BALTIC JOURNAL OF HEALTH AND PHYSICAL ACTIVITY
© Gdansk University of Physical Education and Sport in Gdansk, Volume 4, No 2, 2012, 116-123

ORIGINAL ARTICLE

DOI: 10.2478/v10131-012-0013-0

Factors Determining the Level of Physical Activity among Warsaw Institutes Employees

Elżbieta Biernat

Warsaw School of Economics, Warsaw, Poland

Authors' Contribution:
A – Study Design
B – Data Collection
C – Statistical Analysis
D – Data Interpretation
E – Manuscript Preparation
F – Literature Search
G – Funds Collection

Key words: *preventive measures, level of physical activity, scientists, Warsaw*

Abstract

Background: *The evaluation of physical activity level of scientists and determining factors which influence the physical activity. Getting to know the characteristics of the group and observing its behavior can lead to pro-healthy campaign.*

Material/Methods: *Research was conducted on 301 Warsaw scientific institutes employees (NIPH-NIH – 82 persons, IMWM – 50 persons, IPPLM – 39 persons, BRI – 50 persons NFNI – 80 persons). A questionnaire was applied. Analysis was made with the usage of SPSS v.17. In accordance with WHO classifications, the interviewed were divided into active (n=162) and non-active (n=139). The active group consisted of persons with a high and average level of physical activity and the non-active group was made of persons who had a low level of physical activity or did not do any exercises. The log-line analysis served to evaluate the relationship between physical activity and various variables. The chi-squared test was used to find significant differences in analysis.*

Results: *Low level of physical activity was characteristic of half of the interviewed scientists (NIPH-NIH – 48.8%, IMWM – 32.0%, IPPLM – 38.5%, BRI – 32.0% and NFNI – 93.8%). Scientists from NFNI have 30 times stronger risk of having physical activity level insufficient in order to maintain good health condition. The questioned men have a double chance to be active persons. Regular participation in recreation (OR 2.43) and a high level of tourism activity (OR 2.38) diminish twice as much the risk of being non-active.*

Conclusions: *The Warsaw scientific institutes employees cannot serve as an example for the rest of the society.*

Word count: 2,742
Tables: 3
Figures: 0
References:

Received: March 2012
Accepted: June 2012
Published: June 2012

Corresponding author:
Elżbieta Biernat, PhD
SGH, Al. Niepodległości 162,
02-554 Warszawa, CWFiS.
E-mail: elzbieta.biernat@sgh.waw.pl
Phone: +48 22 6653839

Introduction

A dynamic development of civilization drastically changes people's behavior [1]. New technologies are ahead of biological adaptation of the human being, and at the same time they are a health threat. Common behavior which includes sedentary lifestyle, ignoring the symptoms of being tired, tense and in a hurry, lack of relaxation skills causes dangerous and long-term health consequences [2, 3]. It results not only in gaining weight but also in widespread civilization diseases [4, 5]. The development of medical sciences has led to prolongation of life expectancy, but research shows that the aging process starts earlier than in previous generations and the symptoms of civilization diseases are to be observed among increasingly younger persons [6, 7, 8].

Taking into account all the previously written issues, it is important to pay close attention to formation of pro-health habits among scientists – a model group for the society. The aim of this paper is to evaluate the level of physical activity of scientific institutes employees and to show which of the variables (gender, age, marital status, BMI, income, institute, participation in tourism and recreation) influences it. Getting to know the conditions of scientists' active lifestyle can lead to discovering how to promote health and upgrade the level of life for the Polish society.

Material and Methods

The research was conducted on 301 employees of scientific institutes in Warsaw: the National Institute of Public Health – National Institute of Hygiene (NIPH-NIH), the Institute of Meteorology and Water Management (IMWM), the Institute of Plasma Physics and Laser Microfusion (IPPLM), the Building Research Institute (BRI), the National Food and Nutrition Institute (NFNI). In order to obtain participants for the research, a two-phase drawing has been done. The first stage was to choose randomly 5 institutes in Warsaw, the second one was to draw a number of employees in each institution. In those institutes which had up to 40 employees, the research was conducted on all of them. In the institutes which employed over 40 persons the research was conducted only among 30% of the staff. The characteristics of the sample are presented in Table 1.

Tab. 1. Characteristics of Warsaw scientific institutes employees

Institute	Sex	All		Age (average±SD)	BMI (average±SD)	Marital status (%)		
		n	%			In a relationship	Single (bachelor / maiden)	Single (divorced / widow/er)
NIPH-NIH	Men	41	29.9	48.4±13.9	25.8±3.6	85.4	12.2	-
	Women	41	25.0	45.2±11.8	22.6±2.8	61.0	29.3	2.4
	All	82	27.2	46.9±12.9	24.2±3.6	73.2	20.8	1.2
IMWM	Men	31	22.6	49.6±14.8	26.3±3.9	71.0	29.0	-
	Women	19	11.6	49.6±11.9	24.8±5.3	57.9	42.1	-
	All	50	16.6	49.6±13.7	25.7±4.5	64.5	35.6	-
IPPLM	Men	24	17.5	52.9±12.5	26.3±2.7	70.8	29.2	-
	Women	15	9.1	39.5±11.7	22.7±3.7	66.7	33.3	-
	All	39	13.0	47.7±13.7	24.9±3.6	68.8	31.3	-
BRI	Men	27	19.7	40.0±12.8	25.5±3.5	63.0	37.0	-
	Women	23	14.0	41.8±12.6	23.9±4.1	65.2	30.4	4.3
	All	50	16.6	40.9±12.6	24.8±3.9	64.1	33.7	2.2
NFNI	Men	14	10.2	48.5±12.5	23.8±3.4	64.3	35.7	-
	Women	66	40.2	40.7±11.7	23.3±3.5	69.7	30.3	-
	All	80	26.6	42.1±12.2	23.4±3.4	67.0	33.0	-

The research was of a questionnaire character. The poll was conducted by trained and supervised interviewers in accordance with a given plan. The percentage of persons who did not want to participate in the research was low – 3-5%.

The questionnaire – modified by introductory research – consisted of two parts. The first part concerned participation in tourism and recreation during the previous year. It helped to collect information about different forms of tourism and recreation and the frequency with which this was done. The questions concerned travelling (participation in minimum one journey), its kinds (one-day trips without overnight stay, short trips – maximum 4 days with a minimum of one night in the destination, long-term journeys – over 5 days with a minimum of 4 nights in the destination, foreign trips with a minimum of one night spent abroad), its frequency (number of journeys) and its aim; in the case of foreign trips – their destination. The character of participation in recreation was understood as regular (minimum once a week, 5 months a year), seasonal (several times during one season) and sporadic (several times a year)

The second part of the pool was based on the *International Physical Activity Questionnaire* – IPAQ. It served to collect information about the frequency and duration of all types of physical activity that the interviewed had during the previous week. On the basis of the results expressed in MET-min/week standard [9] counting was done and the level of physical activity was adjusted (high, medium, low).

In pursuance of the rules given by the IPAQ creators, the research was conducted only in March and November 2009. All types of holidays were excluded from the research time due to higher physical activity in these periods.

Interviewers collected information concerning sex, education, age, marital status, height, weight and the income of the questioned persons.

The indicator of touristic activity was analyzed on the basis of the kind and time of the journey. All trips were given a number of points depending on their length. Trips without an overnight stay were given 1 point, 2-4-day trips – 2 points, more than 5-day journeys – 3 points and travelling abroad – 4 points. 0 points was given to answers stating that there were no trips. In a further phase the number of points was summed up and divided by 4 (number of kinds of trips). This indicator classified physical activity and divided people into 3 groups (persons with a low, average and high level of physical activity).

Three interviewers were excluded from the general classification of physical activity level as they were ill or had days off.

The relationship between the level of physical activity, gender and the place of employment was checked by the chi-squared test. To eliminate the relationship between independent variables describing the level of physical activity, the log-line method was applied. In all analyses the level of importance was $p=0.05$. The analysis was made with the usage of SPSS 17.0 PL.

Results

Evaluation of physical activity level of Warsaw scientists was made with IPAQ [9]. A low level, not fulfilling the WHO norms, characterized half of the interviewed employees of Warsaw scientific institutes (NIPH-NIH – 48.8%, IMWM – 32.0%, IPPLM – 38.5%, BRI – 32,0% and NFNI – 93.8%). At the same time, among the NFNI (both men and women) it was found relatively more often ($p <0.05$) than among other subjects (Tab. 2).

Among all interviewed women, this level was noticed the most rarely ($p<0.05$) in the Institute of Plasma Physics and Laser Microfusion.

An average level of physical activity was characteristic of half of the interviewed persons (NIPH-NIH – 48.8%, IMWM – 62.0%, IPPLM – 56.4%, BRI – 68.0% and NFNI – 6.3%). Scientists from the National Food and Nutrition Institute (both men and women) reached the average level more seldom ($p<0.05$) than other questioned persons.

Among all the interviewed men statistically significant differences were not stated in this respect. An average level of physical activity was characteristic of women from the Institute of Meteorology and Water Management.

A high level of physical activity was observed relatively more seldom ($p<0.05$) than other levels (low and average). Only 3% of the interviewed scientists were classified to this group (NIPH-NIH – 2.4%, IMWM – 6.0% and IPPLM – 5.1%). Due to the fact that the group of persons with a high

level of physical activity was small, it was combined with the group of persons with the average level of physical activity – active people who applied WHO recommendations. Others were classified as non-active subjects.

Tab. 2. Level of physical activity of Warsaw scientific institutes employees (n=301)

Institute	Level of physical activity					
	Low		Average		High	
	n	%	n	%	n	%
NIPH-NIH						
Men	20	48.8	20	48.8	1	2.4[d]
Women	20	48.8	20	48.8	1	2.4[d]
IMWM						
Men	11	35.5	17	54.8[e]	3	9.7[d]
Women	5	26.3[b]	14	73.7[c.e]	-	-
IPPLM						
Men	11	45.8	12	50.0	1	4.2[d]
Women	4	26.7 [b]	10	66.7[e]	1	6.7[d]
BRI						
Men	7	25.9	20	74.1[e]	-	-
Women	9	39.1	14	60.9	-	-
NFNI						
Men	13	92.9[a.f]	1	7.1[a]	-	-
Women	62	93.9[a..f]	4	6.1[a]	-	-

Considerably different (p<0.05): [a] – NFNI vs. other institutes; [b] – IPPLM, IMWM vs. other institutes; [c] – IMWM vs. other institutes; [d] – high vs. average, low; [e] - average vs. high, low; [f] – low vs. average

The relationship between physical activity and socio-demographic factors, such as gender, place of work, age, BMI, income, marital status, participation in recreation (regular, seasonal or sporadic) and tourism activity index (low, average or high) is shown in Table 3.

According to various analyses, age, BMI, income and marital status are not indicators which determine physical activity in a significant way. The risk of being non-active is twice as high among women. A similar risk was observed among persons who did not participate in recreation. Persons who participated in tourism had a higher level of physical activity.

Physical activity was determined by the place of work of the interviewed persons. If one compares those working in the Building Research Institute and in the Institute of Meteorology and Water Management, scientists working in the National Institute of Public Health – the National Institute of Hygiene were twice as much exposed to the risk of being non-active. Scientists working for the National Food and Nutrition Institute had a 30 times lower chance to reach the level of physical activity recommended by WHO.

Tab. 3. Factors determining physical activity of Warsaw scientific institutes employees and the multiplication of chances of being active

Variable	Active		Non-active		p	OR	95% CI
	n	%	n	%			
Sex					p<0.05		
M	75	54.7	62	45.3		1	-
W	64	39.0	100	61.0		0.57	[0.36-0.90]
Institute					p<0.001		
NIPH-NIH	42	51.2	40	48.8		2.02	[0.97-4.22]
IMWM	34	68.0	16	32.0		1	-
IPPLM	24	61.5	15	38.5		1.33	[0.55-3.19]
BRI	34	68.0	16	32.0		1	-
NFNI	5	6.2	75	93.8		31.88	[10.79-94.13]
Age					NS		
20-29	23	52.3	21	47.7			
30-39	37	45.1	45	54.9			
40-49	17	37.0	29	63.0			
50-59	38	48.7	40	51.3			
≥60	24	47.1	27	52.9			
BMI					NS		
Underweight	14	46.7	16	53.3			
Normal	71	47.7	78	52.3			
Overweight	44	43.1	58	56.9			
Obesity	10	50.0	10	50.0			
Income					NS		
<1300	19	32.2	40	67.8			
1300-2100	45	48.9	47	51.1			
2100-2700	38	54.3	32	45.7			
>2700	33	50.8	32	49.2			
Being in relationship					NS		
No	47	50.0	47	50.0			
Yes	92	44.4	115	55.6			
Participation in recreation					p<0.05		
No	17	30.4	39	69.6		1	-
Yes	122	49.8	123	50.2		2.28	[1.22-4.24]
Participation in recreation					p<0.001		
Sporadic	28	43.8	36	56.2		1	-
Seasonal	35	38.5	56	61.5		0.81	[0.42-1.54]
Regular	59	65.6	31	34.4		2.45	[1.27-4.72]
Level of participation in tourism					p<0.001		
Low	28	35.9	50	64.1		1	-
Average	70	46.4	81	53.6		1.54	[0.88-2.71]
High	41	56.9	31	43.1		2.36	[1.22- 4.56]

NS – insignificant statistical differences; Odds ratios (OR) – only to active persons

Discussion

In Poland taking care of good health condition is associated with medical services, which is insufficient to solve health problems. Traditional medicine, often helpless towards known illnesses and new health risks, values the importance of prophylactics and health promotion [4]. Scientific centers give weight to health related fitness as an easy and cheap medicine for the prevention of civilization diseases [10]. They focus on physical activity [11, 12, 13]. *Centers for Disease Control and Prevention* recommends 150 minutes of moderate physical activity per week to maintain good

health condition [14]. The norms created by the *American College of Sports Medicine (ACSM)* suggest a minimum of 30 minutes of physical activity per day [14].

The presented results of the research show that almost half of the examined scientists (employed in Warsaw scientific institutes) fail to realize a minimal physical activity program in order to be healthy; in the case of the National Food and Nutrition Institute almost 94% of the staff do not do that.

The phenomenon of hypokinesis in this professional group is alarming not only due to the high percentage of its representatives but also because this group is elite, model for the rest of society [15]. Intuitionally, one can think that the necessity of physical activity among scientists is higher than among other social groups due to education, general manners and knowledge of the scientists. Published research states that these persons more often treat their health in a serious way, have regular medical examinations and practice sports on a regular basis [16]. However, previous [17] and this research conducted by Biernat does not confirm this statement – a low level of physical activity is not only observed among Warsaw scientists (49%) but also among civil servants (49%).

In comparison to statistical Swedish people, 75% of whom apply recommendations of WHO [18], the presented data are unsatisfactory. Also, if compared to Californians, the percentage of the interviewed scientists who fulfill the ACSM norms is lower (50%) [16].

What determines the level of physical activity among scientists? Do socio-demographic variables, such as gender, age, marital status, BMI, income, place of work influence that, or maybe the participation in recreation and tourism is crucial? The results of the log-line analysis showed that there is a significant relationship between physical activity and gender, place of work, character of participation in recreation and tourism activity index.

According to research, gender is one of the factors that influences physical activity of persons [19, 20]. The presented data confirm the tendency (active men – 54.7% and active women – 39%). The interviewed men had a double chance to be more active people.

The place of work was also important – scientists from BRI and IMWM were more active (68.0%), but the situation in every institute was different (NIPH-NIH – 51.2% of active persons, IPPLM – 61.5%). It is very surprising that 94% scientists working in the National Food and Nutrition Institute, who had knowledge concerning public health, did not see the necessity of movement in their lives. It seems that the awareness of the necessity of undertaking physical activity in the modern civilization is insufficient. Qualitative data (personal observations, respondents' reactions and expressed emotions) also point to some other reasons for this, i.e. lack of time and aversion to physical activity, which could be associated with intense physical exercise. A similar behavior was observed among the Poles surveyed by GUS [21]. Poles usually declare that the reason they do not participate in recreational activities is the lack of free time – 31.9%. The second obstacle to participation in physical activity is the lack of interest and willingness to take physical activity – 18.4%. As a barrier also age – 12.5% and health status – 11.8% are often provided.

As a result, the risk that NFNI employees will not achieve the level of physical activity which allows maintaining good health is 30 times higher. It is thought that their good weight is possible only due to their diet. It is important to state that BMI in the whole group was below the norm (men – 23.8±3.4, women – 23.3±3.5).

Among active scientists regular participation in recreation was declared by 65.6%. Among those who were non-active it was 34.4%. Similarly, 60% of active persons had a high level of tourism activity and 36% had a low one. The higher the level of physical activity the interviewed have, the better chance they had to be active persons (high level – OR 2.38; average level – OR 1.54),which is confirmed by earlier research conducted by Biernat [22, 23]. It is obvious that participation in sport, recreation or tourism (even if it is seasonal or sporadic) increases the physical activity level [24]. However, if scientists are supposed to be a model group for the rest of the society, they should do physical exercises on regular basis.

Conclusion

Systematic physical activity of contemporary Poles is a process in constant development. On the one hand, it is popular among a greater part of the society; on the other hand, for some persons it is beyond their reach. To create model behavior, it is important what kind of lifestyle model will be demonstrated by the elites (e.g. scientists). Unfortunately, the level of physical activity of half of the scientific institutes employees in Warsaw is low. Due to that fact, this group cannot serve as an example for the rest of the society. The way to maintain good health for the scientists is systematic recreation and tourism. Perhaps motivation programs and practical pro-health classes held by their employers in their place of work will lead to the change of the scientists' lifestyle. Only then will behavior models, based on own experience, be of wider acceptance.

Acknowledgments

This work was supported by the Joseph Pilsudski University of Physical Education in Warsaw, the Ministry of Science and Higher Education in Poland (grant DS – 86; project leader prof. dr hab. A.K. Gajewski), and the Provost Fund of the Warsaw School of Economics.

References

1. Steptoe AJ, Wardle J, Fuller R, et al. Leisure-time physical exercise: prevalence, attitudinal correlates, and behavioral correlates among young Europeans from 21 countries. *Prev Med* 1997; 26(6):845–854.
2. Cordeo-MacIntyre Z, Peterson R, Fukuda D, Gun-gur S. Obesity a Worldwide Problem. New Horisons. 24th International Council for Physical Activity and Fitness Research Symposium. Wrocław; 2006.
3. Dandona P, Aljada A, Bandyopadhyay A. Inflammation: the link between insulin resistance, obesity and diabetes. Trends Immunol 2004;25:4-7.
4. US Department of Health and Human Services. The Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity. Rock-ville, MD: US Department of Health and Human Services. Public Health Services, Office of the Surgeon General; 2001:8-15.
5. Hawley J, Houmard J. Introduction-Preventing insulin resistance through exercise: a cellular approach. *Med Sci Sport Exer* 2004;36:1187-1190.
6. Duke J, Huhman M, Heitzler C. Physical Activity Levels Among Children Aged – 13 Years. Your Media Campaign, National Center for Chronic Disease Prevention and Health Promotion. *Morbidity and Mortality Weekly Report* 2003;52(33):758-788.
7. Lee IM, Hsieh CC, Paffenbarger RS Jr. Exercise intensity and longevity in men. The Harvard Alumni Health Study. *JAMA* 1995;273:1179-1184.
8. Lemura LM, von Duillard SP, Mookerjee S. The effects of Physical training on functional capacity in adults aged 46 to 90: a meta-analysis. *J Sport Med Phys Fit* 2000;27:701-709.
9. Biernat E, Stupnicki R, Gajewski AK. Międzynarodowy Kwestionariusz Aktywności Fizycznej (IPAQ) – wersja polska. [In Polish] [International Physical Activity Questionnaire (IPAQ) – Polish version]. *Physical Education and Sport* 2007;51(1):47-54.
10. Bouchard C, Shephard RJ. Physical activity, fitness, and health: the model and key concepts, In: Bouchard C, Shephard RJ, Stephens T, editors. *Physical activity, fitness, and health*. Champaign IL: Human Kinetics; 1994.
11. Booth FW, Chakravarthy MV, Gordon SE, Spangenburg EE. Waging war on physical inactivity: using modern molecular ammunition against an ancient enemy, *J Appl Physiol* 2002;93:3-30.
12. Jegier A. Aktywność ruchowa w promocji zdrowia oraz zapobieganiu chorobom przewlekłym. [In Polish] [Physical activity in health promotion and prevention of chronic diseases]. In: Jegier A, Nazar K, Dziak A, editors. *Medycyna sportowa*. Warszawa: PTMS; 2006, 403-456.
13. Drabik J. Aktywność, sprawność i wydolność fizyczna jako miernik zdrowia człowieka. [In Polish] [Activity, fitness and physical exercise capacity as a measurement of human health]. Gdańsk: AWF; 1997.
14. Craig CL et al. International physical activity questionnaire: 12-country reliability and validity. *Med Sci Sport Exer* 2003;35:1381-1395.
15. Słaby T. Konsumpcja elit ekonomicznych w Polsce – ujęcie empiryczne. [In Polish] [Consumption of economic elites in Poland – an empirical approach]. Warszawa: SGH; 2006, 11.
16. Hawkins SA et al. An Estimate of Physical Activity Prevalence in a Large Population – Based Cohort. *Med Sci Sport Exer* 2004;36(2):253–260.
17. Biernat E, Tomaszewski P, Milde K. Physical activity of office Workers. *Biology of Sport* 2010;27(4):289-296.

18. Ekelund U, Sepp H, Brage S, et al. Criterion-related validity of the last 7-day, short form of the International Physical Activity Questionnaire in Swedish adults. *Public Health Nutr* 2006;9:258-265.
19. Vaishali G, Bhavna J. Impact of Socio-Demographic Factors and Marketing Strategies on Tourism Industry in India. In: *Proceedings of Conference on Tourism in India – Challenges Ahead, 15-17 May 2008*. Kozhikode: Indian Institute of Management; 2008.
20. Kattiyapornpong U, Miller KE. A practitioner's report on the interactive effects of socio-demographic barriers to travel. *Journal of Vacation Marketing* 2008;14(4):357.
21. Uczestnictwo Polaków w sporcie i rekreacji ruchowej. [In Polish] [Participation of the Polish people in sport and physical recreation]. Warszawa: GUS; 2009.
22. Biernat E, Tomaszewski P. Determinants of physical activity of working Warsaw residents aged 60 to 69 years. *Journal of Human Kinetics* 2011;30:107-115.
23. Biernat E, Poznańska A, Gajewski AK. Determinanty prozdrowotnego stylu życia nauczycieli warszawskich szkół. [In Polish] [Determinants of health oriented physical activity among Warsaw teachers]. *Przegląd Epidemiologiczny* 2012;66:119-126.
24. Hootman J. Physical activity, Fitness, and Joint and Bone Health. In: Blair SN, Haskell WL, Bouchard C, editors. *Physical Activity and Health*, Champaign IL: Human Kinetics; 2007.