

SELF-REPORTED PHYSICAL ACTIVITY IN PERCEIVED NEIGHBORHOOD IN CZECH ADULTS - NATIONAL STUDY

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BACKGROUND: International studies associate physical activity (PA) to other factors such as the environment, culture, and policy. External influences on lifestyle and PA, such as the effect of the physical and built environment, are discussed. Neighborhood environments seem to be one of the important aspects in prevention of unhealthy lifestyle and physical inactivity research.

OBJECTIVE: The main objective is to analyze the relationship between PA and neighborhood environment of the adult population of the Czech Republic. The study tries to define the basic correlates of PA in relation to environmental and other socio-demographic factors.

METHODS: Nationwide data collection of adult PA was done regionally in the Czech Republic between the years 2005–2009 using the IPAQ (long) and ANEWs questionnaires.

RESULTS: The results show that males realize significantly more vigorous PA than females while females realize more moderate PA and walking than males. PA of residents of smaller communities is higher than those living in large cities. The level of weekly PA does not significantly affect the neighborhood walkability [$H(3, 8708) = 19.60$; $p < .001$; $\eta^2 = .002$].

CONCLUSIONS: The results clearly indicate the need to connect multiple sectors that affect the lifestyle of the general population. Possible solution is an interdisciplinary approach to the evaluation of the fundamental environmental factors influencing the level of PA (walkability; SES; participation in organized and voluntary PA; neighborhood safety; type of transportation; size of the community).

Keywords: Questionnaire, built environment, walkability, size of the residence, lifestyle.

INTRODUCTION

Correlates and determinants of daily physical activity (PA) become an important research and policy issue in recent decades abroad. Issues related to energy and intensity (Ainsworth et al., 2000; Ainsworth & Tudor-Locke, 2005), international comparative studies (Bauman et al., 2009), in psychological theories

(Sallis & Owen, 2002) or in translation research into policy (Smith & Bird, 2004; USDHHS, 2000) are very often discussed. In the Czech Republic is apparent similar trend in research of intensity and structure of PA (Frömel et al., 2006; Frömel, Mitáš, & Kerr, 2009), of socio-economic impact (Mitáš, Frömel, et al., 2007; Pelclová et al., 2008) or psychosocial correlates of PA (Sigmund et al., 2008). The issues of unhealthy lifestyles in developed countries are solved through strategic documents (Commission of the European Communities, 2007a, 2007b; USDHHS, 2000, 2008).

Topics related to external influences on lifestyle and PA, such as the effect of the physical and built

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environment, are frequently discussed in relation to body weight (Adams et al., 2011), to community design (Frank & Engelke, 2001), to participation and promotion of PA (Humpel, Owen, & Leslie, 2002; Sallis, Bauman, & Pratt, 1998), active transportation (Sallis, Frank, Saelens, & Kraft, 2004) or adherence to PA in varying environments (Sallis, King, Sirard, & Albright, 2007). These associations should lead to solve architectural projects from the perspective of both urban design and PA (Frank, Schmid, Sallis, Chapman, & Saelens, 2005; Frumkin, 2002; Rodriguez, Khattak, & Evenson, 2006).

The global “epidemic” of obesity and unhealthy lifestyles is apparent in economically developed countries. Developing countries (especially from the former “Communist bloc”), quickly take over unhealthy habits and copy the negative trends known from developed countries (Frömel, Mitáš, & Kerr, 2009). These newly “democratized” countries did not grow in a process of changing lifestyle, which was carried out in developed countries in the second half of the 20th century. Socio-economic status, which is associated with a healthier way of life of adults (Giles-Corti & Donovan, 2002), and adolescents (Maher & Olds, 2011; Tremblay & Willms, 2003) differs in the Czech Republic and other post-communist countries (Frömel, Mitáš, & Kerr, 2009). The standard of living of the population is below the European Union average and lifestyle and health topics correspond to this development. Busy work and personal life on one hand, the convenience and availability of consumerism on the other hand, lead to an increase in obesity rates and to a decrease in health status and physical activity in the general population (Mitáš et al., 2007). Neighborhood environments in the evaluation of physical activity of the population seems to be one of the important aspects in prevention of unhealthy lifestyle and physical inactivity (Brownson, Hoehner, Day, Forsyth, & Sallis, 2009; Frank, Engelke, & Schmid, 2003; Sallis & Kerr, 2006). Based on the knowledge from developed countries we were interested whether similar associations between perceived neighborhood walkability and PA in different size of location can be found in post-communist countries like Czech Republic in national sample of adults.

AIM

The main objective of this study was to analyze the relationship between the structure of physical activity and perceived neighborhood walkability of the adult population of the Czech Republic. Further aims were to find out gender differences in structure of PA and the role of the size of location in the level of PA in Czech adults.

METHODS

Nationwide data collection of adults PA was done in regions in the Czech Republic between the years 2005–2009 using the International Physical Activity Questionnaire (IPAQ – long version) and Neighborhood Environment Walkability Scale – Abbreviated (ANEWS) questionnaires. The research sample was randomly selected from the addresses database available at the Ministry of Interior of the Czech Republic. Distributors implemented the research at the randomly selected addresses within the regions as instructed. The research was carried out among respondents aged 15–69 years (IPAQ and pedometer monitoring) and 20–65 years (ANEWS questionnaire and monitoring of PA using accelerometers). A total of 8,708 inhabitants of the Czech Republic (3,868 males and 4,840 females) aged 40.84 ± 9.09 participated in the research study. The data obtained from the questionnaires were processed and entered into the database. Walkability was determined as a measure of how friendly an area (built environment) is for residents to perform daily activities around the neighborhood within walking distance. According to the criteria, areas with lower or higher walkability have been selected, which is also associated with the PA level. Random sample was specified by gender and ratio between males and females within the regions of the Czech Republic (Czech Statistical Office, 2009). Males ($N = 3,868$) were aged 40.79 ± 9.62 (height 180.31 ± 6.84 cm; weight 84.58 ± 12.01 kg; BMI 26.03 ± 3.55 kg/m²); females ($N = 4,840$) were aged 40.87 ± 8.65 (height 167.03 ± 6.08 cm; weight 65.88 ± 10.50 kg; BMI 23.62 ± 3.64 kg/m²). The Prague region was excluded from the analyses due to a non-representative sample ($n = 452$). Meeting the PA guidelines accounts for meeting the general PA recommendations of vigorous and moderate intensity PA including walking recognized by global institutions (World Health Organization). For the Czech population the advanced recommendation criteria were used, as inhabitants of the Czech Republic compared to other countries showed higher amount of realized PA. The data were statistically analyzed using Statistica 9 software and SPSS 18. Basic descriptive statistics, Kruskal-Wallis ANOVA test (StatSoft CR, 2008; SPSS CR, 2008) and “effect size” η^2 (Morse, 1999) were used to characterize associations. Cohen coefficient “effect size” d (Cortina & Nouri, 2000) was used to assess the internal group variability. The level of statistical significance was set by $p \leq .001$.

RESULT AND DISCUSSION

This paper presents methods used within the international research on physical activity and neighborhood environment. Regional specificities and different

lifestyle, based on local conditions, indicate regional differences within the Czech population in the implementation of PA in relation to the neighborhood environment. The results show that the level of total PA among Czechs is high which denotes the population as highly active (more than half of the adult population).

It is apparent that neighborhood walkability plays an important role in participation in leisure time PA nearby the place of the residence (De Bourdeaudhuij, Sallis, & Saelens, 2003; Van Dyck, Deforche, Cardon, & De Bourdeaudhuij, 2009). Perceived neighborhood walkability derived from questionnaires was verified in previous international studies (Humpel, Marshall, Leslie, Bauman, & Owen, 2004; Humpel, Owen, & Leslie, 2002; Saelens & Handy, 2008) saying that there is a high correlation between higher walkability and higher level of moderate to vigorous PA of respondents living in these areas. This indicates that it is possible to get a relevant finding from subjective assessment of neighborhood environments associated to the structure of PA of respondents living in specific areas. Analysis of the structure of PA intensity (vigorous, moderate and walking) documents whether the neighborhood walkability affects PA of Czech adults (Figure 1). We have found a significant difference in total level of PA between males and females. However the level of weekly PA is not significantly affected by the neighborhood walkability in both males and females [$H(3, 8708) = 19.60$; $p \leq .001$; $\eta^2 = .002$]. We can argue that differences in the walkability of the environment do not significantly influence PA in men, although slightly more active are those living in low walkable areas. Women indicated higher total weekly PA if they lived in a high walkable neighborhood, but the difference was not significant as well. High level of total walking also predicts that the neighborhood setting is walking friendly in both low and high walkable areas. This suggests that neighborhood environment across the Czech Republic still remains pedestrian friendly and should

be thus maintained and further developed. Small differences in total PA in both males and females (less than 40 MET-min./week) indicate that the level of walkability does not influence the total PA of Czech adults.

The results of the IPAQ questionnaire (Figure 2) show that males realize significantly more PA than females ($p \leq .001$; $d = 0.124$). This difference is caused by a higher amount of vigorous PA in males ($p \leq .001$; $d = 0.414$). On the other hand, females realize more moderate PA ($p = .273$; $d = 0.012$) and walking ($p \leq .001$; $d = 0.093$) than males. The difference in walking was 200 MET-min./week, which confirms that females realize more regular routes for shopping or services by walking. The main difference between males and females represents the difference in vigorous PA, which is characterized by heavy load, harder breathing and shorter duration, corresponding to the structure of the activities realized by males and females. Males more often realize soccer, swimming, cycling, tennis and team sports (more often vigorous PA), females realize mostly swimming, cycling, aerobics and walking (more often moderate PA).

Physical activity of the Czech adult population is significantly influenced by the size of the location where respondents live. Results of the study confirm proposed statement in previous studies (Frömel et al., 2004; Frömel, Mitáš, & Kerr, 2009; Mitáš & Frömel, 2011) that PA in residents of smaller communities is higher than those living in big cities.

Analysis of the structure of PA in males (Figure 3) indicates a significant difference in vigorous PA [$H(3, 3678) = 17.60$; $p \leq .001$; $\eta^2 = .03$]. Highest significance was found between residents of a large city and a village ($p \leq .001$; $d = 0.209$). Highest significant difference in moderate PA of males [$H(3, 3678) = 174.53$; $p \leq .001$; $\eta^2 = .05$] was found between residents of a large city and a village ($p \leq .001$; $d = 0.666$); between residents of a medium-sized town and a village ($p \leq .001$; $d = 0.461$); and between residents of a small

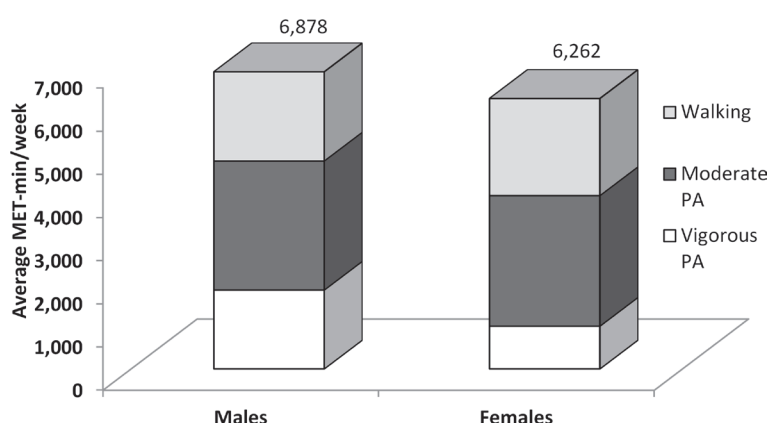


Figure 1. The structure of weekly physical activity of males ($N = 3,868$) and females ($N = 4,840$) based on the level of walkability

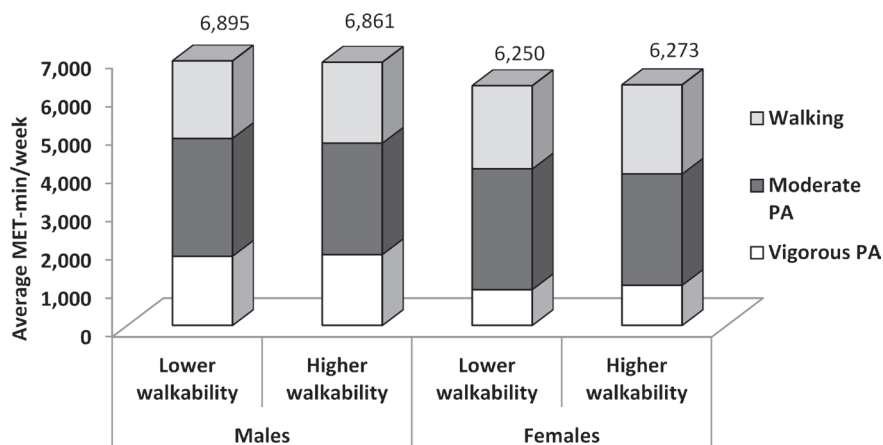


Figure 2. The structure of weekly physical activity of Czech males ($N = 3,868$) and females ($N = 4,840$)

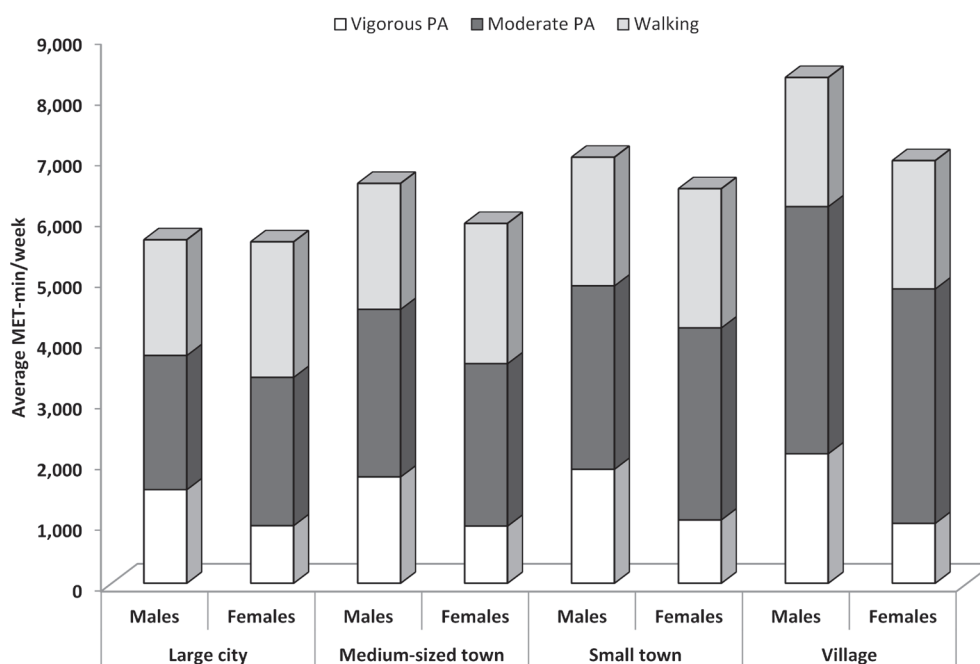


Figure 3. The structure of weekly physical activity of males ($N = 3,868$) and females ($N = 4,840$) based on the size of the residence. Note. Large city = place with more than 100,000 residents, medium-sized town = place with 30,000 to 100,000 residents, small town = place with 1,000–29,999 residents, village = place with less than 1,000 residents.

town and a village ($p \leq .001$; $d = 0.351$). No significant difference in walking in various size of the residence in males was found. The total PA is significantly higher in residents of villages compared to males living in larger areas (large city, medium-sized and small town) [$H(3, 3678) = 102.23$; $p \leq .001$; $\eta^2 = .03$].

We found no significant difference in vigorous PA and in walking in various size of the residence in females (Figure 3). The highest significant difference in moderate PA of females [$H(3, 4578) = 135.56$; $p \leq .001$; $\eta^2 = .03$] was found between residents of a large city and a village ($p \leq .001$; $d = 0.482$); between resi-

dents of a medium-sized town and a village ($p \leq .001$; $d = 0.416$); between residents of a small town and a village ($p \leq .001$; $d = 0.197$); and between residents of a medium-sized town and a small town ($p \leq .001$; $d = 0.202$). The total PA is higher in residents of villages compared to females living in larger localities (cities and towns) [$H(3, 4578) = 38.44$; $p \leq .001$; $\eta^2 = .008$].

Residents of smaller communities (up to 1,000 and up to 30,000 inhabitants) reported significantly higher level of PA than those living in large cities (over 30,000 and over 100,000 inhabitants) [$H(7, 8256) = 162.68$; $p \leq .001$; $\eta^2 = .02$]. This trend is apparent in both males

and females and we can set this state as a specificity of the Czech adult population as stated previously (Frömel, Mitáš, & Kerr, 2009). Studies from other countries, however, still tend to suggest greater walking and PA in more compact urban environments, where access to PA facilities may be greater, distances may be shorter and sidewalks are often present to facilitate walking for transportation (Ham, Macera, & Lindley, 2005; Reis et al., 2004; Schwanen & Mokhtarian, 2005). Only limited national studies indicated similar results like this Czech study, used town size and compared towns with greater than 100,000 residents and those with fewer than 1,000 (Badland & Schofield, 2006; Bertrais et al., 2004). The association with activity might be explained by occupational activities or higher incidence of agricultural work or manual labor in rural environments. In addition, activity may be higher in smaller towns due to safer neighborhoods and access to forest trails in comparison to larger cities where walking distances may be longer according to the size of the city. Shorter distances in smaller communities motivate people to walk or bike to destinations (shops, services, facilities). Larger cities are characterized by better infrastructures, thus longer distances and subjectively perceived safety indicate increased use of public transport or personal cars for transportation (Frömel et al., 2004).

Czech society is still relatively marginally differentiated in terms of PA realization and is characterized as highly active (Frömel, Mitáš, & Kerr, 2009). So we differ with the results of international studies in developed countries that argue that residents of PA friendly neighborhood environments initiate higher level of total PA compared to the inhabitants of areas with lower walkability (De Bourdeaudhuij, Sallis, & Saelens, 2003; Frumkin, 2002; Humpel, Marshall, Leslie, Bauman, & Owen, 2004; Humpel, Owen, & Leslie, 2002; Saelens & Handy, 2008). There exist evidence (ČLS, 2006; Láčková & Daňková, 2010) in increasing overweight and obesity rates among residents of the Czech Republic, as well for residents of developed countries, which are related to the non-communicable diseases linked to unhealthy lifestyles. Neighborhood environment motivating people to be physically active within their community may help in programs aimed at healthy living communities and healthier residents of these areas.

General health recommendations for PA are met by the total of 64.1% of females and 59.9% of males in the Czech population (results not presented). This means that they simultaneously meet at least one or more of the advanced criteria of recommended amount of realized PA (at least 60 minutes in 5 or more days of vigorous or moderate PA or walking per week). However, about 40% of the population of the Czech Republic does not meet even basic health recommendations for

PA. Within the population with 50% of overweight and obese people this is one of the key points that need to be addressed while changing the health indicators based on knowledge of the economic costs of less active population.

Strengths & limitations of study

This study benefits from a large sample size in a unique population, with multiple social and environmental measures related to physical activity and walking. The study did not include objective measures of physical activity and did not analyze the distinction between walking for different purposes, such as leisure and transportation.

CONCLUSIONS

The paper presents an approach which can be applied in research of neighborhood environment and PA in the Czech adult population. The results clearly indicate the need to connect multiple sectors that affect population lifestyle. Physical activity of the population in all regions of the Czech Republic is balanced. People living in low walkable areas are not less active than those living in high walkable locations and this confirms the low variability in neighborhood environment in the Czech Republic. Females are less active than males but this is basically because of their level of vigorous PA. Residents of smaller communities reported the highest level of total weekly PA which is a different conclusion compared to other country studies.

The interest in research of factors linking neighborhood environment and socio-demographic factors aiming at behavioral changes has been growing. Topics focused on leisure and environment become part of the study programs or subjects. It is desirable to include these topics into independent disciplines into a field with key determinants of research. The interrelation of biomedical, epidemiological and natural scientific fields in order to change lifestyle habits and personal health within the population has gained its validity and its research base is growing. Behavioral changes with regard to PA in different neighborhood environments appear to be a viable interdisciplinary filed.

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**POHYBOVÁ AKTIVITA DOSPĚLÝCH OBYVATEL
ČESKÉ REPUBLIKY V OKOLÍ MÍSTA
BYDLIŠTĚ - NÁRODNÍ ŠETŘENÍ**
(Souhrn anglického textu)

VÝCHODISKA: Mezinárodní výzkumy vztahují pohybovou aktivitu (PA) k dalším faktorům jako jsou podmínky prostředí, kultura, a politika místních podmínek. Velmi často jsou zmiňovány vnější vlivy na životní styl a PA, jako je vliv fyzického a zastavěného prostředí. Ukazuje se, že podmínky prostředí okolí místa bydliště jsou jedním z důležitých aspektů při prevenci nezdravého způsobu života a pohybové inaktivity.

CÍLE: Hlavním cílem práce je analýza vztahů mezi pohybovou aktivitou (PA) a prostředím místa bydliště dospělé populace České republiky. Práce se snaží definovat základní koreláty PA v závislosti na podmínkách prostředí a dalších socio-demografických aspektech.

METODIKA: Celorepublikový sběr dat o PA dospělé populace probíhal v rámci regionů České republiky 2005–2009 pomocí dotazníků IPAQ (long) a ANEWS.

VÝSLEDKY: Výsledky ukazují, že muži realizují signifikantně více intenzivní PA než ženy, zatímco ženy realizují více středně zatěžující PA a chůze než muži. PA obyvatel menších sídel je vyšší než u obyvatel velkých měst. Na velikost týdenní PA české populace nemá signifikantní vliv míra chodeckosti [$H(3, 8708) = 19.60$; $p < .001$; $\eta^2 = .002$].

ZÁVĚRY: Z výsledků práce jasně vyplývá, že je třeba propojení více oborů ovlivňujících životní styl běžné populace. Jednou z cest je interdisciplinární přístup při hodnocení zásadních faktorů podmínek prostředí ovlivňujících PA (chodeckost; SES; účast v organizovaných a neorganizovaných volnočasových PA; bezpečnost v okolí bydliště; způsob transportu; velikost místa bydliště).

Klíčová slova: dotazník, zastavěné prostředí, chodeckost, velikost sídla, životní styl.