La Medicina del Lavoro

Med Lav 2016; 107, 6: 444-461

Physical activity for longer working lives: an analysis of physical activity profiles of selected occupational groups in Poland

Elżbieta Biernat[1], Sonia Buchholtz[1], Marek Góra[1, 2]

[1] Warsaw School of Economics, Warsaw, Poland

[2] Institute for the Study of Labor, Bonn, Germany

Key words

Ageing; longer working lives; employability; physical activity; obesity

Parole chiave

Invecchiamento; prolungamento della vita lavorativa; occupabilità; attività fisica; obesità

Summary

Background: *Extending working lives has become an inevitable objective of public policy in the era of population ageing. It is possible, however, that the duration of working life will depend on individual employability. Out of a wide range of factors affecting employability, in this paper we have analyzed one specific aspect of health status, which is physical activity.* **Methods:** *This paper studies the relationship between physical activity and BMI among representatives of seven occupational groups in Poland using a logit regression. We use a dedicated micro-database of over 5,000 Warsaw inhabitants.* **Results:** *Being overweight and obese is a significant problem among scientific researchers and public administration professionals; however, insufficient physical activity mainly affects sales workers and health professionals. Sex and age groups and professions are a far better predictor of a high BMI than the level of individual physical activity. In the case of the latter, the number of recreational disciplines and frequency of walking is more important than any other physical activity-related variable. We confirm that being overweight and having a sedentary lifestyle lead to a vicious circle of inactivity.* **Conclusions:** *In order to break this cycle or at least bring it under control, it is necessary to monitor the weight and waist circumference of workers, which is a prerequisite for any further intervention.*

Riassunto

«Attività fisica per vite lavorative più lunghe: un'analisi dei profili di attività fisica di alcune categorie professionali in Polonia». **Introduzione:** *A fronte dell'invecchiamento della popolazione, l'allungamento della vita lavorativa è diventato un obiettivo obbligato delle politiche pubbliche. E' possibile, tuttavia, che la durata della vita lavorativa dipenda dal rimanere idonei al lavoro dei singoli individui. Tra i molti fattori che influenzano questo aspetto, il presente articolo analizza un aspetto specifico dello stato di salute: l'attività fisica.* **Metodi:** *Questo articolo studia la relazione tra attività fisica e BMI in un campione proveniente da sette categorie professionali in Polonia, attraverso modelli di regressione logistica. E' stato utilizzato un data-base dedicato di oltre 5.000 abitanti di Varsavia.* **Risultati:** *Il sovrappeso e l'obesità sono un problema significativo tra ricercatori e dipendenti della pubblica*

Pervenuto il 23.4.2016 - Revisione pervenuta il 24.7.2016 - Accettato il 12.10.2016

Corrispondenza: Assoc. Professor Elżbieta Biernat, Warsaw School of Economics, Department of Tourism, Al. Niepodległości 162, 02-554 Warsaw (Poland) - Tel. (+48 22) 5646855 - Fax (+48 22) 5646862 - e-mail: elzbieta.biernat@sgh.waw.pl

amministrazione; tuttavia, l'insufficiente attività fisica riguarda principalmente commessi e lavoratori della sanità. Sesso, classe di età e professione sono risultati predittori molto migliori di un alto BMI che non il livello di attività fisica individuale. A loro volta, il numero di attività ricreative svolte e la frequenza della camminata sono risultati i più importanti predittori legati all'attività fisica. Si è confermata l'ipotesi che essere sovrappeso e avere uno stile di vita sedentario porta, in un circolo vizioso, a una maggiore inattività. **Conclusioni:** *Per interrompere questo circolo vizioso o, per lo meno, cercare di tenerlo sotto controllo, è necessario monitorare il peso e la circonferenza addominale dei lavoratori, come prerequisito per qualsiasi ulteriore intervento.*

Introduction

Population ageing has contributed to changes in the patterns of social life in developed countries. Key features of this transition include increasing longevity. We live longer (54), but life is expensive. Extended consumption requires more income. In this context transfers do not solve the problem as they only reallocate income instead of increasing it, so additional income has to be earned. Welfare-state countries in the last decades of the 20th century, whose economies had been driven by the demographic dividend, easily forgot this rule. The share of old-age transfers in GDP is significant and projected to continue increasing in the decades to come (17). This model lacks stability and, therefore, the increasing lifespan has to entail a longer professional career.

The shrinking labour force leads to a decrease in social system revenues, which coincides with higher expenditure on policy goals resulting from more numerous older age cohorts. As a result, the gap is widening. People need to change their profiles of income allocation over their life cycle. Given longer lifespans, this may mean lower consumption in earlier periods of life, and/or lower consumption in later periods of life, and/or longer working activity.

Extending working lives is probably the most promising method of adjustment at both individual and aggregate levels of analysis. Withdrawing from the labour market later than is common nowadays (in early to mid-60s) is to an extent possible (23). Retirement at the age of 65 was introduced at the end of 19th century when longevity and health status of workers were incomparably lower than today. For this simple reason, developed countries are witnessing an increasing number of not-yet-old (NYO) retirees (21)[1]. There is room for prolonging working lives (4). However, the extent to which it is or will be possible depends on a number of factors, including those determined by individual employability.

The latter is hugely affected by sustainable work and promotion of healthy ageing. This issue has become a topic of an EU-OSHA campaign for 2016-2017 (16). The rationale behind the campaign emphasizes that caring for the physical health of workers prevents their early exit from the labour market, as well as increasing the employability of subsequent age cohorts.

Working longer – possibilities and constraints

Postponing labour market withdrawal seems to be a reasonable direction and the official retirement age acts as one of the strongest means of enforcing such a policy. It is, however, only partially effective in increasing the effective retirement age[2]. Longer working lives are influenced by a number of factors:

a. *skills*: Skills become obsolete faster than workers' age. The ex-ante adjustment of skills is required as the ex-post reaction with outdated skills tends to be insufficient. People retire earlier than they could when their skills become obsolete (even if nominally high).

[1] Retirement before reaching the real (apart from definition) old age equals a reduction of means left for remuneration of younger workers. It also worsen the health status of the NYO retirees.

[2] In this paper we do not discuss differences between the age at which one exits the labour market and the age when one begins to receive pension.

b. *motivation*: Traditional pension systems provide neither incentives to postpone retirement nor disincentives to early exit (23). Workers retire earlier than they could since it maximizes their individual utility.
c. *health status*: Physically and/or mentally burdened workers are less capable of working longer than their counterparts with healthy lifestyles throughout many decades before retirement[3].

In this paper we focus only on the third factor. We discuss the impact of lifelong physical activity on the ability to work in the advanced stage of working careers. A full analysis of this impact would require specific longitudinal data. This type of data is not available for Poland[4]. If it was, our thesis would have been as follows: physical activity from school to retirement contributes to better employment opportunities in the advanced stage of working careers as well as contributes to the ability to postpone retirement. Such a thesis cannot be tested on any of the existing datasets. Consequently, while advocating policies focused on promoting life-long physical activity and facilitating such policies (including public financing), we have to base on partial considerations.

We assume individual employability in the later stage of individual working activity is positively dependent on the individual health status in that stage of life, which in turn is also positively dependent on physical activity during the worker's entire life. The existing data does not provide any means of estimating the strength of these relations.

Physical fitness and its perception by employers

It is relatively easy to check the qualifications of an employee by verifying the so-called *hard skills*. The fact remains, however, that certificates, diplomas and letters of recommendation are not crucial (8). The diagnosis of an employee's predisposition to perform a particular job role, and evaluation of their competences (knowledge, skills and responsibilities) and potential determine hiring. Armstrong (3) distinguishes three types of competences: (a) general and specific (referring to all workers in a particular occupation); (b) conditioning (specifying the basic requirements for a given position) and action-based (dividing workers into better and worse depending on how they perform their assigned functions); (c) differentiating (defining behavioural features – characterizing people who achieve good results).

These personal characteristics remain in a strong relationship with the implementation of assigned roles. Doubtless, the worker's health (at least normal weight and level of physical activity sufficient to maintain good health) should be included in these characteristics. Bearing this in mind, the unique application FwdHealth, launched in the US, investigates the physical activity of workers throughout the day. Its aim is to support the health assessment of the worker, the possible costs of absenteeism for health reasons and the insurance rates charged for the insurance group (15). With the help of FwdHealth, an employer knows when a worker is jogging, whether he/she was visited the gym or the pool and how much time he/she spent sleeping. This data is aggregated and used to build a profile of the employee's health. The data can then be used to assign bonuses (e.g. a pass to the gym instead of a cash bonus) or to reduce the cost of insurance (5). One of the simplest ways to reduce insurance premiums is to prove that one's employees belong to a low-risk group.

The profitability of prophylactic programmes tackling obesity (which may result in lower probability of disease, improvement in life quality and expectancy, as well as workplace productivity) ranges from \$1.44 to \$4.16 per one pound of weight loss (1). On the basis of such insight, Japanese companies with employees not able to maintain proper weight are required to examine all their employees over 40 years old regularly in terms of the risk of metabolic syndrome (often associated with being overweight) (37). For a waist circumference greater than 85 cm

[3] The above mentioned burden includes wide range of aspects, from stress, through poor nutrition and drugs, to the sedentary lifestyle and insufficient physical activity. We focus on the latter issue.

[4] To our best knowledge, this type of data is also hardly available for other countries.

among women and exceeding 90 cm among men, physical exercise, a special diet, and – if necessary – a visit to the doctor are recommended. The Japanese government recognizes obesity as a dangerous and costly disease and, therefore, obliges corporations to reduce the number of obese by 25% (within two years prior to 2010 by 10%)[5]. Companies not reaching specific targets will be forced to pay 10% higher social security contributions.

Companies are risk-averse. Firms offer employees discounts on tickets to sports clubs and special dietary plans. Japan is one of the slimmest nations in the world (according to Organisation for Economic Co-operation and Development (35) data, only 3.6% are obese). However, the statistics are merciless – 3.6% is equal to over 4.5 million people, and a further 14 million are at risk, while the average weight of men has risen by 10% in a decade (for women - by 6%). It is still nine times less than in the US (36) or in Poland (30), where 10.3 million adults have a BMI greater than or equal to 27.5, which means being seriously overweight or obese. In Poland, the estimated cost of treating diabetes may exceed 1 billion EUR in 2030, and for cardiovascular diseases as much as 10 billion EUR. The costs of lost productivity could reach, respectively, 0.9 billion and 13.3 billion EUR (30).

Because of that, it becomes necessary to create effective strategies for counteracting obesity and overweight, conscious of the needs of different professional groups. Promoting an active lifestyle (especially among those working in sedentary positions) requires monitoring and analysis. Current scientific data suggest that many factors may have a negative impact on the level of physical activity (32). Therefore, in this study we assessed the physical activity levels of representatives of 7 professional groups (healthcare, education, research, commerce, administration, acting and students) in Warsaw (Poland). We have attempted to show the relationship between insufficient activity and the incidence of being overweight and obesity as well as investigate the relationship between the implementation of the World Health Organization (WHO) physical activity recommendations and gender, professional group, Body Mass Index (BMI) and sitting time.

Methods

Dataset

This study takes advantage of a dedicated database of 5,132 inhabitants of the city of Warsaw, comprising their socio-economic and physiological characteristics, declared amount of weekly physical activity and sitting habits, collected in a computer-assisted personal interview (CAPI) procedure. To the best of our knowledge, this is the largest dataset on physical activity in Poland, especially with its occupational dimension.

Sample

The sample represents both sexes and 6 ISCO-compatible occupational groups, which includes: (a) teaching professionals (university, high school, junior high school and elementary school education), (b) science and engineering professionals (research institutes), (c) health professionals (doctors, nurses, physiotherapists and others), (d) public administration professionals (from central and local governments), (e) sales workers (retail), (f) actors, extended with (g) students (of 2nd and 4th year)[6] (see table 1 for the sample structure). The refusal rate did not exceed 5%.

The selection of occupations was purposeful: we chose several professions perceived as highly-skilled, of high international prestige and favourable economic position (22), students who aspire to this status and, in a sense, a control group of sales workers of

[5] The Japanese case illustrates well the determination of policy makers; however, it seems that the country still has a long way to go. According to WHO expert consultation (57), the BMI limits preventing risk of illnesses such as type 2 diabetes and cardiovascular diseases may be systematically lower for the Asian population than the universal cut-offs. In this case, WHO recommends analysing an additional cut-off point at the level of 23 kg/m^2.

[6] We refer to the ILO International Standard Classification of Occupations ISCO-08: teaching professionals (23), science and engineering professionals (21), health professionals (22 and 32), public administration professionals (242 and 335), sales workers (52), actors (2655).

Table 1 - Sample structure

Variables	Total (n=5132)		Men (n=1928)		Women (n=3204)	
	n	%	n	%	N	%
Age						
19-29	1957	38.1	798	41.4	1159	36.2
30-39	1181	23.0	431	22.4	750	23.4
40-49	901	17.6	287	14.9	614	19.2
50-59	789	15.4	262	13.6	527	16.4
60-69	276	5.4	143	7.4	133	4.2
Education						
Higher	3580	69.8	1388	72.0	2192	68.4
Secondary	1386	27.0	463	24.0	923	28.8
Vocational or elementary	160	3.1	74	3.8	86	2.7
Gross income per household member						
<325 EUR	1067	20.8	277	14.4	790	24.7
325-525 EUR	1559	30.4	549	28.5	1010	31.5
525-675 EUR	642	12.5	282	14.6	360	11.2
>675 EUR	594	11.6	312	16.2	282	8.8
Profession						
Public administration professional	627	12.2	208	12.2	419	13.1
Health professional	764	14.9	240	14.9	524	16.4
Teaching professional	1551	30.2	465	30.2	1086	33.9
Science and engineering professional	301	5.9	137	5.9	164	5.1
Actors	104	2.0	67	2.0	37	1.2
Sales workers	685	13.3	300	13.3	385	12.0
Students	1100	21.4	511	21.4	589	18.4

Source: Authors' calculations
Note: Due to refusals sample size might differ between variables

lower prestige and position. The structure reflects the current and anticipated structure of the labour market of Warsaw, as proved by historical trends presented in Polish General Social Surveys 1992-2010 (14)[7]. The purpose of this sample was to analyze physical activity patterns among those holding various high professional positions, usually sedentary ones.

We used a two-stage sampling procedure. In the first stage we sampled institutions employing 3-10 people of a particular profession from all the institutions of this type in Warsaw. For the analysis of retail workers three streets in each district, with a large number of commercial buildings, were chosen. The second stage involved sampling a specified number of people in each institution. In institutions employing up to 35 people, all the employees who were at work during the research day were surveyed. In institutions employing or educating more people, a 30 per cent sample was drawn, but 100 persons was the maximum for a given institution. Slightly different procedures were used for retail employees. 10 outlets at each randomly selected street were drawn and all the employees owners of a retail outlet were surveyed, but no more than 3 people at each one. When assessing the level of physical activity, the respondents who in the last 7 days were sick, were in hospital, performed rehabilitation activities, were on leave etc., were excluded from the sample.

[7] To our best knowledge, this is the only dataset allowing for analysis of the skills and occupational structure of Warsaw labour market. Due to unknown socio-demographic structure within each occupation we decided not to add any analytical weight.

Questionnaire

The questionnaire consisted of 3 modules. The first included the socio-economic characteristics of an individual (sex, age, marital status, education level, profession and income), the second one – physiological parameters (height and weight), allowing the BMI[8] to be calculated. In the third module individuals were asked about their physical activity (organized, recreational and other activities, like gardening on one's allotment) as well as their sitting habits. The latter part was IPAQ-compatible with physical activity frequency, duration and intensity (intensive, moderate and walking) measured on a weekly basis. The results were converted to MET-min/week and, finally, we divided the sample into subsamples of high, moderate or low physical activity level, according to the IPAQ framework (6)[9]. It was conducted in March and November in order to reflect the average of yearly activity and the questions clearly referred to the week prior to the survey. We excluded from the study the periods prior to holidays which could overstate the physical activity by including visits to cemeteries, family meetings, etc. The survey was conducted by trained and supervised staff, according to a specific plan.

[8] For the purpose of our analysis, we divided BMI into 4 categories: low (<20 kg/m^2), normal (20 to 24.99 kg/m^2) overweight (25 to 29.99 kg/m^2), obese (≥30 kg/m^2), as does Petry (39), which is widely used in Poland (e.g. by the National Food and Nutrition Institute). Contrary to the WHO classification, it assigns the BMI values between 18.50 and 19.99 underweight instead of normal weight.

[9] High physical activity was assigned to the individuals performing (1) 3 or more days of VPA, overall at least 1500 MET-min/week, or (2) 7 or more days of any combination of physical activity (walking, MPA or VPA) exceeding 3000 MET-min/week. Moderate physical activity was assigned to the individuals fulfilling one of the following criteria: (1) 3 or more days of VPA, at least 20 minutes per day, (2) 5 or more days of MPA or walking, not less than 30 minutes per day, (3) 5 or more days of any combined activities (walking, MPA or VPA) exceeding 600 MET-min/week. Individuals not fulfilling the abovementioned levels were automatically classified as low physical activity. Moreover, in order to maintain health at least moderate physical activity is recommended. Henceforth, we use the notions insufficient and low physical activity interchangeably.

Quantitative methods

This paper largely uses quantitative methods: statistical analysis and econometric modelling. The former allows the study to contrast the activity of sedentary and non-sedentary occupations. It also allows for a methodologically restrictive identification of the relevance of various individual features. The existence of a relationship between variables was tested using the Chi-square (χ^2) test with α=0.05[10]. Statistical calculations were performed using the IBM® SPSS® Statistics Version 21 software. The latter is used to determine whether physical activity is crucial for lengthening the human lifespan. With all the limitations listed above, we cannot give a definite answer to this question; however, we are able to identify which factors increase the risk of excess BMI. To estimate the role of BMI-driving factors we use a logit model, which is a useful econometric procedure provided one has a large micro-database, i.e. a database of respondents with detailed characteristics and preferences of each respondent. Our dedicated database meets these criteria completely. In order to assess the impact of physical activity on BMI, we estimate 3 models: a basic one with personal characteristics (Model 1) and two extended versions with additional information on physical activity – descriptive (Model 2A) and IPAQ-compatible (Model 2B). Comparing nested Model 1 and Model 2A or 2B allows for assessment of the value added from extending the information pool. Econometric analysis was conducted with STATA 14 (12).

Results

Diversity of physical activity by occupational group

Table 2 reveals that in the overall sample 12.5% of respondents were underweight, 55.7% had normal body mass, while 25.9% and 4.9% were overweight and obese, respectively. Being overweight seems to be more common among men than women

[10] Therefore, the notation for Chi-square test with α=0.05 and *i* degrees of freedom is as follows: $\chi^2_{0,95;i}$

Table 2 - BMI distribution by sex and occupation

Occupation	Sex	BMI: Underweight (<18.5)			Normal (18.5-24.9)			Overweight (25.0-29.9)			Obese (30.0-39.9)		
		n	%	p	n	%	p	n	%	p	n	%	p
Health professionals	Men	1	0.4		99	41.3		121	50.4	a	18	7.5	
	Women	78	14.9		305	58.2		103	19.7		29	5.5	
	Total	79	10.3		404	52.9	b	224	29.3	b	47	6.2	
Teaching professionals	Men	15	3.2		182	39.1		225	48.4	a	39	8.4	
	Women	158	14.5		656	60.4		203	18.7		47	4.3	
	Total	173	11.2		838	54.0	b	428	27.6	b	86	5.5	
Students	Men	21	4.1		356	69.7		132	25.8	a	2	0.4	
	Women	169	28.7		403	68.4		17	2.9		-	-	
	Total	190	17.3	c	759	69.0	bc	149	13.5	c	2	0.2	a
Public administration professionals	Men	1	0.5		70	33.7		89	42.8	a	46	22.1	a
	Women	80	19.1		219	52.3		87	20.8		21	5.0	
	Total	81	12.9		289	46.1	b	176	28.1	b	67	10.7	c
Science and engineering professionals	Men	3	2.2		60	43.8		64	46.7	a	10	7.3	
	Women	27	16.5		89	54.3		38	23.2		10	6.1	
	Total	30	10.0	c	149	49.5		102	33.9		20	6.6	
Actors	Men	0	-		32	47.8		31	46.3	a	4	6.0	
	Women	17	45.9		12	32.4		7	18.9		1	2.7	
	Total	17	16.3		44	42.3	bc	38	36.5	bc	5	4.8	
Sales workers	Men	7	2.3		161	53.7		115	38.3	a	16	5.3	
	Women	64	16.6		214	55.6		97	25.2		7	1.8	
	Total	71	10.4		375	54.7	b	212	30.9	b	23	3.4	
Total	Men	48	2.5		960	49.8		777	40.3	a	135	7.0	
	Women	593	18.5		1898	59.2		552	17.2		115	3.6	
	Total	641	12.5		2858	55.7	b	1329	25.9	b	250	4.9	

Source: Authors' calculations
Note: Significantly different ($p<0.05$) to: [a] – women; [b] – other BMI categories; [c] – other occupational groups

($\chi^2_{0,95;24}$=235.1; p=0.000[11]) regardless of their occupational group; however, this disproportion may quadruple among public administration professionals (22.1% for men *vs.* 5.0% for women).

Except for students, normal body weight and overweight were substantially more common than obesity and underweight. Among healthcare workers ($\chi^2_{0,95;4}$=688.5), teachers ($\chi^2_{0,95;4}$=1425.9) and sales workers ($\chi^2_{0,95;4}$=710.3) normal BMI is the most common and concerns the majority of respondents. In the case of actors ($\chi^2_{0,95;3}$=38.1), public administration ($\chi^2_{0,95;4}$=375.7) and researchers ($\chi^2_{0,95;3}$=149.6) these shares are lower (42.3; 46.1 and 49.5%, respectively). Being overweight (depending on the group) is observed in 13.5–36.5% of cases ($\chi^2_{0,95;6}$=479.354). On the other hand, obesity is less common relative to normal body weight and overweight ($\chi^2_{0,95;6}$=171.5)

[11] Unless stated otherwise, the probability value (p-value) is close to zero (p=0.000)

in each of the analyzed groups. Nevertheless, the largest number of obese is among public administration (10.7%), science and engineering (6.6%) and healthcare professionals (6.2%).

The analysis of physical activity has shown that 18% of the respondents do not undertake any physical activity in their free time. This especially pertains to sales workers (36%) and health professionals (21%). By contrast, physically working out is widespread among actors (4%) and students (7%). 75.6% of those spending time actively preferred aerobic activities (table 3).

The analysis of all activity undertaken (either in free or working time) shows that 52.2% of the surveyed do not undertake any intensive physical activities, 21.7% avoid moderate activities and 9.5% do not walk for 10 minutes at least once a week (table 4).

Table 3 - Physical activity by occupation (%)

Activity	Health professionals (n=764)	Teaching professionals (n=155)	Students (n=1100)	Public administration professional (n=627)	Science and engineering professional (n=301)	Actors (n=104)	Sales workers (n=685)
Aerobic	75.3	75.6	80.9	78.9	73.4	89.4	55.5
Anaerobic	0.7	1.3	4.7	-	1.0	1.9	1.3
Mixed	26.6	33.5	59.9	33.7	36.2	64.4	24.1

Source: Authors' calculations
Note: Due to refusals sample size might differ between variables

Table 4 - Time spent on activity per day (in min) by type of activity and occupation (%)

	Healthcare (n=764)	Teachers (n=155)	Students (n=1100)	Administration (n=627)	Researchers (n=301)	Actors (n=104)	Tradesmen (n=685)
Intensive							
0	62.1	54.4	37.8	60.8	54.0	38.7	57.8
1-30	12.1	6.8	26.3	11.2	14.8	18.7	9.9
31-60	4.5	7.4	4.4	5.1	6.1	8.0	5.2
61-180	2.2	7.6	0.4	3.2	2.0	4.0	4.8
181-300	0.1	1.0	-	-	-	-	0.9
>300	0.2	0.2	-	0.1	-	-	0.6
Moderate							
0	18.1	21.3	14.4	29.1	31.7	11.2	26.2
1-30	24.3	14.3	29.6	23.4	26.7	10.7	15.2
31-60	11.8	11.3	11.5	7.4	5.7	15.0	11.7
61-180	4.5	11.6	1.6	4.1	1.8	15.0	8.6
181-300	0.4	2.0	-	0.5	-	3.7	0.8
>300	0.1	0.4	-	-	-	-	1.1
Walking							
0	9.7	5.2	5.0	6.9	8.1	11.8	19.9
1-30	25.7	23.9	34.0	30.5	30.9	27.4	28.0
31-60	11.0	16.6	12.1	12.3	11.3	9.1	8.4
61-180	6.5	6.6	1.3	3.7	3.2	7.5	3.4
181-300	1.8	0.3	-	0.1	0.4	-	0.3
>300	0.4	-	-	-	0.2	-	-

Source: Authors' calculations

An insufficient level of physical activity to maintain good health was concluded in as many as 41.2% respondents, moderate and high (sufficient to maintain good health) in 48.9% and 9.7% respectively. Furthermore, there is a significant correlation between the level of physical activity and occupation ($\chi^2_{0,95;18}$=500.2). A low level of physical activity concerned most commonly ($\chi^2_{0,95;6}$=430.7) sales workers (55.5%), science and engineering professionals (53.4%), public administration professionals (49.1%) and health professionals (45.2%; figure 1). On the other hand, a high level of physical activity was most commonly seen ($\chi^2_{0,95;6}$ =770.3) among actors (20.8%) and teaching professionals (18.6%).

Respondents' physical inactivity is highly correlated with their sex, BMI and occupational group (table 5). Men have a slightly lower chance of fulfilling the WHO health norms than women (57.2 vs. 59.2%). Unfortunately, inactivity rises along with the BMI, which seems to create a vicious circle: the obese (47.2%) and overweight (46.2%) are less prone to activity than their counterparts with a normal BMI (38.9%), 1.4 times and 1.3 times, respectively. Teaching professionals (72.7%) and actors (71.2%) are the most active groups. Relative to them, sales workers (42.2%) have a 3.7 times lower chance of reaching the recommended amount of activity. For science and engineering professionals the respective statistics are 46.2% and 3.1. In the case of administration (49.8%) and health professionals (46.2%) the risk of inactivity is slightly lower (OR=0.38 and 0.44). In comparison with teaching professionals and actors even students (49.8%) are characterized with 1.8 times more inactivity (OR=0.57).

The mean respondent spent over 7.5 hours per day sitting (454.2 min; SD=220.1 min). Evidently, occupation differentiates the length of sitting ($\chi^2_{0,95;6}$=876.8). The greatest share of respondents spending over 8 hours/day in such a way was noted among public administration professionals (72.4%), science and engineering professionals (61.1%) and students (59.1%). This pattern was much less common for actors (15.4%) and teaching professionals (18.4%). What is worth mentioning in this context is the regularity of a two-fold decrease in the chance of reaching the recommended amount of activity among those who exceed the sitting threshold of 8 hours per day (46.4 *vs.* 67.1%).

BMI-driving factors

In our paper we are asking whether physical activity is crucial for lengthening working lives. Even though we cannot give a definite answer to this

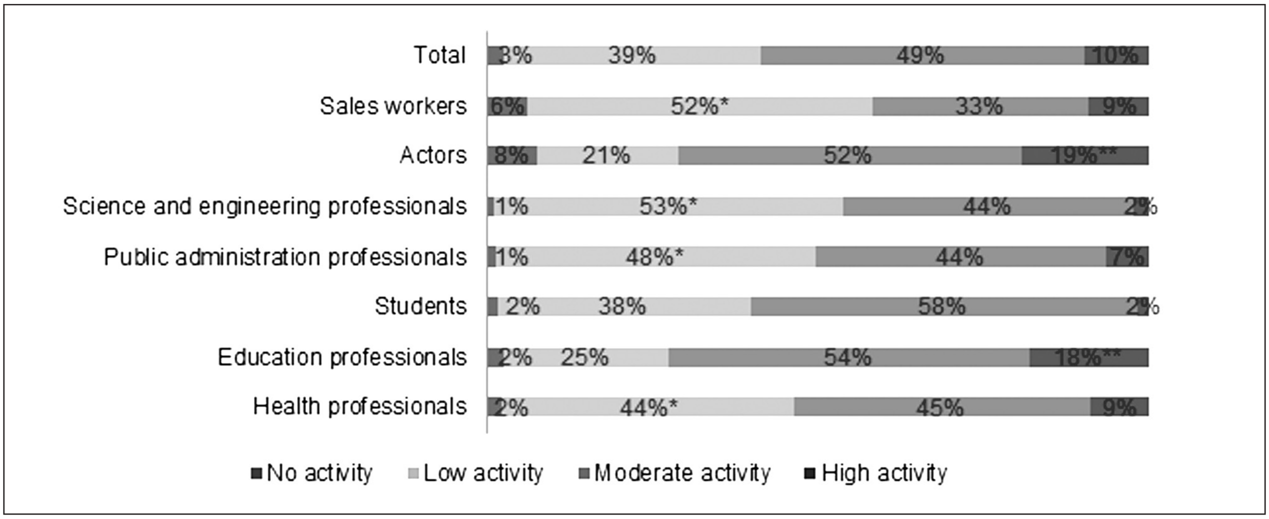

Figura 1 - Physical activity level by occupation
Source: Authors' calculations.
Note: Significantly different (p<0.05) to: *– actors, administration professionals, students and teaching professionals
** – sales workers, students, research workers, administration professionals, health professionals.

Table 5 - Factors influencing respondents' physical inactivity

Factors	Physically inactive		Physically active		p-value (trend)	OR	95% CI
	n	%	n	%			
Sex							
Men	825	42.8	1097	57.2	0.000	0.90	0.80-1.00
Women	1287	40.2	1912	59.8		ref.	-
Occupation							
Health professionals	353	46.2	409	53.8	0.000	0.44	0.36-0.52
Teaching professionals	423	27.3	1124	72.7		ref.	-
Students	436	49.8	662	50.2		0.57	0.48-0.67
Public administration professionals	312	49.8	315	50.2		0.38	0.31-0.46
Science and engineering professionals	162	53.8	139	46.2		0.32	0.25-0.42
Actors	30	28.8	74	71.2		0.93	0.60-1.44
Sales workers	396	57.8	286	42.2		0.27	0.23-0.33
BMI							
Underweight	251	39.2	390	60.8	0.000	0.99	0.83-1.18
Normal	1112	38.9	1738	52.7		ref.	-
Overweight	613	46.1	714	53.9		0.75	0.65-0.86
Obese	118	47.2	131	52.8		0.71	0.55-0.92
Sitting							
≤480 min./day	1013	32.9	946	67.1	0.000	ref.	-
>480 min./day	1099	53.6	2063	46.4		2.01	1.79-2.25

Source: Authors' calculatons
Note: Due to refusals sample size might differ between variables. Odds ratios (OR) were computed with reference to the physically inactive.* Significant differences (p<0.05) between physically inactive and active. Ref.=reference category

question, we can at least assess which factors increase the risk of high BMI and, therefore, pose a threat to the duration of professional lives. For this reason we estimate three models: a simple one with socio-demographic variables only (model 1) and two extended models including additional variables reflecting an individual's physical activity (models 2A and 2B).

The simple model proves that age and sex (jointly) are significant in explaining the odds of above-normal BMI (see table 6). As our reference group we take males aged 30-39, who traditionally represent the prime age group on the labour market. Compared to the reference category, all females below 60 have lower odds of being overweight or obese than men under 30 have. The odds increase steadily with age: women below 30 have them over 11 times lower than men between 30 and 39, and these odds decrease to only 28% for women aged 50-59. For men ageing is merciless, as among men aged 40-49 the odds exceed 70%, and after reaching 50 – over two. The above-mentioned proportions are robust across all models, both with respect to the odds levels and probabilities. The robustness, however, does not refer to marital status, and only partial conclusions may be drawn from the analysis of education. A significant effect is observed only for individuals with elementary or vocational levels of education – their odds of BMI exceeding 25 are on average 1.8 times higher than for their counterparts with completed tertiary education.

Occupation also becomes a significant determinant of being overweight and obesity. As a reference category we chose in this case public administration professionals, who are one of the most affected by overly high BMI levels and their levels of physical

Table 6 - Logit estimation of overweight and obesity incidence

	Model 1				Model 2A				Model 2B			
	Odds ratio	p-value	95% CI		Odds ratio	p-value	95% CI		Odds ratio	p-value	95% CI	
Sex x age group												
Female 19-29	0.086	0.000	0.062	0.120	0.084	0.000	0.061	0.117	0.088	0.000	0.063	0.122
Female 30-39	0.191	0.000	0.145	0.251	0.177	0.000	0.134	0.234	0.195	0.000	0.148	0.258
Female 40-49	0.464	0.000	0.358	0.602	0.411	0.000	0.314	0.538	0.481	0.000	0.370	0.626
Female 50-59	0.721	0.015	0.555	0.938	0.626	0.001	0.477	0.823	0.736	0.023	0.565	0.959
Female 60+	1.020	0.920	0.687	1.515	0.873	0.512	0.583	1.309	1.042	0.841	0.699	1.551
Male 19-29	0.569	0.000	0.420	0.770	0.593	0.001	0.437	0.805	0.582	0.000	0.429	0.789
Male 30-39	ref.				ref.				ref.			
Male 40-49	1.777	0.000	1.302	2.424	1.779	0.000	1.300	2.435	1.793	0.000	1.311	2.451
Male 50-59	2.343	0.000	1.687	3.254	2.189	0.000	1.569	3.054	2.295	0.000	1.649	3.195
Male 60+	2.433	0.000	1.613	3.670	2.192	0.000	1.445	3.325	2.425	0.000	1.603	3.668
Marital status												
Single	ref.				ref.				ref.			
In a relationship	0.942	0.483	0.796	1.114	0.935	0.433	0.789	1.107	0.940	0.469	0.794	1.112
Education												
Tertiary	ref.				ref.				ref.			
Secondary	1.046	0.655	0.859	1.274	1.016	0.877	0.833	1.239	1.076	0.470	0.882	1.313
Primary or vocational	1.805	0.005	1.190	2.738	1.669	0.017	1.097	2.540	1.853	0.004	1.218	2.818
Profession												
Public administration professional	ref.				ref.				ref.			
Health professional	0.760	0.030	0.593	0.974	0.738	0.017	0.574	0.948	0.751	0.027	0.583	0.967
Teaching professional	0.686	0.001	0.550	0.857	0.698	0.002	0.558	0.873	0.749	0.012	0.597	0.939
Science and engineering professional	0.687	0.021	0.499	0.945	0.681	0.019	0.494	0.939	0.676	0.017	0.491	0.931
Actors	0.527	0.008	0.330	0.843	0.605	0.039	0.375	0.976	0.589	0.030	0.365	0.950
Sales workers	0.688	0.013	0.513	0.923	0.641	0.003	0.476	0.863	0.645	0.004	0.478	0.868
Students	0.403	0.000	0.293	0.553	0.401	0.000	0.290	0.554	0.407	0.000	0.295	0.561
Organized activity												
No					ref.							
Yes					0.833	0.317	0.582	1.192				
Recreational activity characteristics												
Number of disciplines					0.875	0.005	0.797	0.960				
Aerobic disciplines					1.013	0.929	0.754	1.363				
Anaerobic disciplines					1.508	0.112	0.909	2.503				
Mixed disciplines					0.905	0.362	0.730	1.122				
Recreational activity frequency												
No activity					ref.							
Sporadically					1.142	0.444	0.813	1.603				
Periodically					1.091	0.612	0.779	1.530				
Regularly					1.003	0.986	0.710	1.417				

(continued)

Table 6 ***(continued)*** - Logit estimation of overweight and obesity incidence

	Model 1				Model 2A				Model 2B			
	Odds ratio	p-value	95% CI		Odds ratio	p-value	95% CI		Odds ratio	p-value	95% CI	
Other activities												
No					ref.							
Yes					0.894	0.108	0.780	1.025				
IPAQ vigorous activity												
Weekly frequency									0.969	0.375	0.905	1.038
Total weekly effort									1.001	0.112	1.000	1.002
IPAQ moderate activity												
Weekly frequency									0.977	0.313	0.934	1.022
Total weekly effort									1.000	0.100	0.999	1.000
IPAQ walking												
Weekly frequency									0.953	0.003	0.924	0.984
Total weekly effort									1.000	0.531	0.999	1.000
IPAQ sitting												
Time per day (min)									1.000	0.430	1000	1.000
Constant	1.369	0.030	1.032	1.816	2.283	0.001	1.391	3.746	1.682	0.003	1.196	2.365
n	5052				5052				5052			
Adjusted R^2	0.167				0.1727				0.1726			
Correct classifications	73.85%				73.83%				73.71%			
LR test					0.000				0.000			

Source: Authors' estimations
Note: 1. Sample size reduced due to refusals. 2. LR (likelihood ratio) test for multiple coefficients verifies (separately) extended models against simple model

activity are also far from what is desired. Indeed, the odds for the second highest group of health professionals are 24% lower; teaching professionals, science and engineering professionals and sales workers are characterized by similar odds of ca. 32% lower compared to the reference group, while actors have almost twice lower odds. For the less exposed students this proportion reaches under 60%. These results are consistent across models, with only slight differences – the biggest gap (less than 8 pp) referred to actors.

In our analysis the role of physical activity is investigated in two manners. In the first case descriptive declarations of activity are used (asking for its type, disciplines and frequency) and the second one is based on the IPAQ standards. In the descriptive approach (model 2A) we included organized sports, recreational sports and other activities requiring some physical effort (like gardening on one's allotment). However, neither organized sports nor other activities were popular enough to become significant in explaining the above-normal BMI. More often recreational sports deliver limited robust conclusions – for each declared sports discipline (up to 5) the odds decrease by 12.5%, regardless of the discipline or frequency. Switching to the IPAQ standards (model 2B), less popular vigorous activity cannot affect the odds of being overweight or obese. Frequency of walking becomes the only variable significant for the scale of impact – each additional day per week with recreational or transportation walking reduces the odds by less than 5%.

By and large, extending the set of variables with physical activity leads to mixed results. Even though the likelihood ratio test proves significance of the extensions, their value added is relatively low – the share of correct classifications in the simple model is slightly decreasing while extending the list of variables.

Discussion

Extending working lives has become an inevitable objective of public policy in the era of population ageing. It is possible, however, that its duration will depend on individual employability. Out of a wide range of factors affecting employability, in this paper we analyze one specific aspect of health status, which is physical activity. The logic behind this assumption is as follows: employability of a worker in the later stage of his/her working activity is positively dependent on health status at that stage, which in turn is also positively dependent on physical activity during the entire professional career of the worker, including its early and middle stages.

The aim of the paper was modest and ambitious at the same time. It had to be modest since the richest datasets are still scarce. To measure the impact of physical activity on employability one should possess longitudinal micro-datasets, which are currently not available for the Polish population. It was ambitious since we attempted to investigate the impact of lifelong physical activity of selected occupational groups on their employability in later stages of their professional activity – an area rarely investigated.

In the absence of first-best longitudinal datasets, we took advantage of a dedicated database of over 5,000 working inhabitants of Warsaw. The sample covers students and six occupational, mainly knowledge-intensive, groups. So far, this database has been the largest in-depth dataset including the occupational aspect, containing physiological and socio-demographic characteristics as well as information on physical activity. The only existing similar material concerns Polish policemen and army personnel (42). By and large, neither information on weight nor its dynamics are regularly recorded within occupations. Tracking physical activity is even more challenging, especially that it is based on self-assessment only.

We used the micro-database in several ways. Firstly, we have examined the separate occurrence of BMI of minimum 25kg/m^2 and low physical activity. Secondly, we have attempted to show a correlation analysis with physical activity. Thirdly, we have analyzed which factors drive individual BMI. Being overweight or obese (measured as overly high BMI) affects almost two out of five workers. It is not only a serious health problem (18, 20, 56), but also an economic one (more dire than the consequences of tobacco or alcohol addiction) (34). In Poland healthcare costs for the overweight and the obese are 44% higher than those of people with normal weight (51). Similarly, in the US total healthcare costs of people with BMI 30-34.9 kg/m^2 exceed those of slender people by 25% (44). In the group of people whose BMI is above 35 kg/m^2 the costs are even 44% higher (19). It is estimated that the direct costs associated with obesity (depending on a country) constitute 1-10% of all healthcare funds. The indirect costs connected with the treatment of this disease can be even twice as high (51). It has been calculated that BMI increased by one unit entails 2.3% higher costs of treatment (19).

Our study shows that this phenomenon (being overweight or obese) is more common among males, actors, science and engineering professionals, but becomes marginal among students. Obesity occurs most often among public administration professionals. It does not come as a surprise that in the Polish population this problem applies particularly to males. The Central Statistical Office already in 2011 pointed to the fact that 44.8% of males were overweight (*vs*. 29.2% of females) and 16.6% were obese (*vs*. 15.2%). Similar data were presented by Kara et al. (29); (overweight – 14.5% males and 8.4% females). This trend has also been recorded in other countries, for example in the neighbouring Czech Republic, where being overweight and obesity have been identified in 81% of the male and 71% of the female population aged 45–69 in 2002–2005 (41). It is not surprising that obesity most frequently concerns public administration employees. Previous studies (7, 13, 50) have demonstrated a higher association of being overweight and obesity with low activity, sedentary occupations compared to high activity occupations. What is astonishing, though, is the fact that this phenomenon concerns the highest professional strata (with the greatest awareness and socioeconomic status – SES), i.e. actors and science and engineering professionals. A previous study by Kaleta et al. (28) showed a significantly increased risk of obesity both among workers with primary education compared to university-educated workers, and among low income workers compared to high-income workers, yet no association of BMI with occupational activity. It turns out that increased knowledge and risk awareness as well as higher SES, contrary to the findings of McLaren (33) or Bonauto et al. (7), do not result in healthier behaviours. This might be connected with the extending working time of those professional groups and the related prolonged sitting time, which might constitute a separate risk factor of civilization diseases (including being overweight and obesity). Singer et al. (46) proved that for both the overall population and for males the adjusted odds of being overweight or obese compared to normal weight increased significantly for each 10-hour increment of work per week. Equally, Luckhaupt et al. (31) and Jang et al. (2014) (24) reported a significant association of long working hours with obesity for all workers (regardless of the profession). These findings support the observation that extended working hours may be the critical factor linking occupation with being overweight or obese. It is also possible that long working hours crowd out the time and motivation available for LTPA.

Meanwhile, scientists constantly emphasize that a tendency to maintain so-called health–related fitness is a perfect remedy (easy and cost-effective) for the prevention of civilization diseases (10). They pay particular attention to the role of physical activity in that respect (9, 25). Unfortunately, in our study low levels of activity are characteristic for men, sales workers, science and engineering professionals or public administration professionals and those with a sedentary lifestyle, as well as those who are overweight or obese. Although these results only partially coincide with literally no or low physical activity, other studies demonstrate a greater proportion of overweight and obese individuals who reported no LTPA, and a smaller proportion of overweight and obese individuals who reported vigorous LTPA compared to normal weight individuals (2). Such observations may underscore the potential importance of LTPA as a determinant of being overweight or obese.

Historically, literature identified that workers of lower occupational status or blue-collar workers participate in less leisure-time physical activity and are more likely to be insufficiently active to maintain health than professional and white-collar workers (11, 46, 49, 52, 58). The higher the level of education, professional status and income connected to it, the longer the LTPA participation time (26) and the smaller the percentage of people with a low level of physical activity (27). Previous studies also showed that in sedentary occupations leisure-time included more physical activity than work-time (38, 53). However, Tigbe et al. (54) underline that leisure-time activity is not increased in the low-intensity group compared to other groups. They conclude, therefore, that workers of lower occupational status or those performing sitting work do not fully compensate in their LTPA for the lack of activity at work. Other Polish studies are in agreement and show that people representing professions involving little physical effort (including lawyers, economists, doctors, engineers, managers and office workers, as well as pensioners and the unemployed) stand less chance of fulfilling the ACSM recommendations (43). A similar trend is observed among sales workers, public administration professionals or those with a sedentary lifestyle, i.e. science and engineering professionals. It seems reasonable to hypothesize that we are witnessing a vicious circle of inactivity – the more physical activity one needs, the lower one's propensity to work out is. A reverse situation is observed with regard to sex. There is no proof that males are more frequently active than women and more often fulfill the pro-health physical activity guidelines (49). One can assume, then, that Polish women care more about their health and appearance. It has been shown by Robroek et al. (45) that female workers had a higher participation in worksite health promotion programmes aimed at physical activity and/ or nutrition than men.

We have analyzed which factors drive the individual BMI. Three logit models estimate that sex and age jointly as well as profession are significant robust variables, while the education level explains high BMI only partially. In contrast to socio-demographic variables, physical activity was not predictive enough. Out of a long list of descriptive and IPAQ-compatible variables, the only significant ones were: number of practised disciplines and walking frequency. As the socio-demographic variables explain much of the variability, we hypothesize that they cover some unobserved features of the respondents' activity.

Conclusions

The general conclusion of the analysis is rather pessimistic. The public debate on the retirement age suggests that Polish workers covered by the sample do not seem to be aware of the coming challenge of the need to postpone retirement. This can result from the lack of reliable information and lack of habits of being more physically active, as well as of the low availability of sports facilities.

The policy conclusion we would like to suggest is the development and implementation of public interventions in this field, which has so far been inefficient (40). This should particularly concern males and those with a sedentary lifestyle (sales workers, public administration professionals, science and engineering professionals). It is necessary to develop the policy of increased physical activity (with a clear action plan and aimed at the selected groups). It will certainly be more efficient than individual actions. We observe a lack of complex action mechanisms in Poland. They would require involvement from local governments, public health insurance providers, workplaces and sports organizations. It is important to create space for PA (access to sports facilities, particularly in rural areas) and widely available programmes (taking advantage of the potential of "health managers" or local sports organizations). Employers (financially motivated by insurance companies) should prepare a detailed and long-term programme of implementing PA in the daily lives of their employees (permanent teams, competitions, annual events). Such preventive measures are cheaper than the growing expenditure on health and mitigation of the results of declining productivity. Socknoll et al. (48) calculated that 1 euro invested in the promotion of heath in the workplace brings a return of 2.5-4.8 euro in the form of smaller costs of absenteeism. It seems necessary to develop the health prevention profile of an employee including standard tests for PA measurement. What we would like to suggest is developing and implementing measures that will help to bring the dangerous trend of growing obesity under control. Those measures will have to take into account monitoring the weight and waist circumference of workers, which together with public education will be a prerequisite for any further intervention. The data should be entered into employees health monitoring systems.

An active lifestyle ought to be created through the promotion of organized events (information displays, newsletters, on-line materials, speaking about them at work) and with a level of enthusiasm. It could be supported by various incentives, such as bonuses in the form of swimming pool passes, fitness club cards or Well Working/ Work-life balance packages.

No potential conflict of interest relevant to this article was reported

References

1. Anderson LM, Quinn TA, Glanz K, et al: The Effectiveness of Worksite Nutrition and Physical Activity Interventions for Controlling Employee Overweight and Obesity: A Systematic Review. Am J Prev Med 2009; 4: 340-357
2. Archer E, Hand GA, Hébert JR, et al: Validation of a novel protocol for calculating estimated energy requirements and average daily physical activity ratio for the US population: 2005-2006. Mayo Clinic 2013; 88: 1398-1407
3. Armstrong MA: Handbook of Human Resource Management Practice, 9th ed. London: Kogan Page, 2003

4. Beard JR, Officer A, Araujo de Carvalho I, et al: The World report on ageing and health: a policy framework for healthy ageing; World Health Organization: 2015
5. Bhattacharya J: Who Pays for Obesity? NBER Reporter: Research Summary 2008; 3 https://www.nber.org/reporter/2008number3/jay.html (last accessed 11 Mar 2016)
6. Biernat E: International Physical Activity Questionnaire – Polish long version. Polish J Sport Med 2013; 1: 1-15
7. Bonauto DK, Lu D, Fan ZJ: Obesity prevalence by occupation in Washington State, Behavioral Risk Factor Surveillance System. Prev Chronic Dis 2014; 11: 130-219
8. Bonetyńska A: The diagnosis of employee's competence as guaranty healthy way of life the organization. Annales Universitatis Mariae Curie-Skłodowska. Sectio D Medicina 2003; (suppl. 13): 108-112
9. 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
10. Bouchard C, Shephard RJ: Physical activity, fitness, and health: the model and key concepts. In Bouchard C, Shephard RJ, Stephens T (eds): Physical activity, fitness, and health. Champaign: Human Kinetics, 1994
11. Burton NW, Turrell G: Occupation, Hours Worked, and Leisure-Time Physical Activity. Prev Med 2000; 31: 673-681
12. Cameron AC, Trivedi PK: Microeconometrics using STATA; 2nd ed. College Station (TX): STATA Press, 2003
13. Chau JY, van der Ploeg HP, Merom D, et al: Cross-sectional associations between occupational and leisure-time sitting, physical activity and obesity in working adults. Prev Med 2012; 54: 195-200
14. Cichomski B, Jerzyński T, Zieliński M: Polskie Generalne Sondaże Społeczne: skumulowany komputerowy zbiór danych 1992-2010 (Polish General Social Surveys: cumulated computer dataset 1992-2010). The Robert B. Zajonc Institute for Social Studies, University of Warsaw, 2013
15. Crook J: FwdHealth Tracks And Reports Your Health To Employers In An Effort To Cut Insurance Costs, 2013. Available on line at: http://techcrunch.com/2013/08/30/fwdhealth-tracks-and-reports-your-health-to-employers-in-an-effort-to-cut-insurance-costs/ (last accessed 11-03-2016)
16. European Agency for Safety and Health at Work. 2016-17 Campaign: Healthy Workplaces for All Ages. Available on line at: https://osha.europa.eu/en/healthy-workplaces-campaigns/2016-17-campaign-healthy-workplaces-all-ages (last accessed 01-07-2016)
17. European Commission: Ageing Report 2015. Economic and budgetary projections for the 28 EU Member States (2013-2060). European Economy 2015; 3: 1-424
18. Finer N: Obesity. Clin Med 2003; 3: 15-19
19. Finkelstein EA, Trogdon JG, Cohen JW, Dietz W: Annual medical spending attributable to obesity: payer-and service-specific estimates. Health Aff (Millwood) 2009; 5: w822–831
20. Gabel JR, Whitmore H, Pickreign J, et al: Obesity and the Workplace: Current Programs and Attitudes Among Employers and Employees. Health Affairs 2009; 1: 46-56
21. Góra M: Political economy of pension reforms: selected general issues and the Polish pension reform case. IZA Journal of Labor & Development 2013; 2: 1-31
22. Grzelak J, Zarycki T: Społeczna mapa Warszawy (The social map of Warsaw). Warsaw: Wydawnictwo Naukowe Scholar, 2004
23. Gruber J, Wise D: Social Security and Retirement around the World. Chicago: Chicago University Press, 2008
24. Jang TW, Kim HR, Lee HE, et al: Long work hours and obesity in Korean adult workers. J Occup Health 2014; 55: 359-366
25. Jegier A: Aktywność ruchowa w promocji zdrowia oraz zapobieganiu chorobom przewlekłym (Physical activity in health promotion and prevention of chronic diseases). In Jegier A, Nazar K, Dziak A (eds): Medycyna sportowa. Warszawa: PTMS, 2006: 403-456
26. Kahan E, Fogelman Y, Bloch B: Correlations of work, leisure, and sports physical activities and health status with socioeconomic factors: a national study in Israel. Postgrad Med J 2005; 81: 262-265
27. Kaleta D, Jegier A: Predictors of Inactivity in the Working Age Population. Int J Occup Med Environ Health 2007; 2: 175-182
28. Kaleta D, Makowiec-Dabrowska T, Jegier A: Occupational and leisure-time energy expenditure and body mass index. Int J Occup Med Environ Health 2007; 20: 9-16
29. Kara I, Maksymiuk T, Wiesiołowska A: Overweight and obesity in 40-year old inhabitamys of the city and the province of Poznan as an important risk factor for cardiovascular diseases. Probl Hig Epidemiol 2005; 2: 99-102
30. KPMG Poland and Nutricia Foundation (2012). Analiza zmian społeczno-demograficznych oraz wpływu złego odżywiania, niedostatecznej aktywności fizycznej, nałogów i innych czynników ryzyka na rozpowszechnienie oraz koszty cukrzycy i chorób sercowo-naczyniowych w Polsce. Stan obecny i prognoza do 2030 roku. (Analysis of socio-demographic changes and the

impact of poor nutrition, insufficient physical activity, addictions, and other risk factors on the prevalence and costs of diabetes and cardiovascular disease in Poland. Current status and forecast to 2030). Available on line at: http://www.zdrowepokolenia.org/uploads/news/Raport_kpmg.pdf?PHPSESSID=35qu106b0vup9p9i0m980sfkt5 (last accessed 11-03-2016)
31. Luckhaupt SE, Cohen MA, Li J, Calvert GM: Prevalence of obesity among U.S. workers and associations with occupational factors. Am J Prev Med 2014; 46: 237-248
32. Martin SB, Morrow JR Jr, Jackson AW, Dunn AL: Variables related to meeting the CDC/ACSM physical activity guidelines. Med Sci Sports Exerc 2000; 12: 2087-2092
33. McLaren L: Socioeconomic status and obesity. Epidemiol Rev 2007; 29: 29-48
34. Ministry of Health of the Republic of Poland. Program ograniczania zdrowotnych następstw palenia tytoniu w Polsce (Program of limiting the health consequences of smoking in Poland). Warszawa, 2013. Available on line at: http://www2.mz.gov.pl/wwwmz/index?mr=m11&ms=&ml=pl&mi=7&mx=0&mt=&my=6&ma=8427#zal (last accessed 11-03-2016)
35. Organisation for Economic Co-operation and Development: Obesity Update 2014. Available on line at: https://www.oecd.org/health/Obesity-Update-2014.pdf (last accessed 11-03-2016)
36. Ogden CL, Carroll MD, Curtin LR, et al: Prevalence of Overweight and Obesity in the United States, 1999-2004. JAMA 2008; 13: 1549–1555
37. Onishi N: Japan, Seeking Trim Waists, Measures Millions. New York Times, 13-06-2008
38. Parry S, Straker L: The contribution of office work to sedentary behaviour associated risk. BMC Public Health 2013; 13: 296
39. Petry C: Gestational Diabetes: Origins, Complications, and Treatment. Boca Raton (FL): CRC Press, 2014
40. Piekutowska S, Kanicka M, Pogorzelska P, et al: Role of social campaigns in promoting health behavior among college students in Bialystok. Hygeia Public Health 2013; 4: 500–504
41. Pikhart H, Bobak M, Malyutina S, et al: Obesity and education in three countries of the Central and Eastern Europe: The HAPIEE study. CentrEur J Public Health 2007; 4: 140-142
42. Polish Press Agency: Waga policjanta. MZ: brzuchy piwne mają się teraz zamienić w "kaloryfery" (The weight of the policeman. Ministry of Health: beer bellies to change into six-packs), 2016. Available on line at: http://samorzad.pap.pl/depesze/redakcyjne.zdrowie/162191/Waga-policjanta--MZ-brzuchy-piwne-maja-sie-teraz-zamienic-w--kaloryfery- (last accessed 11-03-2016)
43. Puciato D, Rozpara M, Mynarski W, et al: Physical Activity of Adult Residents of Katowice and Selected Determinants of their Occupational Status and Socio-economic Characteristics. Med Pr 2013; 5: 649-657
44. Raebel MA, Malone DC, Conner DA, et al: Health services use and health care costs of obese and non-obese individuals. Arch Intern Med 2004; 19: 2135-2140
45. Robroek SJW, van Lenthe FJ, van Empelen P, Burdorf A: Determinants of participation in worksite health promotion programmes: a systematic review. Int J Behav Nutr Phys Act 2009; 6: 26
46. Salmon J, Owen N, Bauman A, et al: Leisure-time, occupational, and household physical activity among professional, skilled, and less-skilled workers and homemakers. Prev Med 2000; 3: 191–199
47. Singer RH, Stoutenberg M, Gellman MD, et al: Occupational Physical Activity and Body Mass Index: Results from the Hispanic Community Health Study / Study of Latinos. PLoS One 2016; 3: e0152339
48. Socknoll I, Kramer I. Bödeker W: IGA-Report 13e – Effectiveness and economic benefits of workplace health promotion and prevention, 2009
49. Steele R, Mummery K: Occupational physical activity across occupational categories. J Sci Med Sport 2003; 4: 398–407
50. Steeves JA, Bassett DR Jr, Thompson DL, Fitzhugh EC: Relationships of occupational and non-occupational physical activity to abdominal obesity. Int J Obes (Lond) 2012; 36: 100-106
51. Szymborski J: Public health in the population policy programming projects. In Szymborski J (ed): Public health and population policy. Warszawa: Rządowa Rada Ludnościowa, 2012: 9
52. Tammelin T, Nayha S, Ribntamaki H, Zitting P: Occupational Physical Activity is related to Physical Fitness in Young Workers. Med Sci Sports Exerc 2002; 1: 158–165
53. Thorp AA, Healy GN, Winkler E, et al: Prolonged sedentary time and physical activity in workplace and non-work contexts: a cross-sectional study of office, customer service and call centre employees. Int J Behav Nutr Phys Act 2012; 9: 128
54. Tigbe WW, Lean ME, Granat MH: A physically active occupation does not result in compensatory inactivity during out-of-work hours. Prev Med 2011; 53: 48-52
55. United Nations Department of Economic and Social Affairs, Population Division: World Population Prospects: The 2015 Revision, Key Findings and Advance Tables. ESA/P/WP.241. 2015

56. Włodarek D: Otyłość – czynniki wpływające na rozwój otyłości. Med po Dypl 2004; 13: 103-108
57. World Health Organization: WHO expert consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. The Lancet 2004; 363: 157-163
58. Wu B, Porell F: Job characteristics and leisure physical activity. J Aging Health 2000; 4: 538–59T

ACKNOWLEDGMENTS: *This work was supported by the Provost Fund of the Warsaw School of Economics and the Joseph Pilsudski University of Physical Education in Warsaw grant from the Ministry of Science and Higher Education in Poland (grant number DS - 86).*
The authors would like to thank Marcin Wroński and Maciej Pomykała for their technical assistance.

Nota per i medici competenti

Come molti lettori ben sanno, la vigente normativa circa la Formazione Continua prevede obblighi tassativi di acquisizione di un numero minimo triennale di Crediti ECM, per potersi iscrivere all'Elenco Nazionale dei Medici Competenti di cui all'articolo 38, comma 4, del decreto legislativo n. 81/2008.

Tale obbligo è attualmente (triennio 2014-2016) pari a 150 crediti per i liberi professionisti e 105 per i lavoratori dipendenti, con la necessità di svolgere almeno il 70% di questi crediti nell'area della Medicina del Lavoro.

La gestione/verifica dei propri crediti ECM può essere fatta comodamente utilizzando il sito del CoGeAPS (Consorzio Gestione Anagrafica Professioni Sanitarie) raggiungibile al link www.cogeaps.it, accedendo all'Accesso Anagrafe Crediti ECM personale. A partire da questo triennio, con la Delibera Commissione Nazionale Formazione Continua del 7 luglio 2016 in tema di acquisizione crediti per tutti i professionisti sanitari in maniera flessibile, è stata estesa ai dipendenti e ai liberi professionisti la possibilità di inoltrare richiesta di riconoscimento di crediti acquisiti attraverso autoformazione.

Utilizzando questa modalità il medico può vedersi riconosciuti, nel triennio 2014/2016, crediti per attività di autoformazione nel limite del 10% dell'obbligo del triennio fino a un massimo di 15 crediti. Tale richiesta può essere effettuata sul portale sopra citato, previa presentazione di un'autocertificazione firmata in cui si indicano lo studio di un testo o di una rivista scientifica, la descrizione del materiale di lettura (titolo, editore, anno pubblicazione, autore), il periodo in cui si è svolto lo studio, di modo che possano essere riconosciuti fino a un massimo di 15 crediti.

E' possibile riferirsi ad articoli de La Medicina del Lavoro che sono risultati particolarmente utili per la propria formazione (si suggerisce un massimo di cinque articoli con richiesta di 3 crediti per articolo), indicando come Disciplina "Medicina del Lavoro", così che tali crediti siano computati anche nella quota del 70%, necessaria per essere inseriti tra i Medici Competenti.

La Redazione