engage in recreational physical activity facilitating active and healthy aging. In Western European countries we can more and more often hear about the need of including persons at risk of social exclusion in physical activity. This includes seniors but also other persons with specific needs, e.g. children and their parents, women, and disabled persons.

Metropolises are areas of the highest population density with diverse quality of life. It is commonly acknowledged that the term "metropolis" refers to a city with a population of at least one million inhabitants. In the case of regional metropolises, the population threshold is usually lowered to 500 000. In addition to the quantitative criterion, morphological and functional features are also taken into account. It needs to be stressed that spatial and demographic development of an agglomeration is not sufficient for its transformation into a metropolitan area. The basic feature of an agglomeration is joining urban areas, while that of a metropolis is functional integration and external metropolitan functions

When we consider the quality of life of Poles, in particular their health, access to physical activity and physical recreation during free time in the closest proximity of home is a very important issue. Although sports and recreational facilities are more available in city centres than in rural areas, publicly available, free-access

recreation sites and green areas are less available there due to, for example, dense development. Physically active residents are very visible in urban public spaces, because contemporary forms of physical activities are becoming more and more detached from typical sport facilities. In light of scientific research, participation in a physical activity alone is not sufficient from the point of view of human health needs. What is more important, a significantly increased mortality and incidence of lifestyle diseases caused by lack of physical activity can be observed. There are 5 million deaths worldwide attributable to physical inactivity. Physical activity is a necessary component of a healthy lifestyle and it should be undertaken by a much larger share of the population. Moreover, economic studies show that inactive residents generate high costs for cities.

This volume focuses on the participation of the inhabitants of the Poznań Metropolis in physical, recreational, and tourist activity with special reference to its social, demographic, economic, and geographic determinant factors. The volume includes papers reporting results of research conducted during the team project of the WSB University in Poznań entitled "Metropolitan region as a space of recreational penetration on the example of the Poznań agglomeration" in 2015-2016."

The spatial scope of the study presented in the volume comprises Poznań Metropolis understood as the city of Poznań, together with 17 municipalities of Poznań District, and municipalities of Oborniki, Śrem, Szamotuły and Skoki, all belonging to the Association of Poznań Metropolis. Poznań Metropolis as the area of research was selected on the basis of several factors. First of all, Poznań Metropolis is one out of seven most urbanized areas in Poland together with four agglomerations (Warsaw, Cracow, Łódź and Wrocław) and two conurbations (Upper Silesia and Tricity). Moreover, Poznań Metropolis with its 1,023 million inhabitants is one of the major elements of the contemporary settlement system not only within Poland but also in Europe. According to the classification of European Spatial Planning Observation Network – ESPON it is one out of 76 areas of metropolitan character in Europe (Metropolitan European Growth Areas – MEGA).

The level of physical activity of the inhabitants of the Poznań Metropolis and its selected health, demographic, and socio-economic determinants reported by Agata Basińska-Zych and Alicja Kaiser serves as a starting point for further considerations. In the paper entitled *Selected Determinants of Physical Activity of the Inhabitants of the Poznań Metropolis Based on the IPAQ Questionnaire* the authors characterize physical activity of the inhabitants of the Poznań Metropolis and present key factors differentiating such activity based on the results of a survey research using the International Physical Activity Questionnaire (IPAQ). They also distinguish groups of inhabitants of the Poznań Metropolis at risk of hypoki-

nesia and formulate practical recommendations for inclusion of these groups in physical activity based on empirical analyses.

Conceptual axis of the paper by Agata Basińska-Zych and Bernadeta Hołderna-Mielcarek entitled *Social and Economic Conditioning of Recreational Activity and Migration of Inhabitants of the Poznań Metropolis* is the influence of socio-economic factors on recreational activity and migrations of the inhabitants of the Poznań Metropolis. The paper determines forms and frequency of physical activity of the inhabitants of the Poznań Metropolis within and outside of their home locations and the structure of their recreational migrations (everyday, weekend, and long-term) expressed as distance and time needed to reach a recreation site. The results prove that age, gender, home location, marital status, number of children, occupational status and net income per household member have different influence on the analysed areas of recreational activity.

Selected results of the research focusing on persons with disabilities who live in the area of the Poznań Metropolis are presented by Joanna Łuczak and Michał Preisler. The authors of the paper entitled *Physical Recreation of People with Disabilities – Inhabitants of the Poznań Metropolis. Selected Study* emphasise low level of participation of persons with disabilities in physical recreation both within and outside their home location. Moreover, the paper describes preferences concerning forms of recreational activity, its frequency, recreation sites, utilisation of sports and recreation facilities, and monthly expenditure on physical recreation. The authors recommend creation of more favourable conditions for participation of persons with disabilities in mass physical recreation and development of personalised offer adjusted to a certain type of disability.

The next paper, by Maria Zamelska and Beata Kaczor, concerns a very important issue of tourist and recreational trips of the inhabitants of the Poznań Metropolis. The authors of the paper entitled *Social and Geographical Conditions Influencing Tourist and Recreational Migrations of Inhabitants of the Poznań Metropolis* show that the Poznań Metropolis is a tourist region consisting of three areas: internal, external and peripheral, which are characterised by a defined structure and specific character of tourist and recreational migrations. The results of the survey research indicated that one-day recreation predominates in the urban area, while 2-4-day recreation is more frequent in the suburban area. Financial conditions and diversified elements and features of tourist space proved to be important factors provoking tourist and recreational activity.

In a paper entitled *Cycling trail Network of the Poznań Metropolital Area: Prospects for Research in Physical Activity and Recreational Appeal*, Jarosław Styperek and Mateusz Rogowski describe inhabitants of the Poznań Metropolis as potential users of cycling trails. The authors show extremely innovative usage of the Garmin Edge 810 Bundle measuring device (designed for cyclists) for the anal-

ysis of cycling on a chosen part of the Wielkopolska System of Bike Trails. They focus on presenting pre-developed methods for analysing a network of bike trails in terms of physical activity and recreational attractiveness as well as preliminary results concerning an exemplary trail. The results are to be used to create order to create targeted tourist and recreational offer for the Poznań Metropolis based on the Wielkopolska System of Bike Trails.

Agata Basińska-Zych

Agata Basińska-Zych*, Alicja Kaiser**

Selected Determinants of Physical Activity of the Inhabitants of the Poznań Metropolis Based on the IPAQ Questionnaire[1]

Abstract. Low level of physical activity is one of the main problems of modern society's health. Research results suggest that Poland is a country characterised by low physical activity, with city dwellers being more active than villagers. So far, the research issues of physical activity of city dwellers have not included a context of a metropolitan area. Therefore, the aim of this research was to determine the level of physical activity of the inhabitants of the Poznań Metropolis and to analyse selected health, demographic, and socio-economic factors influencing such activity. A questionnaire survey was conducted from March to June 2016 on a group of 1584 inhabitants of the Poznań Metropolis. The survey was based on a short version of the International Physical Activity Questionnaires – IPAQ. The results showed that 33% of the inhabitants of the Poznań Metropolis showed sufficient, 48% – high level of physical activity, and only 17% of the respondents did not meet the WHO recommendation for physical activity. Statistical analysis based on the CHAID classification tree algorithm indicated the highest influence of age, gender, income, home location, and marital status on the level of physical activity of the inhabitants of the Poznań Metropolis. The analysis did not find statistically significant correlation between the Body Mass Index BMI and the level of physical activity.

Keywords: physical activity, IPAQ, health, BMI, socio-economic factors, demographic factors, Poznań Metropolis, classification tree

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[1] Paper based on the results of research carried out within the research project entitled "Metropolitan region as a space of recreational penetration on the example of the Poznań agglomeration" in 2015-2016 in the WSB University in Poznań financed from the statutory funds of the Polish Ministry of Science and Higher Education under supervision of Agata Basińska-Zych, PhD (decision number 27090/E534/S/2016).

1. Introduction

Physical activity is one of the main factors influencing health and quality of life of a contemporary people. It is also the key element of the healthy lifestyle [Aaranio et al. 2002: 360-364]. Numerous researchers all over the world have been interested in this issue for many years. The number of reports on correlation between physical activity and health is growing [Knapik et al. 2009: 17-21]. Regular physical activity allows to improve or maintain good physical, mental, and social health. Based on epidemiological studies, physical activity is currently recognised as an important factor affecting physiological capacity, motor abilities and skills, normal posture and physique, and ability of coping with stress and preventing many civilisation diseases: cardiovascular diseases, coronary heart disease, strokes, type-2 diabetes, osteoporosis, and colon, breast and prostate cancers [Gonçalves et al. 2014: 445-454; Langsetmo et al. 2012: 401-408; Schmid & Leitzmann 2014: 1293-1311; Warburton et al. 2010: 39; Pereira et al. 2014: 117-124; Thibaud et al. 2012: 5; Warburton, Nicol & Bredin 2006: 801-809].

Results of many research projects also proved that physical activity plays a key role in body weight reduction and prevents negative effects of excess fat tissue [Bensimhon, Kraus & Donahue 2006: 598-603; Jakcic & Otto 2005: 226-229; Wessel et al. 2004: 1179-1187; López-Gullón et al. 2011: 217-225; Kouvelioti, Vagenas & Langley-Evans 2014: 456-474; McArdle et al. 2007: 190-195].

However, low level of physical activity remains one of the main problems of public health in modern societies. International research has shown that the number of people in Europe engaging in sports classes has increased by 3% during last five years. Similar growth was reported from Poland [Special Eurobarometer 2014]. The results of the Eurobarometer research indicated that Poland is one of the low physical activity countries. According to this research only 27% of Poles is regularly active. This places Poland on one of last places in the European Union [Special Eurobarometer 2014: 16-23]. Moreover, all-Poland studies of the Institute for Structural Research conducted to the order of the Ministry of Sport and Tourism of the Republic of Poland showed that 39% of Poles was physically active during their free time at a level recommended by the World Health Organization. Physical activity is strongly connected to age and level of education. Young people are more active than older people and higher education also favours higher level of physical activity [IBN 2016: 8]. Low level of physical activity of Poles was also emphasised in the National Health Programme as one of the main causes of diseases and deaths in Polish society [NPZ 2016-2020]. A number of directives were elaborated on the level of the entire population concerning optimal level of physical activity preventing diseases [Blair, LaMonte & Nicha-

man 2004: 913-920; Pate et al. 1995: 402-407; *EU Physical Activity Guidelines* 2008].

Any intervention programmes aiming at increasing physical activity require proper diagnosis of reasons for physical passivity and factors encouraging physical activity in order to be successful. Therefore, the number of researches concerning determinants, and especially barriers of physical activity, in different social environments [Strawiński 2011: 57-67; Knapik et al. 2009: 17-21; Knapik et al. 2012: 64-65; Knapik et al. 2013: 333-340; Łysak et al. 2014: 549-553; Florkiewicz et al. 2011: 341-351] and selected conditions of physical activity of city dwellers [Biernat 2011; Drygas et al. 2005: 1-6; Lizak & Czarny 2015: 279-285; Misigoj-Durakovic et al. 2000: 428–432; Puciato et al. 2013: 649-657; Zhou et al. 2013: 1-7; Ribeiro et al. 2013: 664-670] is growing. However, the results of these analyses are not explicit as they show different impact of the studied variables on the physical activity.

It needs to be stressed, however, that there are no fully reliable studies concerning the level of physical activity (PA) of the adult part of the society reported from Poland. Sparse reports usually concerned only selected cities [Warsaw: Biernat 2011, Katowice: Puciato et al. 2013; Toruń: Drygas et al. 2001; Łódź: Drygas & Bielecki 2002; or regions of Poland [voivodeships of Poland: Drygas et al. 2005; region Tarnów: Lizak & Czarny 2015]. In the majority of available evidence and analyses conducted by research centres, the Central Statistical Office of Poland, and centres of public opinion research (CBOS Public Opinion Research Center), the type, frequency, and duration of PA physical activity were not assessed properly or different research tools making any comparisons very difficult. It is also noteworthy that the context of an agglomeration or metropolitan area has not been yet included in the analyses of physical activity of city dwellers.

Thus, the aim of the research presented here was to determine the level of physical activity of the inhabitants of the Poznań Metropolis and to analyse selected health, demographic, and socio-economic factors influencing such activity based on the International Physical Activity Questionnaires – IPAQ. The paper presents the following hypotheses:

1. Level of physical activity of the majority of the inhabitants of the Poznań Metropolis is sufficient.

2. Level of physical activity of obese inhabitants of the Ponań Metropolis is lower in comparison to those with normal body weight.

3. The key demographic variable resulting in different levels of physical activity of the inhabitants of the Poznań Metropolis is age.

4. The key socio-economic variable resulting in different levels of physical activity of the inhabitants of the Poznań Metropolis is income.

2. Material and methods

The survey was conducted on a group of 1584 inhabitants of the Poznań Metropolis from March to June 2016 (Table 1). Data obtained from the Statistical Office of Poznań concerning populations of individual communes on the date of 31.12.2015 divided by gender and age were used to determine sample's size and structure [http://poznan.stat.gov.pl]. In the research, a diagnostic survey method was used based on author's questionnaire comprising 29 questions prepared by the research team with an extended part concerning personal data. The first part of the questionnaire also included the short version of the International Physical Activity Questionnaires – IPAQ.[2] The survey was conducted in all the 22 communes of the Poznań Metropolis in different days of a week and at various times by recreational and sports facilities and open-access recreation sites, i.e., tourist trails, parks, and playgrounds. The respondents were chosen using the quota proportional representation format. The studied group modelled the total population of the Poznań Metropolis according to: population size, gender, and age. Trained interviewers received a detailed survey's instruction with the number of surveys to be carried out in each of the communes of the Poznań Metropolis. The survey's instruction contained information broken down by gender and age in each municipality (control variables). Before starting the study, interviewers asked filtering questions to the respondents to fullfill the the criteria of the sample selection. A minimum number of questionnaires was calculated based on a level of confidence of 95% ($a = 0.05$) with maximum error of ±5% (0.05) and amounted to 1426 questionnaires.

The results were analysed using the SPSS software, in particular the following statistical tests were conducted: for quantitative variables – an analysis of the significance of differences between means based on the *t*-Student test and for the qualitative variables – comparison of column proportions using the Z-test to find statistically significant differences. In a case of quantitative variables divided into more than two groups the one-way ANOVA was used to show the significance of differences and the LSD test was used to make multiple comparisons. The results were based on the two-way tests with the level of significance of $p < 0.05$. In addition, to summarise the importance of individual demographic and socio-economic variables, the classification tree employing the tree growth model based on the CHAID algorithm was applied.

A classification of occupations and specialities for the labour market was implemented to process information on the respondents' occupations. The struc-

[2] The second part of the research tool concerned physical activity of the inhabitants of the Poznań Metropolis, migrations connected to recreation, and conditions of undertaking such activity and migrations.

Table 1. Number of respondents from individual communes of the Poznań Metropolis

Commune	*N*	%
Buk	19	1
Czerwonak	50	3
Dopiewo	34	2
Kleszczewo	9	1
Komorniki	35	2
Kostrzyn Wielkopolski	27	2
Kórnik	34	2
Luboń	44	3
Mosina	45	3
Murowana Goślina	17	1
Oborniki	53	3
Pobiedziska	32	2
Poznań	841	53
Puszczykowo	20	1
Rokietnica	22	1
Skoki	20	1
Stęszew	20	1
Suchy Las	22	1
Swarzędz	79	5
Szamotuły	50	3
Śrem	60	4
Tarnowo Podgórne	34	2
No data available	17	1
Total	1584	100

Source: own elaboration based on the conducted survey ($N = 1584$).

ture of the classification resulted from grouping individual occupations and specialities in basic groups, and those in more aggregated medium-sized, big-sized, and large-sized groups based on similarities between competencies required to exercise occupational responsibilities. The classification included four broad levels of competencies described in the International Standard Classification of Occupations (ISCO-08) and levels of education set in the International Standard Classification of Education – ISCED 2011 *Legal basis: Regulation of the Minister of Labour and Social Policy of 7 August 2014 on classification of occupations and specialities for needs in the labour market and the scope of its use.*[3]

[3] www.klasyfikacje.gofin.pl/kzis/6,0.html [access: 15.12.2017].

The level of physical activity was assessed based on the International Physical Activity Questionnaires – IPAQ [Biernat & Stupnicki 2005; Craig et al. 2003; Bergier 2013: 91-94; www.ipaq.ki.se/downloads.htm]. It included seven questions on all of the types of physical activity (connected to everyday life, work, and recreation). Activities conducted during work, at home, recreation, and exercising were taken into consideration, including time spent sitting, walking, and being physically active. The assessment of the level of physical activity only included activities lasting continuously for at least 10 minutes. The IPAQ is a method utilising the Metabolic Equivalent of Work (MET).

Based on the obtained results including the total of a week-long physical activity, the respondents were classified into three groups corresponding to the following levels of activity:

High level of physical activity: (HEPA active)[4] persons meeting one of the below two criteria:

– 3 or more days of intense physical activity, at least 1500 MET-min./week (Metabolic Equivalent of Work) in total;

– 7 or more days of any combination of activities (walking, moderate or intense activities) exceeding 3000 MET-min./week.

Sufficient level of physical activity (minimally active[5]; moderate): persons meeting the following criteria:

– 3 or more days of intense physical activities for at least 20 minutes a day;

– 5 or more days of moderate physical activities for at least 30 minutes a day;

– 5 or more days of any physical activity (intense, moderate activities, or walking) exceeding 600 MET-min/week.

Insufficient level of physical activity (inactive; low; insufficiently active): persons declaring no physical activity or not meeting the requirements for the suf-

[4] The name of the category proposed by IPAQ Research Committee. A separate category labelled HEPA' level, which is a more active category can be computed for people who exceed the minimum public health physical activity recommendations, and are accumulating enough activity for a healthy lifestyle. This is a useful indicator because it is known that higher levels of participation can provide greater health benefits, although there is no consensus on the exact amount of activity for maximal benefit. Also, in considering lifestyle physical activity, this is a total volume of being active which reflects a healthy lifestyle. It is at least 1.5-2 hours of being active throughout the day, which is more than the LTPA-based recommendations of 30 minutes. As Tudor-Locke and others have indicated, there is a basal level of around 1 hour of activity just in activity of daily living, and an additional 0.5-1 hour of LTPA makes a healthy lifestyle amount of total PA – hence, these new cut points are still consistent with the general LTPA based public health recommendations of at least half an hour per day of additional activity or exercise [*Guidelines for Data Processing and Analysis of the International Physical Activity Questionnaire IPQ – short version*, Version 2.0. April 2004; www.institutferran.org/documentos/scoring_short_ipaq_april04.pdf, access: 10.12.2017].

[5] "Minimally active" implies some physical activity but is not an optimal level of total HEPA, www.institutferran.org/documentos/scoring_short_ipaq_april04.pdf [access: 10.12.2017].

Table 2. Norms for BMI according to WHO

Value of BMI	Body weight category
< 18.5	underweight
18.6-24.9	normal weight
25.0-29.9	overweight
> 30.0	obesity (1st, 2nd, or 3rd degree)

Source: own elaboration based on WHO 1995; Kolimechkov 2014: 2.

ficient and high level of physical activity [Biernat, Stupnicki & Gajewski 2007: 47-54].

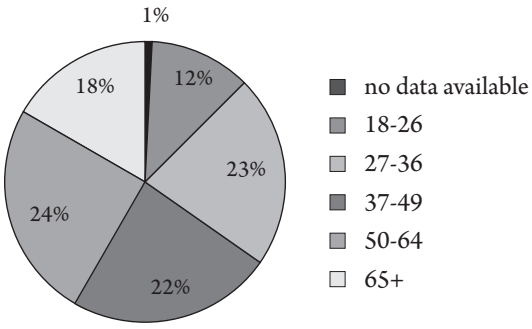
The Body Mass Index (BMI), which includes the height to body weight ratio, was calculated based on the formula and recommendations of the World Health Organization (WHO 1995).

3. Results

3.1. Description of the respondents

The survey included 1584 adult inhabitants of the Poznań Metropolis (Table 1), with the majority of women (51%). The vast majority of the respondents lived in cities and towns (75%) and less frequently in rural areas (24%). The majority of the surveyed inhabitants of the Poznań Metropolis were aged 50-64 (24%) or 27-36 (23%) and 22% of the respondents were aged 37-49. Groups of persons aged 18-26 or over 65 were the least numerous (Chart 1).

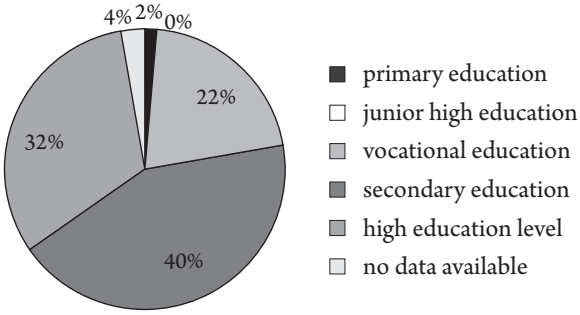
Chart 1. Age structure of the respondents



Source: own elaboration based on the conducted survey (N = 1584).

The majority of the inhabitants of the Poznań Metropolis declared secondary (40%) or higher education level (32%), and every fifth respondent declared vocational or primary education level (2%) (Chart 2).

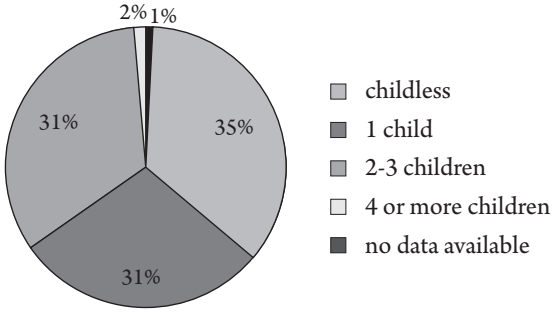
Chart 2. Education level of the respondents



Source: own elaboration based on the conducted survey (N = 1584).

Almost 64% of the respondents was married and 10% declared cohabitation or common-law relationship as their marital status. Every fourth respondent was single. Almost 65% of the inhabitants of the Poznań Metropolis participating in the survey declared having at least one child, while 35% was childless (Chart 3). Among those having children, 31% had 1 child, 31% had 2-3 children, and only 2% had 4 or more offspring.

Chart 3. Number of children of the respondents

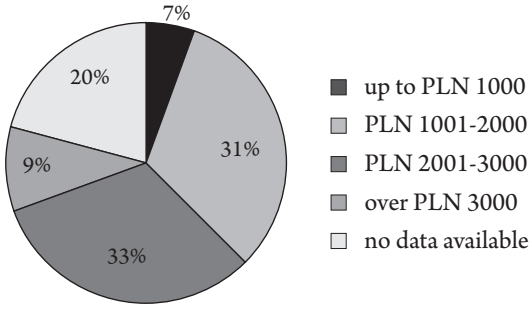


Source: own elaboration based on the conducted survey (N = 1584).

As it comes to the economic status, every third respondent declared the average net income per household member between PLN 2001 and 3001, and 31%

between PLN 1001 and 2000 (Chart 4). The least applicable were groups of respondents declaring the income of up to PLN 1000 per household member (7%) and over PLN 3000 per household member (9%).

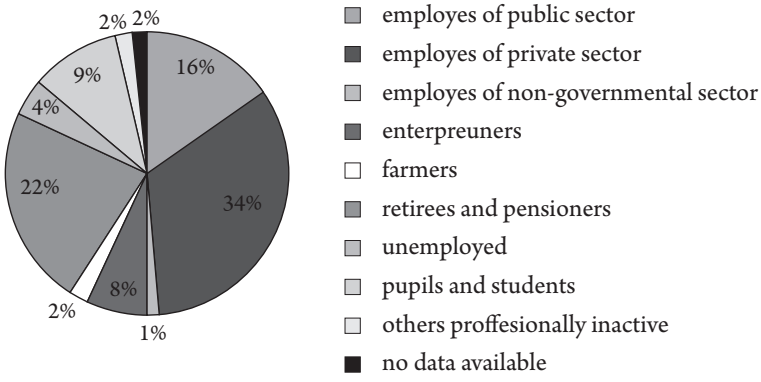
Chart 4. Net income per household member of the respondents



Source: own elaboration based on the conducted survey (N = 1584).

Employees of private sector (34%), retirees and pensioners (22%), and employees of public sector (16%) predominated among the studied inhabitants of the Poznań Metropolis (Chart 5).

Chart 5. Occupational status of the respondents



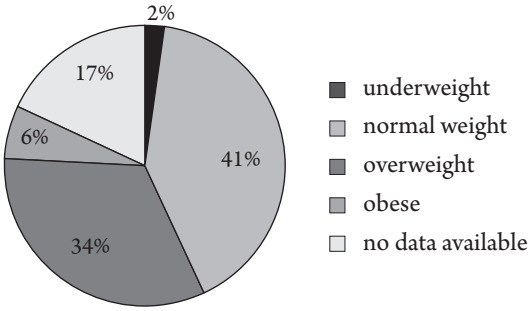
Source: own elaboration based on the conducted survey (N = 1584).

Whereas only every tenth respondent was a pupil or a student, 8% of the respondents were entrepreneurs, 4% – unemployed persons, 2% – farmers or others professionally inactive persons, and 1% worked in the non-governmental sector.

3.2 Physical activity of the inhabitants of the Poznań Metropolis: health aspects

Health aspects was the first focus of the analysis of the physical activity of the surveyed group. In order to do that, basic morphological features were included – the height (from 139 to 196 cm) and the body weight (from 41 to 146 kg) and the height to body weight ratio expressed as the BMI. The obtained results were presented in Chart 6.

Chart 6. The Body Mass Index of the respondents

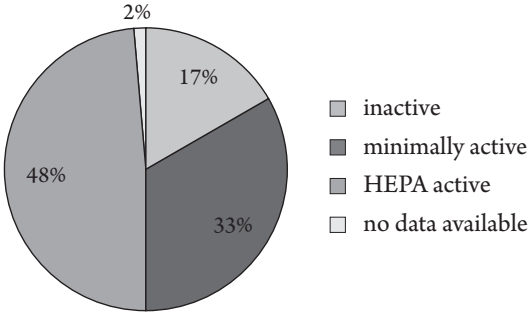


Source: own elaboration based on the conducted survey (N = 1584).

The results showed that the BMI values of 41% of the respondents indicated normal weight. However, every third respondent was overweight and 6% were obese. Only 2% were underweight.

Next, the level of physical activity of the inhabitants of the Poznań Metropolis was assessed. According to the International Physical Activity Questionna-

Chart 7. The level of physical activity of the respondents based on IPAQ



Source: own elaboration based on the conducted survey (N = 1584).

ires – IPAQ the respondents were classified groups corresponding to the three levels of activity (Chart 7). Almost half of the studied group of respondents were classified to the high level of physical activity group based on their declarations. Whereas every third respondent was classified to the sufficient level of physical activity group. Participation in physical activity of only every fifth respondent was classified as insufficient.

Then, differences between the levels of physical activities in relation to the BMI were statistically analysed. It turned out that the highest percentage of the inhabitants having normal weight (50.3%) and overweight (50.5%) engaged in physical activity at a high level, as did almost every second obese respondent (Table 3).

Table 3. Physical activity of the respondent in relation to the BMI

Level of physical activity according to IPAQ	BMI category				
	underweight	normal weight	overweight	obesity	no data available
	% of *N* in a column				
Insufficient	6.7	15.0	15.7	20.0	27.9
Sufficient	50.0	34.1	32.2	30.0	30.5
High	36.7	**50.3**	**50.5**	**45.6**	37.9
No data available	6.7	0.6	1.7	4.4	3.7

Source: own elaboration based on the conducted survey ($N = 1584$).

Notes: The results were based on the two-way tests with the level of significance of 0.05. Statistical significance is marked with bold font and capital letters. The tests were adjusted using the Bonferroni's adjustment for all the comparisons of the pairs within each internal sub-table.

Similar percentages of obese (30%), overweight (32.2%), and respondents of normal weight (34.1%) is characterized by sufficient level of physical activity. Although, no statistically significant difference was found between the level of physical activity and the BMI, it is noteworthy that in comparison to all the other persons, higher percentage of obese inhabitants of the Poznań Metropolis was insufficiently physically active (20%).

3.3. Physical activity of the inhabitants of the Poznań Metropolis: demographic aspects

The next stage of the analysis considered the influence of basic demographic variables on the physical activity of the Poznań Metropolis. The first analysed factor was participant gender (Table 4).

Table 4. Physical activity of the respondents in relation to the gender (in %)

Physical activity level according to IPAQ	Gender		
	Female (A)	Male (B)	no data available
Insufficient	16.5	18.8	9.1
Sufficient	**37.6 B**	27.8	36.4
High	44.6	**51.3 A**	36.4
No data available	1.3	2.1	18.2

Notes: The results were based on two-way tests with the level of significance of 0.05. Statistical significance is marked with bold font and capital letters. The tests were adjusted using the Bonferroni's adjustment for all the comparisons of the pairs within each internal sub-table.

The results showed that high level of physical activity was more frequent among men (over 50%) than women (37.6%) (statistically significant difference). However, sufficient physical activity was significantly more frequent among women than men. No statistically significant difference was found between genders in the group of insufficient level of physical activity.

The next analysed independent variable was the age (Table 5).

Table 5. Physical activity of the respondents in relation to the age (in %)

Physical activity level according to IPAQ	Age					
	18-26 (A)	27-36 (B)	37-49 (C)	50-64 (D)	65+ (E)	no data available
Insufficient	13.6	14.2	11.7	16.1	**33.9 ABCD**	18.2
Sufficient	21.6	25.8	**38.5 AB**	**35.1 A**	**40.7 AB**	27.3
High	**62.3 CDE**	**59.1 CDE**	**47.5 E**	**47.0 E**	23.6	45.5
No data available	2.5	0.8	2.3	1.8	1.8	9.1

Notes: The results were based on two-way tests with the level of significance of 0.05. Statistical significance is marked with bold font and capital letters. The tests were adjusted using the Bonferroni's adjustment for all the comparisons of the pairs within each internal sub-table.

The above-presented data indicated that high level of physical activity is the most common in a group less than 36 years old (statistically significant differences when compared to all other age groups). While the insufficient level of physical activity was mainly declared by respondents over 65 years old (statistically significant differences when compared to all other age categories). It is, however, worth noticing that over 40% of the surveyed seniors declared a sufficient level of physical activity.

The last analysed independent variable was the home location of the respondents (Table 6).

Table 6. Physical activity of the respondents in relation to home location (in %)

Physical activity level according to IPAQ	Home location		
	Town/City (A)	Village (B)	no data available
Insufficient	18.1	16.4	0.0
Sufficient	**35.2 B**	26.0	20.0
High	45.3	**54.1 A**	80.0
No data available	1.3	3.4	0.0

Notes: The results were based on two-way tests with the level of significance of 0.05. Statistical significance is marked with bold font and capital letters. The tests were adjusted using the Bonferroni adjustment for all the comparisons of the pairs within each internal sub-table.

As indicated by data presented in table 6, the highest percentage of villagers (over 54%) and city dwellers (over 45%) showed high level of physical activity. Statistically significant differences between different home locations were found in groups of sufficient and high level of physical activity.

3.4. Physical activity of the inhabitants of the Poznań Metropolis: socio-economic aspects

Characterisation of physical activity of the inhabitants of the Poznań Metropolis also included the influence of socio-economic variables.

It seemed interesting whether the education level influenced the level of physical activity of the studied population. The findings are presented in Table 7.

Table 7. Physical activity of the respondents in relation to the education level (in %)

Physical activity level according to IPAQ	Education level					
	Primary (A)	Lower-secondary (B)	Vocational (C)	General upper-secondary (D)	Higher (E)	no data available
Insufficient	22.5	50.0	**23.1 E**	18.2	12.9	14.3
Sufficient	32.5	0.0	36.8	32.3	31.2	32.1
High	42.5	50.0	38.3	**48.5 C**	**54.2 C**	41.1
No data available	2.5	0.0	1.8	1.0	1.8	12.5

Notes: The results were based on two-way tests with the level of significance of 0.05. Statistical significance is marked with bold font and capital letters. The tests were adjusted using the Bonferroni adjustment for all the comparisons of the pairs within each internal sub-table.

The obtained data suggests that level of physical activity of persons with higher education was the most beneficial for health. The majority of this group was classified to the group of high level of physical activity (54.2%) and the lowest percentage engaged in physical activity at an insufficient level (almost 13%). Whereas the level of physical activity of persons with vocational education was the least frequently classified as high. Statistically significant differences were found between the respondents with higher and vocational education and between secondary and vocational education.

Next analysed aspect was the influence of marital status on physical activity of the inhabitants of the Poznań metropolis (Table 8).

Table 8. Physical activity of the respondents in relation to the marital status (in %)

Physical activity level according to IPAQ	Martial status			
	married (A)	in a common-law relationship/ cohabitation (B)	single (C)	no data available
Insufficient	**20.7 BC**	10.5	12.2	14.3
Sufficient	34.3	27.6	31.2	35.7
High	42.9	**61.2 A**	54.9	50.0
No data available	2.1	0.7	1.7	0.0

Notes: The results were based on two-way tests with the level of significance of 0.05. Statistical significance is marked with bold font and capital letters. The tests were adjusted using the Bonferroni adjustment for all the comparisons of the pairs within each internal sub-table.

The analysis of the influence of the marital status showed that the level of physical activity of the respondents living in common-law relationships or cohabitation was the most beneficial for health. They comprise the biggest part of the group of high level of physical activity (over 60%). Comparison with married respondents let to finding a statistically significant difference. The lowest level of physical activity was demonstrated by married persons – the level of physical activity of over 20% of them was classified as insufficient (comparison to singles and persons living in common-law relationships or cohabitation showed statistically significant differences). No statistically significant difference was found between singles and persons in common-law relationships or cohabitation.

The next determinant of physical activity connected to marital status was the number of children (Table 9). It was found that the level of physical activity of persons having no children was high significantly more frequently than the level of the respondents having 2-3 children. However, the difference between the respondents having no children and having 4 or more children was statistically insignificant, despite big difference in actual percentages (A – 52.4%, D – 36.7%).

Table 9. Physical activity of the respondents in relation to the number of children

Physical activity level according to IPAQ	Number of children				
	no children (A)	1 child (B)	2-3 children (C)	4 or more children (D)	no data available
Insufficient	13.7	17.2	**21.0 A**	**36.7 A**	25.0
Sufficient	31.4	32.5	35.7	26.7	25.0
High	**52.4 C**	48.7	41.9	36.7	50.0
No data available	2.5	1.6	1.5	0.0	0.0

Notes: The results were based on two-way tests with the level of significance of 0.05. Statistical significance is marked with bold font and capital letters. The tests were adjusted using the Bonferroni adjustment for all the comparisons of the pairs within each internal sub-table.

Moreover, it was noticed that respondents having 2 or more children declared insufficient level of physical activity significantly more frequently than respondents having no children.

The influence of income on the level of physical activity of the inhabitants of the Poznań Metropolis was also analysed (Table 10). The results indicated that the surveyed inhabitants of the Poznań Metropolis declaring higher income per household member, statistically significantly more frequently presented high level of physical activity while the inhabitants with lower income more often engaged in physical activity at an insufficient level. About every second respondent declaring a net income per household member between PLN 2001 and 3000 and over PLN 3000 showed high level of physical activity.

Table 10. Physical activity of the respondents in relation to net income per household member (in %)

Physical activity level according to IPAQ	Net income per household member				
	up to PLN 1000	PLN 1001-2000 (B)	PLN 2001-3000 (C)	over PLN 3000 (D)	no data available
Insufficient	**24.1 CD**	**18.4 C**	11.6	9.5	27.3
Sufficient	24.1	38.1	11.6	9.5	27.3
High	46.1	41.8	**53.8 B**	**55.8 B**	43.8
No data available	5.6	1.6	1.2	0.7	2.5

Notes: The results were based on two-way tests with the level of significance of 0.05. Statistical significance is marked with bold font and capital letters. The tests were adjusted using the Bonferroni adjustment for all the comparisons of the pairs within each internal sub-table.

The last analysed independent variable was the occupational status of the studied inhabitants of the Poznań Metropolis (Table 11). The least beneficial level of

Table 11. Physical activity of the respondents in relation to the occupational status (in %)

Physical activity level according to IPAQ	Employment status									
	employee of a public sector (A)	employee of a private sector (B)	employee of a non-governmental sector (C)	private entrepreneur (D)	farmer (E)	pensioner, retiree (F)	unemployed (G)	pupil, student (H)	other professionally inactive person (I)	no data available
Insufficient	15.7	11.6	20.0	8.0	15.8	**35.7 ABDGHI**	12.5	13.8	2.7	27.3
Sufficient	**40.3 E**	**31.6 E**	**50.0 E**	24.0	2.6	**37.4 E**	**44.6 E**	23.9	29.7	43.8
High	**43.1 F**	**55.6 F**	30.0	**65.6 AFG**	**76.3 AFG**	25.1	39.3	**60.9 AF**	**64.9 F**	27.3
No data available	0.8	1.3	0.0	2.4	5.3	1.7	3.6	1.4	2.7	2.5

Notes: The results were based on two-way tests with the level of significance of 0.05. Statistical significance is marked with bold font and capital letters. The tests were adjusted using the Bonferroni adjustment for all the comparisons of the pairs within each internal sub-table.

physical activity was shown by the group of retirees and pensioners of which almost 36% declared insufficient level of physical activity. The tests confirmed statistically significant differences in this aspect between retirees and pensioners and employees of public sectors, employees of private sector, entrepreneurs, pupils and students, unemployed persons, and other professionally inactive persons. The occupational groups showing significantly highest participation in physical activity included farmers – 76.3%, professionally inactive persons – 64.9%, entrepreneurs – 65.6%, and pupils and students – 60.9%, also, employees of a public and private sector.

3.5. Physical activity of the inhabitants of the Poznań Metropolis: the influence of selected variables

In order to verify the influence of individual demographic and socio-economic variables on the level of physical activity of the inhabitants of the Poznań Metropolis, a statistical analysis using the classification tree based on the CHAID algorithm was performed. As a method, classification trees are one of the most frequently used Data Mining techniques [Drejerska, Chrzanowska & Pomianek 2014: 33]. A classification tree is a way of segmenting and predicting being an alternative of classic statistical techniques. A tree is a graphic representation of dividing a set of objects Ω into disjoint subsets. If a feature y is nominal then the developed model is represented by a classification tree (a discriminatory tree). If a feature y is continuous then the model is represented by a regressive tree (Gatnar 2001: 26-29).

A sequence of variables in a tree results from the "power" with which they divide the observations into classes. The higher the discriminative power of a variable is, the higher its position on a graph is. In each node of the tree we can find percentage shares of units being a part of each class. This value is calculated based of historic data and we can interpret it as a probability of being a member of a certain class [www.allgomine.pl].

The dependent variable included in the analysis was the level of physical activity of the inhabitants of the Poznań Metropolis expressed as the three categories: insufficient, sufficient and high. While independent variables included a health factor: the BMI; demographic factors: age, gender, and home location; and socio-economic factors: education, marital status, number of children, and net income per household member. Occupational status included high number of categories (9 categories) that is why this variable was removed from further analysis. The results of the analysis is shown on a classification tree presented

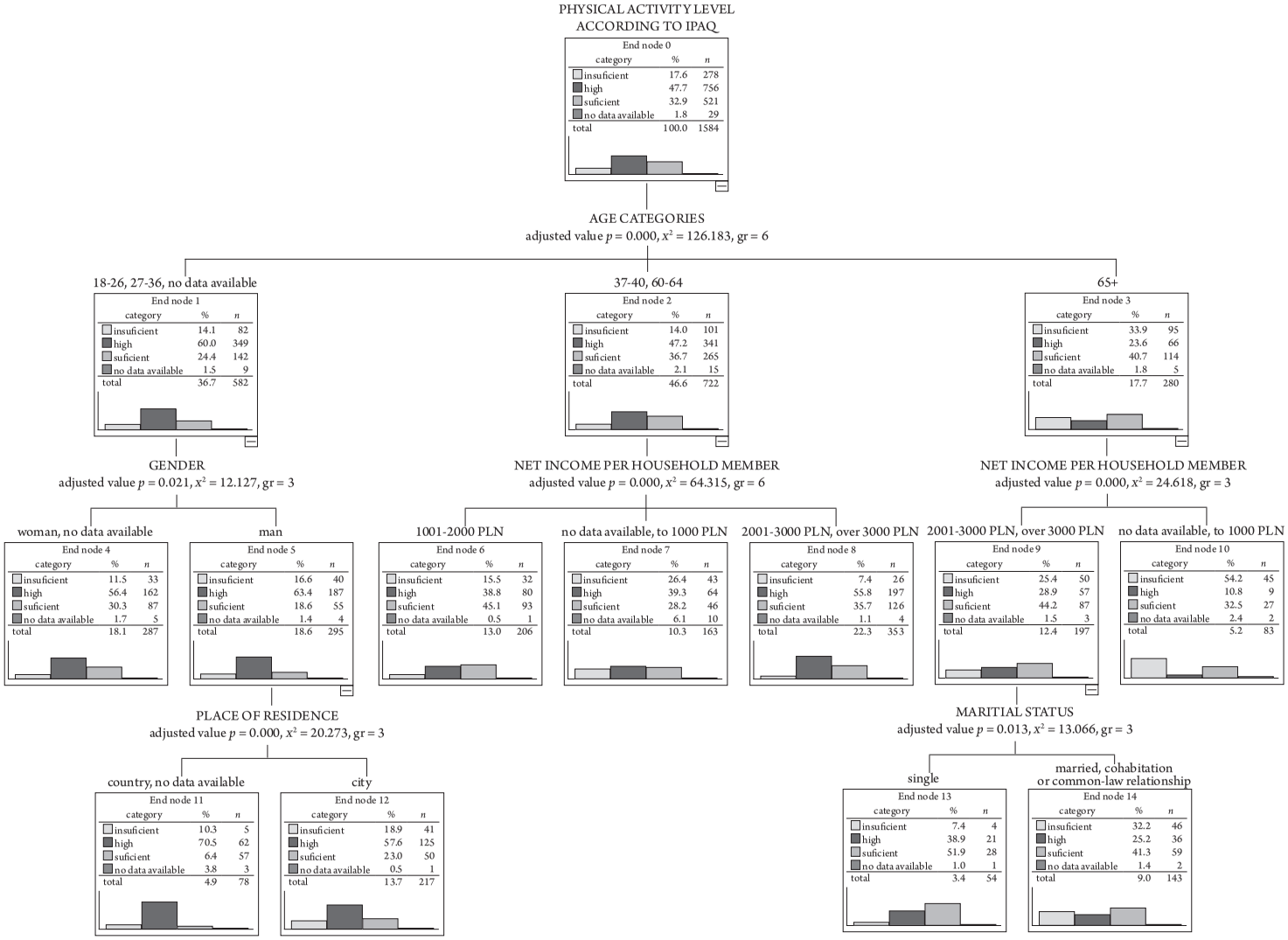


Figure 8. Classification tree – summarised influence of selected variables on the level of physical activity of the inhabitants of the Poznań Metropolis

Source: own elaboration based on the conducted survey ($N = 1584$).

in Figure 8. The tree shows different levels of influence of explanatory variables on the level of physical activity of the inhabitants of the Poznań Metropolis. The generated tree had 9 end nodes.

The following factors had the highest influence on the level of physical activity of the respondents, respectively: 1) age, 2) gender, 3) net income per household member, 4) home location, and 5) marital status (Fig. 8) (risk assessment: 0.47; standard error: 0.013). The influence of age on differentiation of the level of physical activity of the inhabitants of the Poznań Metropolis was the highest, as a result of the classification analysis, three age classes emerged. Persons aged 18-26 and 27-36 were characterised by the highest level of physical activity, next group was created by persons aged 37-49 and 50-64. In the last, the least physically active group comprised of persons aged 65 or more. The next variable differentiating physical activity of the studied inhabitants was gender. The level of physical activity of the surveyed men was higher than this of women of the Poznań Metropolis. Another factor of high discrimination power was the net income per household member. The inhabitants with the net income over PLN 2000 per household member were more physically active than persons with lower income. The last factors influencing differentiation of the level of physical activity of the inhabitants of the Poznań Metropolis were home location and marital status.

Other factors analysed in the tree model: BMI, number of children, and education level had much lower impact on physical activity of the inhabitants of the Poznań Metropolis.

4. Discussion

Nowadays, it seems extremely important to monitor the level of physical activity as well as factors that influence such activity. It is justified by the prevalence of civilisation diseases: cardio-vascular, musculoskeletal, metabolic diseases or even tumours or mental disorders as hypokinesia – a shortage of physical activity – is one of the main causes of such conditions.

Unfortunately, Polish research has lacked similar analyses of metropolitan areas and analyses focusing on urban (Warsaw, Katowice, Toruń, Łódź) or regional (the Tarnów region) environments are also sparse. That is why it is very difficult to make any comparisons. Here presented survey on physical activity using the IPAQ questionaire indicated that the population of the Poznań Metropolis is characterised by higher level of physical activity in comparison to the entire population of Poland. Almost 33% of the respondents participated in physical activity at a sufficient level, and level of physical activity of almost every second person was high (48%). Thus, the hypothesis that the level of physical activity

of the majority of the inhabitants of the Poznań Metropolis is sufficient was not confirmed.

The data of the Institute for Structural Research collected in similar period (first half of 2016) suggested that 50% of Poles showed no physical activity (during free time) while according to this research only 17% of the inhabitants of the Poznań Metropolis were physically inactive. This means that only 39% of Poles were active during their free time at a level recommended by the WHO (sufficient and high activity) [IBS 2016: 19] while in the Poznań Metropolis people physically active comprised 81% of the respondents.

Data reported from other researches of the Central Statistical Office of Poland – Participation of Poles in Sports and Physical Recreation [2017], the Eurobarometer [2014], and the PolSenior research indicated that the percentage of Poles regularly exercising or practising sports is low and amounted to 40% [*Diagnoza społeczna* 2015: 261-262; Rowiński & Dąbrowski 2012: 535] 46% [GUS 2017: 35], and 48% [Special Eurobarometer 2014: 7-8].

The reasons of discrepancies between the results of those studies can be found, for instance, in different methodological approaches. However, the main reason seem to be the fact that the survey of the Institute for Structural Research concerned physical activity during free time while here presented research included all the physical activity, including the activity at work or during moving from one place to another. High level of the inhabitants of the Poznań Metropolis participation in physical activity (48% – high level, 33% – sufficient level) might have resulted from the time (March to June) and localisation of the survey (by recreational and sports facilities, open-access recreation sites, tourist trails, and green areas). Moreover, the other reasons of high level of physical activity of respondents may be the type of the work – physical work or frequent walking. On the other hand, such methodological conditions and support of trained interviewers emphasises reliability of the collected material as regards to how the respondents classified their activity, e.g. types of physical activities.

Regional differences in sports activity and high availability of sports and recreational infrastructure in communes of the Poznań Metropolis may have also been the reason for higher level of physical activity of the inhabitants of the Poznań Metropolis in comparison to entire population of Poland. The results of the studies conducted within the Social Project 2012 indicated that the highest percentage of physically active inhabitants was found in the following voivodeships: lubuskie (50%), wielkopolskie (51%), and dolnośląskie (51.3%) while the lowest percentage was characteristic for the voivodeships of the so-called Eastern Poland [2012: 20-21]. Moreover, the highest percentage of active persons (51.7%) was found among the inhabitants of metropolitan areas of over 500 000 people. This is probably connected to socio-economic profile of such metropolitan areas and better sports infrastructure in cities [2012: 19].

However, the results indicating high participation of the inhabitants of the Poznań Metropolis in physical activity are similar to the all-Poland results obtained by E. Biernat and M. Piątkowska [2012: 19] showing as many as 78% of Poles responding yes to a question whether they undertake any kind of recreational activity (including 77.9% in the age of 15-24, 75.6% – in the age of 25-39, 84% – in the age of 40-54, and 75.4% – in the age of 55-69). It needs to be stressed, however, that this recreational physical activity mainly included walking. Therefore, an important empirical demand would be to perform extended statistical analysis of the percentage of individual types of the activity: moderate, intensive, walking in the overall structure of physical activity of the inhabitants of Poznań.

The results indicated that physical activity of about 20% of obese inhabitants of the Poznań Metropolis was insufficient. The obtained results correspond with the results of the Social Diagnose research showing that 21% of obese Poles declared no physical activity [*Diagnoza społeczna* 2015: 253-262]. It is worth noticing that 41% of the surveyed inhabitants of the Poznań Metropolis had normal BMI values. However, every third respondent was overweight and 6% were obese. In comparison to the all-Poland survey these results look better for the inhabitants of the Poznań Metropolis as in the all-Poland about 36.3% of Poles was overweight and 17.4% was obese.

It is noteworthy that the obtained results confirmed also the tendency showed in the above-cited all-Poland studies concerning the influence of the analysed health, demographic, and socio-economic factors on the level of physical activity of the inhabitants of the Poznań Metropolis. The key demographic variable resulting in different levels of physical activity of the inhabitants of the Poznań Metropolis was age and among the socio-economic variables the net income per household member showed the highest significance. The analysis did not found statistically significant correlation between the BMI and the level of physical activity.

5. Conclusion

The Act on Public Health [Journal of Laws 2015, item 1916] adopted in Poland on 11th September 2015 provides for creation of the next version of the National Health Programme. The National Health Programme for 2016-2020 aims to increase life expectancy, improve health, and reduce social health inequalities. Tasks specified in the Programme include, for instance, reduction of health inequalities resulting from socio-economic conditions and increase in the level of physical activity of the society. Most of these tasks are to be executed by local government units and non-governmental organizations because it is important to create conditions for healthy lifestyle close to people's homes, so on a local level.

The results of this research are highly applicable because they enable classification of the inhabitants of the Poznań Metropolis into specific groups and identification of groups in danger of insufficient level of physical activity or completely physically passive. The inhabitants of the Poznań Metropolis in danger of hypokinesia belong to the following groups: persons aged 50-64 or over 65 years old; with primary, lower-secondary or vocational education; living in urban or rural areas; married; having more than 3 children; and retirees, pensioners or persons working in a non-governmental sector. Moreover, such persons are more frequently overweight or obese and their net income is lower than PLN 1000 per household member. These groups especially need financial, organizational, infrastructural, and educational support in the field of promotion of physical activity. That is why, in authors' opinion, these groups should be the recipients of actions like complex and long-term local physical activity or health promotion programmes combining many different aspects (e.g., education, free recreational activities, and workouts aiming at health improvement). Implementation of such programmes may decrease expenditures of communes, towns, and cities for health care related to diseases caused by insufficient physical activity by increasing the level of physical activity of local communities.

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Wybrane determinanty aktywności fizycznej mieszkańców Metropolii Poznań na podstawie kwestionariusza IPAQ

Streszczenie. Niski poziom aktywności fizycznej jest jednym z większych problemów zdrowia publicznego współczesnego społeczeństwa. Wyniki badań wskazują, iż Polska należy do krajów o niskiej aktywności fizycznej, przy czym bardziej aktywni są mieszkańcy miast niż wsi. Do tej pory problematyka badań aktywności fizycznej mieszkańców miast nie była analizowana w kontekście metropolitalnym. W związku z tym celem badań jest określenie poziomu aktywności fizycznej mieszkańców metropolii Poznań, jak również analiza wybranych czynników zdrowotnych, demograficznych i społeczno-ekonomicznych różnicujących tę aktywność. Badania ankietowe przeprowadzono wśród 1584 mieszkańców metropolii Poznań w okresie od marca do czerwca 2016 r. na podstawie krótkiej wersji Międzynarodowego Kwestionariusza Aktywności Fizycznej – IPAQ. Wyniki ujawniają, że 33% mieszkańców metropolii Poznań cechuje wystarczający, a 48% – wysoki poziom aktywności fizycznej, tylko 17% respondentów nie spełnia minimalnych zaleceń WHO w zakresie aktywności fizycznej. Analiza statystyczna oparta na algorytmie drzewa klasyfikacyjnego CHAID ujawniła największy wpływ wieku, płci, dochodu, miejsca zamieszkania i stanu cywilnego na poziom aktywności fizycznej mieszkańców metropolii Poznań. Badania nie potwierdziły istotnej statystycznie zależności między wskaźnikiem BMI a poziomem aktywności fizycznej.

Słowa kluczowe: aktywność fizyczna, IPAQ, zdrowie, BMI, czynniki społeczno-ekonomiczne, czynniki demograficzne, metropolia Poznań, drzewo klasyfikacyjne

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Social and Economic Conditioning of Recreational Activity and Migration of Inhabitants of the Poznań Metropolis[1]

Abstract. In the global economy based on knowledge it is metropolises that determine the region's developmental potential. These are the regions of high population density and of diverse levels of life quality. Apart from intrapersonal and interpersonal features it is also environmental factors that impact on the likelihood of someone participating in physical recreation Recognizing characteristic features determining different forms of motor activity, their frequency together with the structure of recreational migrations is crucial in the process of planning and organizing recreational system in cities and metropolises. Therefore, the purpose of the following study is to determine the level of participation in recreational activity of the inhabitants of Poznań metropolis, together with the analysis of selected factors of demographic, social and economic character that have a differentiating effect onto this activity. In the study 1584 inhabitants of Poznań metropolis were examined by 5 professional interviewers between March and June 2016 by means of a standardized questionnaire. The conducted studies proved high diversification of recreational activity of the inhabitants of the Poznań Metropolis and substantiated the directional hypotheses. The obtained results made it possible to identify the groups of inhabitants who participate in recreational activity regularly, seasonally and occasionally. Moreover, the demographic, social and economic variables made it possible to identify a group of inhabitants who are extremely passive or participate in motor recreation very rarely.

Keywords: physical recreation, recreational migrations, metropolis, social and economic factors, demographic factors, inhabitants, forms of recreation, place of residence

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1. Introduction

Sustainable development, one of the major purposes of which is the increase in the life quality, is considered to be the contemporary concept of metropolises and city development. Typical characteristics of sustainable cities in terms of physical recreation is creating conditions suitable for undertaking different forms of physical and sports activity and ensuring access to all these forms. It is essential that the factors characterizing forms of physical activity, their frequency and the distance from the place of living together with the preferences and expectations of the inhabitants are recognized.

The purpose of the following paper is to exhibit the influence of social and economic factors onto the physical recreation of the inhabitants of Poznań Metropolis together with recreational migrations. Here, "recreational migration" is considered to be moving from the place of residence to the place in which one can perform a given form of physical activity.

The following hypothesis has been adopted in the study: age, gender, place of residence, education, marital status, children and professional status, together with income, determine the forms and place of recreation and the recreational migrations of the inhabitants of Poznań Metropolis. Current knowledge on the relation between personal factors and physical activity as well as sport and recreation behaviour justifies assuming the following directional hypotheses:

1. Persons of younger age, with higher education, with higher income per household member, having no children, and living in towns and cities are more active during their leisure time, both within their home location and outside of it.

2. Men, younger persons, and inhabitants of towns and cities more frequently prefer different forms of recreation connected to higher level of physical effort (endurance physical activity).

3. Distance of every-day, weekend, and long-term recreational migrations and time spent to get to facilities for physical activity decreases with increasing age, decreasing income per household member, and increasing number of children.

The following areas of study have been analyzed:

– forms and frequency of physical recreation within and away from the place of residence,

– distance from and time necessary to reach the destination of a given physical activity.

The empirical part of the study follows the theoretical part concerning the conditions of undertaking physical activity in cities.

2. Conditioning of recreational activity in metropolises

In the global economy based on knowledge it is metropolises that determine the developmental potential of the given region. They accumulate economic activity in terms of production and services [Jankowska 2015: 176]. The notion of metropolis still waits for its legal and statistical definition. It is commonly acknowledged that the term refers to a city with a population of at least one million inhabitants. In the case of regional metropolises, the population threshold is usually lowered to 500 000. In addition to the quantitative criterion, morphological and functional features are also taken into account. Another term which is quite often used interchangeably, however, erroneously, with the term metropolis is agglomeration. The morphological structure of an agglomeration must comprise three mutually complementary areas: in the city core; the suburbs, and the suburban zone [Smętkowski, Jałowiecki & Gorzelak 2009: 37-38]. It needs to be stressed that spatial and demographic development of an agglomeration is not sufficient for its transformation into a metropolitan area. The basic feature of an agglomeration is joining urban areas, while that of a metropolis is functional integration and external metropolitan functions [Markowski & Marszał 2006: 14]. The concomitance of numerous metropolitan functions together with their synergy and impact is indispensable for the large city to be considered a metropolis of a given rank [Gaczek 2013: 26]. At the same time, they are places where not only technological innovations, but new cultural patterns, lifestyles and values are initiated [Hall & Pain 2006; Castells 1998; Taylor 2003: 1-14].

In the second half of the 20th century dynamic development together with globalization processes brought about significant changes in the urban landscape. Inhabitants began to move away from the city centers to the suburbs in search for more comfortable living conditions and lower prices. Other urban functions followed the movement – the same happened to trade, services, education, culture and sport. Polish cities entered the phase of urban sprawl, that is suburbanization, which is the creation of an actively functioning ring around the city, on its outskirts. Suburbs are the place of extensive money exchange and social activity, while the centers pauperize as their offer for inhabitants keeps shrinking. Hypermarkets, often being parts of shopping malls, where one can find also gyms and multiplexes take over the functions of city centers. However, is has been noticed that large distances between the place of work, residence and services together with the necessity of using a car do not have a favorable effect onto building social relations, sustainable city development and the health of its inhabitants. Restoring the basic function of city centers has been postulated for years (especially in the countries of the Western Europe) [Kostrzewska 2013: 1-6]. New multi-func-

tional spaces, full of life at different times, changing their character and their users depending on the time of the day or night, especially in the city centers degenerated by suburbanization processes, are being created. Multifunctional buildings containing offices, sports facilities (gyms, swimming pools), restaurants and art galleries are being designed and erected. City centers are becoming congested due to the erection of new housing blocks. Proximity of particular functions and services makes it possible for the inhabitants to give up cars and start using bicycles or simply walk [Kostrzewska 2013: 4-6].

Physically active residents are very visible in urban public spaces, because contemporary forms of physical activities are becoming more and more detached from typical sport facilities. In light of scientific research, participation in a physical activity alone is not sufficient from the point of view of human health needs. What is more important, a significantly increased mortality and incidence of lifestyle diseases caused by lack of physical activity can be observed [Edwards & Tsouros 2008: 15]. There are 5 million deaths worldwide attributable to physical inactivity (Lee et al. 2012: 219-220). Physical activity is a necessary component of a healthy lifestyle and it should be undertaken by a much larger share of the population. Moreover, economic studies show that inactive residents generate high costs for cities [ISCA/CEBR Raport 2015: 6; Davis 2010; *Designed to Move*... 2015]. Financial outlays on friendly, physically activating public space and infrastructure tend to be several times lower than the cost of treating diseases caused by lack of physical activity.

Empirical study results indicate that physical activity and active lifestyle of an individual, including recreational activity, are determined by intrapersonal, interpersonal and environmental factors [Biernat & Tomaszewski 2011: 173-181; Sherwood & Jeffery 2000: 21-44; Lindström et al. 2000: 200; Özdemir 2013: 229; Puciato et al. 2013: 650] (Fig. 1). Intrapersonal factors related to physical activity also in building urban environment include age, sex, socioeconomic status, educational level, marital status, lifestyle factors (e.g., physical inactivity, obesity) (Hinrichs et al. 2015: 258-269; Pang et al. 2005: 1667-1674).

On the other hand, interpersonal factors refer to the influence which the closest people have onto the individual (family, friends, colleagues) understood as support, indifference or rejection of the necessity of undertaking physical activity [Puciato et al. 2013: 650; Chadbury et al. 2016: 104-113]. Social factors refer to social relationships and social support acting as a facilitator or inhibitor for physical activity. Finally, the physical or built environment of the home and neighbourhood environment plays an important role in influencing health behavior [Özdemir 2013: 229]. Environmental factors can be of both physical character (climate, topography, site management, safety, urban density, access to recreational facilities and services within the place of residence) and of social character (influence of people the individual gets in touch with, excluding family and closest friends).

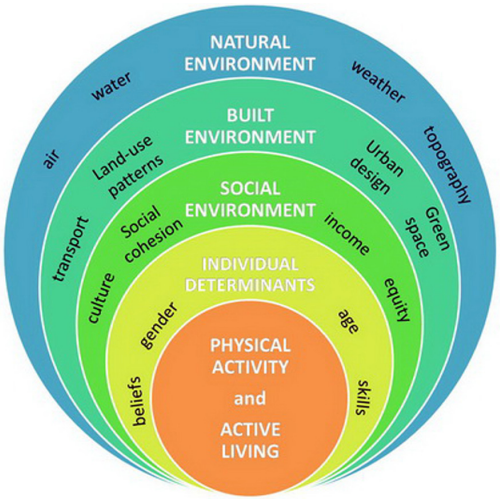


Figure 1. Factors influencing physical activity in communities

Source: adapted from Dahlgren & Whitehead 1991 [Özdemir 2013: 229].

Studies conducted by other researchers [e.g., Sallis et al. 2016: 1-10; Bourdeaudhuij et al. 2005: 886; Biernat & Tomaszewski 2011: 173-181 concerning participation in physical activity and physical recreation in urban areas indicate the existence of multi-direction interrelations between such variables as gender, age, education, professional status, income or place of residence.

For instance, the choice of a particular activity form may depend on different factors, the most important of which are: age, gender, sex, family status (e.g. being a parent of a baby), as well as place of residence and its proximity to sports and recreation facilities. Although these factors may not be relevant to certain people or groups, they impact the way of using public spaces, sports facilities [Kostrzewska 2017: 3] and the participation in motor recreation and physical activity.

3. Materials and methods

The spatial scope of the study comprises Poznań Metropolis understood as the city of Poznań, together with 17 municipalities of Poznań District,[2] and municipalities of Oborniki, Śrem, Szamotuły and Skoki, all belonging to the Association

[2] Poznań Districts consists of 17 municipalities surrounding the city of Poznań: Buk, Czerwonak, Dopiewo, Kleszczewo, Komorniki, Kostrzyn Wlkp., Kórnik, Luboń, Mosina, Murowana Goślina, Pobiedziska, Puszczykowo, Rokietnica, Skoki, Stęszew, Suchy Las, Swarzędz, Tarnowo Podgórne.

of Poznań Metropolis (Fig. 2). Poznań Metropolis as the area of research was selected on the basis of several factors. First of all, Poznań Metropolis is one out of seven most urbanized areas in Poland together with four agglomerations (Warsaw, Cracow, Łódź and Wrocław) and two conurbations (Upper Silesia and Tricity). Moreover, Poznań Metropolis, with its 1,023 million inhabitants is one of the major elements of the contemporary settlement system not only within Poland but also in Europe. According to the classification of European Spatial Planning Observation Network – ESPON it is one out of 76 areas of metropolitan character in Europe (Metropolitan European Growth Areas – MEGA) [Metropolia Poznań... 2011: 19].

Poznań Metropolis ranks high in terms of gross domestic product per capita, value of industrial exports, entrepreneurial innovativeness and concentration of business environment companies. Poznań is a leading center of commerce, science, education, culture and specialized social services. Numerous objects of cultural heritage can be found within the boundaries of the city of Poznań and Poznań Municipality. It is also unique in terms of the neighboring areas of Wielkopolski National Park, Zielonka Forest Landscape Park, the Warta River and numerous recreational areas. The agglomeration is also unique with regard to the individual path of bottom-up management integration and cooperation of public institutions [Metropolia Poznań... 2011: 28].

Moreover, when compared with other agglomerations such as Tricity, Warsaw or Cracow, Poznań is not a typical tourist destination. However, intensive tourist development of not only the city itself, but also adjacent areas has been observed in recent years. Additionally, according to the data provided by Poznań Tourism Barometer [PLOT 2015: 3] the structure of touristic offer of Poznań has strengthened in two dimensions – in terms of cultural tourism and in terms of creating a joint offer together with the adjacent areas, which strengthens the area's metropolitan character.

An own survey questionnaire prepared by the team of researchers was used in the process of gathering the data. The questionnaire consisted of 29 questions, most of which were of a closed type, with an extensive metrics part. They mainly concerned physical[3] and recreational activity of the inhabitants of Poznań Metropolis, their recreational migrations and conditioning of undertaking this type of activity. The survey was conducted between March and June 2016. The sample of 1584 individuals was interviewed by 5 trained interviewers. The survey was conducted in all 22 municipalities of Poznań Metropolis on various weekdays, at different times, in front of sports facilities and other public recreational places,

[3] The short Polish version of the International Physical Activity Questionnaire (IPAQ) was used in the first part of the questionnaire. Both versions (short and long) were prepared according to the recommendations of the IPAQ Scientific Committee by Stupnicki & Biernat [2007: 47-54].

Figure 2. Poznań Metropolis – study area

Source: own work.

such as hiking trails, parks or playgrounds. Respondents were selected proportionally as the research sample corresponds with the population of Poznań Metropolis in terms of the number of inhabitants, their gender and age. 13% of the sample were people with disabilities. The number of questionnaires was established on the basis of the confidence level 95% ($\alpha = 0.05$) with the maximum permissible error of 0.005. The data from Statistical Office in Poznań concerning the population of 31.12.2015 were used while determining the size and the structure of the research sample with regard to gender and age in particular municipalities [http://poznan.stat.gov.pl]

SPSS software was used for data analysis. For quantitative variables significance analysis of mean values was used on the basis of the Student's t-test and, for qualitative variables – difference significance for column proportions was analyzed by means of Z tests. While analyzing quantitative data in order to indicate difference significance with the division into more than two groups, analysis of variance ANOVA was used, and for multiple comparisons NIR test was applied. The obtained results are based on two-sided tests with the significance level of $p < 0.05$.

4. Study results

4.1. Profile of respondents

Study sample comprised 1584 inhabitants of Poznań Metropolis, most of whom (51%) were females. Social and demographic profile of respondents is displayed in Table 1. The respondents lived in 22 municipalities being the part of Poznań Metropolis and 75% of them lived in cities. Most respondents were at the age of 50-64, 27-36 or 37-49. The smallest segments of the population sample were respondents at the age of 18-26 who accounted for 12% of the study sample and those over 65 years of age (18%).

Most respondents had either secondary – 40% or higher education – 32%, and one out of five respondents had vocational or primary education (2%). Almost 65% of the examined inhabitants of Poznań agglomeration declared having at least one child and 35% were childless. Among those who declared having children 31% had 1 child and 31% – 2 or 3 children.

One out of three respondents declared average net income per family member within 2001-3001 PLN, and 31% – within 1001-2000 PLN (Table 1). The smallest segment of the examined population were those with the net income below 1000 PLN per family member (7%) and over 3000 PLN (9%). The majority of the examined inhabitants were workers of the private sector (34%), pensioners (22%) and the workers of the public sector (16%). Only one out of ten

Table 1. Social and demographic profile of respondents

Variable		*n*	%
Gender	female	817	51
	male	756	48
	no data	11	1
Age	18-26	199	12
	27-36	372	23
	37-49	343	22
	50-64	379	24
	65+	280	18
	no data	11	1
Education	primary	40	2
	lower secondary	2	0
	vocational	342	22
	secondary	631	40
	higher	513	32
	no data	56	4
Professional status	worker of a public sector	249	16
	worker of a private sector	547	34
	worker of non-govermental	10	1
	sector	125	8
	private entrepreneur	38	2
	farmer	352	22
	pensioner	56	4
	unemployed	139	9
	student	40	2
	other, professionally inactive	37	2
	no data	0	0
Marital status	married	1017	64
	cohabitation	152	10
	single	401	25
	no data	14	1
Children	no children	561	35
	1 child	495	31
	2-3 children	482	31
	4 and more children	30	2
	no data	16	1
Place of residence	city	1192	75
	country	377	24
	no data	15	1
Net income per family member	below 1000 PLN	108	7
	1001-2000 PLN	488	31
	2001-3000 PLN	519	33
	over 3000 PLN	147	9
	no data	322	20

Source: own work on the basis of study results ($N = 1584$).

respondents was a student, 8% were private entrepreneurs, 4% – unemployed, 2% – farmers and others professionally inactive, and 1% – workers of the non-governmental sector.

4.2. Forms and frequency of recreational activities undertaken by the inhabitants of Poznań Metropolis in and away from the place of residence

The study results indicate that 56.5% of respondents declared their participation in various forms of recreational activity. The three most commonly undertaken in the place of residence forms of recreational activities were: 1) hiking/walking, which were undertaken by 53 out of 100 respondents, 2) cycling, undertaken by 38 out of 100 respondents, and 3) swimming, preferred by 29 out of 100 respondents. Activities undertaken in the place of residence by at least 10 out of 100 respondents were: fitness (14 out of 100), running/jogging (14 out of 100), other activities (10 out of 100), and nordic walking (10 out of 100). The analysis of personal variables made it possible to conclude that gender differentiates[4] the two most commonly undertaken in the place of residence activities. One can also notice gender differences while taking a close look at other mentioned motor activities. Women, on average, most commonly participate in: hiking/walking, swimming, fitness classes, running, nordic walking, aerobics, roller-blading. Men, on the other hand, most commonly participate in: cycling, fishing, tennis and other activities [Basińska-Zych & Hołderna-Mielcarek: 2017: 54].

Moreover, demographic variables, such as age and the place of residence, and social and economic variables, such as education, professional status, marital status and the number of children influence the selection of particular forms of recreational activity indicated by the respondents. According to the performed analysis the respondents can be divided into two segments on the basis of their age: the younger and the older ones, both of whom are characterized by a different participation in recreational activity. Younger inhabitants of Poznań metropolis, those at the age below 35, usually get engaged in cycling, go hiking or walking, take part in fitness classes, go running or roller blading. Respondents belonging to the older group, on the other hand, mostly get engaged in hiking or walking, nordic walking or fishing.

Another important variable differentiating the participation in various forms of motor activity undertaken by the inhabitants of Poznań metropolis turned out to be the place of residence (Table 2).

[4] hiking/walking ($p < 0.002$), cycling ($p < 0.007$).

It can be inferred on the basis of the study results that despite numerous similarities in terms of different forms of physical recreation undertaken in the urban and rural areas, there are some forms which are much more popular among the inhabitants of rural areas, the most popular of which are: fitness (18 out of 100 respondents), fishing (9 out of 100 respondents) and other activity types (14 out of 100 respondents). This differentiation was confirmed statistically. Moreover, inhabitants of urban areas prefer hiking and walking and also roller blading.

It is also the forms of recreation undertaken away from one's place of residence that were analyzed (Table 2). The obtained results indicate that the inhabitants of Poznań metropolis much more frequently undertake recreational activity in their place of residence (98 out of 100 respondents), rather than away from it (47.2 out of 100 respondents). Those who get engaged in recreation away from their place of residence usually choose: 1) hiking/walking (13.1 out of 100 respondents), cycling (11.1 out of 100 respondents) and swimming (8.4 out of 100 respondents). It also needs to be noted that swimming is most often chosen by the inhabitants of rural areas away from the place of residence (Table 2). The variables that mostly differentiate the forms of recreation of the inhabitants of Poznań metropolis away from the place of residence are: age, gender, place of residence, income, marital status and the number of children. Active forms of recreation, such as hiking/walking and cycling, undertaken away from the place of residence are more often chosen by women (17.5 out of 100 respondents; and 12.4 out of 100 respondents respectively) rather than by men (8 out of 100 respondents; and 9.6 out of 100 respondents respectively), by those at the age of 18-26 and over 37, with higher education and the income per family member below 2000 PLN. Inhabitants at the age of over 50, on the other hand, when it comes to the activities undertaken away from their place of residence, most often choose nordic walking and gymnastics. Childless, usually single people or cohabitating couples, prefer participating in motor recreation away from their place of residence when compared to married couples with children.

Also the frequency of undertaking motor recreation, including its particular forms was analyzed. The study results indicate that respondents undertake those activities a few times a month on weekdays (20.3%) or a few times a month at weekends (16%) (Chart 1). Smaller numbers declared participation in recreational activity on a daily basis (11.8%) or every weekend (8%). The frequency of one's participation in motor activity declines with age – almost 75% of inhabitants of Poznań metropolis who are over 65 do not undertake any form of recreational activity. The same is true for every second person over 50 years of age and 40.8% of people over 37. It is the youngest groups of inhabitants, that is those at the age of 18-26 and 27-36 who are the most frequent participants in physical recreation. Only 15.6% of respondents at the age of 18-26 and 27.2% of those at the age of 27-36 did not declare participating in any form of motor recreation.

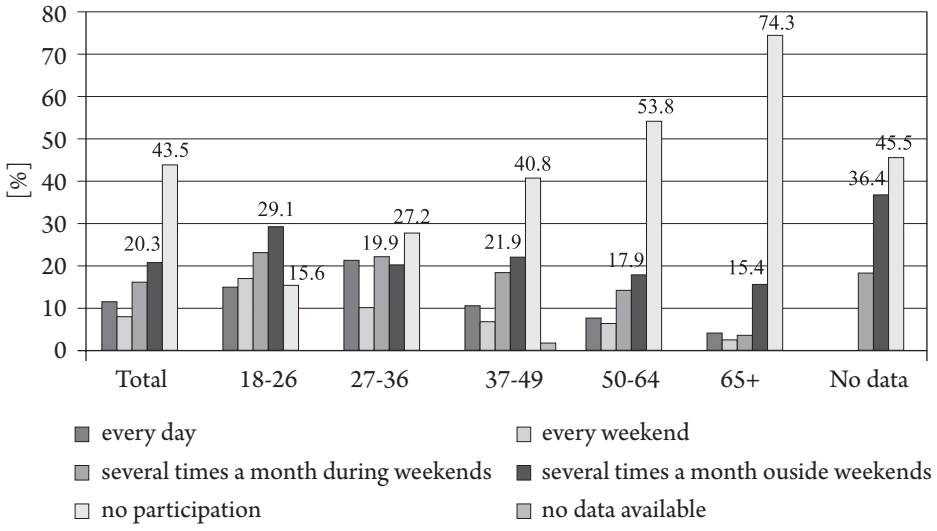
Table 2. Forms of recreational activity of inhabitants of Poznań Metropolis in and away from the place of residence

Form of recreational activity	In place of residence				Away from place of residence			
	total	city	country	no data	total	city	country	no data
	out of 100 respondents C	out of 100 respondents A	out of 100 respondents B	out of 100 respondents	out of 100 respondents D	out of 100 respondents A	out of 100 respondents B	out of 100 respondents
Hiking/walking	52.8	**55.4 B**	44.9	55.6	13.1	14.2	9.3	22.2
Cycling	37.7	38.2	35.6	44.4	11.1	11.9	8.3	11.1
Tennis	3.7	3.3	5.1	0.0	0.6	0.7	0.0	0.0
Badminton	1.6	1.0	2.8	11.1	1.1	1.3	0.5	0.0
Squash	1.3	1.5	0.5	11.1	0.3	0.3	0.5	0.0
Golf	0.2	0.3	0.0	0.0	0.1	0.1	0.0	0.0
Swimming	29.2	30.9	23.6	33.3	8.4	6.9	**13.4 A**	0.0
Horse riding	1.9	2.1	1.4	0.0	0.4	0.6	0.0	0.0
Roller-blading	4.7	**5.8 B**	0.9	11.1	1.0	1.0	0.5	11.1
Skateboarding	1.0	0.3	**3.2 A**	0.0	0.2	0.1	0.5	0.0
Roller skating	0.7	0.7	0.5	0.0	0.2	0.3	0.0	0.0
Aerobics	7.5	8.1	5.6	11.1	0.6	0.3	1.4	0.0
Fitness	14.4	13.1	18.1	22.2	1.6	1.2	2.8	0.0
Yoga	4.0	4.3	2.8	11.1	.6	.7	0.0	0.0
Gymnastics	7.0	7.3	5.1	33.3	1.2	1.2	0.9	11.1
Dance	5.8	5.8	5.1	22.2	1.9	1.9	1.4	11.1
Running/jogging	13.9	15.2	9.3	22.2	2.3	2.5	1.9	0.0
Nordic walking	10.2	11.2	6.9	11.1	2.1	2.5	.9	0.0
Fishing	7.9	7.8	8.8	0.0	2.7	2.5	3.2	0.0
Hunting	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0
Team sports	5.6	6.0	4.6	0.0	1.3	1.3	0.9	11.1
Extreme sports	0.4	0.4	0.5	0.0	0.1	0.1	0.0	0.0
Winter sports	1.1	1.0	1.4	0.0	1.3	1.6	0.5	0.0
Other activities	10.4	9.0	14.4	22.2	0.7	0.6	0.9	0.0
Do not undertake	0.6	0.1	**1.9 A**	0.0	**47.2 C**	43.3	**58.3 A**	66.7
No data	2.8	1.6	6.0	11.1	24.0	27.2	14.8	11.1

Notes: The results were based on the two-way tests with the level of significance of 0.05. Statistical significance is marked with bold font and capital letters. The tests were adjusted using the Bonferroni's adjustment for all the compari-sons of the pairs within each internal sub-table.

Source: own work on the basis of survey results (N = 1584).

Chart 1. Frequency of undertaking motor recreation



Source: own work on the basis of survey results (N = 1584).

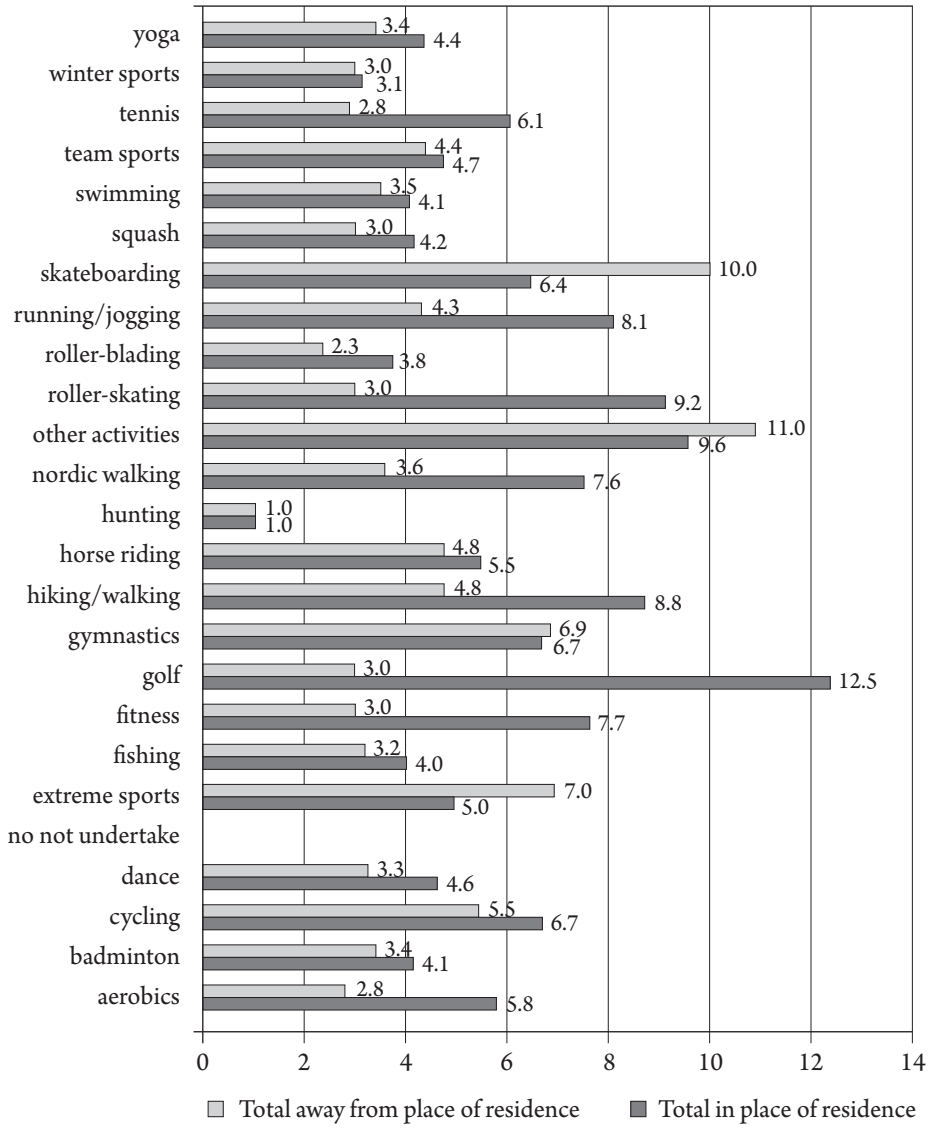
It needs to be noted that people from the age group of 27-36 tend to undertake recreational activity on the most regular basis as 21.2% out of them do that on a daily basis. Statistically significant differences confirm different frequency of engaging in motor recreation of two age segments: the younger one (aged 18-26) and those who are older (over 37).

It is also other social and economic features, such as education, place of residence, professional and marital status, the number of children and income that influence the frequency of undertaking recreational activity. The mentioned variables made it possible to form a social and economic profiles of frequent and infrequent consumers of recreational services in Poznań metropolis. People who undertake motor recreation on the most regular basis (every weekday and weekend) are: inhabitants of Poznań metropolis at the age of 18-36 with higher education, working in the private or non-governemntal sectors, private entrepreneurs, students or pupils, single or cohabiting, having no children and with the net income of over 2001 PLN per a family member.

The "infrequent" consumers of recreational services, those who undertake those activities a few times a month on weekdays or at weekends are those living in rural areas of Poznań metropolis, with secondary or higher education, at the age of 18-49, working in the public, private or non-governmental sectors, private entrepreneurs, students or pupils, usually single or cohabiting, with no or up to 2-3 children with the income of over 2001 PLN per a family member.

The group of people who most rarely participate or do not participate at all in any form of physical recreation are people at the age of 37-49 and over 50, with primary, lower secondary or vocational education, living in either urban or rural

Chart 2. Frequency of participating in the preferred forms of motor recreation among the respondents (arithmetic mean of the number of undertaken activities per month)



Source: own work on the basis of survey results ($N = 1584$).

areas, married, with more than 4 children, those who are farmers, unemployed or other professionally inactive with the income below 2000 PLN per a family member.

Particular, declared by the inhabitants of Poznań metropolis forms of recreational activity in and away from the place of residence were also analyzed (Chart 2).

The forms of recreational activity which were most often preferred in the place of residence were: golf (12 times a month), other activities (about 10 times a month), roller skating (about 9 times a month), hiking/walking (about 9 times a month), running/jogging (about 8 times a month), fitness (about 8 times a month) and nordic walking (about 8 times). All that means participating in the mentioned forms of activity about twice a week. Winter sports (3 times a month), roller-blading, fishing (about 4 times a month) and swimming (about 4 times a month) were the least often declared activities undertaken in the place of residence.

The most often undertaken forms of activity realized away from the place of residence are: other activities (11 times a month), skate boarding (10 times a month), extreme sports (7 times a month) and gymnastics (7 times a month). The activities in which the respondents participated the least often were hunting (once a month), roller blading, roller skating, tennis, aerobics, golf, squash – usually at about 3 times a month.

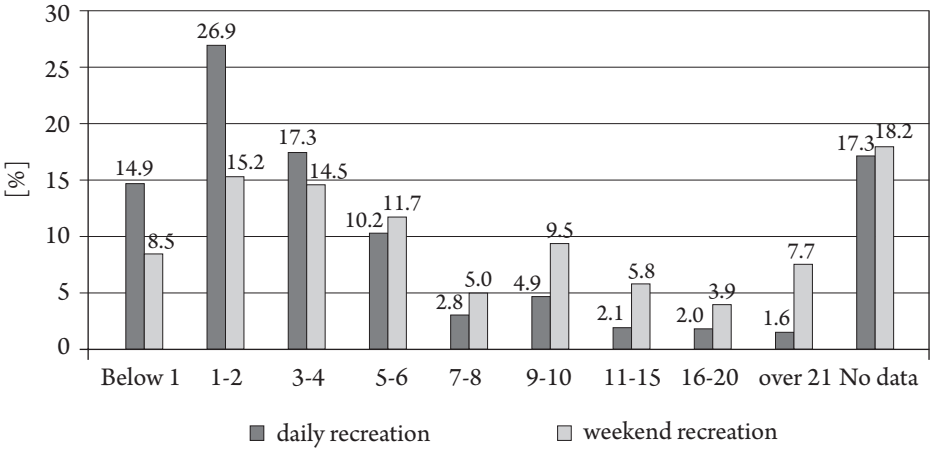
4.3 Distance and time related to reaching the place of a particular recreational activity

Another area of analysis were recreational migrations of the inhabitants of Poznań metropolis. They were asked about the distance (Chart 3) and the time necessary to reach the place of undertaken physical recreation (Table 4).

The obtained results indicate that the inhabitants of Poznań metropolis undertake daily recreation close to their place of residence – within the radius of up to 3 km (59.1%). Almost 27% respondents choose the locations within the radius of up to 2 km from their place of residence. Almost 15% inhabitants prefer the recreational activity very close to their place of residence, that is, within the radius of 1 km (Chart 3).

Physical activity undertaken at weekends by about 60% respondents, on the other hand, is usually performed within the distance of 1 to 10 kilometers from the place of residence. The obtained results confirm the influence of demographic variables, such as age and the place of residence onto the distance between the place of residence and the place where the recreational activity is undertaken. The distance of recreational migrations between those undertaken daily and those

Chart 3. Distance to the place of physical recreation broken into activity types in km



Source: own work on the basis of survey results ($N = 1584$).

undertaken at weekends decreases together with the increase in the age of the respondents.[5] Statistically significant differentiation of the influence of the place of residence onto the distance of undertaken activity was, for daily activity up to 2 km,[6] for recreation undertaken at weekends within the radius of 16-20 km and over 21 km from the place of residence. Moreover, the structure of weekend recreational migrations of the inhabitants of Poznań metropolis further than 21 km from the place of residence is characterized by a significantly higher percentage of the inhabitants of urban areas (7.7%) when compared to the inhabitants of rural areas (1.6%).

Social and economic variables, such as marital status, professional status, the number of children and net income per family member also differentiate the distance within which both daily and weekend recreation is undertaken. The group of inhabitants who participate in daily recreation within the radius of 2 km are married inhabitants (39.1%), pensioners (71.3%), other professionally inactive (64.7%), and workers of the public sector (54.6%). The professional group whose recreational migrations are significantly different from other groups are farmers, 40% of whom participate in daily recreational activity within the radius of 11-15 km and weekend activity within the radius of 9-10 km away from the place of residence. The distance between daily and weekend recreation decreases together with the number of children. Almost 64% of respondents with 4 children prefer

[5] Statistical significance between inhabitants in age 65+ and 18-26 ($p < 0.000$), 27-36 ($p < 0.001$), and 37-49 ($p < 0.016$).

[6] Statistical significance between inhabitants in age 65+ and 18-26 ($p < 0.000$), 27-36 ($p < 0.001$), and 37-49 ($p < 0.016$).

daily recreation within the radius of 2 km, similarly to 56.2% of respondents with 2-3 children and 30.5% of childless inhabitants. The distance of daily and weekend recreation decreases also together with the fall in the inhabitants' income, however, these differences are not statistically significant. The same is true for another social variable, gender.

Long-term recreation is characterized by a different structure of migration of the inhabitants of Poznań metropolis. Recreational trips taken by inhabitants of Poznań metropolis are usually to the locations further from their domicile when compared to daily and weekend recreation. Almost 40% of the respondents declared long-term recreation more than 60 km away from their domicile (Table 3). The results of the conducted analyses confirm statistical significance of the influence of such variables as age, education, place of residence, marital and professional status and net income per family member onto the differentiation in terms of the distance of long-term recreation from the place of residence. One should note that the inhabitants who declare recreational migrations further than 60km from their place of residence are people at the age of 27-36 (46%) and 56-60

Table 3. Net income per family member versus the distance of long-term recreation from the respondents' domicile

Distance in km	Total	Below 1000 PLN (A)	1001-2000 PLN (B)	2001-3000 PLN (C)	Over 3000 PLN (D)	No data
below 5	3.6	13.3	4.1	3.2	8.2	0.0
5-10	4.9	0.0	3.1	9.5	6.1	1.0
11-15	2.8	0.0	1.0	4.0	8.2	1.0
16-20	3.1	6.7	4.1	4.0	0.0	2.0
21-30	2.6	**20.0 BC**[1]	2.1	3.2	2.0	0.0
31-40	2.6	6.7	3.1	2.4	4.1	1.0
41-50	3.4	0.0	4.1	4.0	4.1	2.0
51-60	3.4	6.7	1.0	3.2	**12.2 B**[2]	1.0
over 60	39.8	26.7	53.6	51.6	42.9	12.0
no data	33.9	20.0	23.7	15.1	12.2	80.0

[1] Statistical significance between inhabitants with income 1001-2000 PLN ($p < 0.010$) and with income 2001-3000 PLN ($p < 0.027$).

[2] $p < 0.027$.

Notes: The results were based on the two-way tests with the level of significance of 0.05. Statistical significance is marked with bold font and capital letters. The tests were adjusted using the Bonferroni's adjustment for all the comparisons of the pairs within each internal sub-table. While analyzing recreational migrations of the inhabitants of Poznań metropolis one should take into consideration the time criterion. Daily recreation in terms of time is characterized by a different structure when compared to weekend recreation. One should note that the respondents prefer the shortest available time of reaching the place of daily recreation, which is similar as in the case of distance (Table 4).

Source: own work on the basis of survey results ($N = 1584$).

(44.3%) with higher education (47%), living in cities (42,9%), more often other unemployed (70%), private entrepreneurs (54%), farmers (40%) or pensioners (32%), cohabitating (59.2%), with the net income per family member of 1001 PLN (53.6%) and 2001-3000 PLN (51,6%). Moreover, the respondents who declared the income below 1000 PLN per family member more often participated in long-term recreation which was closer to their domicile when compared to the respondents with higher income (Table 3).

Almost every second inhabitant of Poznań metropolis prefers the time of reaching the place of daily recreation of 15 minutes, while with regard to weekend recreation the same time span was declared by only every third respondent on average. The respondents are more willing to devote more time to reaching the place of recreational activity at weekends. 24.1% of respondents declared the time of about 30 minutes and 24.6% – about 45 minutes, respectively for weekend recreation (Table 4). The time of reaching the place of recreation is influenced by statistically significant variables, such as: age, marital status, number of children and the place of residence.

Table 4. Age versus time necessary to reach the place of daily and weekend recreation of respondents

Recreation	Time necessary to reach the place in minutes	Total	18-26 (A)	27-36 (B)	37-49 (C)	50-64 (D)	65+ (E)	No data
Daily recreation	below 15	48.3	46.4	44.6	46.8	48.6	**69.4 ABCD**[1]	50.0
	about 30	15.3	10.1	17.7	18.7	14.3	12.5	0.0
	about 45	3.6	4.2	5.2	2.5	2.3	2.8	0.0
	about 60	0.8	2.4	0.4	0.0	0.6	1.4	0.0
	over 60	0.1	0.0	0.4	0.0	0.0	0.0	0.0
	no data	32.0	36.9	31.7	32.0	34.3	13.9	50.0
Weekend recreation	below 15	36.1	33.9	30.3	36.5	42.3	**50.0 B**[2]	0.0
	about 30	24.8	26.8	29.5	21.7	21.1	19.4	33.3
	about 45	6.6	4.2	7.7	7.4	7.4	4.2	0.0
	about 60	3.0	3.0	4.1	1.5	4.6	0.0	0.0
	over 60	0.6	0.0	1.1	0.5	0.6	0.0	0.0
	no data	28.9	32.1	27.3	32.5	24.0	26.4	66.7

[1] Statistical significance between inhabitants in age 65+ and 18-26 ($p < 0.016$), 27-36 ($p < 0.003$), 37-49 ($p < 0.014$), and 50-64 ($p < 0.041$).

[2] $p < 0.017$.

Notes: The results were based on the two-way tests with the level of significance of 0.05. Statistical significance is marked with bold font and capital letters. The tests were adjusted using the Bonferroni's adjustment for all the comparisons of the pairs within each internal sub-table.

Source: own work on the basis of survey results ($N = 1584$).

The time in which the respondents reach the place of daily and weekend recreation decreases together with the increase in the respondents' age (Table 4). Almost 70% of respondents at the age of over 65 declared the time of below 15 minutes. Similarly, this time was selected by 50% of senior citizens in the case of weekend recreation. Younger inhabitants of Poznań metropolis are more willing to devote more time in order to reach the place of physical recreation. Almost 19% of respondents at the age of 37-49 and approximately 18% at the age of 27-36 declared the time of about 30 minutes.

Statistically significant differences between the inhabitants of urban and rural areas with reference to the time devoted to reaching the place of weekend recreation of over 60 minutes were observed ($p < 0.037$). The inhabitants of urban areas are more willing to devote more than 60 minutes for their weekend recreational migrations. Moreover, 37.5% of single respondents significantly more often migrate during daily recreation than those inhabitants of Poznań metropolis who cohabitate. Almost one out of three inhabitants declaring cohabitation was willing to devote up to 30 minutes to reach the place of daily recreation, while similar time was declared by only by 14.5% of single people ($p < 0.043$) and 13.5% of married respondents ($p < 0.006$). Inverse relationship between the time necessary to reach the daily and weekend recreation and the number of children in the family was observed. Almost 62% of inhabitants with 2-3 children devote approximately 15 minutes to migration for daily recreation, similarly as 40% of childless respondents[7]. Higher percentage of childless respondents declared longer time devoted to reaching the place of recreation when compared to those respondents who have children. Statistical analyses did not confirm the influence of gender, professional status and income onto the time devoted to recreational migration among the inhabitants of Poznań metropolis.

5. Discussion

Participation in physical recreation is conditioned by numerous interpersonal, intrapersonal and environmental factors [Biernat & Tomaszewski 2013: 173-181; Sherwood & Jeffery 2000: 21-44; Lindström et al. 2000: 200; Özdemir 2013: 229]. The results of the survey conducted in Poznań metropolis exhibit differentiated impact of demographic, social and economic factors onto recreational activity, in particular the specific forms of motor recreation undertaken in and away from the place of residence together with the frequency of recreational activity.

[7] Daily recreation ($p < 0.000$), weekend recreation ($p < 0.001$); difference between inhabitants with 2-3 children and with 1 child ($p < 0.0034$).

The obtained results indicate that 56.5% of the inhabitants of Poznań metropolis declared participation in recreational activity. While contrasting the obtained results with the nationwide survey conducted by the Polish Central Statistical Office [GUS 2016: 48] it needs to be stressed that the results are quite similar as, on average, 53% of inhabitants of cities with the population of over 500 thousand inhabitants in Poland declared participation in sports or recreational activities in 2016. 46% of Poles, on average, declare recreational activity[8]. The obtained results are lower when compared to the results obtained from the inhabitants of Warsaw, 84% of whom declared undertaking such activity in their free time, although only 43% of them participated in recreational activity on a regular basis [Biernat 2011: 133, 231].

The first of examined demographic variables, that is gender, differentiates only the participation in motor activity, two most often undertaken by the inhabitants of Poznań metropolis motor activities in the place of residence (hiking/walking and cycling) and forms of recreation undertaken away from the place of residence. The examined males (59.1%) participated in recreational activity more often than the examined females (54.5%). It is also the results obtained by the Polish Central Statistical Office [GUS 2017: 48] and GFK Polonia [2015a: 4-12] that confirm this tendency on the national scale – there is a difference between the sports and recreational activity participation between males (48%) and females (45%).

Poles most often undertake the following activities: 1) hiking/walking, 2) cycling, 3) swimming [GUS 2013, 2017]. With respect to the mentioned above activities the examined population of Poznań metropolis does not differ significantly both with reference to the activities undertaken in and away from the place of residence. Female inhabitants of Poznań metropolis prefer the following forms of motor activity: hiking/walking, swimming, fitness, running, nordic walking, aerobics and roller blading. The male inhabitants, on the other hand, prefer cycling, fishing, tennis or other activities.

Furthermore, it is also the place of residence of the inhabitants of Poznań metropolis that differentiates the activities undertaken in and away from one's domicile. Those who live in the rural areas of Poznań metropolis prefer fitness, fishing and other activities. On the other hand, those who live in the urban areas significantly more often engage themselves in hiking/walking and roller blading. The inhabitants of Poznań metropolis more often participate in recreational activity in their place of residence than away from it. The most popular forms of recreational activity undertaken away from one's domicile are: 1) hiking/walking (13.1 out of 100 respondents), cycling (11.1 out of 100 respondents) and swimming (8.4 out of 100 respondents). It also needs to be noted that swim-

[8] Participation referred to the period from 1.10.2015 to 30.09.2016. See: GUS 2017.

ming is more often undertaken by the inhabitants of rural areas away from the is place of residence. The features which significantly differentiate the forms of participation in recreation of the inhabitants of Poznań metropolis away from their place of residence are: gender, age, income, marital status and the number of children.

The analysis of the frequency of participation in motor recreation indicates that the inhabitants of Poznań metropolis most often engage themselves in recreation a few times a month on weekdays (20.3%) and a few times a month at weekends (16%). One out of ten respondents declared daily participation in physical activity. The frequency of the participation in motor recreation diminishes with the increase in age, number of children and with the fall in income or level of education. These interdependencies are confirmed by other studies [Biernat 2011: Puciato et al. 2013: 654-655; GUS 2017: 48-55] It is also the nationwide surveys conducted by the Polish Central Statistical Office that prove the relationship between the regularity/frequency of participation in motor recreation and the professional life cycle (the fall in the percentage of those exercising on a daily basis at the age of 20-49, and then, its increase [GUS 2017: 65]. In the case of the inhabitants of Poznań metropolis, the most active "regular consumers of recreational services" are people at the age of 18-36, while the most passive respondents (or those who very rarely participate in recreational activity) are the inhabitants at the age of 37-49 and over 50. The nationwide surveys conducted among senior citizens confirm the lower participation of people over 50 in recreational activity [GFK Polonia 2015b: 25-26].

It is also the marital status and the number of children in the family that have impact on the forms of recreational activity and the frequency of participation. The most active respondents are those who are single (approximately 73%), or those cohabiting (67.8%), while every second married inhabitant of Poznań metropolis does not participate in motor recreation. The number of children in the family and connected with that the lack of time results in the lower participation of this group in motor recreation.

Recreational activity of the inhabitants of Poznań metropolis is also dependable upon the net income per family member. Almost 66% of the respondents with the income below 1000 PLN per a family member did not participate in recreational activity. Moreover, people with higher income – over 2001 PLN per family member, were more regular consumers of motor recreation when compared to those with lower income. Such tendencies are also indicated by other authors [Biernat, Tomaszewski 2011: 173-181; the Polish Central Statistical Office 2017: 59] Similarly to the results obtained by the Polish Central Statistical Office in the nationwide survey the level of income does not significantly influence the forms of undertaken motor recreation.

The results of the study indicate also the influence of participant demographic, social and economic variables onto recreational migrations of the inhabitants of the metropolis measured by means of the distance from and the time necessary to reach the place of recreation. The obtained results prove that daily recreation is undertaken by the inhabitants of Poznań metropolis in or very close to the place of residence – within the radius of 3 km (59.1%). On the other hand, 60% of the respondents undertake weekend recreation within the radius of 1-10 km from their domicile. The study results confirm the influence of both demographic variables, namely age and the place of the residence, and the influence of social and economic variables, such as income and professional status onto the distance of recreational activity from one's domicile. Younger, wealthier inhabitants of Poznań metropolis are more willing to travel longer distances in comparison to older and less well-to-do respondents.

Similar interdependencies were observed with respect to the time which the inhabitants of Poznań metropolis had to spend while reaching the place of recreation. Almost every second inhabitant of Poznań metropolis prefers the time of 15 minutes in order to get to the place of daily recreation, while as far weekend recreation is concerned, the same time span was declared by every third respondent on average.

Long-term recreation of inhabitants of Poznań metropolis is of a different structure. Recreational trips are undertaken to more distant places (further away from the place of residence) when compared to daily and weekend recreation. Almost 40% of the examined inhabitants migrate for the purposes of long-term recreation over distances longer than 60 km. The results of the conducted analyses confirm statistical significance of the influence of such variables as age, education, place of residence, marital and professional status and net income per family member onto the differentiation with respect to the long-term distance of recreation. The increase in the level of income per family member results in the increase in the long-term migration distance.

6. Conclusion

The significance of demographic, social and economic features for undertaking recreational activity has been discussed by numerous authors. The conducted studies proved high diversification of recreational activity of the inhabitants of the Poznań Metropolis and substantiated the directional hypotheses. The obtained results made it possible to identify the groups of inhabitants who participate in recreational activity regularly, seasonally and occasionally. Moreover, the demo-

graphic, social and economic variables made it possible to identify a group of inhabitants who are extremely passive or participate in motor recreation very rarely.

The group of people who are threatened with exclusion from physical activity or who do not undertake it at all, are the inhabitants of Poznań metropolis at the age of 37-49 and over 50, with primary, lower secondary or vocational education living in both urban and rural areas, married with more than 4 children, farmers, pensioners, unemployed or other professionally inactive with the net income below 2000 PLN per family member. These people prefer daily and weekend recreation very close to their place of residence and are willing to devote only up to 15 minutes to reaching the place of recreation. Therefore, it may be concluded that there should be a wider access to public places of recreation and sports and recreational facilities in the very vicinity of their domicile. The shorter the time in which one can reach the place of recreation the greater the motivation to undertake such an activity. Those inhabitants who are threatened with exclusion from physical activity should be targeted with numerous preventive actions which could take various forms: educational activities, recreational classes or events or even complex metropolitan programs promoting active rest in one's spare time and healthy lifestyle. Furthermore, the obtained results could be used in planning and preparing metropolitan recreation and touristic offer based on physical activity.

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Społeczno-ekonomiczne uwarunkowania aktywności i migracji rekreacyjnych mieszkańców metropolii Poznań

Streszczenie. W globalnej gospodarce opartej na wiedzy o potencjale rozwojowym regionu decydują metropolie. Są to obszary o dużej gęstości zaludnienia oraz zróżnicowanej jakości życia. Poza czynnikami intrapersonalnymi i interpersonalnymi na uczestnictwo w rekreacji ruchowej wpływają czynniki środowiskowe. Istotnym elementem planowania i organizacji sytemu rekreacyjnego w miastach i metropoliach jest rozpoznanie uwarunkowań charakteryzujących formy aktywności ruchowej, ich częstotliwość, a także strukturę migracji rekreacyjnych. W związku z tym celem badań jest określenie poziomu uczestnictwa w aktywności rekreacyjnej mieszkańców metropolii Poznań oraz analiza wybranych czynników demograficznych i społeczno-ekonomicznych różnicujących tę aktywność. Badania ankietowe przeprowadzono wśród 1584 mieszkańców metropolii Poznań w okresie od marca do czerwca 2016 r. na podstawie standaryzowanego kwestionariusza ankietowego, przy wsparciu pięciu przeszkolonych ankieterów. Przeprowadzone badania dowodzą dużego zróżnicowania rekreacyjnej aktywności mieszkańców metropolii Poznań i potwierdzają słuszność sformułowanych hipotez kierunkowych. Wyniki badań pozwoliły na wyłonienie grup mieszkańców metropolii Poznań: regularnie, sezonowo i sporadycznie podejmujących aktywność rekreacyjną. Dodatkowo na podstawie zmiennych demograficznych i społeczno-ekonomicznych wyszczególniono grupę mieszkańców pasywnych lub bardzo rzadko uczestniczących w rekreacji ruchowej.

Słowa kluczowe: rekreacja fizyczna, migracje rekreacyjne, metropolia, czynniki społeczno-ekonomiczne, czynniki demograficzne, mieszkańcy, formy rekreacji, miejsce zamieszkania

Joanna Łuczak*, Michał Preisler**

Physical Recreation of People with Disabilities – Inhabitants of the Poznań Metropolis. Selected Study[1]

Abstract. Presented results are part of a broader study on the metropolitan region as the space of recreational penetration. It employed diagnostic survey and the tool used was the questionnaire prepared by the authors. The purpose of the following paper is to characterize selected aspects of physical recreation only of inhabitants with disabilities of the Poznań metropolis. It presents below only the results concerning the basic information of physical recreation of this social group, without the analysis of the conditionality of the participations in this kind of leisure time activities. The study results indicate that the participation of people with disabilities in physical recreation near and away from their place of residence is low. Respondents prefer weekend activity near their place of residence and the forms of recreation are not very diverse. They usually use small recreation and sports facilities or they use outdoor infrastructure. Enhanced involvement of people with disabilities in physical recreation together with personalized, adjusted to a given dysfunction offer is required.

Keywords: metropolis, metropolitan area, physical recreation, disability

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1. Introduction

A metropolitan area is a highly urbanized region with a system of municipal settlements comprising a number of units, including metropolises [Gaczek 2015: 12; cf. Ni, Kamiya & Ding 2017]. According to Poland's National Spatial Development concept 2030 (KPZK) Poznań is one out of ten metropolises in Poland [KPZK 2011: 192]. This city as an urban core with highly developed metropolitan functions together with surrounding cities, towns and villages (highly urbanized) constitute a functional and spatial zone which is the Poznań metropolitan area [Kaczmarek 2015: 41].

According to the European Observation Network, Territorial Development and Cohesion, Poznań metropolitan area is perceived as, so called, Metropolitan European Growth Area (MEGA), in terms of human potential, competitiveness of urban systems (in infrastructure or a given function), national and European communication networks and scientific development [Interim Territorial Cohesion Report 2004: 90, 98-101]. However, it needs to be stressed that Poznań is not competitive when compared to other cities of a similar size in Western and Northern Europe [KPZK 2011: 22].

It is assumed that contemporary regional development needs to be perceived in terms of economic globalization and metropolization. The latter is connected with "population concentration in highly urbanized (metropolitan) areas in which huge human and economic potential together with economic differentiation generates new needs and requirements, and where accelerated dynamics of social and economic life is in line with activities directed towards enhancing living conditions and functionality of cities" [Kaczmarek, Kaczmarek & Bul 2011: 5].

Therefore, the development of metropolitan areas is mainly associated with the enhancement of those functions which determine social and economic development and have favorable effects on the wealth growth and population potential of the given centers. This concentration of metropolitan functions can enhance the attractiveness of cities as areas offering better work conditions and higher quality of life [Kaczmarek, Kaczmarek & Bul 2011: 21].

The notion of life quality is regarded in many aspects and its analysis is of multi-disciplinary character. Researchers in many scientific domains agree that the scope of this analysis should be two dimensional – it should concern broadly understood objective conditions and subjective welfare. According to Joanna Śniadek and Alina Zajadacz, examining the relations between life quality and tourism and recreation is difficult as, which is also stressed by G.I. Crouch and J.R.B. Ritchie, the development of this sector should result in the development of the local community [Crouch& Ritchie 1997: 137; Śniadek & Zajadacz 2014: 341].

It is assumed in the following paper that the essential aspect connected with the process of metropolization in terms of the changes in the social life together with better living conditions is creating best possible conditions and opportunities for the inhabitants of the metropolis to participate in physical activities. Therefore, the research into the level of participation in those activities, together with their preferred forms and the places where these activities are undertaken is essential.

It is also assumed that physical recreation is understood as various games, exercises and sport disciplines undertaken in one's free time for pleasure, recreation and health reasons together with preventing diseases of affluence and increasing the favorable effect onto the capacity for white and blue collar work [Barankiewicz 1998: 11].

In this article the assumptions mentioned above referred to inhabitants with disabilities of Poznań metropolis. This social group is rarely referred to in the papers concerning the present state and development possibilities in Poznań metropolis.

One should also bear in mind that, together with the ongoing economic and social welfare development, it is leisure time and the way it is used that will influence the perception of life quality [Śniadek & Zajadacz 2014: 343].

2. Defining disability

The accession of Poland into the European Union in 2004 made it necessary to increase interest into the problems of people with disabilities. This process was later enhanced by signing by Poland the Convention on the Rights of Persons with Disabilities in 2007[2] and its ratification in 2012.[3] This fact did not result in the increase in the social awareness of disabilities, nevertheless, it enforced certain actions on the part of administration, local self-government and municipality in terms of life quality improvement of this particular social group.

It needs to be stressed that it is also the growing activity of people with disabilities that really matters. More and more people with disabilities are constantly demanding their rights and they want their specific needs to be fulfilled within the scope of social life together with the rights guaranteed by law and in terms of

[2] www.mpips.gov.pl/spoleczne-prawa-czlowieka/organizacja-narodow-zjednoczonych/konwencja-o-prawach-osob-niepelnosprawnych/ [access: 6.05.2017].

[3] www.mpips.gov.pl/spoleczne-prawa-czlowieka/organizacja-narodow-zjednoczonych/konwencja-o-prawach-osob-niepelnosprawnych/ratyfikacja-konwencji-o-prawach-osob-niepelnosprawnych-przez-polske/ [access: 6.05.2017].

customary law.[4] The activity of people with disabilities in many spheres results in breaking down the barriers and stereotypes associated with disability[5]. However, the situation of people with disabilities in Poland can still be assessed as difficult and many changes not only on the structural, but also on system and social levels need to be implemented [Kryńska 2013: 12].

In the Act on Social and Vocational Inclusion and Employment of the Disabled (ustawa o rehabilitacji 1997),[6] three different levels of disability are mentioned: light, moderate and severe and these levels are used for the purposes determined in this act. The classifications of disability levels are diverse and sometimes dependent upon the purposes for which they have been formulated, such as pension or non-pension (for example rehabilitation or education) purposes. The most basic division consists of certified disability (confirmed by a specific certificate) and biological disability, that is the subjective perception of deficiency in performing basic tasks for a given age activities without having certified disability [Jurczewska: Encyklopedia *Dziennika Gazety Prawnej*]. The most commonly referred to classifications of disability are based upon the classification by World Health Organization and by Maria Grzegorzewska and Zofia Sękowska [Żółkowska 2003: 15; Grzegorzewska 1964: 18; Sękowska 1998: 27-28; cf. Brault 2012: 1-3]. In 2013 the International Classification of Functioning, Disability and Health (ICF) was published in Polish. This classification "goes beyond the traditional perception of disability understood in biological terms and moves toward perceiving disability in functional terms taking into account what a person is capable of doing and how he or she can be supported," which is helpful in "a totally modern perception of disability"[7] [Prochyra 2013; Dązbłaż 2016].

The very notion of disability which is defined in Poland as "permanent or temporary inability to fulfil social roles due to permanent or long-term impairment, especially if it causes inability to perform work" [ustawa o rehabilitacji

[4] For example, Karta Praw Osób Niepełnosprawnych [Resolution of the Sejm of the Republic of Poland of 1 August 1997, M.P. of 13.08.1997 No. 50, item 475]; Standardowe Zasady Wyrównywania Szans Osób Niepełnosprawnych, www.mpips.gov.pl/userfiles/File/mps/ONZ.doc [access: 6.05.2017].

[5] Negative stereotypes of the disabled are still dominant – the common image is as follows: a disabled person is vulnerable, dependent, incapable of taking care of oneself and one's own interests; people with disabilities are also described as weak, fearful, nervous, withdrawn, insecure and dissatisfied with life [Ostrowska 1997: 76; *Mity i stereotypy...* 2010; Niedbalski 2014: 61].

[6] Ustawa z dnia 27 sierpnia 1997 r. o rehabilitacji zawodowej i społecznej oraz zatrudnianiu osób niepełnosprawnych, Dz.U. 1997, nr 123, poz. 776 [Act on Social and Vocational Inclusion and Employment of the Disabled, Journal of Laws 1997, No. 123, item 776].

[7] Except from a statement by Igor Radziewicz-Winnicki, then Under Secretary in the Ministry of Health during the conference „International Classification of Functioning, Disability and Health" which took place on 9 May 2013 at the offices of Social Security Service at 3/5, Szamockiej Street in Warsaw, www.niepelnosprawni.pl/ledge/x/166805 [access: 7.05.2017].

1997] should also be reviewed. This revision concerns the very definition of a person with disability who, even in the Charter of the Rights of People with disabilities is described as "a person whose physical, psychological or mental ability permanently or temporarily impedes or inhibits everyday life, education, work or the fulfilment of social roles according to legal and customary norms" [Karta Praw 1997]. Academic work also provides similar definitions [e.g., Mikulski & Auleytner 1996: 19].

According to the guidelines of the EU adopted at the European Disability Forum in 1994, a person with disability is "an individual having their full rights in a situation that inhibits him or her due to environmental, economical and social barriers, which he or she cannot – contrary to other people – overcome because his or her disabilities" [Kawwa & Wilmowska-Pietruszyńska 2016: 76].

The quoted above definition is referred to in the following paper. The authors have also adopted, after Joanna Łuczak and Michał Preisler, that the use of the term "a person with disability" is more adequate and in line with European guidelines than a "disabled person" [Łuczak & Preisler 2014: 165].The following classification of disability has been adopted for the research: motor disability (moving independently, on crutches, in a wheelchair), aural disability (using/not using hearing aid), visual disability (blind/sight impaired) and mental disability [Kirenko & Parchomiuk 2006: 17].

3. Disability in statistical numbers

According to the results of Polish Census of 2011 (NSP) the number of people with disabilities at the end of March was less than 4.7 million, and that constituted 12.2% of the country's population [NSP 2011: 67]. People with both biological and legal disability took part in the survey [NSP 2011: 34, 67]. 53.9% of women with disabilities and 46.1% of men with disabilities were noted. Almost 79% of all the disabled people, that is, about 3.7 million had their disability certified by a competent authority.[8]

However, it needs to be noted that the questions concerning disability were voluntary and therefore, almost 1.5 million respondents (including those with certified disability) refused to answer them. According to Krystyna Slany this fact has unfavorable effect onto the quality, dependability and adequacy of the gathered information [Slany 2014: 46].

[8] In Poland there are two distinct case laws presented by different institutions and regulated by distinct legal acts – compare Act on Social and Vocational Inclusion and employment of the Disabled, chapter 2, and Ordinance of Minister of Economy, Labor and Social Policy of 15 July 2003 on Determining Disability and Degrees of Disability, Journal of Laws 2003, No. 139, item 1328.

According to the information in the census it needs to be assumed that the total numbers of men and women with different disabilities in the census of 2011 are underestimated. As a result, the percentage of people with disabilities with relation to the whole population is also too low [NSP 2011: 68].

In Poland, the data concerning people with certified disability are accessible up-to-date and revised quarterly on the website of the Office of the Government Plenipotentiary for Disabled People. The data are prepared on the basis of the Labor Force Survey (BAEL). The most up-to-date data from Labor Force Survey concerning people with disabilities (in particular voivodeships) refer to the fourth quarter of 2016.[9]

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Data concerning Wielkopolska Voivodeship are presented below (Table 1).

Table 1. Economic activity of people with disabilities aged 16 and more in Wielkopolska in 2016 (in thousands)

2016	Total	Active population	
		Total	Including working population
I quarter	355	63	55
II quarter	347	59	53
III quarter	304	53	50
IV quarter	303	46	41

Source: own work on the basis of quarterly data from BAEL for particular voivodeships for the period 2007-2016 as of 28.07.2017, www.niepelnosprawni.gov.pl/p,81,bael [access: 31.05.2017].

According to the data presented by Elżbieta Tonder, Staroste Plenipotentiary for Disabled People[11] at the beginning of 2014 there were about 13,000 people with a certified disability in the Poznań District, including about 2,780 with severe degree of disability, 4,070 with moderate degree of disability, 4,820 with light disability and over1,300 of children under the age of 16. The most common

[9] www.niepelnosprawni.gov.pl/p,81,bael [access: 31.05.2017].

[10] www.niepelnosprawni.gov.pl/p,81,bael [access: 31.05.2017].

[11] Presentation given on 12 December 2014 during conference summarizing the 7th stage of the project "Overcoming Exclusion. Comprehensive Activation of People in Danger of Social Exclusion in Poznań District" realized by District Family Support Centre in Poznań, http://powiat.poznan.pl/pokonac-wykluczenie/ [access: 31.05.2017].

causes of disability in the Poznań District are motor organ diseases, circulatory system diseases and neurological disorders. People suffering from autism and mental disorders compose the smallest group [Tonder 2014: 1]. Table 2 below presents the numbers of adults with certified disability in Poznań metropolis:

Table 2. Numbers of people with certified disability in Poznań metropolis[12]

Symbol	Municipality	Number of people with certified disability
A	Buk	476
A	Czerwonak	1058
A	Dopiewo	580
A	Kleszczewo	187
A	Komorniki	550
A	Kostrzyn	522
A	Kórnik	700
A	Luboń	1127
A	Mosina	1146
A	Murowana Goślina	676
B	Oborniki	901
A	Pobiedziska	664
C	Poznań	92980
A	Puszczykowo	383
A	Rokietnica	431
	Skoki	lack data
A	Stęszew	652
A	Suchy Las	487
A	Swarzędz	1757
	Szamotuły	lack data
D	Śrem	1362
A	Tarnowo Podgórne	740

A – data of 31 March 2001, B – data of 2014, C – data of 20 May 2002, D – data of 29 April 2013.

Source: own work on the basis of: Tonder 2014 (A); *Strategia rozwiązywania problemów społecznych*... 2014: 45 (B); *Kierunki działań*... 2012: 8 (C); *Powiatowa strategia*... 2014: 18.

Unfortunately, acquiring up-to-date information on the numbers of people with disabilities living in Poznań and in the whole area of the Poznań metropolis is very difficult. Even the Statistical Office in Poznań, or the City Hall websites "Facts and numbers" do not have such data at their disposal.[13]

[12] Distribution on base of information from Poznan Metropolis Portal, www.aglomeracja.poznan.pl/ [access: 25.11.2017].

[13] www.poznan.stat.gov.pl [access: 31.05.2017]; www.poznan.pl/mim/s8a/ [access: 31.05.2017].

4. Physical recreation of people with disabilities

It was at the very beginning of the twentieth century when physical activity in one's leisure time was considered the basic element of healthy lifestyle. Teresa Wolańska indicated that practising a healthy lifestyle, which includes regular participation in physical recreation, should be "considered an obligation as a factor of positive health" [after: Łuczak & Bronowicki 2010: 20]. A significant role of physical recreation in prevention of civilization diseases together with its positive influence on the quality of ageing is very often stressed in the subject literature. Physical recreation can also have a favourable effect onto person's well-being, it prevents stress and is part of therapy of numerous disorders [Krakała 2008: 14; Osiński 2011: 23].

People with disabilities constitute a social group for which – apart from tourism and sightseeing – physical recreation, due to its health and social functions, plays a significant role [Skalska 2004: 17]. The following objectives of this activity should be taken into consideration:

– therapeutic – supporting treatment and rehabilitation of an individual;
– biological – compensation of morphological losses resulting from a given disability;
– anatomical and physiological – supporting kinesis therapy, that is maintaining proper anatomical relations in the joint area, preventing muscle contractures or atrophy;
– hygiene and health – making daily activity program more attractive;
– educational and psychological – shaping positive personality traits;
– hedonistic – taking pleasure from physical activity;
– social – including individuals into social and cultural life [Lorenzen,[14] after: Łobożewicz 2000: 24-25].

It is also Jana Labudowá who stresses that physical recreation should enable a person with disability to:

– broaden cognitive horizons by means of making people acquainted with new objects, equipment and situations together with making new personal contacts,
– improve one's motor disposition,
– develop cognitive and emotional processes,
– improve socialization and develop verbal and non-verbal communication,
– shape proper self-esteem,
– understand social environment in a better way [Labudová 2009: 337].

[14] H. Lorenzen – progenitor of the idea of participation people with disabilities in sports activities

Participation in physical recreation can be of organized character – in sports clubs, or not (sports facilities available to general public or in the open air). However, numerous barriers make it difficult or even impossible for people with disabilities to participate in physical and tourist recreation (e.g., Labudová 2009: 335-336; Preisler 2011: 28; Kubińska, Bergier & Bergier 2011: 191-192; Łuczak & Preisler 2014: 167-168].

Physical exercises and targeted sports activity, including physical recreation, should be inherent to the optimal lifestyle of a person with disability [Labudová 2009: 334]. However, one needs to take into consideration the fact that for the mentioned above objectives to be achieved, particular needs should be satisfied and certain requirements of the participants in physical recreation need to be fulfilled not only with regard to their various preferences but also with regard to their physical limitations.

Creating proper and favorable conditions for the participation of people with disabilities in physical recreation poses a challenge for the state's policy, including government and non-government institutions.

5. Materials and methods

The following study was conducted in Poznań metropolis from March to June 2016 and covered 1584 respondents, 13% of whom were people with disabilities (200 people). The minimum number of questionnaires was calculated on the basis of confidence level of 95% ($\alpha = 0.05$) with the maximum error ±5% (0.05) and equalled 1426 questionnaires. While determining the size and structure of the study sample the data from Statistical Office in Poznań as of 31.12.2015 were used with regard to age and gender and reference to particular municipalities.[15]

The survey was conducted by 5 trained interviewers and the tool used was the questionnaire prepared by the authors and consisting of 29 questions, most of which were closed.

SPSS software, in particular significance tests for quantitative variables, was used to analyze the data statistically. T test was used to analyze the significance of the mean differences, while Z test was used for qualitative variablesin comparing the significance of variable proportions grids. The obtained results are based on two-sided tests with the significance level $p < 0.05$.

The research topic is the participation in physical recreation of people with disabilities living in the Poznań metropolis. The purpose of the following paper is to characterize the selected aspects of the physical recreation only of the inhabit-

[15] http://poznan.stat.gov.pl [access: 31.12.2015].

ants with disabilities of the Poznań metropolis. It presents below only the results concerning the basic information of physical recreation of this social group, without the analysis of the conditionality of the participations in this kind of leisure time activities.

Prior to the study it had been assumed that the level of physical recreation of people with disabilities in the metropolis would not be high and that the highest levels would be in the Poznań municipality. It was also assumed that the forms of the recreation would not be very diverse.

The following research questions were addressed in the paper:

1. How often do respondents participate in physical recreation?
2. Is the level of physical recreation satisfactory for the respondents?
3. What forms of physical recreation are preferred by the respondents?
4. What type of activity and how many times a month do the respondents perform near and away from their place of residence?
5. What sports/leisure facilities do the respondents use most often?
6. How much time (on average) does it take them to get to the place of physical recreation?
7. Do the respondents participate in any form (if yes, what form) of mass sport competitions organized in the Poznan metropolis?
8. How much money a month do the respondents spend on participating in physical recreation?

6. Characteristics of physical recreation of people with disabilities in the Poznań metropolis

6.1. Characteristics of respondents

200 people with disabilities took part in the survey, which is approximately 13% of the total group of the respondents. The questionnaires were filled in by 117 women and 83 men at the age of 23-93. The largest group (47.5%) were people at the age of 65 and older. One person did not fill in the information on their gender and age. The distribution of the respondents in terms of impairment is as follows: 77% respondents have motor disability, 8.5% – vision disability, and 8% – aural disability. The remaining 6.5% respondents either did not give an answer to this question (1.5%) or marked that the question does not apply (5%).

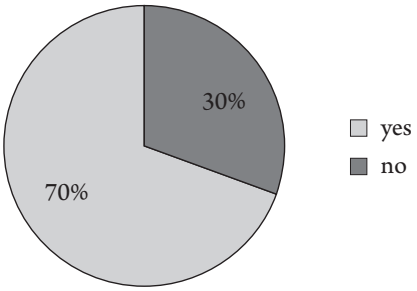
33% of the population sample do not have a certified disability. The remaining 67% declare that their disability is certified by a proper authority, 39% of whom suffer from slight disability, 15.5% – moderate and 9% – from severe disability. The remaining 3.5% of this group did not determine the degree of their disability.

In addition, 48% of respondents are inhabitants of Poznań municipality, while 52% live in municipalities which are part of Poznań metropolis. Their share is 1%-10% depending on a given municipality under study.

6.2. Level and frequency of participation in physical recreation

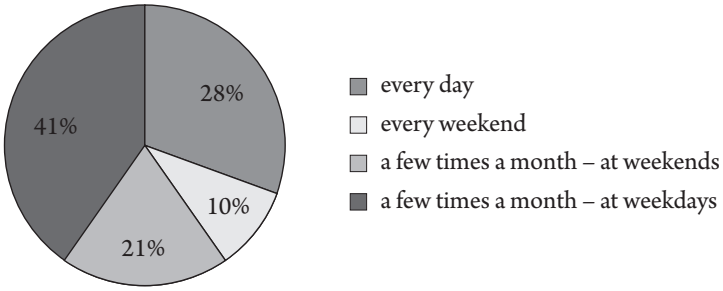
The level of participation in physical recreation in the studied group is low – 30.5% (Chart 1). As it has already been mentioned, the inhabitants of Poznań municipality constitute 48% of all the people physically active in their free time. As far as the remaining 52% are concerned it is the inhabitants of Luboń and Kórnik municipalities who are most active (19.5% and 16% respectively).

Chart 1. Level of participation in physical recreation of people with disabilities in Poznań metropolis



Source: own work ($N = 200$).

Chart 2. Frequency of participation in physical recreation of people with disabilities in Poznań metropolis



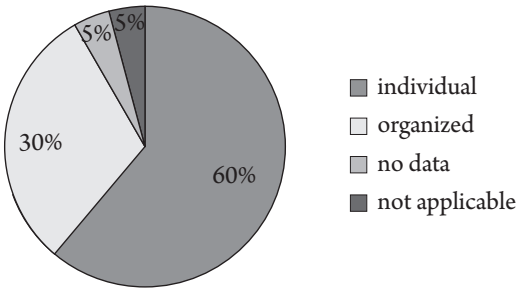
Source: own work ($N = 200$).

28% of the respondents do physical exercises on a daily basis, while almost 41% are active a few times a month, apart from weekends. People who are active several times a month but during weekends constitute 21.3% of the group. Fewer than 10% of the respondents declare participation indifferent forms of recreational activity every weekend (Chart 2). Almost half of the respondents (46%) stated that the present level of participation inphysical recreation is not satisfactory.

6.3. Forms of physical recreation

It can be inferred from the responses that most of the respondents participate in individual forms of physical recreation, while only 30% prefer mass forms of recreation (Chart 3).

Chart 3. Prefered forms of physical recreation



Source: own work ($N = 200$).

In their place of living the respondents most often go walking (77%), swimming (26.2%) or cycling (16.4%). With regard to the activities performed away from the place of residence the mentioned above activities are also very popular, however, the particular percentages are lower: walking – 18%, cycling – below 10% and swimming – 4.9%. The range of activities performed in the place of residence is much wider when compared with the number of activities performed away from the place of residence (18 recreational disciplines and 9 respectively) (Table 3).

The gathered data indicate that very few of the respondents take part in physical activities of mass character which are organized in Poznań. Only 1.6% participate in orienteering, 3.3% in trekking and canoeing, and nearly 5% in fêtes. The remaining respondents did not give their answer to this question. 16% of the respondents participate in such mass events as half marathons and marathons only in the role of spectators, while only 1.6% are competitors. It should be a signal for organizers of this kind of sport and recreational mass events – its need to be

Table 3. Preferred forms of physical recreation in and away from the place of residence (in %)

Form of physical recreation	In the place of residence	Away from the place of residence
Walking	77.0	18.0
Cycling	16.4	9.8
Badminton	1.6	1.6
Swimming	26.2	4.9
Aerobics	1.6	0
Fitness	4.9	0
Yoga	3.3	0
Gymnastics	9.8	3.3
Dancing	1.6	0
Running/jogging	6.5	0
Nordic walking	3.3	1.6
Fishing	9.8	0
Team sports:		
Basketball	1.6	0
Rugby	1.6	0
Soccer	0	1.6
Winter sports	1.6	0
Other activities:		
Weight lifting	1.6	0
Gym workout	4.9	0
Aqua zumba	0	1.6
Gardening	0	1.6

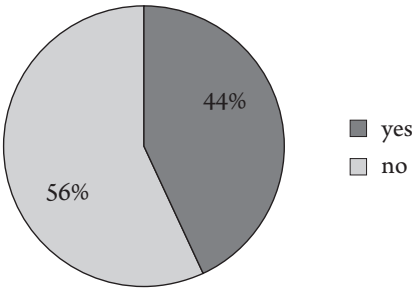
Source: own work ($N = 200$).

well-suited for the potential spectators and contestants with disabilities, because, unfortunately, it still does not often fit to the rrequirements and capabilities of people with disabilities. It is assumed, that the organizers do not take into account many urban and architectonic barriers or they do not expect contestants and participants with disabilities.

6.4. Sports and recreational facilities

The majority of respondents (55%) do not use recreational and sports facilities (Chart 4). The obtained results indicate also that the respondents are more likely to use smaller facilities (32.8%), instead of the big chain facilities. The latter are mostly used in the place of residence (Chart 5).

Chart 4. Use of recreational and sports facilities

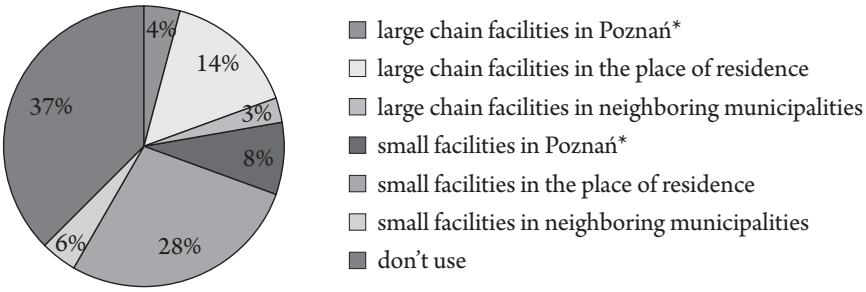


Source: own work ($N = 200$).

When it comes to selecting a sport facility the deciding factors are the following: the closeness of the place of residence (over 73% responses), price (over 53% responses) and the quality of the rendered services (over 35% responses). Getting to a particular facility usually takes the respondents about 15 minutes – during their daily recreation (80% responses) and during their weekend recreation (72% responses). For 1.6% of the respondents it takes over an hour to get to the selected sports facility. The optimal time to get to those facilities is 10 minutes, both during their daily recreation (28.8% responses), and during weekend recreation (24.6% responses). The average time of getting to the sports facility that would be considered satisfactory for the respondents is 12.6 minutes during the week and 14.5 minutes at weekends.

As far as different types of sports facilities are concerned, it is the indoor swimming pools that are visited most often (over 26% responses), health clubs and gyms (over 13% responses) and outdoor gyms (almost 10% responses). The

Chart 5. Use of sports facilities in and away from the place of residence



*only respondents living outside Poznań

Source: own work ($N = 200$).

average number of using a particular facility is quite diverse (Table 4). On average the respondents visit a swimming pool in their place of residence 4.6 times a month, health club and a gym – 8 times a month and an outdoor gym – almost 7 times a month. When it comes to sports facilities away from the place of residence, the respondents visit indoor swimming pools most often (3.8 times a month) and small playing fields (4 times a month).

Table 4. Use of sports facilities in and away from place of residence

Type of sports infractructure	Average number of using the facility per month	
	in the place of residence	away from place of residence
Grass soccer pitches	1.33	1.0
Multifunction playing fields	2.50	0
Small playing fields	2.50	4.0
Multiarenas	4.50	2.0
Gymnasiums	3.80	4.0
Bowling alleys	1.00	1.0
Indoor swimming pools	4.60	3.8
Outdoor swimming pools	4.00	0
Health clubs and gyms	8.75	2.5
Climbing walls	3.00	0
Outdoor gyms	5.67	0
Children's playgrounds	9.20	0
Shooting ranges	2.00	2.0
Bathing lakes	3.00	2.0
Boathouses	13.75	1.0

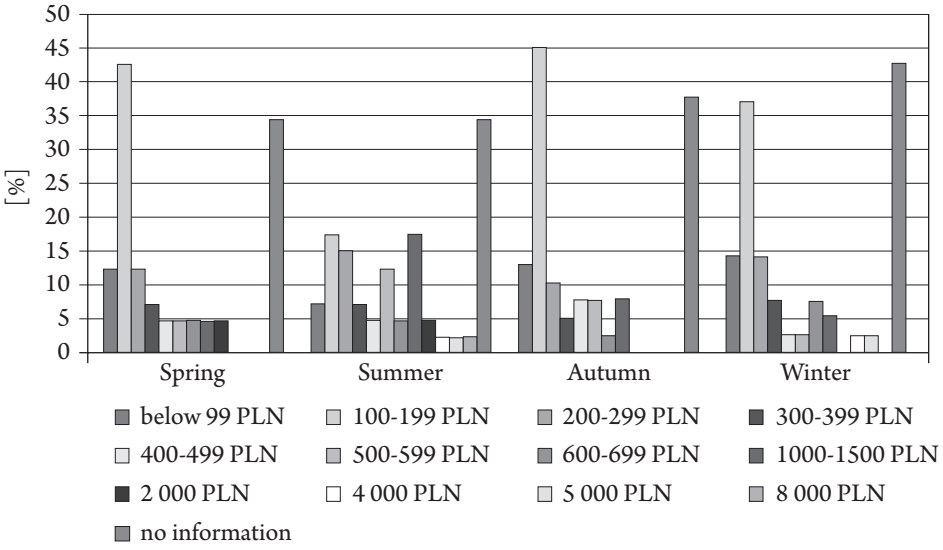
Source: own work ($N = 200$).

Most of all, the results above were expected. For example, daily hasten causes searching for sport facilities the closeness to the place of residence, taking into consideration the price – it is often related to low rewards. However, small interest in outdoor gym activity is surprising. They are available on many housing estates and in recreation open air, besides this kind of activity is free and depends on weather available by the majority of the year.

6.5. Monthly expenditure on physical recreation

Respondents were also asked to establish the sum of money they spend monthly on average on physical recreation. This amount was presented with reference to

Chart 6. Monthly expenditure on physical recreation in different seasons



Source: own work ($N = 200$).

the particular season (Chart 6). Depending on the season over 34% respondents (in spring and summer) up to 42% (in winter) do not declare any expenditure related to their physical activity in their leisure time. 100-199 PLN is the most often selected expenditure range (over 40% responses in spring and autumn). In summer, however, respondents are more willing to spend higher amounts of money.

The lowest amount spent on physical recreation monthly is 20 PLN, while the highest – 8000 PLN. On average respondents spend 73 PLN on various forms of recreational activity.

Most of all the results above are surprising. Especially the fact that the respondents are more willing to spend higher amounts of money in summer. The weather in summer time promotes more outdoor recreation activities, such as running, cycling or walking etc. Besides, this kind of activities is free and very popular at this time of year. The height of declared expense is also surprising. Indeed, not numerous respondents have indicated expenses as high as in 2000-8000 PLN, but unfortunately it is not known on what they are ready to issue such amounts.

7. Conclusion

Reinforcing the functions that facilitate and condition social and economic development is essential for the development of metropolitan areas. These areas sho-

uld be associated with higher quality of living, which is also connected with generating better access to different forms of physical recreation for the inhabitants.

The conducted study indicates clearly that the level of participation in physical recreation, as far as the people with disabilities are concerned, is constantly very low. Small range of activities, preference towards using infrastructure located close to the place of residence, selecting small facilities over the big ones prove that overcoming urban, architecture and social barriers is still a problem. Very small interest into participating in mass sports events in Poznań metropolis also indicates that the types of these activities or events should also be adapted to the special needs of both spectators and contestants with various disabilities. For example – the route of run without urban and architectonic barriers is the greatest chance to apply the participation of sportsman with disabilities, mass sport events promotions should be also dedicated and directed to people with disabilities. Besides, the improvements for spectators with disabilities are needed – depending on various of disabilities improvements of approaches such as special area for supporting participators, current devolution of information for not hearing or unseeing person, during enduring recreation mass events .

People with disabilities are a social group with very specific needs in terms of participating in physical recreation due to their individual impairments and different abilities. Creating proper and favorable conditions for spending free time actively should be one of the basic challenges for the state's (including government and non-government organizations) policy. All this refers also to Poznań metropolis, including Poznań municipality.

The results of the following study allow the authors to draw the following conclusions concerning people with disabilities living within the boundaries of Poznań metropolis:

1. The level of physical activity of inhabitants of Poznań municipality is higher when compared to inhabitants of other municipalities within Poznań metropolis, which is in line with the research hypothesis. Simultaneously, Poznań municipality is not perceived by inhabitants of other municipalities as more attractive in terms of participation in physical recreation – they most often use the infrastructure and facilities near their place of residence.

2. Activities promoting active lifestyle need to be intensified, especially as the level of participation in those activities is not perceived as satisfactory by the respondents.

3. It is advisable to improve access to more diverse forms of physical recreation by creating an offer directed to special needs and abilities of people with disabilities.

4. Sports and recreational mass events in Poznań metropolis need to be well-suited for potential spectators and contestants with disabilities.

5. Further research into the subject of various aspects of recreational activity of people with disabilities is required in order to monitor the situation. This could be the basis for practical activities for interested individuals and for liaising with the organizations working for the benefit of people with disabilities in various spheres of life, including recreation.

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Rekreacja fizyczna osób z niepełnosprawnością – mieszkańców metropolii poznańskiej. Wybrane aspekty badań

Streszczenie. Celem artykułu jest charakterystyka wybranych aspektów rekreacji fizycznej osób z niepełnosprawnością, mieszkających na terenie metropolii poznańskiej. Przedstawione wyniki stanowią fragment szerszych badań na temat regionu metropolitarnego jako przestrzeni penetracji rekreacyjnej na przekładzie aglomeracji poznańskiej. Wyniki badań wskazują na niski poziom uczestnictwa osób z niepełnosprawnością w rekreacji fizycznej zarówno w miejscu zamieszkania, jak i poza nim, przy czym – zgodnie z założeniami –mieszkańcy gminy Poznań są bardziej aktywni niż badani z pozostałych gmin. Ankietowani preferują aktywność weekendową, w miejscu swojego zamieszkania, a formy rekreacji nie są zróżnicowane. Najczęściej wybierają małe obiekty rekreacyjno-sportowe lub korzystają z infrastruktury plenerowej. Wskazana jest większa aktywizacja osób z niepełnoprawnością w zakresie uczestnictwa w rekreacji fizycznej oraz przygotowanie oferty spersonalizowanej – dostosowanej do rodzaju posiadanej dysfunkcji. Należy również stworzyć bardziej korzystne warunki do uczestnictwa w aktywności rekreacyjnej o charakterze masowym, organizowanej na terenie poznańskiej metropolii.

Słowa kluczowe: metropolia, obszar metropolitalny, rekreacja fizyczna, niepełnosprawność

Maria Zamelska*, Beata Kaczor**

Social and Geographical Conditions Influencing Tourist and Recreational Migrations of Inhabitants of the Poznań Metropolis[1]

Abstract. The main objective of this paper was to determine social and geographical conditions influencing tourist and recreational trips of inhabitants of the Poznań Metropolis. Authors assumed that the Poznań Metropolis is a tourist region consisting of three areas: internal, external and peripheral. The areas have been well adjusted to recreational activities and connected to green wedges of the unique wedge-ring greenery system of the city of Poznań. More detailed thesis presuppose that this three areas are also characterised by a defined structure and specific character of tourist and recreational migrations. Hypotheses were tested using direct survey method with an interview questionnaire. Empirical material qualified to the analysis included 1446 questionnaires of interviews with inhabitants undertaking tourist and recreational activity within the Poznań Metropolis. The results of the survey research indicated that one-day recreation predominates in the urban area, while 2-4-day recreation is more frequent in the suburban area. Financial conditions and diversified elements and features of tourist space proved to be important factors provoking tourist and recreational activity.

Keywords: Poznań Metropolis, tourist and recreational activity, conditions provoking tourist migrations

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[1] Paper based on the results of research carried out within the research project entitled "Metropolitan region as a space of recreational penetration on the example of the Poznań agglomeration" in 2015-2016 in the WSB University in Poznań financed from the statutory funds of the Polish Ministry of Science and Higher Education under supervision of Agata Basińska-Zych, PhD (decision number 27090/E534/S/2016). This paper is a presentation of a part of results concerning duration and main directions of tourist and recreational migrations in the area of Poznań Metropolis.

1. Introduction

In the modern world urban areas play an increasingly important role. Global social and economic changes result in concentration of resources on small areas connected with each other by a network of mutual relations. Here is where the people, industry, administration as well as services related to education, science, culture, health, recreation, and tourism are concentrated. The issue of metropolitan areas has been raised in many, scientific and planning, elaborations [e.g. Sołowiej 1992; Iwicki 2002; Markowski & Marszał 2006; Szmytkie 2013; Budner 2015; Jałowiecki 2016]. Current literature on the subject presents many definitions of a metropolis, metropolitan area, or agglomeration. In addition, these three terms are often used as synonyms. This fact considerably hinders identification of the metropolis and analysis of the phenomenon of metropolitanization. The term 'metropolis' usually describes a major urban centre meeting some defined functional requirements related to its size (min. 0.5-1.0 million inhabitants), significant economic potential, developed sector of higher services, high innovation potential, exercising metropolitan functions as well as being a transport node and a stimulator of the network economy and management model, etc. [Markowski & Marszał 2006]. Bogdan Jałowiecki defines a metropolis as a city of 0.5 million or more inhabitants located in a unique and specific area which exercises different functions, has well–established network of services, institutions and facilities, and shows high technological, political and cultural potential [Jałowiecki 2016: 2]. Union of Polish Metropolises adds that a metropolis should also be a place of study for over 50 thousand students and European (supranational) transport node. It is also noticeable that nowadays metropolises are urban–country regions and not mega-communes.[2] In January 2016, a new act on metropolitan relations came into force where the metropolitan area was defined as a "spatially consistent area of influence of a city being a seat of a voivode [...], characterised by the existence of strong functional connections and advanced processes of urbanization, inhabited with at least 500 thousand inhabitants."[3]

Numerous difficulties are also related to identification and determination of centres exercising metropolitan functions. Establishment of the Poznań Metropolis was one of the aims of the Updated Development Strategy for the City of Poznań to 2030[4] which plans enhancement of cohesion through spatial and

[2] www.metropolie.pl [access: 28.11.2016].

[3] Ustawa o związkach metropolitalnych z dnia 9 października 2015 r., Dz.U. nr 0, poz. 1890 [Act on metropolitan relations, Journal of Laws no. 0, item 1890], article 4, chapter 2.

[4] Uchwała Nr LX/929/VI/2013 Rady Miasta Poznania z dnia 10 grudnia 2013 r. w sprawie Strategii Rozwoju Miasta Poznania do roku 2030 [Poznań City Council Resolution of 10 December 2013].

functional integration of the capital of the Wielkopolska Region with the adjacent communes through, among others, recreation, tourism, and surveys of metropolitan awareness and identity [Kaczmarek & Mikuła 2015]. The Poznań Metropolis is one of the metropolises of national significance [Markowski & Marszał 2006] or one of the weakly developed European metropolises (4th order).[5] The metropolitan area includes 22 territorial units arranged in two circles surrounding centrally located Poznań. It includes 11% of the Wielkopolskie Voivodeship area inhabited with 30% of the inhabitants of the Wielkopolska Region [Kaczmarek & Mikuła 2015].

The Poznań Metropolis is located within several physico-geographical units (Poznań Lakeland, Września Plain, Gniezno Lakeland, Poznań Gorge of the Warta River [Kondracki 2008] what results in diversified terrain configuration. A characteristic element of the landscape is radial arrangement of river valleys: Warta with its main tributaries: Wełna, Cybina, Bogdanka, Sama, and Samica, and lakes located in the subglacial channel, especially those located in the Wielkopolski National Park and lakes of Kórnik and Bnin (the so-called blue infrastructure). Natural attractiveness is also increased by forest ecosystems of the Wielkopolski National Park, nature reserves, NATURA 2000 areas, protection forests, and landscape parks: Puszcza Zielonka, Promno, Rogaliński [Mizgajski & Zwierzchowska 2015]. The so-called green infrastructure and high-class cultural values create unique landscape based on which tourist and recreational areas and complexes were determined. This system assumes predominant role of the centrally located Warta River valley in development of tourism and recreation [Bródka & Miedzińska 2015].

The area of the Poznań Metropolis included in the research is not spatially and functionally uniform, it also is not homogeneous concerning forms of administration and settlement. In order to render spatial dependencies the studied area was divided into three areas (Fig. 1): internal – urban (comprising of Poznań along with directly adjacent 9 communes), external – suburban (9 communes), and peripheral (3 communes).[6]

[5] The European Spatial Planning Observation Network (ESPON) programme lead to determination of Functional Urban Areas (FUA) in Europe; Metropolitan European Growth Areas (MEGA) were distinguished among them. They were divided into four groups corresponding to individual category of the metropolitan area. Polish metropolitan areas were classified under the two lowest groups: 1) potential Metropolitan European Growth Area (3rd order) – Warsaw; 2) weak Metropolitan European Growth Areas (4th order) – Cracow, Katowice Urban Area, the Tricity (Gdańsk, Gdynia, Sopot), Wrocław, Łódź, Szczecin, Poznań [www.espon.eu, access: 28.11.2016].

[6] The internal area (urban) consisted of the following communes: Czerwonak, Komorniki, Kórnik, Dopiewo, Luboń, Puszczykowo, Suchy Las, Swarzędz, Tarnowo Podgórne, and the city of Poznań; the external (suburban) area consisted of the following communes: Buk, Kleszczewo, Kostrzyn Wlkp., Mosina, Murowana Goślina, Pobiedziska, Rokietnica, Skoki, and Stęszew; the peripheral area consisted of the following communes: Oborniki, Szamotuły, Śrem.

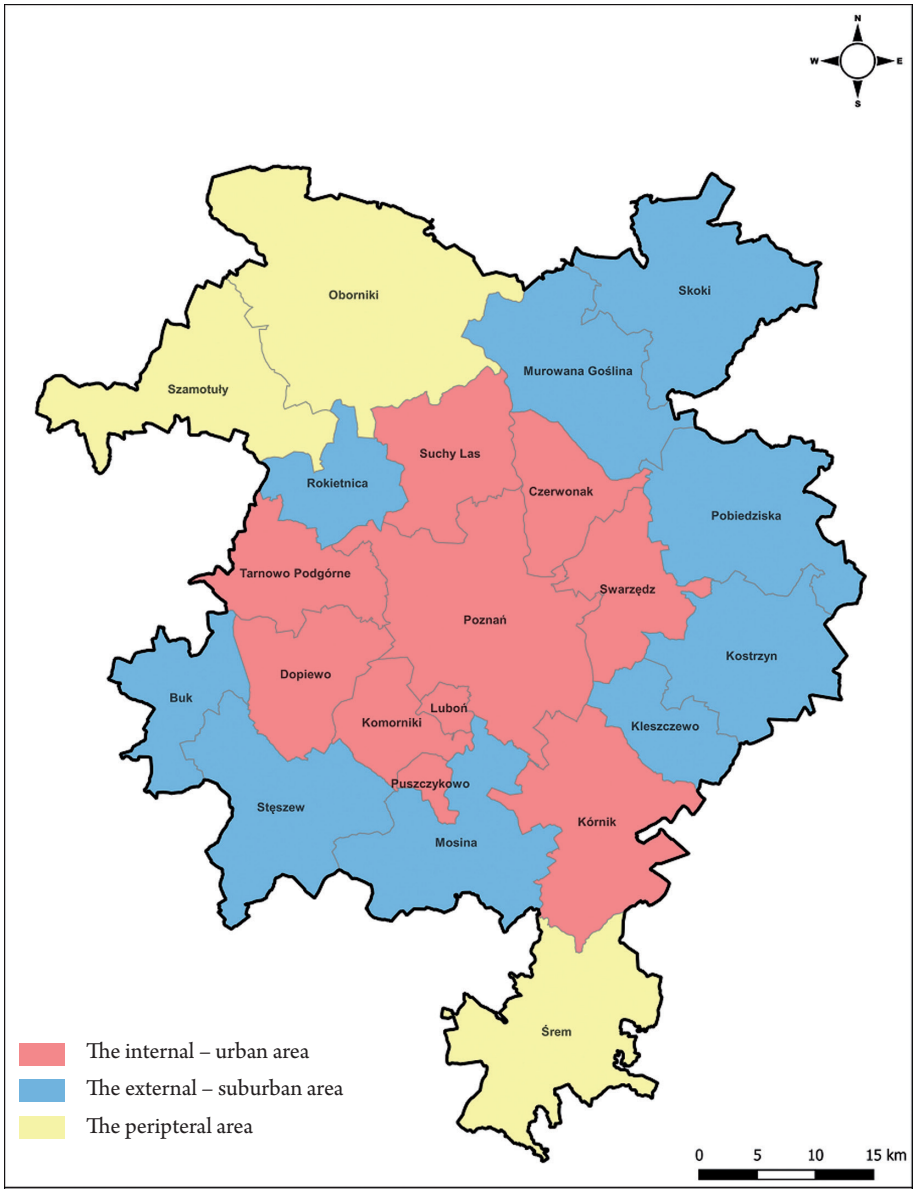


Figure 1. Tourist and recreational areas of Poznań Metropolis

Source: own research.

The main objective of this paper was to determine social and geographical conditions influencing tourist and recreational trips of the inhabitants of the Poznań Metropolis. Meeting this goal required accomplishing several theoretical

and empirical, cognitive, and application tasks. The theoretical and empirical part included determination of respondents, analysis of the structure, specific properties, and chosen factors influencing tourist and recreational migrations of the inhabitants of the Poznań Metropolis within the Metropolis. The cognitive task referred to identification of tourist and recreational areas and complexes where respondents usually spent their free time. Finally, the application task included proposition of a model approach assuming that the Poznań Metropolis is a tourist region comprising of three areas.

The following theses were assumed:

– the Poznań Metropolis has area well prepared for tourist and recreational activity arranged in two clear areas: internal (urban) and external (suburban),

– in the urban area one-day (everyday, afternoon) recreation predominates,

– in the suburban area 2-4-day recreation (weekend) predominates,

– the internal and external areas are connected by green wedges of the main river valleys thanks to the wedge–ring greenery system of the Poznań Metropolis.

– it is possible to distinguish third – peripheral area of the Poznań Metropolis showing distinct character of tourist migrations of its inhabitants,

– individual areas of the Metropolis are characterised by a defined structure and specific character of tourist and recreational migrations.

The inhabitants of the Metropolis were the object of the research while inhabitants' tourist and recreational activity was its subject. Spatial scope includes the area of all the twenty two communes comprising the Metropolis including the city of Poznań, communes of the Poznań district and the following additional communes: Śrem, Oborniki, and Szamotuły with reference to tourist and recreational areas and complexes determined during works on the Concept of Spatial Development Directions for the Poznań Metropolis [Kaczmarek 2015] that play or are predestined to play tourist and recreational role. The research was conducted in 2015-2016. The actual research was preceded by a pilot research on a randomly chosen sample of almost 60 persons. That procedure enabled validation of the research tools correctitude, explicitness and clarity of the posed questions and correctness of the obtained answers. This allowed to make relevant adjustments and to formulate the final version of the questionnaire before starting the collection of empirical data.

The method of direct survey with the technique of an interview with a questionnaire was used to evaluate the hypotheses. The questionnaire contained eleven, closed and open, questions concerning the subject matter of the research, the W sheet in which all the tourist and recreational areas of the area of the Metropolis and forms of recreation activities were stated, questions concerning sociodemographic data, and instruction concerning the aim of the survey and the way of answering individual questions. In addition, a map of tourist and recreational areas and complexes of the Poznań Metropolis was available for the respondents

during the survey. The map was supposed to make it easier for the respondents to navigate in the geographical space. The interviews were conducted in public recreational areas, squares, lawns, parks, areas near tourist trails, and in tourist and recreational areas and were anonymous. The questionnaires were completed in the presence of the person conducting the survey. Questions concerned, among others, participation in tourist and recreational activities within the Metropolis, motives of trips, expectations and needs, forms and places of recreation, and expenses for different forms of tourism and recreation.

Collected material was quantitatively and qualitatively verified (analysis of lacking data), then authors conducted data coding and processing using statistical software SPSS.[7] Basis tools of statistical analysis were used which enabled fuller and more insightful usage of collected material.

2. Description of the sample

The material was obtained with the method of direct survey conducted from March to September 2016 among the inhabitants of 22 communes comprising the Poznań Metropolis. The survey was conducted on a sample of 1600 inhabitants. The size and selection of the sample had significant meaning for credibility of statistical surveys and possibility of making generalizations from the obtained data. When selecting the sample, two criteria were taken into consideration: number and age structure of the inhabitants of the studied administration units of the Poznań Metropolis.[8] After verification of the collected empirical data, 1446 questionnaires completed by persons undertaking recreational and tourist activities within the Metropolis were qualified for the final analysis.

A little over half of the respondents were women (55%). The biggest group comprised persons from 30 to 39 years old (24%) and persons in their twenties and forties (20%), with secondary (37%), vocational (33%), and higher (30%) education. Three quarters of the respondents lived in the cities and towns of the Poznań Metropolis. Households consisting of 2-3 persons were the most common in the analysed group (47%). The respondents determined their current financial situation as good or average (46% and 44%, respectively). Almost half of the respondents indicated their total household monthly income as PLN 4.1-6.0 thousand (46%) and PLN 2.1-4.0 thousand (34%). A little over every third person had from 8 to 10 hours of free time per week. The following goods which

[7] Software purchased by the WSB University in Poznań.

[8] Determination of the size and selection of the sample was the same for the entire survey realised in the statute project of the WSB University entitled "Metropolitan area as a space of recreational penetration on the example of the Poznań Metropolis."

might influence participation in tourist and recreational trips were relatively frequently indicated as owned in the Poznań Metropolis: a car (25% of indications), bike (23%), own garden or allotment (14%), and a tent (12%). Considerably less frequently indicated were roller skates, ski, hunting, fishing equipment (3-7%), and a holiday house (3%). The majority of respondents (3/4) lived in the area of communes of the urban (internal) area of the Poznań Metropolis.

Respondents were asked to indicate the most significant motives behind their tourist and recreational activities during their free time. The need of finding a place where one can experience peace and rest (36% indications), where it is possible to engage into different forms of physical recreation (20%), where one can be close to nature and learn about culture (12%) were indicated the most frequently. Additionally, respondents indicated a desire to spend time with relatives and friends (7%), to improve health (6%), and a desire for aesthetic experiences (5%). The majority of respondents rest with their close ones and family (61%), significantly less respondents prefer to spend their free time with friends and acquaintances (32%), and only 7% of respondents prefer spending their free time alone. The main interests of the respondents are: watching television and sports coverages (46% and 36%, respectively), taking care of their health and physical fitness (30%), gardening works, travels, and visiting new places (27% each).

3. Analysis of tourist and recreational activity of the inhabitants of the Poznań Metropolis (in relation to areas of residence)

The results indicate that among inhabitants of the Poznań Metropolis short, one-day recreational activity predominated (66%) (Table 1). Regardless of the area of residence, several-hour activity was undertaken the most often, although inhabitants of the peripheral area chose this form of activity slightly less frequently (by 6 percentage points). Almost every fourth respondent took longer, 2-4-day trips. Such type of tourist and recreational activity was slightly more often undertaken by inhabitants of the external (suburban) and peripheral area of the Metropolis (by about 4-5 percentage points). Participation in even longer (5 or more days) tourist and recreational trips in the Poznań Metropolis was declared the least frequently (11%). Such long trips were relatively more often undertaken by the inhabitants of the peripheral area (by 2 percentage points). Whereas inhabitants of the external (suburban) area participated in trips of such type less often (by 3 percentage points). This can be explained by the fact that they already lived in areas well-adjusted to recreation so they did not feel the need of so long trips to other regions of the Poznań Metropolis.

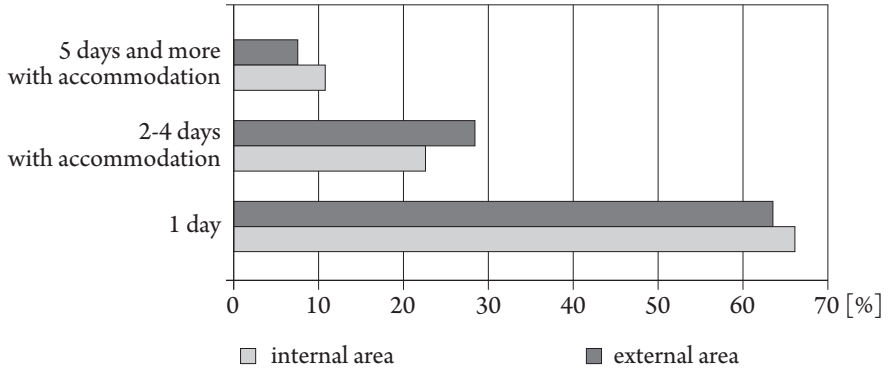
Table 1. Duration of tourist and recreational trips in the Poznań Metropolis taken in 2015 by the inhabitants in relation to the areas of their residence (in %)

Duration	Total	Internal area	External area	Peripheral area
Total	100.0	100.0	100.0	100.0
1 day	65.5	66.4	64.0	59.5
2-4 days with accommodation	24.0	22.8	28.6	28.1
5 or more days with accommodation	10.5	10.8	7.4	12.4

Source: own research (N = 1446).

The inhabitants of the external area took weekend trips (2-4 days) in the Poznań Metropolis more often (by 6 percentage points) while the inhabitants of the internal area more willingly chose longer recreation (5 or more days) in different areas of the Metropolis (by 5 percentage points) (Chart 1).

Chart 1. Duration of tourist and recreational trips in the Poznań Metropolis in 2015 of inhabitants of the internal and external areas (in %)



Source: own research (N = 1446).

Tourist and recreational activity is related to expenses and, as a result, respondents were asked to indicate estimated amount spent on trips in the Poznań Metropolis in 2015 and 2016. In 2015, the majority of them spent relatively small amount of up to PLN 300 (62%) for this purpose and planned to spend similar amounts in 2016 (59%) (Tables 2 and 3). Among the inhabitants of the internal area of the Poznań Metropolis the expenses usually ranged from PLN 101 to 300 (every third person in 2015 and 2016). This can be a result of the possibility of undertaking different forms of tourist and recreational activities relatively close to their home location. It should be recognised that in 2016 a percentage of inhabitants declaring the lowest (up to PLN 100) expenses decreased (by 3 percentage

points) and at the same time the percentage of persons planning to spend from PLN 301 to 600 and over PLN 600 on tourist and recreational activity in the area of the Poznań Metropolis increased (by 1 and 2 percentage points, respectively). In comparison to the total sample, the inhabitants of the internal area significantly less frequently declared expenses at low levels (up to PLN 100 and from 101 to 300) in 2015 as well as in 2016 (less by even up to 3 percentage points). Only this group indicated higher level of expenses (i.e., PLN 301-600 and over PLN 600) in 2015 and 2016 slightly more frequently (by 2 percentage points).

The inhabitants of the external area the most frequently spent PLN 101-300, both in 2015 and 2016 (by 1-2 percentage points more than the total sample). Also significant percentage of the external area's inhabitants indicated such expenses at a level of up to PLN 100 per year (35% in 2015 and 30% in 2016). These indications were higher from the total sample by 7% in 2015 and by 5% in 2016. It also needs to be stressed that this group showed lower tendency to spend more on tourist and recreational activities in the Poznań Metropolis in comparison to the total sample (at the level of PLN 301-600 less by 4% in 2015 and less by 2% in 2016, and at the level of over PLN 600 less by 6 and 5 percentage points, respectively).

Expenses connected to tourist and recreational trips within the Metropolis of the inhabitants of the peripheral area looked distinctly different. Here, indications of lower amounts prevailed. 80% of the respondents of this area declared up to PLN 300 in 2015, and 86% in 2016, i.e., more by 18 and 27 percentage points than the total sample, respectively. This can be related to easier access to tourist and recreational places and areas located closer to respondent's home location, what lowered the costs of the drive, among others.

Table 2. Estimated expenses for tourist and recreational trips in the area of the Poznań Metropolis bore by the inhabitants in 2015 in relation to the areas of their residence (in %)

Expenses (PLN)	Total	Internal area	External area	Peripheral area
Total	100.0	100.0	100.0	100.0
0-100	28.2	25.1	35.3	43.0
101-300	34.0	33.0	37.5	37.0
301-600	21.1	23.0	16.8	12.4
Over 600	16.6	18.9	10.3	7.4

Source: own research ($N = 1446$).

The results suggest that the external area's inhabitants spent significantly less money on tourist and recreational activities within the Poznań Metropolis. The inhabitants of the external area indicated the lowest expenses (up to PLN 100)

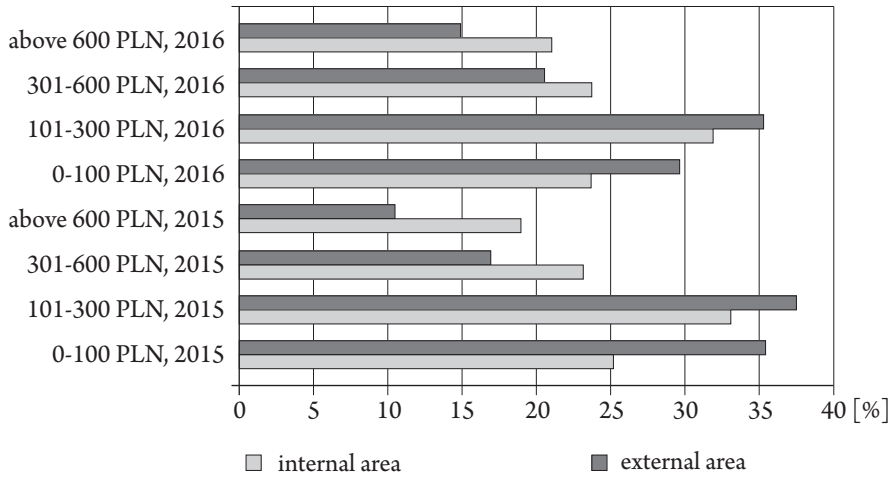
Table 3. Estimated expenses for tourist and recreational trips in the Poznań Metropolis bore by the inhabitants in 2016 in relation to the areas of their residence (in %)

Expenses (PLN)	Total	Internal area	External area	Peripheral area
Total	100.0	100.0	100.0	100.0
0-100	25.0	23.6	29.6	31.0
101-300	34.1	31.8	35.2	54.8
301-600	21.9	23.6	20.4	7.1
Above 600	19.0	21.0	14.8	7.1

Source: own research (N = 1446).

relatively more frequently in comparison to the internal area's inhabitants (by 10 percentage points in 2015 and by 6 percentage points in 2016). Whereas the highest expenses (over PLN 600) were more often declared by the inhabitants of the internal area in comparison to the external area's inhabitants (by 10 percentage points in 2015 and by 7 percentage points in 2016) (Chart 2).

Chart 2. Expenses for tourist and recreational trips in the area of the Poznań Metropolis in 2015 and 2016 declared by the inhabitants of the internal and external areas (in %)



Source: own research (N = 1446).

The most numerous group of inhabitants of the Metropolis, regardless of the area of residence, declared that on average they have one entire day of free time per week (38%) (Table 4). However, every sixth respondent declared that due to excess responsibilities their average free time is limited to somewhat less than a day per week and this significantly lowers their tourist and recreational activ-

ity in the area of the Metropolis. However, it can be noted that 44% of the inhabitants of the Metropolis declared that they have at least two days of free time per week and every fifth person indicated more than two days of free time per week. These opinions need to be taken into consideration when creating a calendar of tourist and recreational events within the area of the Metropolis because they indicate considerable potential of free time of the inhabitants of the Poznań Metropolis.

The analysis of the declarations related to free time per week divided into the areas of residence indicated some differences between the analysed areas of the Metropolis. The inhabitants of the internal – urban area relatively more frequently on average have at least two days of free time per week (more by 2 percentage points than the total sample). Whereas the inhabitants of the external – suburban and peripheral areas have so much free time significantly less often (by 7 and 9 percentage points than the total sample, respectively). Such results can be influenced by a significant number of elderly people living in the centre of the area, i.e. in Poznań, who willingly use the opportunities for outdoor recreation in parks and in readily available tourist and recreational areas. It needs to be stressed, however, that in comparison to the total sample, a higher percentage of the inhabitants of the external and peripheral areas declared that they have a relatively small amount of free time per week, i.e., on average somewhat less than a day (more by 6 and 3 percentage points than the total sample, respectively). Only the peripheral area's inhabitants declared an entire day of free time per week more frequently than the total sample (more by 4 percentage points). The presented analysis can also indicate relatively lower ability of the inhabitants of the suburban and peripheral areas of managing their free time during the week.

Table 4. Amount of free time per week declared by the inhabitants of the Poznań Metropolis, in relation to the area of their residence (hours)

Amount of free time (hours)	Total	Internal area	External area	Peripheral area
Total	100.0	100.0	100.0	100.0
0-7	17.8	16.2	24.6	22.3
8-10	38.4	37.9	38.7	42.1
11-16	23.5	24.6	17.3	23.1
Over 16	20.3	21.3	19.4	12.4

Source: own research ($N = 1446$).

The inhabitants were also asked to indicate the most preferable elements of natural environment (it was possible to indicate maximum of three elements considered the most important of the suggested five) that influenced their choice of a place for tourist and recreational activities. Generally, one (34%) or two (39%

of respondents) of the suggested five elements were selected as important elements guiding them to choose certain location.

Lake and forest areas were the most frequently preferred elements of natural environment (63% and 55% of indications, respectively). Flowery meadows, among which the inhabitants gladly rest, influenced activity of almost every third person (Table 5). River valleys turned out to be the least attractive "lure" for the inhabitants of the (15%), despite the fact that river valleys, especially Warta River valley, are very intensively promoted as places for active recreation. Tourist and recreational infrastructure in river valleys of the Wielkopolska Region has significantly improved these days, especially on the trail of the Great Loop of Wielkopolska which was granted the Best Tourism Product prize in 2015 (Certificate of the Polish Tourist Organisation) this way becoming the main branded product of the Wielkopolska Region. It can be hoped that near future will draw inhabitants' attention to the Warta River valley as an attractive element of natural environment of the area of the Poznań Metropolis and they consider it for tourist and recreational activity.

Table 5. Elements of natural environment preferred by the inhabitants of the Poznań Metropolis in relation to the areas of their residence (percentage of respondents)

Elements of natural environment	Total	Internal area	External area	Peripheral area
Lake	63.4	61.1	76.1	63.9
Artificial reservoir	25.3	27.0	20.2	18.0
River	14.9	16.0	13.3	8.2
Forest	54.7	54.6	58.5	50.0
Meadow	29.1	30.2	26.1	23.8

Source: own research ($N = 1446$).

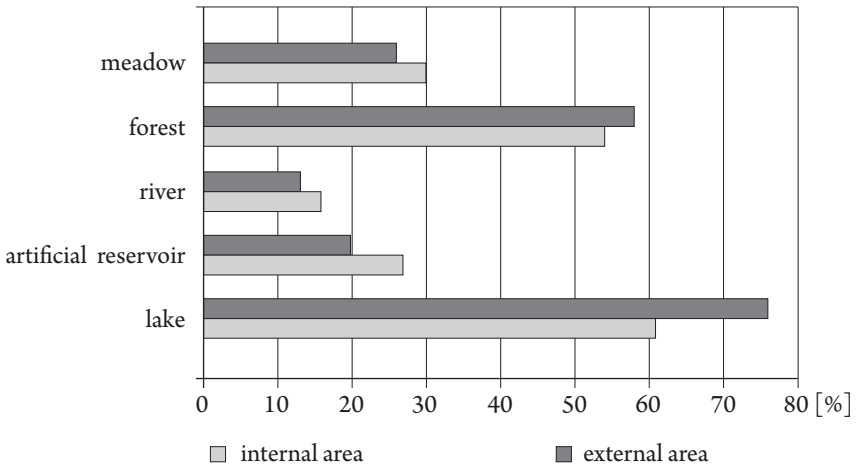
Analysis of the inhabitants' preferences in relation to the elements of natural environment showed some, sometimes significant, differences. The inhabitants of the internal area made only slightly different choice of the preferred elements of natural environment than all of the respondents (by 2 percentage points at maximum as regards to the lake and artificial water reservoir). However, preferences of the suburban area differed, sometimes considerably, from the indications of the total sample. This group showed predilection for lakes (more by 13 percentage points) and to some extent also forests (more by 4 percentage points). Whereas artificial water reservoirs and meadows enjoyed lower interest of this group (less by 5 and 3 percentage points, respectively).

The inhabitants of the peripheral area showed significantly lower preference towards the elements of natural environment suggested in the questionnaire,

choosing a river valley and artificial reservoir significantly less frequently than the total sample (less by 7 percentage points). Similarly, in this group, meadows and forests were less popular (by 5 percentage points). The analysis of the results confirmed that the likings of the inhabitants of the analysed Metropolis area did not differ significantly from usual preferences of tourists who the most willingly rest by a lake or in a forest. The Poznań Metropolis location in the area abundant in lakes and forests fosters leisure activities in respondents residential region.

Comparing the preferences of the inhabitants of the internal and external areas of the Poznań Metropolis concerning the elements of natural environment identified that lakes were the most popular among inhabitants of the suburban area (by 15 percentage points). While the inhabitants of the urban area showed higher appreciation for the appeal of artificial reservoirs such as the Maltańskie Lake (by 7 percentage points) and meadows (by 4 percentage points) (Chart 3).

Chart 3. Elements of natural environment preferred by the inhabitants of the internal and external areas of the Poznań Metropolis (percentage of respondents)



Source: own research (N = 1446).

From the six suggested features of geographical environment, the inhabitants usually chose two features of an area where they would want to spend their free time (43% of respondents) (Table 6). However, the inhabitants of the external and peripheral areas more frequently indicated only one, in their opinion the most important feature (41% and 49%, respectively). The following features were usually indicated as the most important: tourist resorts (64%) and sites located outside built–up areas (54%). Areas of unique landscape values (29%) and environmentally valuable areas (28%) were chosen much less frequently and

Table 6. Features of geogrphical environment preferred by the inhabitants of the Poznań Metropolis in relation to the areas of their residence (percentage of respondents)

Features of geographical environment	Total	Internal area	External area	Peripheral area
Environmentally valuable areas	28.4	29.3	29.3	19.0
Diversified landscape	28.7	30.9	25.0	15.7
Sites outside built-up areas	54.4	59.3	39.9	33.9
Cultural landscape	6.6	6.8	9.0	0.8
Holiday resorts	64.1	63.3	61.7	75.2
Touristically attractive locations	14.9	14.5	17.6	14.9

Source: own research (N = 1446).

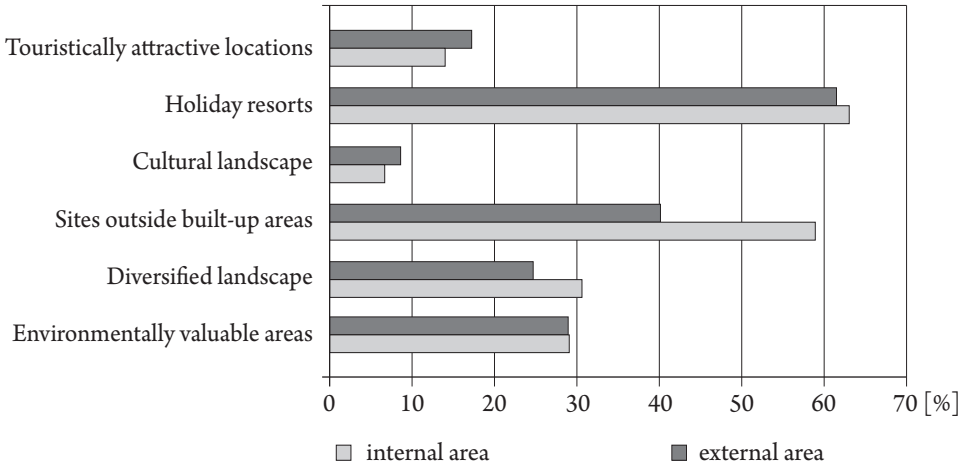
culturally interesting landscape was least important for all of the respondents (7%). Maybe it would be good to know the reasons for the fact that landscape made with a "human hand," being a reflection and achievement of the modern civilisation was so insignificant according to the inhabitants of the Poznań Metropolis.

As in the case of the preferred elements of natural environment, inhabitants' preferences in relation to geographical environment are also differentiated depending on the area of residence. The preferences of the respondents living in the internal area of the Metropolis turned out to be very similar to the preferences of the total sample in relation to features of tourist and recreational space. Only sites located outside built-up areas were chosen more frequently in this group (by 5 percentage points). It is understandable considering the fact that the inhabitants of the city of Poznań considerably prevailed in this group of respondents. The inhabitants of the suburban area made different choices; sites located outside built-up areas turned out to be less important for them than for all of the respondents (by 14 percentage points) while touristically attractive locations and diverse cultural landscape were more important (more by 3 percentage points each). The inhabitants of the peripheral area of the Metropolis considered the presence of a leisure resort as the most important feature of geographical environment (11% more indications in comparison to the total sample). In this group of respondents sites located outside built–up areas had significantly lower impact on respondents' tourist and recreational activities than it was in other analysed groups (less by 20 percentage points in comparison to the total sample).

The preferences of the inhabitants of individual areas of the Metropolis related to the elements of natural environment and features of geographical environment reflected conditions of their home location. When choosing the space for tourist and recreational activities the respondents probably looked for changing their everyday surroundings (Tables 5 and 6).

The results indicated significant differences between the preferences of the inhabitants of the urban and suburban areas in relation to sites located outside built-up areas which was relatively more frequently indicated by the inhabitants of the urban area (by 19 percentage point), and to some extent in relation to diversified landscape (by 4 percentage points). Only environmentally valuable areas were indicated by the same number of inhabitants of both areas (Chart 4).

Chart 4. Features of geographical environment preferred by the inhabitants of the internal and external areas of the Poznań Metropolis (percentage of respondents)



Source: own research ($N = 1446$).

Moreover, to verify connection between the analysed variables, an analysis of correlation based on the Pearson's r correlation coefficient was conducted. The set of analysed variables included demographic, social, and economic characteristics of the inhabitants of the Poznań Metropolis – participants of tourist and recreational activities and their preferences concerning the geographical space (Table 7). The correlation was statistically significant at the level of 0.05 for the 78.2% of the analysed correlations between the variables presented in Table 7 (correlation was statistically significant at the level of 0.01 in as many as 72.7% of coefficients). Almost four fifths of correlation coefficients presented in Table 7 were statistically significant, thus, it can be stated that the proposed model explains the correlation between the analysed variables at a high level.

The strongest correlation occurred between the expenses bore by the analysed inhabitants of the Poznań Metropolis in 2015 and 2016 on tourist and recreational trips in the area of the Metropolis ($r = 0.79$). This indicates a stable level of expenses for that purpose. Strong relationship was also found between diversi-

Table 7. Pearson correlation coefficients of the analysed variables

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)
(A) – 2015 expenses	1	**0.380****	**0.411****	**0.788****	–0.003	–0.126**	0.260**	0.242**	0.136**	0.084**	0.270**
(B) – elements of natural environment	**0.380****	1	**0.657****	**0.406****	–0.013	–0.026	0.117**	0.003	–0.015	–0.015	0.243**
(C) – features	**0.411****	**0.657****	1	**0.405****	–0.017	–0.065*	0.122**	0.075**	0.044	0.024	0.231**
(D) – 2016 expenses	**0.788****	**0.406****	**0.405****	1	–0.050	–0.076*	0.203**	0.181**	0.102**	0.051	**0.335****
(E) – amount of free time	–0.003	–0.013	–0.017	–0.050	1	0.234**	–0.064*	–0.091**	–0.113**	–0.142**	–0.152**
(F) – age	–0.126**	–0.026	–0.065*	–0.076*	0.234**	1	**–0.392****	–0.150**	–0.076**	–0.236**	–0.221**
(G) – educational background	0.260**	0.117**	0.122**	0.203**	–0.064*	**–0.392****	1	**0.316****	**0.319****	0.031	0.262**
(H) – monthly income	0.242**	0.003	0.075**	0.181**	–0.091**	–0.150**	**0.316****	1	**0.615****	**0.412****	**0.477****
(I) – financial situation	0.136**	–0.015	0.044	0.102**	–0.113**	–0.076**	**0.319****	**0.615****	1	0.119**	**0.325****
(J) – number of household members	0.084**	–0.015	0.024	0.051	–0.142**	–0.236**	0.031	**0.412****	0.119**	1	**0.314****
(K) – owned goods	0.270**	0.243**	0.231**	**0.335****	–0.152**	–0.221**	0.262**	**0.477****	**0.325****	**0.314****	1

* significant correlation at 0.05; ** significant correlation at 0.01.

Source: own research ($N = 1446$).

ty of elements of natural environment and features of geographical environment preferred by the respondents (0.66). Statistically significant strong correlation was also observed between declared level of household's monthly income and self-assessed current financial situation (0.62). It is worth stressing that significant moderate correlation occurred in the case of twelve pairs of the analysed variables (22% of correlation coefficients presented in Table 7). Correlation between declared expenses on tourist and recreational trips in 2015 and diversity of elements of natural environment and features of geographical environment preferred by the respondents deserves special attention (0.38 and 0.41, respectively). Also expenses for the said trips in 2016 were correlated in a moderate degree with the diversity of elements of natural environment and features of geographical environment (0.41 in both cases), and the number of goods that can be potentially used for tourist and recreational purposes owned by the household (0.34). The said variable (owned goods) showed moderate-level significant correlation with other variables, such as: total monthly income (0.48), self-assessed current financial situation (0.33), household size expressed as the number of people in the household (0.31). Correlation between the age and educational background of the respondents proved significant at the moderate level (0.39). Moderate-level correlation between educational background and monthly income (0.32) and self-assessed financial situation (0.32) was also statistically significant.

Analysis of correlation between thirty pairs of analysed variables showed statistically significant correlation of relatively lower strength (Table 7). Only ten (per fifty five) of analysed correlations turned out to be statistically insignificant. Negative correlation between the variable describing inhabitants' age and the majority of other factors can be noticed. The only positive correlation occurs between the age and the amount of free time (0.23) which can be explained by the fact older respondents tend to have more free time. The strongest negative correlation occurred between the age and educational background what proves that the younger the inhabitants are the higher educational background they have.

The presented set of variables reasonably describes correlations between the analysed elements characterising basic groups of factors conditioning tourist and recreational activity of the inhabitants of the Poznań Metropolis, such as: demographic, social, economic, and geographical factors.

4. Analysis of spatial distribution of one-day trip and recreational activity of the inhabitants of the Poznań Metropolis

Literature presented concepts for the perfect city with green areas within the cities and in suburban areas fulfilling recreational and holiday functions [Dziewoński

1987; Sołowiej 1992]. Papers describing Poznań agglomeration refers to two kinds of tourist and recreational activities of the inhabitants (determined based on trip's duration): daily and weekend [Cofta 1983; Iwicki 2002]. Recent-years papers assume organisation of tourist functions in the Poznań Metropolis in: ten tourist and recreational areas, fourteen tourist and recreational complexes, tourist resorts, and a system of tourist trails [Bródka & Zmyślony 2017]. The Warta River valley comprises the main axis of this system connecting Puszcza Notecka, Puszcza Zielonka and Biedrusko forests with the Wielkopolski National Park. The Poznań stretch of the Warta River valley is connected to the Kierskie and Strzeszyńskie lakes by the river valley of Bogdanka and with lakes of Kórnik and Zaniemyśl by the river valley of Głuszynka.

Determination of the extent to which the inhabitants of the Poznań Metropolis use tourist and recreational areas for them designed in daily recreational activity. The questionnaire allowed respondents to indicate a place where they spend most of their free time, based on a map of tourist and recreational areas and complexes of the Poznań Metropolis [Kaczmarek 2015].

The inhabitants of the Poznań Metropolis, irrespective of the area of residence, usually spent their free time in the Warta River valley and river valleys of Główna and Cybina (34% and 31% indications in 2015; 29% and 33% in 2016, respectively) (Table 8). In 2015, the respondents significantly less frequently spent their free time in the area of the Puszcza Zielonka Landscape Park, Wielkopolski National Park, and city parks and gardens (6% each). In 2016, the inhabitants slightly more willingly (7%) spent their free time close to their home location in the city green areas. It can be considered surprising that the Wielkopolski National Park, an area of exceptional nature, landscape, and cultural values which is conveniently located and relatively easily accessible enjoyed so little interest of the inhabitants. In addition, a new project "The Active Three" was implemented in 2016. This project aimed at improved promotion of the Wielkopolski National Park area for outdoor active recreation using the system of Nordic walking, running, and cross–country skiing trails.[9]

The most popular sites for practising different forms of tourist and recreational activity were the Warta River valley (34%, 30%, 39% of indications, respectively) and river valleys of Główna and Cybina (32%, 28%, and 23%) (Table 8). These

[9] "The active three" – trails of the three activities in the Wielkopolski National Park was created on the initiative of the following communes: Mosina, Puszczykowo, Komorniki, and Stęszew, in cooperation with the Wielkopolski National Park. Trails of different difficulty were marked out in a form of closed loops (total length of up to 55 km: loops: Mosina 7.4 km, Stęszew 12.2 km, Komorniki 10.1 km and Puszczykowo 20 km), showing off the most interesting areas concerning the nature and culture. The trails were connected with three junctions so that it could be connected in any way. Within the project also a map was made of the trails available at the web pages of all the partners [www.wielkopolskipn.pl/, access: 5.12.2016].

Table 8. One-day trip and recreational activity of the inhabitants of the Poznań Metropolis in 2015 and 2016 according to the areas of their residence (in %)

Tourist and recreational area		2015				2016			
		Total	1	2	3	Total	1	2	3
A	Warta River valley	34	34	30	39	29	29	26	36
B	Puszcza Zielonka Landscape Park	6	6	6	5	5	5	6	3
C	River valleys of the Główna and Cybina	31	32	28	23	33	34	29	32
D	River valleys of the Samica and Bogdanka	5	5	5	18	5	5	7	5
E	Lusowskie Lake	3	3	3	1	3	3	2	2
F	Niepruszewskie and Strykowskie Lakes	2	2	3	0	2	2	1	0
G	Wielkopolski National Park	6	5	10	2	6	5	11	2
H	River valeys of the Głuszynka and Kopla	4	4	3	7	4	4	6	14
I	Puszcza Notecka	1	1	0	0	1	1	1	2
J	Skoki Region	2	2	7	1	2	1	5	0
K	parks, gardens, squares of Poznań Metropolis	6	6	3	2	7	7	8	3
L	outside the Poznań Metropolis	2	2	2	2	3	3	1	3

1 – internal area, 2 – external area, 3 – peripheral area.

Source: own research ($N = 1446$).

locations were indicated the most frequently irrespectively of respondents' area of residence. The Warta recreational areas within borders of the city of Poznań, the Rogaliński Landskape Park, and Puszczykowo were the most frequently visited sites of the Warta River valley. The Warta River valley is the longitudinal axis of the Poznań Metropolis creating good conditions for developing different forms of tourist and recreational activity. The valley presents high level of natural values, is a part of Polish wildlife corridor, and creates the axis of the system of protected areas showing unique historical and cultural values. However, tourist and recreational development is very diversified. This fact was also noticed by the inhabitants of the Poznań Metropolis who chose the areas and complexes well prepared for recreation. However, the Warta River within the borders of the city of Poznań currently "starts to live". More and more investments emerge (e.g. roads, bike and hiking trails), such as places where one can rest, practise many forms of physical recreation activities as well as take advantage of cultural offer (among others, in summer concerts, meetings, workshops). The inhabitants of external area indicated the Warta River valley around Puszczykowo and Rogalin more often. These more natural areas are located closer to their homes and offer recreation in peace and quiet in beautiful landscape. The remaining areas enjoyed small (up to 7% of indications) interest of the inhabitants of external and internal areas, except for the Wielkopolski National Park (10%) which was relatively more often chosen for different forms of activity by the suburban area's inhabitants.

In addition, the inhabitants of peripheral area showed more interest in engaging in trip and recreational activities by the Samica and Bogdanka Rivers (18% of indications) where the following lakes are located: Kierskie, Strzeszyńskie, and Pamiątkowskie. These sites are prepared for recreation, have good infrastructure, and are easily accessible for the inhabitants of this area.

In 2016, the inhabitants of internal and external areas indicated the river valleys of Główna and Cybina (34% and 29%, respectively) and the Warta River Valley (29% and 26%) as locations where they the most frequently rest (Table 8). Majority of persons who chose the Główna and Cybina Rivers as the rest and recreation location usually identify this site with the surroundings of the Maltańskie Lake. These areas offer many possibilities of active recreation regardless of age thanks to different facilities there located, such as: aqua park Termy Maltańskie, the Zoo of Wielkopolska, the regatta track, alpine slide, ski slope, ice rink, ropes course, miniature golf field, bowling field, and bike and hiking trails. In addition, the closeness of Galeria Malta shopping centre enables combining outdoor recreation with shopping.

Like in previous year, the inhabitants of the peripheral area usually spent their free time in the area of the Warta River valley (36%) usually choosing the river stretch around Biedrusko and Oborniki. These areas are located close to their home locations where it is possible to rest surrounded with natural landscape in places not yet "discovered" by the inhabitants of remaining areas, thus, far from the trails packed with people. Areas of the Głuszynka and Kopla Rivers along with lakes of Kórnik and Bnin were indicated slightly more frequently (14%). Rest and recreation areas attractive considering nature (Protected Landscape Area of the basin of the Kórnik and Zaniemyśl Lakes[10]) and culture located in the closest proximity, especially for the inhabitants of the commune of Śrem, were chosen relatively more willingly for short, one-day trips.

In the current year, number of respondents who rested in city parks and gardens slightly increased what can be a result of care and improving condition of green areas of Poznań as well as the fact that they are kept clean and well maintained (paths, benches, gyms) (Table 8). In addition, more and more festivals and recreational events are organised in city parks, especially in summer.

5. Conclusion

Issues connected to the functioning of many metropolitan areas has become the subject of increasing academic study over the last few decades. However, still too

[10] Protected is a part of the lake trough located in the commune of Kórnik (City and Commune Council Act No. I/1/93 of 26 January 1993 on establishing the Protected Landscape Area in the commune of Kórnik, announced in the City and Commune Office on 29 January 1993; a new project of the area in development).

little reliable empirical material enabling learning the phenomenon of tourist and recreational activities of the inhabitants of the Poznań Metropolis is available.

The results allowed to indicate that inhabitants usually undertaken short, often one-afternoon or one-day trip and recreational activity within the area of the Metropolis. Weekend trips were less popular and usually included using, own, friends or family members' allotments or holiday homes.

The elements of natural environment the most often preferred by the inhabitants were lakes and forests. This indicates that the inhabitants appreciated and very willingly took advantage of the Metropolis location in the Lakeland area and of the unique water and forest system (wedge-ring system) of the city of Poznań and its surroundings. Whereas sites located outside the built–up areas or leisure resorts with well-developed infrastructure for different forms of tourism and recreation were the most important for the comfort of their leisure.

Undertaking any trip and recreational activities requires lower or higher financial expenses. The inhabitants of the Poznań Metropolis in 2015 and 2016 predominatingly paid small amounts of money for active participation in tourism and/or recreation. This trend can be seen in a very positive light when considering that the inhabitants showed interest in the closest surroundings and in searching for places interesting landscape–wise as well as free or cheap infrastructure, such as outdoor gyms, bike and hiking trails, Nordic walking trails, or ropes courses. This should be a guideline for the local government for creating more sites for rest and different forms of recreation in individual communes of the Metropolis.

The cognitive part of the conducted survey allowed identification of directions of tourist and recreational trips of the inhabitants within the Poznań Metropolis. Using the map of tourist and recreational areas [Kaczmarek 2015], the inhabitants indicated the Warta River valley and river valleys of Główna and Cybina as the most attractive. This indicates the need of further analysis of this areas and taking into consideration inhabitants' preferences so that, where possible, make these sites even more attractive. Other areas that enjoyed significantly less interest of the inhabitants included: Wielkopolski National Park, Puszcza Zielonka Landscape Park, Promno Landscape Park. Maybe it would be worth finding out how can this be changed?

The application approach enabled distinguish three areas: internal, external, and peripheral that comprise the Poznań Metropolis as a tourist region. Despite many similarities, especially of the urban and suburban areas, also significant differences in tourist and recreational activities of the inhabitants of individual areas could be noticed. One-day recreation was the most frequently preferred by the inhabitants of the internal and external areas. However, the inhabitants of the external area undertaken weekend recreation more willingly by and the inhabitants of the internal area preferred longer (5 days or more) recreation. The area the most often visited by the inhabitants of all the areas was the Warta River

Valley and river valleys of Główna and Cybina. While the Wielkopolski National Park was more willingly chosen by the inhabitants of the suburban area and the river valleys of Głuszynka and Kopla – by the inhabitants of the peripheral area.

Further research, discussion on tourist and recreational activities of the inhabitants, and knowledge on their needs and expectations as well as directions and places of spending free time should result in improved and more efficient exploitation of the potential of the Poznań Metropolis area. Concurring to this could be some qualitative research aiming to resolve the problem what specific kind of tourist and recreational activity form are undertaken by inhabitant of Poznan Metropolis.

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Uwarunkowania społeczno-geograficzne migracji turystyczno-rekreacyjnych mieszkańców metropolii Poznań

Streszczenie Głównym celem pracy było określenie społeczno-geograficznych uwarunkowań wyjazdów turystyczno-rekreacyjnych mieszkańców metropolii Poznań. Metropolia Poznań to region turystyczny składający się z trzech stref: wewnętrznej, zewnętrznej i peryferyjnej. Zostały one dobrze przystosowane do wypoczynku, są połączone klinami zieleni, które tworzą system pierścieniowo-klinowy. Charakteryzują się określoną strukturą i specyfiką migracji turystyczno-rekreacyjnych. W wyniku badań ustalono, że w miejskiej strefie dominuje wypoczynek jednodniowy, a w podmiejskie wyraźnie zaznacza się wypoczynek 2-4-dniowy. Ważnym czynnikiem generującym aktywność turystyczno-rekreacyjną mieszkańców okazało się zróżnicowanie elementów i cech przestrzeni turystycznej oraz czynniki ekonomiczne. Do weryfikacji hipotez posłużono się metodą sondażu bezpośredniego z kwestionariuszem wywiadu. Materiał empiryczny, zakwalifikowany do analizy obejmował 1446 ankiet, przeprowadzonych wśród mieszkańców podejmujących aktywność turystyczno-rekreacyjną na terenie metropolii.

Słowa kluczowe: metropolia Poznań, aktywność turystyczno-rekreacyjna, czynniki generujące ruch turystyczny

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Cycling Trail Network of the Poznań Metropolital Area: Prospects for Research in Physical Activity and Recreational Appeal[1]

Abstract. The increased popularity of cycling in Poland has given new prospects for interdisciplinary research. This enabled multifaceted analysis of recreational activity based on a network of bike trails. One such well-functioning and well-managed network is the Wielkopolska System of Bike Trails which is especially popular in the Poznań agglomeration. The aim of this paper was to present pre-developed methods for analysing a network of bike trails in terms of physical activity and recreational attractiveness as well as to present preliminary results concerning an exemplary trail. The obtained results will enable further development of the methods in order to quite a vague statement make them more precise. Then, the methods will be used to analyse a landscape, trails, and cyclists in order to create a targeted tourist and recreational offer for the Poznań agglomeration based on the Wielkopolska System of Bike Trails.

Keywords: bike active, bike tourism, bike trails, Poznan agglomeration

1. Introduction

Recreational and tourist cycling in Poland has become more and more popular among Polish and foreign tourists. Poland has been accounted to one of the ten countries in Europe where the expenses on bicycle tourism are the highest (abo-

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[1] Paper based on the results of research carried out within the research project entitled: "Metropolitan region as a space of recreational penetration on the example of the Poznań agglomeration" in 2015-2016 in the WSB University in Poznań financed from the statutory funds of the Polish Ministry of Science and Higher Education under supervision of Agata Basińska-Zych, PhD (decision number 27090/E534/S/2016).

ut EUR 2 billion per annum). It is an attractive area, especially for tourists from Southern Europe. Experts also indicated the proximity of the German market as beneficial because it generates the highest revenue from this type of tourist activity (almost EUR 11.4 billion) [Dembińska 2016]. Moreover, the European Cyclist Federation, which cites a study commissioned by the European Parliament in 2012, estimated that there are over 2.2 billion cycle tourism trips and 20 million over-night cycle trips made every year in Europe. These have an estimated economic impact of EUR 44 billion.

The Wielkopolska Region now plays a very important role in using its own bicycle potential, especially in the subject of marking out bike trails. *Wielkopolska System of Bike Trails* exists since 2001 and consists of 9 trails of the total length of 1800 km. Borawska-Melnyk [2016] suggested that creating attractive and high-quality trails with a rich variety of accommodation and gastronomic choices in environmentally and culturally valuable areas is an important factor influencing development of bicycle tourism. Analysing the stage of bicycle tourism development in the agglomeration and cyclists' opinions are especially important issues that should be taken into consideration in proper development of the infrastructure. Current problems of bike trails in the Wielkopolska Region (including the Poznań agglomeration) were discussed during a professional conference entitled "Bicycle tourism in the Wielkopolska Region" which was organised by the Office of the Marshal of the Wielkopolskie Voivodeship on 21 October 2016.

This paper aims to determine the prospects for research in physical activity and recreational attractiveness of bike trails in the Poznań agglomeration. It is based on a pilot study into served a purpose of verification of the assumptions and their specification what will enable conducting proper multifaceted analysis in further research.

2. Research on cycling in urbain area

Analysing cycling is a popular research trend and has been approached in a number of different ways. A lot of authors stressed the role of cycling in natural environment [Rorthert & Kacprzyk 2012: 65-82; Pisarska & Pisarski 2012: 83-100], however, more often focused on a role of cycling in urban environments [Simonsen & Jorgenson 1996: 5-54; Ritchie 1998: 567-582; Tolley 2003: 3-13]. Some authors posit that cycling was the healthiest way of getting around our cities [Pucher et al. 2010: 7-50]. An especially high number of projects undertaken have focused on towns and cities in Western Europe [Pucher & Buehler 2008: 495-528], including cycling for slower travel [Dickinson et al. 2010]. The economical aspect of such research characterised market conditions influencing the develop-

ment of bicycle tourism [Niezgoda 2012: 29-40] and the marketing aspect analysed motivations of practising cycling [Figler et al. 1992: 113-116; Zawadka 2012: 295-306]. Research on cycling in urban areas and as a mean of urban transportation [Rietveld & Daniel, 2004: 531-550], and sustainable development [Bratzel 1990: 177-190; Bertolini 1999: 199-210; Bertolini & le Clercq 2009: 575-589] are essential for our paper. Although researches analysing bicycle tourism development in towns and cities [Sun Chao et al. 2012: 5-16; Sidong et al. 2012: 5-6] are equally important.

Urban bike trails have a specific character because, according to A. Stasiak, J. Śledzińska and B. Włodarczyk [2014: 11-58], in such areas, combinations of separate bikeways and footways, commonly called routes for pedestrians and cyclists or bike paths, are the most common. Traditional bike trails marked, according to T. Dronka [2012: 141-152], with primary and secondary markings (signposts and information boards) and surrounded by complementary infrastructure (e.g., developed resting points) are more common outside the tightly built-up urban areas because there are more bikers. Bike trails are marked in order to move tourist cycling from high-traffic streets and roads to safe bikeways or side roads of different kinds [Boroński 2007: 171-174]. Official statistics indicate that, nowadays, Poland has 19.5 thousand km of bike trails with the highest amount in the following voivodeships: Zachodniopomorskie, Lubuskie, Małopolskie, and Wielkopolskie as it results from the in Poland [GUS 2015]. The following voivodeships show the highest index of bike trails density: Małopolskie, Lubuskie, Zachodniopomorskie, and Śląskie [Śledzińska 2012: 41-64]. Bikeways, the most common element of touristic development, can be divided according to Stasiak et al. [2014: 11-58] into the following types:

– separate bikeways (usually outside urban areas),

– separate in-roadway bikeways (next to a roadway, often separated from a roadway with a greenbelt),

– separated from a roadway with a low curb or painted line (bike lanes, contraflow bike lanes - enabling cycling in only one direction),

– separated from a sidewalk with a low curb, different surface colour or painted line (road surface markings).

It should be noted that a high selection of bike maps and applications, more accurate and up-to-date than traditional paper maps, is now available due to dynamic changes in digital technology. Such applications enable accesss to the newest maps and a number of other functions such as measuring speed, distance, time, altitude, ride's profile, and burned calories. Their practical application is stressed by A. Kalaniewicz [2012: 133-140; 2016], among others. The following applications can be considered the most interesting ones: iMapMyRIDE, Bike Repair HD, Move! Bike Computer, Strava Cycling, Endomondo Sports Tracker, Cyctastic GPS. This applications have a lot usefull data for bikers. Using bike

maps and applications makes bike trips easier and more pleasant. In addition, it creates a sense of security and allows controlling oneself and one's achievements through analysis and observation of displayed results. With such software, it is possible to obtain any data and calculations interesting for us almost immediately, like average and maximal pulse, speed, elevation and air temperature. It can to make a correlations with they.

Current condition of bike recreation development in the Poznań agglomeration was also analysed in the aspect of conditions of developing bike tourism and infrastructure [Billert 2012: 121-132; Zamelska & Kaczor 2015: 105-121; Styperek 2015: 201-213], motives and preferences of cyclists [Graja-Zwolińska &Spychała 2012: 281-194; Łuczak & Kroma 2015: 123-143; Rogowski & Nadolski 2016: 137-155]. Poznań City Council had noticed the necessity of developing bike infrastructure and, within realisation of transport policy, implemented the Bike Programme for 2007-2015 including, among others, possibility of improving cycling safety and conditions, implementing new forms of public transportation – public bicycles, improving routes of bike trails within the city, tourist and leisure bike trails, and promotion of cycling [*Program rowerowy...* 2008]. The effects of that were already noticed by S. Graja-Zwolińska and A. Spychała [2012: 281-194], who stressed that the authorities of Poznań propagate development of cycling infrastructure through organising new bikeways and next public bike stations. Thus, the role of the Poznań City Bike is increasing.

Interesting papers characterising tourist values and bike maps of the Poznań agglomeration were so far published, for example, eight editions of cycling guides of J.Y. Łuczak published by the Municipal Roads Authority of Poznań in which the author describes numerous cycling trails and trips. The "Poznań na dwóch kółkach" map (2013) and "Rowerowa mapa Poznania" online map are also noteworthy. Both elaborations are the most current and detailed and contain all the information needed by cyclists, such as descriptions of different routes (bikeways, connecting paths, marked bike trails, separated bikeways, routes for pedestrians and cyclists and contraflow bike lanes), obstructions, and facilitations (e.g., the zone 30)[2] and city bike stations.[3]

3. Methodology (measuring technique)

Three factors were taken into consideration when developing the methodology of analysing a system of bike trails: landscape, bike trails, chosen cyclists. These factors are presented in the below diagram (Fig. 1) referring to linear systems of

[2] www.zdm.poznan.pl/strefa30.php [access: 16.03.2017].

[3] https://nextbike.pl/miasta/poznanski-rower-miejski/ [access: 15.03.2017].

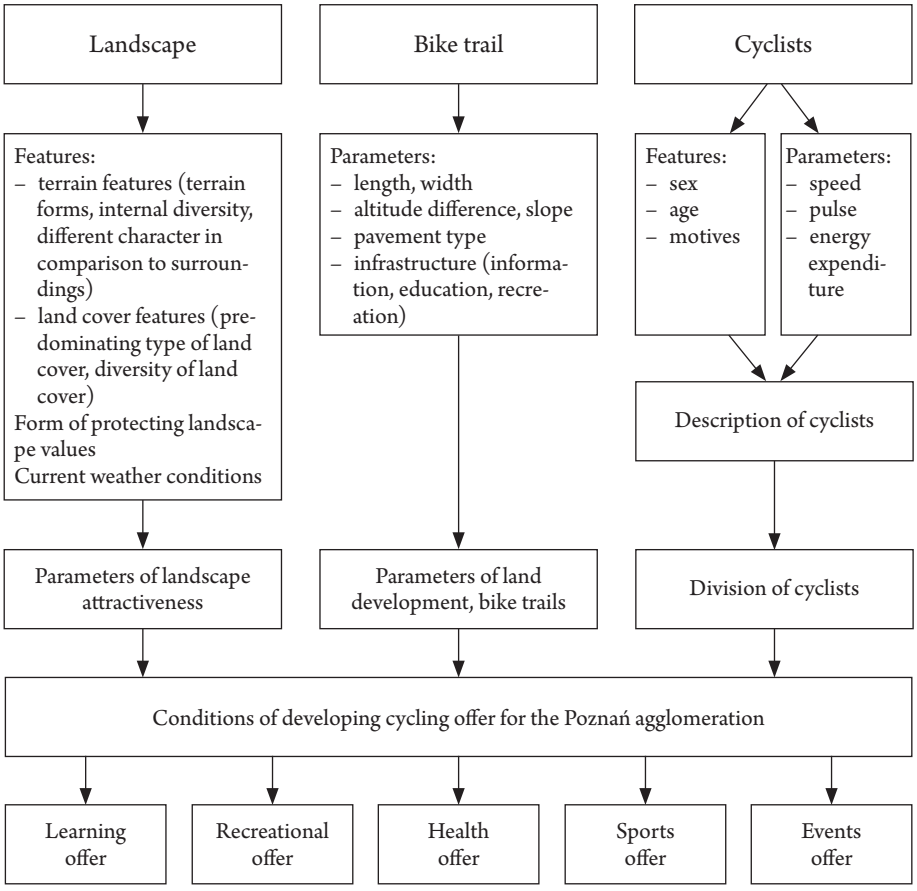


Figure 1. Research procedure

Source: own work.

recreational penetration in the geoecological approach [Styperek 2002: 15-56]. In this approach the system's elements are: participants travelling within tourist space, system's axis that is the penetration route and its infrastructure, and natural and cultural landscape located in the visual perception zone. While the complex of mutual interactions includes interactions between the system's elements as a result of recreational penetration.

The landscape will be analysed with Geographic Information System tools using criteria deciding on the attractiveness (diversity and changeability) of terrain forms and land cover. Garmin Edge 810 Bundle Tp Light cyclocomputer manufactured by Garmin (designed for cyclists) was the main tool for analysing bike trails and cyclists. The device uses satellite navigation in cooperation with

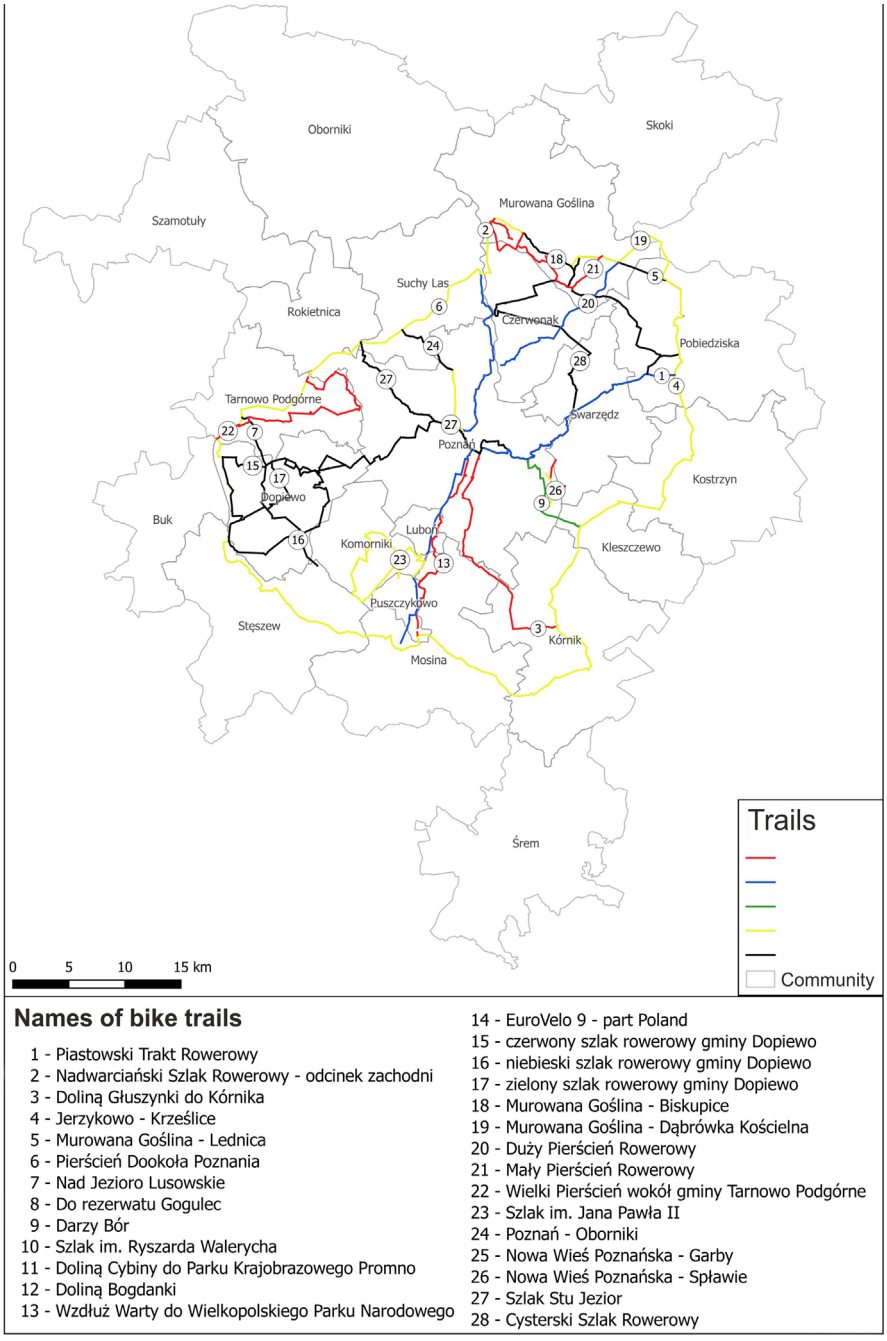
software available on the manufacturer's website (http://connect.garmin.com). This device allows detailed determination of a completed route's length as well as related characteristics, i.e., speed, altitude, and slope. If necessary, it also divides a route into stages. In addition, measurements included such parameters as mean and average and maximal pulse and energy expenditure expressed as burned calories. Individual calibration of the device requires entering data, such as sex, weight, and resting and maximal pulse into device's memory. Data obtained from every ride are presented in tables and graphs, and they are analysed statistically. It is possible to use these data to develop recreational offert for the Poznań agglomeration including different intensity levels. The possibilities of use this software will be presented for one person excemple.

4. Wielkopolska System of Bike Trails

The subject of the research is a part of the Wielkopolska System of Bike Trails located in the Poznań agglomeration. The system was established back in 2001 and now it consists of nine transregional bike trails of the total length of about 1800 km. The system includes historical and cultural trails, such as the Amber Bike Trail and the Polish Landed Gentry Bike Trail. The attractiveness of the Wielkopolska System of Bike Trails can be proved by the fact that it was granted a special Certificate of the Polish Tourist Organisation in 2004. Moreover, this system is a part of the "GPS Wielkopolska" project which established "GPS traits," the so-called tracks that can be downloaded to mobile devices, e.g., mobile phones based on satellite navigation [Kaleniewicz 2012: 133-140].

In this research on the phenomenon of recreation in the Poznań agglomeration, we concentrated on one part of the Wielkopolska System of Bike Trails, that is, the Poznan Bicycle Ring along with seven accesss trails led from the city centre. The Ring of about 170 km is divided into 7 sub-trails by the 7 accesss trails. The Wielkopolska System of Bike Trails consists of the following trails: Poznan Bicycle Ring, Cistercian Bike Trail, Warta Bike Trail, Piast Bike Trail, Bike Trail of a Hundred Lakes, Trans-Wielkopolska Bike Trail (Fig. 2).

For the pilot study was chose one of the bike trails of the Poznan Bicycle Ring. The trail starts in the city centre, in the so-called Poznań Bike Node, located by the Maltańskie Lake at the corner of Baraniaka and Jana Pawła II streets. This trail is marked in green and it is the northern part of the Trans-Wielkopolska Bicycle Trail. The studied trail leads through river valleys of Bogdanka and Cybina where several reservoirs are located: ponds of the Sołacki Park, Rusałka Lake, and Strzeszyńskie Lake. The trail's route lines up with one of belts of the so-called wedge-ring greenery system of the city of Poznań (Fig. 3). High tourist



Names of bike trails

1 - Piastowski Trakt Rowerowy
2 - Nadwarciański Szlak Rowerowy - odcinek zachodni
3 - Doliną Głuszynki do Kórnika
4 - Jerzykowo - Krześlice
5 - Murowana Goślina - Lednica
6 - Pierścień Dookoła Poznania
7 - Nad Jezioro Lusowskie
8 - Do rezerwatu Gogulec
9 - Darzy Bór
10 - Szlak im. Ryszarda Walerycha
11 - Doliną Cybiny do Parku Krajobrazowego Promno
12 - Doliną Bogdanki
13 - Wzdłuż Warty do Wielkopolskiego Parku Narodowego
14 - EuroVelo 9 - part Poland
15 - czerwony szlak rowerowy gminy Dopiewo
16 - niebieski szlak rowerowy gminy Dopiewo
17 - zielony szlak rowerowy gminy Dopiewo
18 - Murowana Goślina - Biskupice
19 - Murowana Goślina - Dąbrówka Kościelna
20 - Duży Pierścień Rowerowy
21 - Mały Pierścień Rowerowy
22 - Wielki Pierścień wokół gminy Tarnowo Podgórne
23 - Szlak im. Jana Pawła II
24 - Poznań - Oborniki
25 - Nowa Wieś Poznańska - Garby
26 - Nowa Wieś Poznańska - Spławie
27 - Szlak Stu Jezior
28 - Cysterski Szlak Rowerowy

Figure 2. The Wielkopolska System of Bike Trails within the Poznań agglomeration

Source: own work.

values (anthropogenic and natural) are characteristic for this section of the trail. Anthropogenic values are sports infrastructure by the Maltańskie Lake, historical architecture around the Old Market Square, Poznań Army Monument, and sports facilities of the Olimpia sports club. Natural values of the trail are the two parks located in the river valley of Bogdanka (Wodziczko Park and Sołacki Park), ecological site "Bogdanka I," Rusałka Lake and Strzeszyńskie Lake, and green areas between them (Fig. 4). Infrastructure of the trail's route and facilities located in its close proximity deserves especial attention. The trail's infrastructure includes: resting sites, information boards concerning various subjects, properly hardened pavement, and self-service bike service stations with four stands containing sets of wrenches and spanners, inflators and universal adapters as well as a code scanning of which displays help. Attractiveness of the analysed trail can also be proved by tourist development of adjacent areas, e.g., several restaurants, beaches and swimming spots be the above-mentioned lakes, volleyball courts, and modern playgrounds.

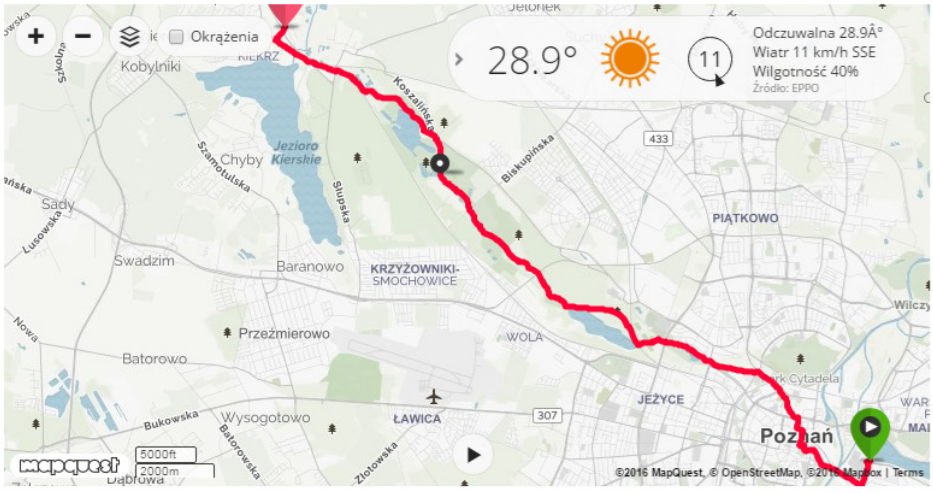


Figure 3. Trait of the exemplary trail

Source: own work based on Garmin Connect; background – the Open Street Map.

The main features determining trail's attractiveness are landscape values connected to post-glacial lakes and high diversification of the surrounding terrain cover. Terrain values include fluvial and glacial terrain forms characteristic for diverse lake districts. Moreover, good level of development in a form of diversifies technological infrastructure and adjusted pavement improves such attractiveness. Land development comprises of route markings, developed resting sites

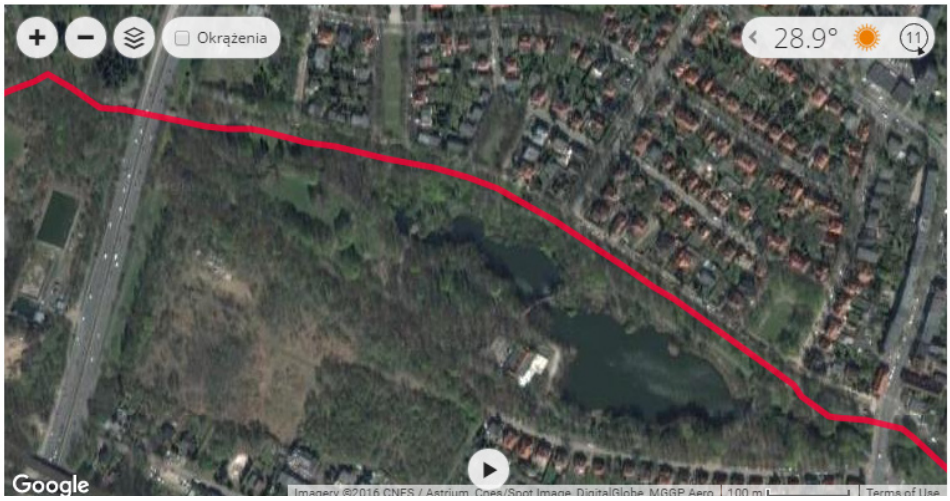


Figure 4. Route of a part of the exemplary bike trail on a satellite image

Source: own work based on Garmin Connect; background Google Maps.

(benches, tables) and educational boards displaying maps. The above-mentioned features determine tourist attractiveness of the analysed trails and influence multisensory landscape perception. This means that analysing parameters of penetration route and physical activity on the trail can comprise premises for optimisation of bike trails' utilisation in the Poznań agglomeration from the point of view of bicycle-using participants.

5. Bike trail's parameters of satellite measurements conducted with the Garmin Edge 810 device

Data obtained during measurements were statistics for one excemple of biker presented as tables, graphs, and maps. The analysed trail had 16 km and consisted of flat or slightly sloping sections. According to barometric altimeter used in the measuring device the lowest point measured 59 m a.s.l., and the highest – 94 m a.s.l., what means that trail's denivelation amounted to 35 m (Chart 1). Low denivelation and low values of increase (82 m) and decrease (65 m) proved very low level of difficulty concerning terrain configuration along the entire trail. Analysis of heights of individual sections of the length of 1 km clearly showed that the average value of altitude increase and decrease amounted to about 4-5m. The highest

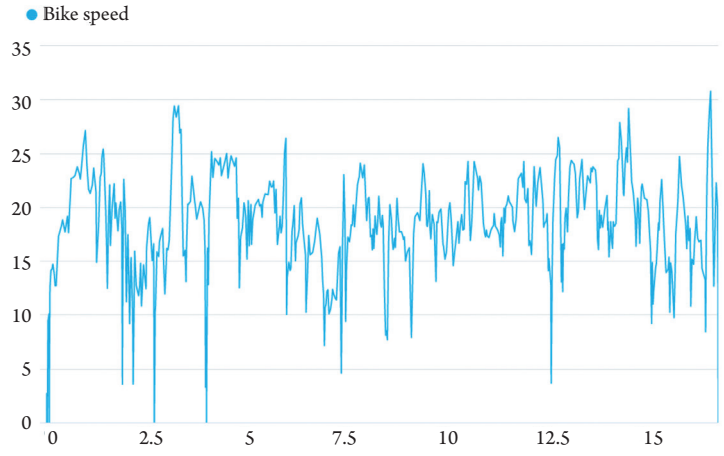
Chart 1. Altitude profile of the exemplary bike trail

Source: own work based on Garmin Connect.

value of the increase was 12 m, and in the one section altitude increase did not occur at all. The highest value of altitude decrease was 11 m while in four sections decrease was not registered.

The next data was the current speed during the whole ride. As it results from the registered data, the average speed of the ride was 16.4 km/h, however, it in-

Chart 2. Speed profile of a ride on the exemplary bike trail

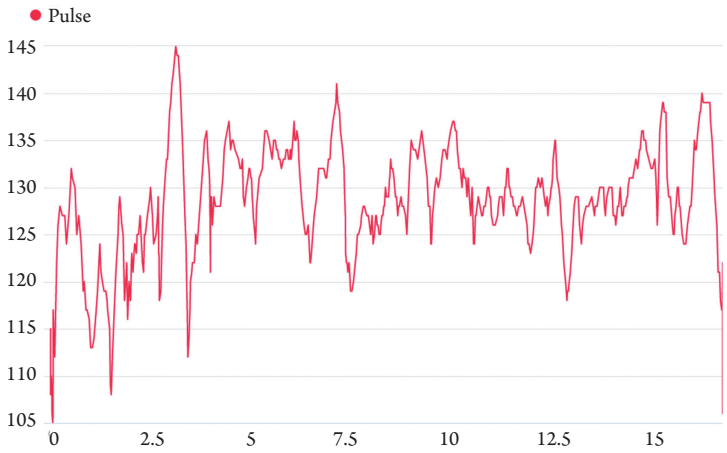


Source: own work based on Garmin Connect.

cluded the time of stopping. While the average movement speed was 18.8 km/h with the maximal speed of 31 km/h (Chart 2).

The measurements also included parameters of physical activity, such as pulse and energy expenditure. Characterisation of pulse included average and maximal values. The average values of pulse in individual sections were slightly diverse and ranged from 119 to 132, while maximal values of pulse ranged from 129 to 145, respectively (Chart 3). The energy expenditure was expressed as burned calories. It is an especially important feature because information on burned calories can significantly contribute to undertaking recreational activity for health. The person participating in the research burned 484 kcal during the entire route, while the energy expenditure in individual sections of the trail ranged from 19 kcal to 49 kcal. Additional measured parameters helpful in analysing physical activity included: time of the ride, average and maximal movement speed, and air temperature in individual sections of the trail.

Chart 3. Cyclist's pulse during riding the exemplary bike trail

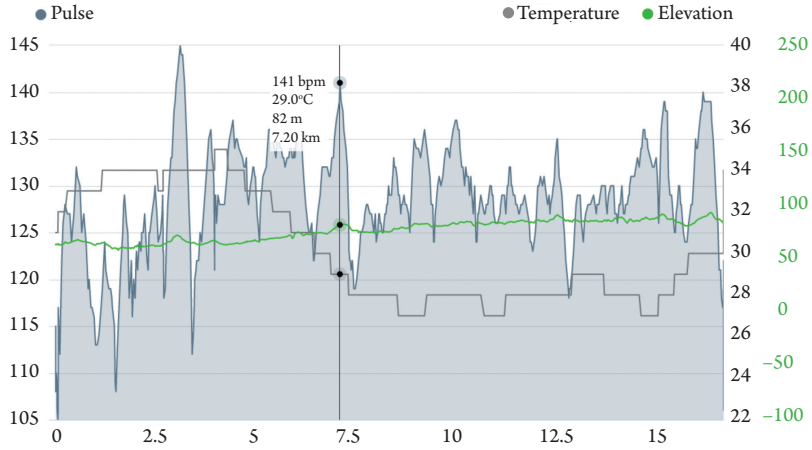


Source: own work based on Garmin Connect.

The used software enabled multilayer analysis of measured parameters in graphs, e.g., pulse changes (pulse) or speed changed depending on changes in terrain configuration, etc. This option enables easier interpretation of recreational activity's results. It is also possible to analyse the above features at individual points of the trail thanks to synchronisation of the map with the statistical data. Below interactions between the obtained data are presented:

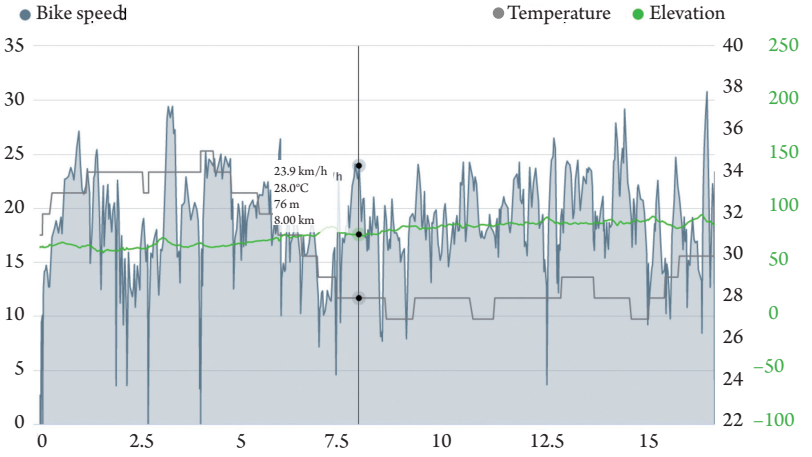
- pulse, air temperature, and altitude a.s.l. (Chart 4),
- speed, air temperature, and altitude a.s.l. (Chart 5),
- speed, pulse, and altitude a.s.l. (Chart 6).

Chart 4. Interaction between pulse, air temperature, and altitude a.s.l.



Source: own work based on Garmin Connect.

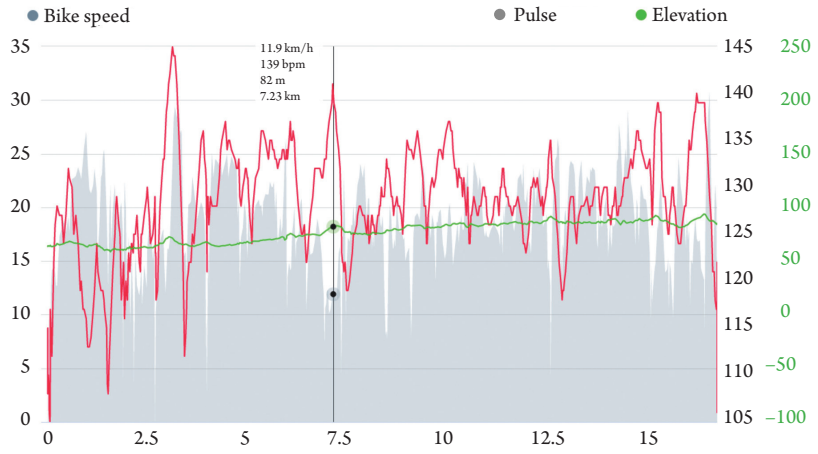
Chart 5. Interaction between speed, air temperature, and altitude a.s.l.



Source: own work based on Garmin Connect.

The exemplary trail was divided into 1-km sections in which a number of data were measured: time, movement time, altitude increase, altitude decrease, average speed, average movement speed, Mmax. speed, average pulse, max. pulse, average air temperature, and calories (Table 1).

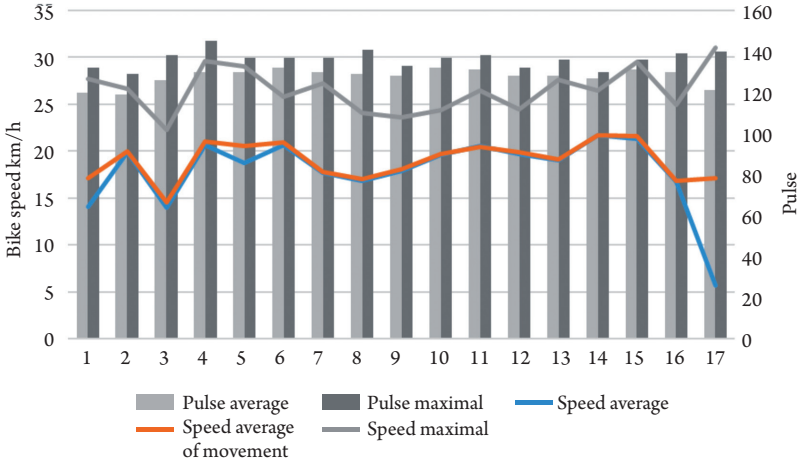
Chart 6. Interaction between speed, pulse, and altitude a.s.l.



Source: own work based on Garmin Connect.

The above specification can be the base for further analysis which would include a number of features. On use every features. Chart 7 below is an example of such analysis presenting the average and maximal pulse and the average movement speed in 1-km sections of the exemplary bike trail.

Chart 7. Comparison of speed and pulse data in 1-km sections of the exemplary trail



Source: own work.

Table 1. Featured registered with the Garmin Edge 810 Bundle Tp Light device

Section	Time	Movement time	Altitude increase	Altitude decrease	Average speed	Average movement speed	Max. speed	Average pulse	Max. pulse	Average air tempera-ture	Calories*
1	04:16.51	03:30	5	4	14.06	17.14	27.66	120	132	32.30	35
2	03:00.791	03:00	4	6	19.91	20.00	26.68	119	129	33.86	24
3	04:16.951	04:08	9	0	14.01	14.52	22.23	126	138	33.81	38
4	02:54.479	02:51	4	9	20.63	21.05	29.58	130	145	34.00	27
5	03:12.184	02:55	2	2	18.73	20.57	29.03	130	137	34.10	30
6	02:54.112	02:52	4	1	20.67	20.93	25.79	132	137	32.41	28
7	03:23.414	03:22	9	2	17.70	17.82	27.22	130	137	30.51	30
8	03:33.781	03:32	4	7	16.84	16.98	24.08	129	141	28.46	30
9	03:21.91	03:19	5	0	17.90	18.09	23.61	128	133	27.66	27
10	03:04.67	03:03	2	2	19.56	19.67	24.41	132	137	27.61	27
11	02:55.331	02:56	4	4	20.53	20.45	26.43	131	138	27.83	24
12	03:02.938	03:01	2	0	19.68	19.89	24.43	128	132	27.61	23
13	03:08.957	03:08	6	4	19.05	19.15	27.64	128	136	28.00	23
14	02:46.79	02:46	0	0	21.68	21.69	26.46	127	130	28.80	19
15	02:48.957	02:47	6	4	21.31	21.56	29.51	131	136	27.78	22
16	03:35.62	03:34	4	11	16.74	16.82	24.92	130	139	28.13	28
17	09:49.405	03:14	12	9	5.64	17.15	31.02	121	140	31.76	49
Total	01:02:03.65	53:58.00	82	65	16.36	18.82	31.02	127	145	30.52	484

* Middle-aged man, weight about 85 kg.

Source: own work.

6. Conclusions

Concluding the pre-developed methods and exemplary results requires stressing the fact that the presented attempt does not include all the possibilities of analysing the obtained results. It needs to be indicated, however, that further analyses based on all of the bike trails will include all of the compared data. The literature review concerning bike trails of the Poznań agglomeration allows to conclude that bike tourism in the Poznań agglomeration is a subject of many current scientific papers concerning different issues. However, papers describing conditions connected to developing bike tourism and infrastructure as well as conditions of bike physical activity predominate. Some papers also present analyses concerning current state of bike trails and paths in the Poznań agglomeration. Relatively small amount of research concerns detailed characterisation of bike trails' parameters describing their attractiveness and recreational usefulness. Moreover, detailed research determining the size and predominating directions of cycling are lacking. The proposed analysis of trail's parameters and literature review allows formulation of the following prospects for research:

– measuring parameters of the entire system of bike trails in the Poznań agglomeration using the Garmin software,

– classifying the entire system and individual trails according to route's parameters and tourist development, activity (difficulty degree, energy expenditure), popularity, and possibility of creating an offer for an exemplary segment of receivers,

– monitoring cycling on individual trails,

– developing a map of system's attractiveness and popularity of individual bike trails in the Poznań agglomeration,

– preparing multifaceted tourist offer of bike trails in the Poznań agglomeration.

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System szlaków rowerowych aglomeracji poznańskiej – perspektywy badawcze w zakresie aktywności ruchowej i atrakcyjności rekreacyjnej

Streszczenie. Wzrost popularności aktywności rowerowej w Polsce daje podstawę do tworzenia nowych perspektyw badawczych na polu interdyscyplinarnym. Dzięki temu możliwa będzie wieloaspektowa analiza aktywności rekreacyjnej w oparciu o system szlaków rowerowych. Jednym z takich sprawnie działających i zarządzanych systemów jest Wielkopolski System Szlaków Rowerowych (WSSR), który w obszarze aglomeracji poznańskiej jest szczególnie popularny. Celem pracy jest prezentacja wstępnie przygotowanej metodyki analizy systemu szlaków rowerowych w zakresie aktywności ruchowej i atrakcyjności rekreacyjnej wraz z przedstawieniem wstępnych wyników dla przykładowego szlaku. Dzięki uzyskanym danym w dalszym etapie możliwe będzie doprecyzowanie metodyki, dzięki której analizie poddany zostanie krajobraz, szlaki oraz rowerzyści w celu stworzenia ukierunkowanej oferty rekreacyjno-turystycznej w oparciu o Wielkopolski System Szlaków Rowerowych na obszarze aglomeracji poznańskiej.

Słowa kluczowe: turystyka rowerowa, trasy rowerowe, aglomeracja Poznań

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