



ORIGINAL ARTICLE

Physical activity and sedentary behaviour in Czech adults: Results from the GPAQ study

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Abstract

The levels of physical activity (PA) and sedentary behaviour are significant indicators of health behaviour and their monitoring is crucial in developing public policy in the area of health promotion and non-communicable disease prevention. The aim of the study was to describe the prevalence of PA and sedentary behaviour as well as age and gender differences in Czech adults (18–90 years old, $N = 1753$; 48.4% male) participating in the Global Physical Activity Questionnaire (GPAQ) cross-sectional study 2011. To assess the significant differences between self-reported PA and sedentary behaviour the MANOVA, a post hoc Fischer's least significant difference (LSD) test and logistic regression were used. The level of PA was classified according to the amount of MET-minutes per week as high, moderate or low. Irrespective of age and gender, 32.3% of adults reported a low level of PA; 21.3% of adults fell within the category of moderate level of PA and 46.4% of adults reported a high level of PA. The level of PA decreases with age; men are generally more physically active than women. More than 60% of adults across all age categories are assessed as 'sedentary'. The highest rate of sedentary behaviour was observed in adults over 65 years of age. The development of national strategies for PA promotion together with the development and verification of specific intervention programmes, especially for women, should be a priority in the Czech Republic.

Keywords: *Physical activity, sedentary, adults, GPAQ, Czech Republic*

Introduction

There is strong evidence that physical activity (PA) is associated with health outcomes. PA reduces rates of all-cause mortality and a number of non-communicable diseases such as coronary heart disease, high blood pressure, type 2 diabetes, colon cancer and others (Lee et al., 2012). Thus, national PA surveillance should be of high importance for the World Health Organization (WHO) countries and health promotion policy-makers (World Health Organization, 2008). Unfortunately, the Czech Republic, Poland, Slovakia, Hungary and other countries of central and eastern Europe were rarely involved in the Eurobarometer or other international surveys (Martinez-Gonzalez et al., 2001; Rutten, & Abu-Omar, 2004; Sjöström, Oja, Hagströmer, Smith, & Bauman, 2006); the International Physical Activity Environment – IPEN study

includes only the Czech Republic (Bauman et al., 2009; Frömel, Mitáš, & Kerr, 2009). In the Czech Republic and in other central and eastern European countries, the mentioned studies are funded by various modest grant schemes; there is a lack of long-term system-based support of national data collection on PA and sedentary behaviour, e.g. by the Ministry of Health. Moreover, despite the fact that international studies in the past decade (Dumith, Hallal, Reis, & Kohl, 2011; Hallal et al., 2012) rated Czech Republic among active countries, some studies indicate a decrease in PA in recent years (Sigmundová, El Ansari, Sigmund, & Fromel, 2011).

In 2006, the WHO, under the STEPS project, developed the Global Physical Activity Questionnaire (GPAQ) as an alternative to International Physical Activity Questionnaire (IPAQ) suitable for low and middle-income countries (Armstrong &

Bull, 2006). The questionnaire was then validated internationally (Bull, Maslin, & Armstrong, 2009) as well as in the WHO regions (Hoos, Espinoza, Marshall, & Arredondo, 2012; Trinh, Nguyen, van der Ploeg, Dibley, & Bauman, 2009). In 2011, the GPAQ was piloted in the Czech Republic. The aim of the study was to describe the prevalence of PA and sedentary behaviour as well as age and gender differences in Czech adults using the GPAQ.

Methods

Participants and data collection

The GPAQ study of PA in the Czech Republic (Question by Question Guide) was carried out in November to December 2011. Based on an electoral list of citizens, 1996 respondents were randomly selected after the selection had been stratified according to region, age and gender (Czech Statistical Office, 2012) in order to create a nationally representative sample. Trained interviewers visited households and collected data via standardised structured interviews. The research sample consisted of a representative set of 1753 respondents aged 18–90 (48.4% men and 51.6% women) from all regions in the Czech Republic. Forty per cent of the respondents were aged 18–39, 42.4% were aged 40–64 and 18% were aged 65–90. The response rate was 90%. The most frequent reason for non-response was the lack of time (35.4% of respondents). Participation in the study was voluntary and no incentives were paid to the respondents. The study was approved by the Institutional Research Ethics Committee at the Faculty of Physical Culture, Palacky University.

Assessment of PA and sedentary behaviour

The level of PA was determined using the standardised GPAQ (Armstrong & Bull, 2006) translated to Czech. The GPAQ was developed by the WHO for PA surveillance in developing countries. It collects information on PA participation in three settings – PA at work, travel to and from places and recreational activities as well as sedentary behaviour. The questionnaire consists of 16 questions covering both vigorous and moderate intensity PA. The participants were, for example, asked how much time they spent doing vigorous-intensity activities at work on a typical day or week, on how many days they walk or cycle for at least 10 minutes continuously to get to and from places.

The GPAQ provides reproducible data for national surveillance comparison and shows a moderate to strong positive correlation with the IPAQ (Bull, Maslin, & Armstrong, 2009), a previously validated and accepted measure of PA (Craig et al., 2003). The concurrent validity between the IPAQ

and GPAQ showed a moderate to strong positive relationship ($r = 0.45–0.65$); criterion validity was in the poor–fair range ($r = 0.06–0.35$). The reliability coefficients were of moderate to substantial strength ($\kappa = 0.67–0.73$; $\rho = 0.67–0.81$) (Bull, Maslin, & Armstrong, 2009).

The measured data was processed according to the GPAQ Analysis Guide (World Health Organization, 2012), and MET-minutes per week values calculated and distributed as per the above-mentioned age categories. The duration of vigorous PA was multiplied by an energy equivalent coefficient of MET = 8, the duration of moderate PA was multiplied by a coefficient of MET = 4 (Hagströmer, Bergman, Bauman, & Sjöström, 2006).

The level of PA was assessed according to the following criteria:

High: A person reaching any of the following criteria is classified in this category. Vigorous-intensity activity on at least three days achieving a minimum of 1500 MET-minutes per week or seven or more days of any combination of walking, moderate- or vigorous-intensity activities achieving a minimum of 3000 MET-minutes per week.

Moderate: A person not meeting the criteria for the ‘high’ category, but meeting any of the following criteria is classified in this category. Three or more days of vigorous-intensity activity of at least 20 minutes per day or five or more days of moderate-intensity activity or walking for at least 30 minutes per day or five or more days of any combination of walking, moderate- or vigorous-intensity activities achieving a minimum of 600 MET-minutes per week.

Low: A person not meeting any of the above-mentioned criteria falls in this category (World Health Organization, 2012).

Sedentary behaviour was classified according to minutes per day of sitting at a desk, sitting with friends, travelling by car, bus, train, reading, playing cards or watching television, excluding the time spent for sleeping.

Statistical analysis

The data was analysed using STATISTICA v.10 and IBM SPSS v.19. The prevalence of PA and sedentary behaviour in age (18–39 years, 40–64 years and 65 years and more) and gender groups were described. Firstly, the proportion of ‘highly active’, ‘moderately active’ and ‘low active’ adult females and males in different age categories were described. The effects of age and gender on the probability to be highly

active and low active were assessed using a logistic regression model. The interaction of the effect of age and gender on the probability to be highly active and low active was excluded as non-significant.

For a detailed analysis of sedentary behaviour, the third model of logistic regression was used. On the basis of a logistic regression analysis (Enter method), the respondents were divided into two groups: those sedentary ≥ 4 hours per day and others (dependent variable). The model also included the factors of gender (males were the reference group; female) and age. In all models, the interactions of independent variables were also monitored.

Secondly, the mean length (MET-minutes per day) of PA at work, travel to and from places, recreational PA, and sedentary behaviour in age and gender groups were described. Four two-way (three age categories \times two genders) MANOVAs and main effect ANOVA were conducted to examine the age and gender association with self-reported PA and sedentary behaviour. PA at work, travel to and from places, recreational PA (MET-minutes per day) and sedentary behaviour (minutes per day) were used as dependent variables. Age categories (18–39 years \times 40–64 years and ≥ 65 years) and gender (female \times male) were used as independent variables. In order to identify the differences in dependent variables between the age categories of females and males, a post hoc Fischer's test was used. Finally, the mean length of total PA in age and gender groups was assessed in a similar way.

Results

Level of PA

Irrespective of age and gender, 32.3% of adults showed a low level of PA, 21.3% fell within the moderate level of PA and 46.4% of people showed a high level of PA (according to the GPAQ Analysis Guide). Figure 1 indicates that with rising age the

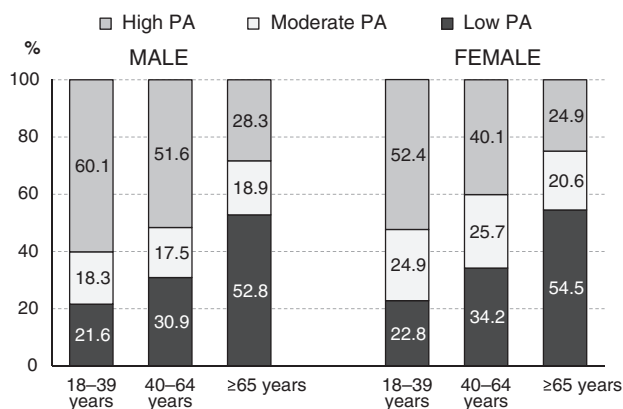


Figure 1. Proportion of respondents according to the level of PA by age groups and gender.

proportion of men and women with a low level of PA increases and with a high level of PA decreases.

As can be seen in Table I, respondents in older age (>65 years) and middle age (40–64 years old) groups have a 4 times and 1.7 times, respectively, higher chance to be low active in comparison with young adults (18–39 years old). No gender differences were found in the probability to be low active. Similar findings were found with regard to age in model assessing chances to be highly active. Respondents in older age (>65 years) and middle age (40–64 years old) groups have a 3.5 times and 1.5 times, respectively, lower chance to be highly active in comparison with young adults (18–39 years old). Males have a 1.4 times higher chance to be highly active in comparison with females.

Time spent in PA and sedentary behaviour

Figure 2 shows that younger men and women generally participate in more PA than older age categories. The most significant differences in PA between men and women were observed in the age category of 18–39, the least gender-based differences were observed in seniors ≥ 65 years.

Significant associations of age with PA and sedentary behaviour were confirmed in PA at work, recreational PA and sedentary behaviour, but not in travel to and from places (Table II; Figure 2). The older the age group, the less PA and more sedentary behaviour was reported. Gender differences were confirmed in PA at work and also in recreational PA: men spent more MET-minutes per week than women. Based on the MANOVA model, interactions of age and gender on the explored variables of PA and sedentary behaviour were not significant.

In terms of sedentary behaviour, more than 60% of the adults across the age categories are assessed as 'sedentary'. The logistic regression analysis confirmed that with increasing age adults are significantly more likely to be sedentary (≥ 4 hours per day) (OR/95% CI: 1.011/1.005–1.017). Conversely, gender was not significantly associated with the criterion of being sedentary ≥ 4 hours per day.

Discussion

The aim of this study was to describe the prevalence of PA and sedentary behaviour as well as age and gender differences in Czech adults using the GPAQ. Irrespective of age and gender, almost half of the population showed a 'high level' of PA. Significant associations of age with PA and sedentary behaviour were confirmed in PA at work, recreational PA, sedentary behaviour, but not in travel to and from places. The older the age group, the less PA and more sedentary behaviour were reported. Gender

Table I. Odds ratios for meeting the low PA level (model 1) and high PA level (model 2) categories.

Variable	Model 1 Being low active			Model 2 Being high active		
	% ^a	OR	CI	% ^a	OR	CI
<i>Age</i>						
18–39 years	22.2	Ref.		56.3	Ref.	
40–64 years	32.6	1.691**	1.335–2.140	45.8	0.656**	0.533–0.809
65 years and more	53.8	4.039**	3.036–5.372	26.3	0.285	0.212–0.382
<i>Gender</i>						
Male	30.3	Ref.		51.7	Ref.	
Female	34.1	1.112	0.904–1.368	41.5	0.695**	0.573–0.843

Notes: %^a: percentage of participants who met the criterion in a given area; OR: odds ratio; CI: confidence interval
 ** $p < 0.001$.

differences were confirmed in PA at work and also in recreational PA.

The results indicate that the ‘highly active’ proportion in adults of 46.4% still ranks the Czech Republic among active countries (Dumith et al. 2011; Hallal et al., 2012); the Czech Republic can also be considered a country of walkers and cyclists (Belohlavek, Sigmund, & Zaccal, 2011). As expected, older adults are less likely to be in the ‘high active’ category and tends to be ‘low active’. In contrast, there are no gender differences in the chance to be low active, but males were more likely to be ‘highly active’ compared with females.

However, our results suggest a lower proportion of ‘highly active’ adults compared with previous surveys. Bauman et al. (2009), in a study analysing PA in Czech adults using a short-self administrative version of IPAQ, reports the proportion of ‘highly active’ adults in the Czech Republic of 62.9%. Suchomel, Sigmundová, and Frömel (2008) observed 60% of

‘highly active’ citizens in the Liberec region. A decrease in the level of PA was also confirmed by global (Ng & Popkin, 2012) as well as local studies (Sigmundová, El Ansari, & Sigmund, 2011).

According to our findings, younger men and women generally participate in more PA than older age categories. This is in line with recent findings of another Czech study by Mitáš and Frömel (2011). We also confirmed the gender differences between PA at work and recreational PA. Men are more engaged in PA at work and leisure-time activity than women. Again, this is in accordance with another recent study in the Czech Republic (Mitás, Ding, Frömel, & Kerr, in press).

In relation to our objective, we described and compared the proportion of sedentary females and males. Sixty per cent of adults across the age categories spend four and more hours a day sedentary; the highest rate of sedentary behaviour was observed in the age category of >65. This corre-

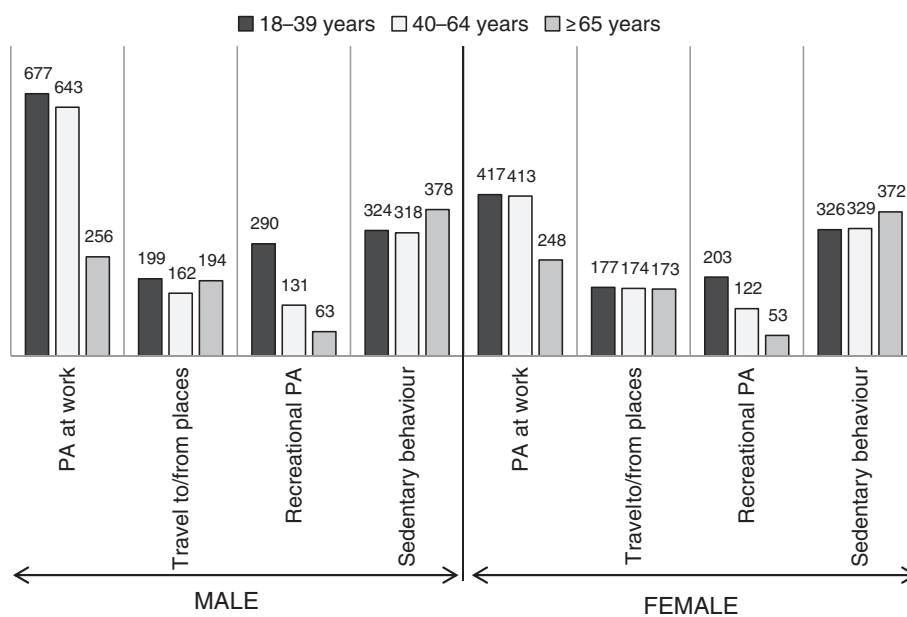


Figure 2. Mean value of PA (MET-minutes per day) and sedentary behaviour (minutes per day).

Table II. *F*-values of differences in PA (MET-minutes per day) and sedentary behaviour (minutes per day) by age group and gender.

Variable/ <i>F</i> _{factor}	<i>F</i> _{age}	<i>F</i> _{gender}	<i>F</i> _{age×gender}
<i>Physical activity (PA)</i>			
PA at work	10.42**	10.37*	1.83
Travel to and from places	0.62	0.32	0.51
Recreational PA	32.86**	3.25	2.19
<i>Sedentary behaviour</i>			
Sitting time	8.02**	0.06	0.25

Note: Based on multivariate analysis of variance: **p* < 0.01; ***p* < 0.001.

sponds with the European average of 64.1%; the world average is 41.5% (Hallal et al., 2012). In addition, Bauman et al. (2011) report an even higher proportion of Czech sedentary adults. A decreasing level of PA and a high rate of sedentary behaviour can thus contribute to an enormous increase in overweight and obesity in the Czech Republic in recent years (Knai, Suhrcke, & Lobstein, 2007; Mitás et al., in press). In the Czech Republic, 68.6% of men and 49.7% of women aged 25–64 suffer from overweight or obesity (Doak, Wijnhoven, Schokker, Visscher, & Seidell, 2012). The prevalence of mass non-communicable diseases is also constantly growing. Cardiovascular diseases, cancer, diabetes and chronic respiratory diseases are the main cause of mortality and morbidity in the Czech Republic, the prevalence of diabetes mellitus from 2009 to 2010 in the Czech Republic grew by 3% annually (ÚZIS, 2011). The increasing prevalence of mass non-communicable diseases and the increase in body mass index (BMI) among the population is also reported in other central and eastern European countries (Finucane et al., 2011; Webber et al., 2012).

Despite a noticeable development of national policy documents on PA promotion in recent years (Daugbjerg et al., 2009), the issue of low level of PA is still not a political priority in the countries of the former Eastern Bloc and the area of prevention is of marginal interest to political representations. The Czech Republic has no national strategy for PA promotion; the same applies to other countries in the region – Poland, Slovakia, Hungary, Romania, etc. (Kalman, 2012). Together with national evidence-based policies, each country should develop communication strategies and implementation guidelines that take into account their ethnic and cultural diversity (Oja, Bull, Fogelholm, & Martin, 2010). Changing the PA behaviour of the adult population seems only to be possible by effectively combining different intervention concepts (Biddle, Brehm, Verheijden, & Hopman-Rock, 2012) as well as closer collaboration of countries across Europe (Muller-Nordhorn et al., 2012).

Limitations

Despite conducting the study on a representative sample of Czech population using a valid international standardised tool for PA assessment, there are some limitations of this study. A weakness of the study is that no GPAQ validation studies have been published in central and eastern European countries. Another general limitation of questionnaire studies is that they work with self-reported data that can distort real facts.

Conclusion

Irrespective of age and gender, 32.3% of adult Czechs reported a low level of PA, 21.3% fell within the moderate level of PA and 46.4% of Czechs showed a high level of PA. The level of PA decreased with age; men were generally more active than women. More than 60% of adults across the age categories were rated 'sedentary'. The highest rate of sedentary behaviour was observed in the age category of >65. The development of national strategies for PA promotion together with the development and verification of specific intervention programmes, especially for women, should be a priority in the Czech Republic.

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