# DIFFERENCES BETWEEN VARIOUS HOUSEHOLD INCOME BACKGROUNDS IN RELATION TO OBJECTIVELY MEASURED PHYSICAL ACTIVITY IN CZECH ELEMENTARY SCHOOL-AGED CHILDREN

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**Abstract**

Despite of having a lot of evidence how socioeconomic status (SES) in many ways influences a child's quality of life, there is still insufficient information about how SES impacts child's daily physical activity (PA). Objective: This study examined differences between various household income (low, middle and high) in relation to time spent in different levels of PA and step counts in Czech elementary school children. Method: Ninety children aged 9-11 participated in this study. They were divided into three SES groups on the base of monthly household income. Child's PA was measured for four consecutive days including one weekend day. Physical activity was measured using ActiGraph models GT3X and GT3X+. Differences between the groups were tested using analysis of covariance (ANCOVA). Body mass index (BMI) was considered as a covariate. Results: Children from high-SES group spent significantly more time (p = .04) in vigorous physical activity (VPA) and took fewer steps per day (p = .02) than their counterparts from low-SES group. There were no differences across groups in relation to time spent in light physical activity (LPA) and moderate physical activity (MPA) as well. Conclusion: The results of this study indicate the need for the promotion of VPA in children from families with low SES

**Key words:** socioeconomic status, ActiGraph, body mass index, vigorous physical activity

## Introduction

An increasing number of research studies suggest that there are numerous physical, psychological and social benefits of PA for children (Curie et al., 2012). Child's daily PA patterns are influenced directly or indirectly by many factors (Bauman et al., 2012). Bauman et al. emphasize the importance of identifying and understanding of correlates and determinants that influence PA in children. According to them, exploring factors associated with different levels of PA could help society to better understand why there are some individual less physically active and also could help in planning and organizing public health interventions in this field. There are a lot of evidences from different studies which confirm the fact that SES influences quality of child's life in many ways. However, there is still inconsistent information about how SES impacts child's daily PA. Curie et al. (2012) claim that low SES may affect different areas of social life. Reilly (2005) recognize SES as a factor that contributes to risk for overweight and obesity in children. Reilly also reported that children who come from low-SES families have greater BMI then those who come from families with high-SES background. Sulemana et al. (2006) underlined that higher BMI is related to lower physical activity levels. The Health Behavior in School-aged Children (HBSC) study has found association between family affluence and young people's health (Curie et al., 2012). Curie et al. also found that children from families with low household incomes had less opportunity to participate in fee-based physical activity, especially in sports and activities that require expensive equipment or lessons. According to Drenowatz et al. (2010) the level of child's PA significantly correlates with socio-economic conditions of the family. Drenowatz et al. found that children from the low-SES families were less active and spent more time in sedentary behavior than high-SES children. Results from study conducted by Baquet et al. (2014) showed that children who belonged to high-SES group spent significantly more time in MPA and VPA than those from low-SES group during school recess. The purpose of this study was to examine differences between various household income (low, middle and high) in relation to time spent in different levels of PA and step counts in children.

**Method**

    Subjects were randomly selected children from two public elementary schools located in the city of Olomouc, Czech Republic. A total of 90 children (44 boys, 46 girls) aged 9-11 participated in this study. The study had been previously approved by authorities at the individual schools. Prior to data collection, informed written consent was obtained from parents. Data collection took place during November 2013. Outcomes related to family's SES were based on parental reports using Environmental Stimulus for Physical Activity (ESPA) questionnaire from authors Vanreusel and Renson. This questionnaire is made to assess child's level of stimulation to PA, both in the family and in school. The questionnaire is divided in two parts. For this study we used only the first part of this questionnaire which is related to family's SES. To get objectively information about SES we added one more question with regard to family's monthly household income. SES indicator was determined based on monthly household income divided by the number of family members. According to Regional Administration Czech Statistical Office the families should be grouped into four groups (< 8,000 CZK; 8,000-10,000 CZK; 10,001-15,000 CZK; > 15,000 CZK). Due to the smaller sample size in the present study subjects were grouped into three groups (Low < 8,000 CZK; Medium 8,000-15,000 CZK; High > 15,000 CZK). Child's BMI was measured using the body composition analyzer InBody 720. Weight status was classified as normal, overweight or obese using international age- and sex-specific BMI cut-off points (Cole et al., 2000). Objective assessments of physical activity behavior were obtained using the ActiGraph activity monitors GT3X and GT3X+. Both models have small size and mass and contain a triaxial accelerometer for assessing accelerations in the vertical, anterior-posterior and medio-lateral axes. Also, these devices include an inclinometer which detects if subject is in the standing or lying position or when ActiGraph is off (non-wear period). During the study children are asked to wear the ActiGraph on the hip. ActiLife software was used for initializing the monitors and downloading the data. Only data from children who wore the accelerometer at least ten hour per day, for four consecutive days, including one weekend day were taken in consideration. Physical activity cut-off points for children were determined according to Freedson (Freedson et al., 2005): Light 150-499 cut-points per minute (CPM), Moderate 500-3,999 CPM, Vigorous > 4,000 CPM. Activity monitors were set to record movement counts in 1-min epochs. Outcome variables derived from the GT3X and GT3X+ were presented as mean minutes per day spent in different levels of PA and mean step counts per day as well. All statistical analyses in this study were carried out using commercially available software STATISTICA 12 and $p < .05$ was considered as the level of statistical significance. Descriptive statistics are expressed as means, standard deviations and percent's. Differences in age and BMI across SES groups were tested using univariate analysis of variance (1-way ANOVA). Differences between SES groups in the relation to the level of physical activity and step counts were tested using analysis of covariance (ANCOVA) Participants' BMI were considered as covariates. Significant ANOVA/ANCOVA results were followed up using the Fisher's LSD post hoc test.

**Results**

    Descriptive characteristics of the subjects are presented in Table 1. Based on SES indicator almost the same number of participants belonged to low-SES group (40%) and middle-SES group (39%) whereas 21% were from families with high household income background. There were no significant differences between SES groups in relation to age of participants. Total of 21% children were classified as obese or overweight of which only 1% come from high-SES group. Statistically significant difference was occurred between middle-SES and high-SES groups in relation to BMI ($p = .02$).

Table 1: Descriptive statistics of participants

|  | Low SES | Middle SES | High SES | Total |
|---|---|---|---|---|
| Number of children (boys/girls) | 36 (17/19) | 35 (18/17) | 19 (9/10) | 90 (44/46) |
| Age M (SD) | 9.8 (0.7) | 9.7 (0.7) | 9.5 (0.6) | 9.7 (0.7) |
| BMI M (SD)* | 17.6 (3.1) | 17.9 (2.7) | 16.1 (1.9) | 17.4 (2.8) |
| Number of obese-overweight | 8 (9%) | 10 (11%) | 1 (1%) | 19 (21%) |

Note. BMI = body mass index, M = mean, SD = standard deviation. *Significant difference (ANOVA) between high-SES and middle-SES at $p < .05$.

Children from high-SES showed less BMI value then children from the other two SES groups. Table 2 shows differences between three household income groups in relation to time spent at different level of PA and step counts controlling for BMI. Statistically significant differences were found between groups in relation to VPA and step counts as well. High-SES children spent significantly more time in VPA ($p = .04$) and also took significantly more steps per day ($p = .02$) than their counterparts from low-SES. There were no statistical differences between all three groups in relation to LPA and MPA.

Table 2: Differences between SES groups in relation to time spent at different level of PA (min/day) and step counts (steps/day) controlling for BMI, presented as mean and standard deviation

| PA levels | SES groups | | | Low-Middle | Low-High | Middle-High |
|---|---|---|---|---|---|---|
| | Low | Middle | High | *p* value | *p* value | *p* value |
| LPA | 139.6 (28.9) | 138.6 (27.1) | 135.7 (24.7) | .87 | .59 | .69 |
| MPA | 200.4 (64.5) | 193.4 (41.9) | 216 (51.9) | .59 | .31 | .14 |
| VPA | 9.9 (9.2) | 11.1 (12.6) | 16.4 (10.4) | .66 | .04* | .09 |
| Steps | 9570.6 (2816.2) | 9961.3 (3081.4) | 11587.8 (3323.3) | .60 | .02* | .07 |

Note. SES = socio economic status; SD = standard deviation; LPA = light physical activity; MPA = moderate physical activity; VPA = vigorous physical activity. *Significant differences (ANCOVA) between low-SES and high-SES at $p < .05$.

**Discussion**

The aim of this study was to examine differences between various household income (low, middle and high) in relation to the time spent in different levels of PA and step counts in children. The results from the present study confirm the statement that child's PA is a complex, multifactor issue and are influenced by many factors (Sallis & Owen, 2008). Descriptive statistic from the present study showed that most obese/overweight children were in the low-SES group and in the middle-SES group as well. As a result, children from the high-SES group showed generally less value of the BMI. Findings from study conducted by Drenowatz et al. (2010) support our claims regarding to correlation between SES and BMI. They found that low-SES children had a higher BMI than children from high-SES families. Our findings clearly demonstrate that with increasing household income per person, also increased the time children spent at the level of VPA. At this PA level statistically significant deference was found between children that belonged to the high-SES group and those from low-SES background. It is already well known that vigorous intensity of PA offers additional health benefits for children (Janssen & LeBlanc, 2010) and it is interesting that in the present study statistical difference between SES groups occurred at the level of VPA. Gutin et al. (2005) found that particularly VPA were strongly negatively associated with fatness which implies that in our study BMI had an impact on child's PA. Curie et al. (2012) reported that potential reason why differences occurred could be because children from the low-SES families have less opportunity to participate in fee-based physical activity. Findings from this study suggest that public health promoting actions should be focused on children who come from families with low SES background. In our study children from lower SES families had a higher BMI, spent significantly less time at VPA level and took significantly fewer steps than children who come from high SES families. There are few limitations of this study that should be mentioned. The sample used in the present study was small and is not representative. The cross-sectional design is not useful if we search for causal explanation and on the base of the results we could not determine what caused differences, although it is evident that the differences exist. To get the objective and useful data related to relation between child's PA and SES, further research should be based on longitudinal designs and it should take in account ecological model in research of correlates related to PA, which is based on multidimensional and transdisciplinary approaches (Sallis & Owen, 2008).

**Conclusion**

The results from the current study show that low-SES children spent significant less time at the VPA level. They had a higher BMI and also took significantly fewer steps per day than children who belonged to the high-SES group.

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