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## Assessment of physical activity of residents of Bydgoszcz using the international physical activity questionnaire IPAQ

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### Abstract

**Introduction:** Currently, we live in the age of promoting a healthy lifestyle and encouraging physical activity, which justifies conducting a survey on the level of physical activity of the population living in Bydgoszcz. The results of the observation carried out will allow for the analysis of changes in physical activity of Bydgoszcz residents over the years in the future.

**Material and methods:** 199 people living in Bydgoszcz, 97 women and 102 men participated in the study. The mean age of the respondents is 37.7 years, mean BMI: 25.84. The study was conducted using the Polish version of the IPAQ - Long version.

**Results:** 84.42% (n = 168) of respondents were physically active, 12.06% (n = 24) of respondents were sufficiently physically active, and 3.52% (n = 7) were insufficiently physically active.

**Conclusions:** The physical activity of the inhabitants of Bydgoszcz is at a high level, but the in-depth analysis of the results encourages the education in the aim to increase the level even more and to conduct more research.

**Key words:** Physical activity, IPAQ questionnaire, Poles, Bydgoszcz

## **1. Introduction**

In the era of promoting a healthy lifestyle, nutrition and physical activity, you can notice the emergence of many new places enabling a variety of physical activity. This is signalled by an increased demand for this type of services, but in the questionnaire conducted among Poles, less than every fifth respondent was of the opinion that he practices sport on a regular basis and that it plays a very important role in his life. Recent studies also indicate that the majority of the society prevails that their immediate surroundings have a sufficient number of facilities and places for recreation and physical activity [1]. It seems obligatory to conduct reliable research, considering the types of physical activity related to work, family life, everyday mobility and leisure. Physical activity includes exercise and all other activities that involve various parts of the body in motion, such as play, movement, recreation, paid work and housework [2].

The aim of the study is to obtain knowledge about physical activity among the inhabitants of Bydgoszcz.

## **2. Material and methods**

### **2.1. Participants and procedures**

The study was approved by the Bioethical Committee of the Nicolaus Copernicus University in Torun, Ludwik Rydygier Collegium Medicum in Bydgoszcz (KB 272/2019).

The study was conducted at the Department of Physiotherapy in Collegium Medicum NCU in the period from February 26, 2019 to May 31, 2019.

The only exclusion criterion in the study was age under 18. There are no inclusion criteria other than voluntarily willing to participate in the study.

Overall, 199 people living in Bydgoszcz, 97 women and 102 men participated in the study. The mean age of the study group was 37.7 years (min = 18, max = 64), the mean body weight was 71.14 kg (min = 50, max = 102), the mean height was 166.9 cm (min = 150, max = 193) and the mean BMI (Body Mass Index) was 25.84 (min = 14.45, max = 40.44). The BMI index (calculated by the formula:  $BMI = \text{body weight [kg]} * \text{height [m]}^2$ ) of the respondents proves that only 77 people are in the correct weight range.

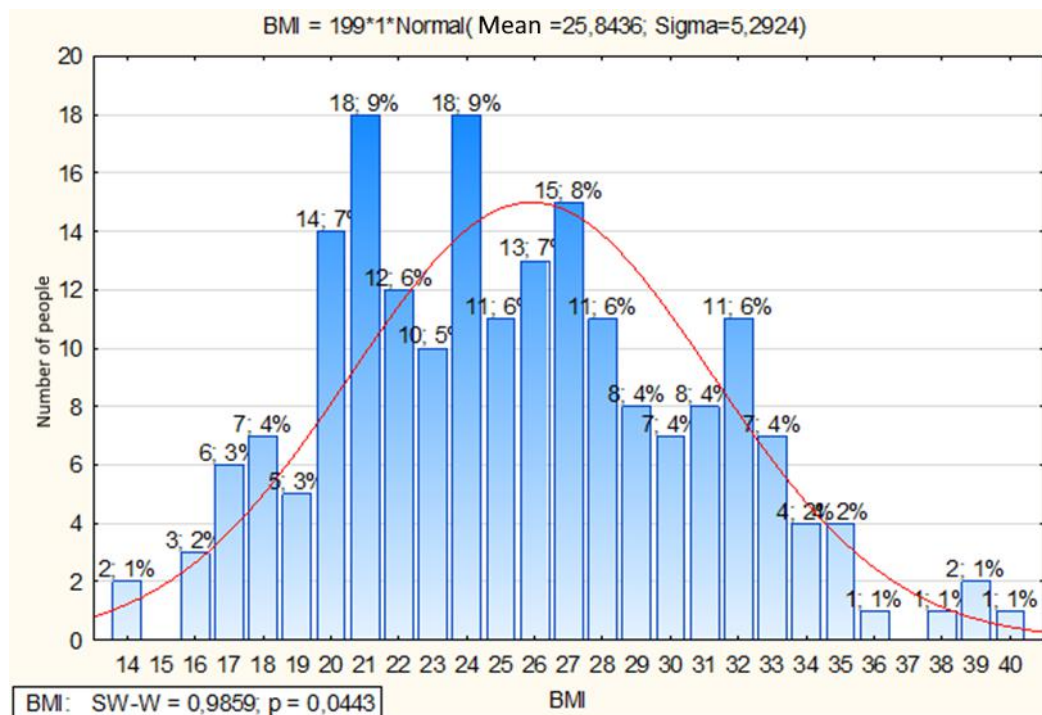


Figure 1. BMI Histogram

Among the respondents there were people with higher education, as well as secondary and vocational education (33 women - higher education, 47 women - secondary education, 17 women - vocational education; 36 men - higher education, 30 men - secondary education, 36 men - education professional). The place of origin also varied (51 women came from the city, 46 women came from the countryside, 48 men came from the city and 54 men came from the countryside).

## 2.2. International Physical Activity Questionnaire (IPAQ) – Polish version

The IPAQ questionnaire, whose task is to measure physical activity in respondents, was created thanks to the idea of Michael L. Booth (first observation in 1996) and after the consultation of a team of scientists. Eight versions of the questionnaire (4 short and 4 long)

were developed between 1998 and 1999. Each of these versions of the questionnaire is divided into sections relating to the average week and the last seven days [3].

The IPAQ questionnaire is addressed to people aged 15 to 69. Despite some disadvantages, this questionnaire is a tested and effective method of assessing physical activity [4, 5, 6].

The long version of the questionnaire was used in the study. It is divided into 5 parts from which you can get information about:

- paid work - activities related to physical effort during work, study, social activities and all non-income activities that may be considered work outside the home,
- movement - the questions about travel time by means of transport and the time of moving from one place to another,
- homework - activities performed around the household, e.g. cleaning work, gardening or taking care of the family,
- time devoted to recreation and sport - free time devoted to recreation, sports and other forms of physical entertainment,
- time spent sitting - this part of the questionnaire gathers information on the time spent sitting, whatever the situation - at home, at work, while studying or spending free time.

The analysis of the obtained results consisted in the assessment of the level of physical activity, measured with a MET (Metabolic Equivalent of Work). Below is a table showing the MET for the long version of the questionnaire.

Table 1. MET examples for various activities [3]

Activity	MET Factor
Walking	3,3
Medium activity	4
Medium activity related to housework	3
Intensive activity	8
Intensive activity related to housework	5,5
Bike riding (as a means of transport)	6

After the questionnaire results are obtained, all activities are converted into MET / week value. Once these results are obtained, all activities (housework, work and leisure) can be listed as physical activity in MET / week, thanks to the following formula:

$$\text{MET-min/week} = \text{MET Factor} * \text{Number of days} * \text{Mean duration}$$

The above value makes it possible to divide the respondents into the following groups:

- high activity group (must meet at least 1 of the following values):
  - at least three or more days with strenuous physical exercise, at least 1500 METs / week,
  - at least 7 days or more of physical effort that sums up to over 3000 MET / week.
- sufficient activity group (must meet at least 1 of the following values):
  - at least 3 days or more of intense physical activity lasting more than 20 minutes a day,
  - at least 5 days or more of moderate exercise for at least 5 or more days of walking, not less than 30 minutes per day,
  - at least 5 or more days of physical effort whose total value exceeds 600 MET / week.
- group of insufficient activity - this category includes all participants who did not meet the requirements of the previous categories [3].

### **2.3. Author's questionnaire of additional information about the survey participant**

In addition, the participants of the study completed a proprietary questionnaire to obtain information such as: age, sex, body weight, height, learned profession, profession, interests (max 3), education, place of origin, place of residence, favourite physical activity, presence of chronic disease.

## **3. Results**

The obtained results of the questionnaire allow the respondents (n = 199) to be divided into groups of the level of physical activity as follows:

- 7 people did not meet the requirements of the intensive group and sufficient physical activity, and therefore were classified as insufficient physical activity. Includes 5 men and 2 women,

- 24 people did not meet the requirements of the intensive activity group. However, they met the requirements of a sufficiently active group. Including 12 men and 12 women

168 met the requirements of an intensive activity group. Including 88 men and 80 women.

Table 2. Comparison and analysis in context of IPAQ recommendations. Summary of physical activity of the respondents.

	Level of activity	N	Mean	Median	Min	Max	Lo.quartil	Up.quartil	Std.dev	P-95%	P95%	Std.err
Age	Intensive	168	37.3393	35	18	64	23.5	51	14.52144	13.11704	16.26528	1.120353
Height (cm)			167.1369	68	150	189	154	178	12.60402	11.38506	14.11761	0.972421
Body mass (kg)			70.7619	70	50	102	61	79.5	12.28882	11.08028	13.73969	0.94639
BMI			25.6723	25.2804	14.4525	40.4444	21.5739	29.2018	5.45858	4.92885	6.11183	0.420983
Age	Sufficient	24	41.625	43	19	64	25	59	16.61276	12.91166	23.30372	3.391065
Height (cm)			165.2083	160.5	150	193	151	179	14.85577	11.5461	20.83909	3.032421
Body mass (kg)			73.0833	73	50	95	65	81	12.57989	9.77726	17.64657	2.567859
BMI			26.888	26.0898	20.4382	34.209	23.7342	30.4701	4.11575	3.19882	5.77341	0.840124
Age	Insufficient	7	32.8571	24	19	61	21	49	16.12894	10.39339	35.517	6.096168
Height (cm)			167	170	150	180	158	174	10.34408	6.66566	22.77835	3.909695
Body mass (kg)			73.4286	77	51	88	57	84	14.26951	9.19518	31.42241	5.39337
BMI			26.356	24.3911	19.7232	33.6485	22.6667	31.2314	5.04101	3.24839	11.10064	1.905323

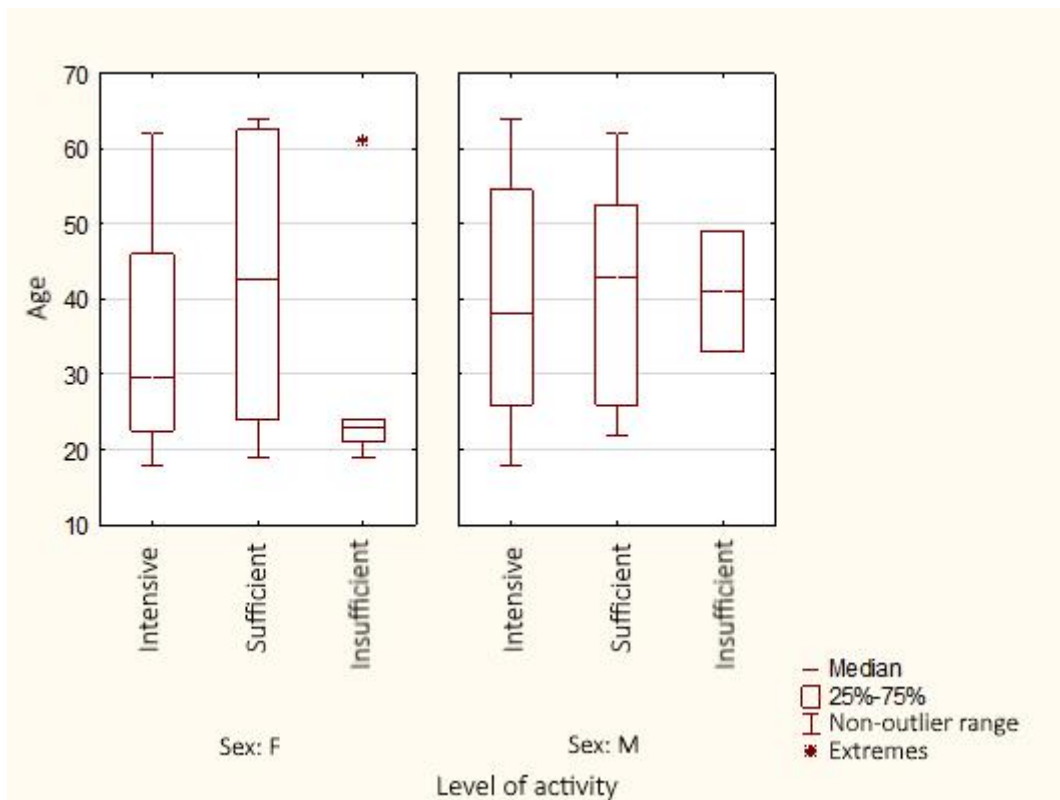


Figure 2. The level of physical activity by age, broken down by gender

3.52% (n = 7) of the respondents are insufficiently physically active, 12.06% (n = 24) of the respondents are sufficiently physically active, 84.42% (n = 168) of the respondents are highly physically active.

#### 4. Discussion

While searching for scientific literature in the scientific aggregators PubMed and Google Scholar, using the keywords "ipaq" and "bydgoszcz" or "ipaq" and "poland", no significant scientific publication related to the physical activity of Poles living in Bydgoszcz was found.

The publication by Puciato D., Mynarski W., Rozpara M. and Nawrocka A. describes a study conducted in Katowice in 2012-2014, during which 2,173 residents (1,017 women and 1,156 men) were examined. The Polish version of the short version of the IPAQ questionnaire (IPAQ-SF) was used for the study. Contrary to the results of our research, in Katowice at that time, researchers showed significant differences between the length and frequency of physical activity of residents. This may suggest the correctness of the theory of popularizing physical activity in free time, but the discrepancy of years and the distance between cities make it difficult to draw an unambiguous conclusion [7].

The analysis of 10 most important basic life support systems of human body — cardiovascular (CVS), respiratory (RS), nervous (NS), digestive (DS), endocrine (ES), immune (IS), excretory (EXS), brain (BS), musculo-skeletal (MSS), hematopoietic (HS) was carried out. Based on this analysis two levels of ensuring the reliability of organism's work were revealed: sequential and parallel.

The system of logical equations for reduced sequential system is:  $Y_{s1} = CVS \text{ RS } BS$ , where is the notation for the conjunctions of set elements.

The system of logical equations for the reduced parallel system is:  $Y_{s2} = NS \text{ DS } ES \text{ IS } HS \text{ EXS } MSS$ , where is the disjunction of the scheme elements.

Visualization of human STC changes the concept of the kinetics of age-related changes in the organism and the role of determinants of health as a stable factor accompanying a uniform, smooth transition from the most pronounced functions of the body to their gradual extinction.

For human STC is formulated the following regularity kinetics of involutory processes: after 30 years of age in the human body morphological changes regress in arithmetic progression, and the functions of organs in a geometric one.

Assumption of health as a state redundancy of functions is suggested [8].

The research is devoted to the fundamental issue of medicine and biology – the study of factors limiting the life span of a person. As a model, the system of adaptation of the human body to the forces of natural gravity is chosen, the disadaptation to which manifests itself in falls and everyday injuries. The object of the study was the selection of severe fractures of bone tissue due to fall, taken in the age aspect. Statistical and meta-analytical research methods were used. It is shown that the age-related increase in mortality due to household falls, coming to severe bone fractures, is non-linear and increases in geometric progression. As a result of the coincidence of the age characteristics of bone fragility and age-related kidney function, an assumption is made about the role of involution of the renal tissue in the development of osteoporosis in the elderly and the need for a new approach to the prevention of osteoporosis and domestic injuries [9].

## **Conclusions**

The level of physical activity of the surveyed Poles staying in Bydgoszcz is at a high level. A much smaller group of respondents, who did not meet the requirements of the group with a high level of physical activity, showed that they are in the group of sufficient physical activity with their activities from the last week. The smallest group of respondents - the group of people with insufficient physical activity - shows that education is needed on the topic of impact of physical activity. What is important is not only the activity undertaken as part of the current employment or form of education, but also the way and form of spending free time. One should strive to achieve a state in which people with insufficient physical activity will not be included in the statistics of physical activity surveys. The lack of available research materials suggests that further research should be carried out to compare the physical activity of Poles over the years.

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