Original empirical article

INACTIVITY, NUTRITIONAL AND LIFESTYLE HABITS: A CROSS-SECTIONAL STUDY IN CZECH SCHOOLCHILDREN AND THEIR NUCLEAR FAMILIES

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Abstract. *The aim of this study was to investigate inactivity, nutritional and lifestyle patterns in schoolchildren and their parents. Six hundred and ten members (156 mothers, 140 fathers, 156 daughters and 158 sons) of 175 nuclear families, with an average size of 3.49 members, completed a validated and reliable 16-item questionnaire of physical activity. Inactivity was found to be closely related to nutrition and selected lifestyle habits in children and their parents. A practical implication of these findings indicated that a proper physical activity intervention should consider a change in all of the nutritional and lifestyle parameters in order to be beneficial for health. Therefore, attention should be paid not only to the increase physical activity through an organized exercise plan, but also to the improvement in lifestyle habits, like optimal sleeping, consuming fruit, vegetables and breakfast every day, employing the stairs instead of the elevator, and avoiding watching TV.*

Key words: *Questionnaire, exercise, health, age, gender.*

INTRODUCTION

In the context of physical activity (PA) assessment, it was proposed (Fung *et al.*, 2000; Gordon-Larsen *et al.*, 2000; Macera *et al.*, 2001) that the time spent watching TV and in front of the computer be used as an index of inactivity. Time spent in front of the television and computer, preference of the elevator instead of the stairs, as well as the use of car instead of public transportation could be employed to describe the lower end of the physical activity spectrum, i.e. physical inactivity.

From the aforementioned three parameters of physical inactivity, the two former were included in the questionnaire of the present study, whilst the latter was excluded in order

for the items in the questionnaire to be common and eligible for children, adolescents and adults. Such an index could overtake the limitations of the objective measurement of PA scores. According to the inactivity index, inactivity could be classified as low (0-1.4 h), moderate (1.4-3.4 h) and high (more than 3.4 hours daily spent in front of the TV or computer). The aim of the present study was to investigate inactivity and its association with nutritional and other lifestyle habits in schoolchildren and their nuclear families.

METHODS

Procedures. This study had a cross-sectional design, where data were collected at one point in time. Two high schools of Prague were selected to participate in this research. Two trained and skilled students of the Department of Physical Education and Sport of the Charles University in Prague, during their compulsory teacher training course, undertook to contact the pupils, in order to distribute the questionnaire. Each pupil was provided with an envelop, which contained five questionnaires and a cover letter, with the mention that the envelop with its content should be returned by the next Physical Education class, approximately after two to three school days.

Participants. Six hundred and ten members (156 mothers, 140 fathers, 156 daughters and 158 sons) of 175 nuclear families, with an average size of 3.49 members, completed a validated and reliable 16-item questionnaire of physical activity. The survey procedures were designed to protect the students', their parents' and the schools' privacy by allowing for anonymous participation.

RESULTS

Considering their anthropometric characteristics (**Table 1**), the four family groups had different body mass values ($F_{3,598}$=181.71, P<0.05, Tukey-Kramer's critical value 3.64). Their mean values regarding age ($F_{3,605}$=1773.07, P<0.05), stature ($F_{3,601}$=58.83, P<0.05) and the body mass index ($F_{3,596}$=130.51, P<0.05) were also different. However, the outcome of this one-way analysis of variance provided evidence that there were at least two means that differed, without more details about which groups differed. Such information was obtained by the implementation of the Tukey-Kramer test, which revealed a critical value of approximately 3.64 for all the above mentioned anthropometric traits. This statistical tool showed no differences between daughters and sons with respect to age and the body mass index, as well as between mothers and sons regarding stature.

Table 1. Anthropometric characteristics of the participants in the family study.

	N	Age (years)	Body mass (kg)	Stature (m)	BMI (kg m^{-2})
Mothers	156	43.91 (5.53)	62.7 (11.59)	1.64 (0.07)	23.25 (3.91)
Fathers	140	47.88 (5.86)	81.57 (10.21)	1.77 (0.07)	26.14 (3.05)
Daughters	156	14.95 (4.94)	48.21 (12.1)	1.56 (0.16)	19.16 (2.62)
Sons	158	14.42 (4.79)	59.76 (20.52)	1.65 (0.22)	20.32 (3.13)

N the number of participants, BMI body mass index; values were presented as means with standard deviation in brackets.

Inactivity index. Mothers, fathers, daughters and sons spent on average of 2.9 (median 2.5), 3.7 (3), 2.3 (2.5) and 2.7 (2.3) hours daily in front of the TV or computer, respectively. Their mean scores differed significantly ($F_{3,596}$=14.18, $P<0.05$). Due to the aforementioned categorization, the average father was classified as highly inactive, while the other family groups as moderately inactive. When their classification took place with respect to median values, all the groups were identified as moderately inactive (Figure 1).
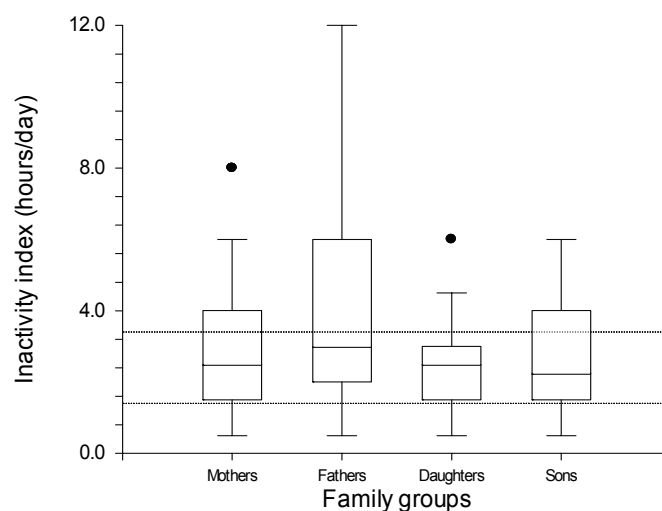

Fig. 1.   Inactivity index with the two parallel to x axis dot lines dividing the graph in three zones (low, moderate and high inactivity).

The findings of the present study supported a weak, but significant, association between this behavior and the body mass index for both genders (r=0.30, $P<0.05$, 95% *CI* 0.19, 0.40 for the females and r=0.18, $P<0.05$, 95% *CI* 0.07, 0.29 for the males). However, looking at this relationship in the context of each age and gender group separately, there was no consistency in the results. A moderate association was shown for the mothers (r=0.28, $P<0.05$, 95% *CI* 0.13, 0.42), whilst for the fathers it was low, negative and non significant (r=-0.12, *n.s.*, 95% *CI* -0.28, 0.04). Almost identical patterns appeared for the daughters (r=0.18, $P<0.05$, 95% *CI* 0.02, 0.33) and sons (r=0.19, $P<0.05$, 95% *CI* 0.04, 0.34). That is, the more time the family members (with the exception of fathers) spent daily in front of the TV or computer, the higher their body mass index.

Daily time spent on walking. The mean values (median values and 25th-75th percentile in brackets) of time spent on walking daily given in minutes were 41.9 (40, 30-50), 37.4 (30, 20-50), 39.9 (30, 20-50) and 39.4 (30, 20-60) for the mothers, fathers, daughters and sons respectively. A Kruskal-Wallis one-way ANOVA was used to examine the null hypothesis that the median values of the four family groups were equal and its result (χ^2=3.26, *df*=3, *n.s.*)[1] suggested that we accept the null hypothesis. Therefore, there was no difference in walking patterns between the groups.

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[1] The result of χ^2 (chi-square) test and of Kruskal-Wallis one-way ANOVA of ranks, presented here and thereinafter, was corrected for ties (i.e. two or more observations with the same values). It was accompanied by the degrees of freedom (*df*) and the corresponding probability level (*P*).

Household chores. The mean values (median values and 25th-75th percentile in brackets) of time spent on household chores daily given in minutes were 71.9 (75, 40-90), 24 (20, 10-30), 19 (15, 10-20) and 15.2 (10, 10-20) for mothers, fathers, daughters and sons respectively. A Kruskal-Wallis one-way ANOVA was used to examine the null hypothesis that the median values of the four family groups were equal and its result (χ^2=253.64, df=3, P<0.05) suggested that we reject the null hypothesis and adopt its alternative research hypothesis. Thereafter, a Kruskal-Wallis multiple-comparison z-value test and Bonferroni test were employed to find which groups' median differed and revealed differences between mothers and the rest of the groups, as well as between fathers and sons. The mothers spent approximately three times more time in household chores daily in comparison to the other family groups.

Sleeping habits. Regarding their time spent in sleeping daily, the mean values (median values and 25th-75th percentile in brackets) in hours for mothers, fathers, daughters and sons were 6.9 (7, 6-8), 7 (7, 6.5-7.9), 8.2 (8, 7-9) and 8.2 (8, 7.4-9) respectively. A Kruskal-Wallis one-way ANOVA was used to examine the null hypothesis that the median values of the four family groups were equal and its result (χ^2=124.61, df=3, P<0.05) suggested that we reject the null hypothesis and adopt its alternative research hypothesis. Thereafter, a Kruskal-Wallis multiple-comparison z-value test and Bonferroni test were used to find which groups' medians differed and revealed differences between parents and offsprings, but not between spouses or between siblings. The offspring spent about one hour more than the parents sleeping, which suggested an age effect on sleeping.
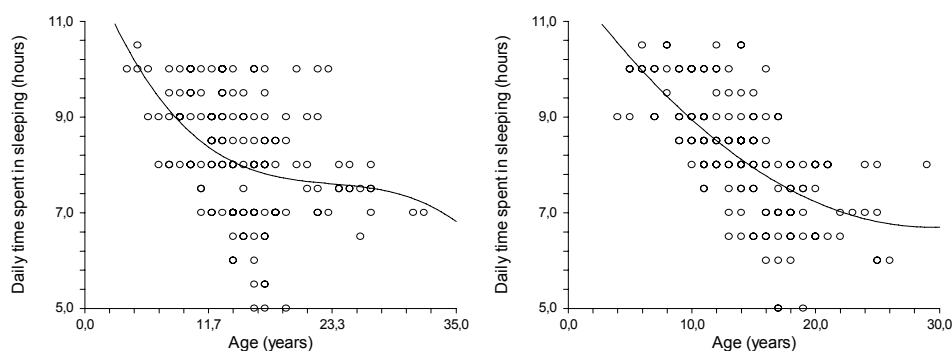

Fig. 2. Sleeping and aging in daughters (left) and sons (right).

The association between sleeping and aging was estimated with the Spearman rank correlation coefficient ρ, which was ρ=-0.22 (P<0.05, 95% CI -0.36, -0.06) for the mothers, ρ=-0.03 (n.s., 95% CI -0.20, 0.13) for the fathers, ρ=-0.44 (P<0.05, 95% CI -0.56, -0.30) for the daughters and ρ=-0.70 (P<0.05, 95% CI -0.77, -0.61) for the sons. There was an inverse relationship between the two variables especially for the offspring, that is, the older the offspring, the less time spent sleeping (Figure 2).

The effect of the body mass index as a measure of body composition on sleeping was examined through a multiple regression analysis. The correlation between these two variables was $r=0.03$ (*n.s.*) for the mothers, $r=0.10$ (*n.s.*) for the fathers, $r=-0.28$ ($P<0.05$) for the daughters and $r=-0.53$ ($P<0.05$) for the sons. Because both the BMI and sleeping were under the influence of aging, their values were adjusted for the age effect. Therefore, the partial correlation for the corresponding family groups was $r=0.09$ (*n.s.*), $r=0.13$ (*n.s.*), $r=-0.22$ ($P<0.05$) and $r=-0.32$ ($P<0.05$). Thus, an inverse relationship was delineated between the BMI and sleeping for the daughters and sons, suggesting that the higher the body mass index of the offspring, the fewer hours they spent sleeping.

Nutrition habits. Three nutritional parameters were examined in the questionnaire; the number of daily meals, consumption of breakfast and consumption of fruit and vegetables. With respect to the daily number of meals, mean values (median and 25th-75th percentile in brackets) for the mothers, fathers, daughters and sons were 2.8 (3, 2-3), 2.5 (3, 2-3), 3 (3, 3-3) and 3.1 (3, 2-3) respectively.

A Kruskal-Wallis one-way ANOVA was used to examine the null hypothesis that the median values of the four family groups' number of daily meals were equal and its result ($\chi^2=25.92$, *df*=3, $P<0.05$) suggested that we reject the null hypothesis and adopt its alternative research hypothesis. Thereafter, a Kruskal-Wallis multiple-comparison z-value test and Bonferroni test were employed to find which groups' median differed and revealed differences between the fathers and daughters and between the fathers and sons, i.e. fathers had significantly fewer daily meals when compared to the daughters and sons.

The corresponding relationship between the number of meals and the body mass index for the above mentioned family groups was $\rho=-0.17$ ($P<0.05$, 95% *CI*, -0.32, 0), $\rho=0$ (n.s., 95% *CI*, -0.18, 0.16), $\rho=-0.14$ ($P<0.05$, 95% *CI*, -0.29, 0.02) and $\rho=-0.25$ ($P<0.05$, 95% *CI*, -0.40, -0.10). An inverse association was delineated between these variables, that is, the greater the number of meals per day, the smaller the body mass index, for all the family members except the fathers. This pattern was depicted in Figure 3, where the body mass index was plotted against the mean values of each subcategory of daily meal consumption (less than three, three and more than three) for every family group.

The majority of participants responded that they had breakfast every day; 63.5% of the mothers, 60% of the fathers, 75.6% of the daughters and 63.3% of the sons. A comparison of family groups' proportions regarding whether they had breakfast every day or not revealed significant differences ($\chi^2=9.62$, *df*=3, $P<0.05$). A consistent association was depicted (Figure 4) between this nutritional habit and exercise behaviour, body composition and inactivity levels, expressed as time spent in front of the television and computer.
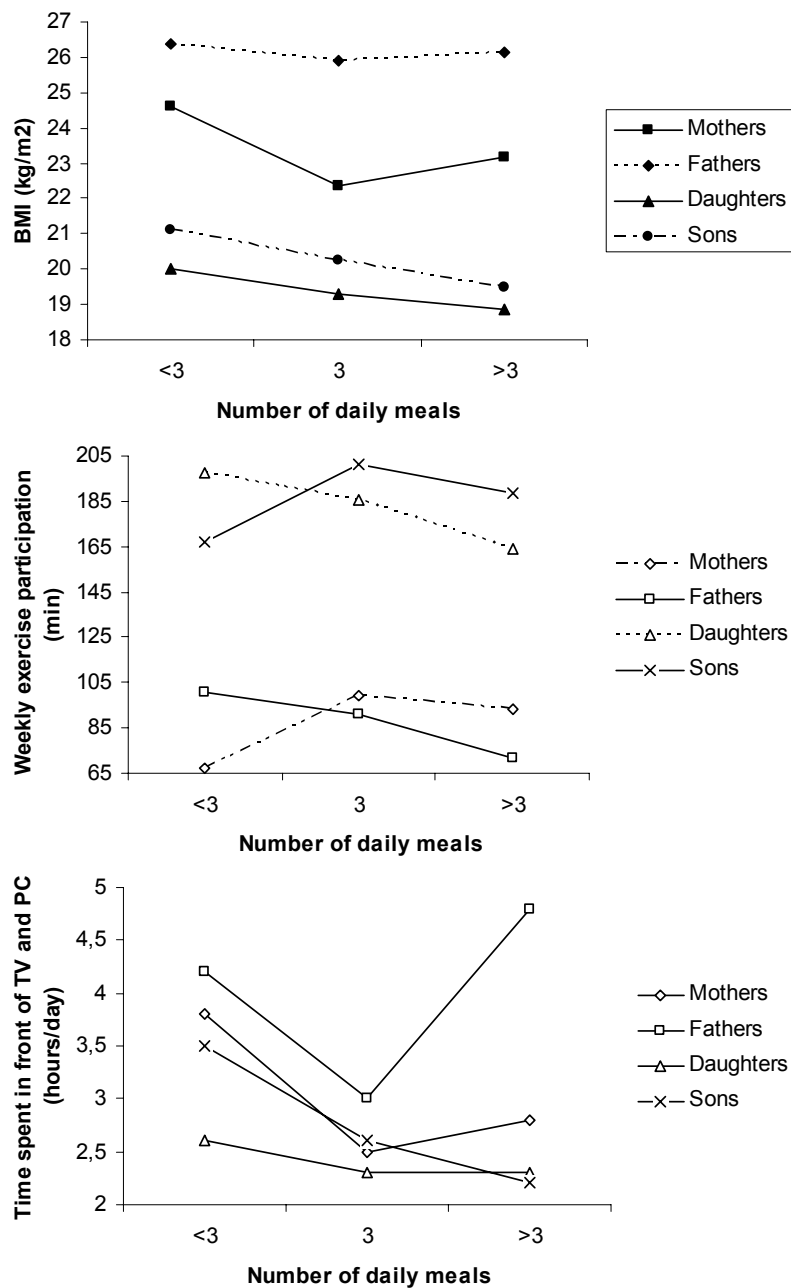
Fig. 3. Fluctuation of body mass index values, weekly exercise participation and time spent in front of the TV and PC with respect to the number of daily meals for family groups.
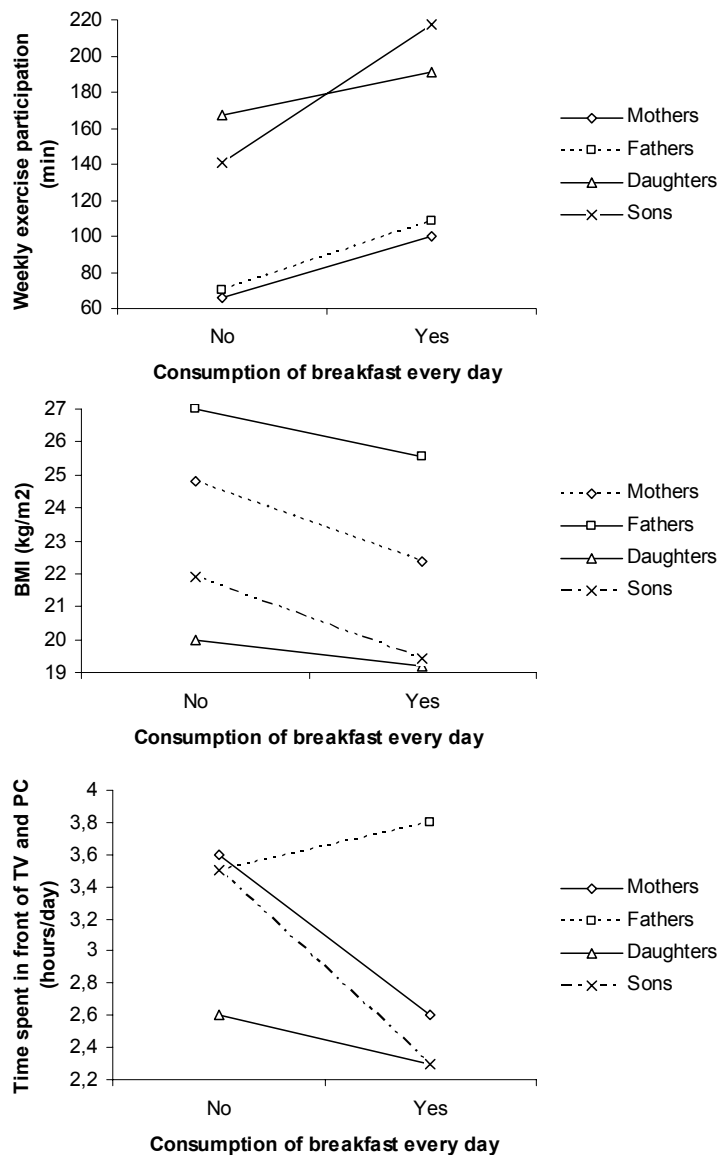
Fig. 4. Relationship between weekly exercise participation, body mass index and time spent in front of the TV and PC, and consumption of breakfast every day.

The participants who consumed breakfast every day had higher levels of weekly exercise participation (99.8 min vs. 65.9 min for the mothers, 108.8 min vs. 70.2 min for the fathers, 191.3 min vs. 167.6 min for the daughters and 217.4 min vs. 141.2 min for the sons) and a smaller body mass index (22.35 $kg \cdot m^{-2}$ vs. 24.78 $kg \cdot m^{-2}$, 25.57 $kg \cdot m^{-2}$ vs. 26.98 $kg \cdot m^{-2}$, 19.2 $kg \cdot m^{-2}$ vs. 19.98 $kg \cdot m^{-2}$ and 19.43 $kg \cdot m^{-2}$ vs. 21.91 $kg \cdot m^{-2}$ respectively).

These participants also had lower inactivity levels (hours spent in front of the TV and PC daily; 2.6 vs. 3.6 for the mothers, 2.3 vs. 2.6 for the daughters and 2.3 vs. 3.5 for the sons), except in the case of the fathers (3.8 vs. 3.5). A comparison of family group values regarding the consumption of fruit and vegetables also revealed significant differences (χ^2=11.17, *df*=3, *P*<0.05) (Figure 5).
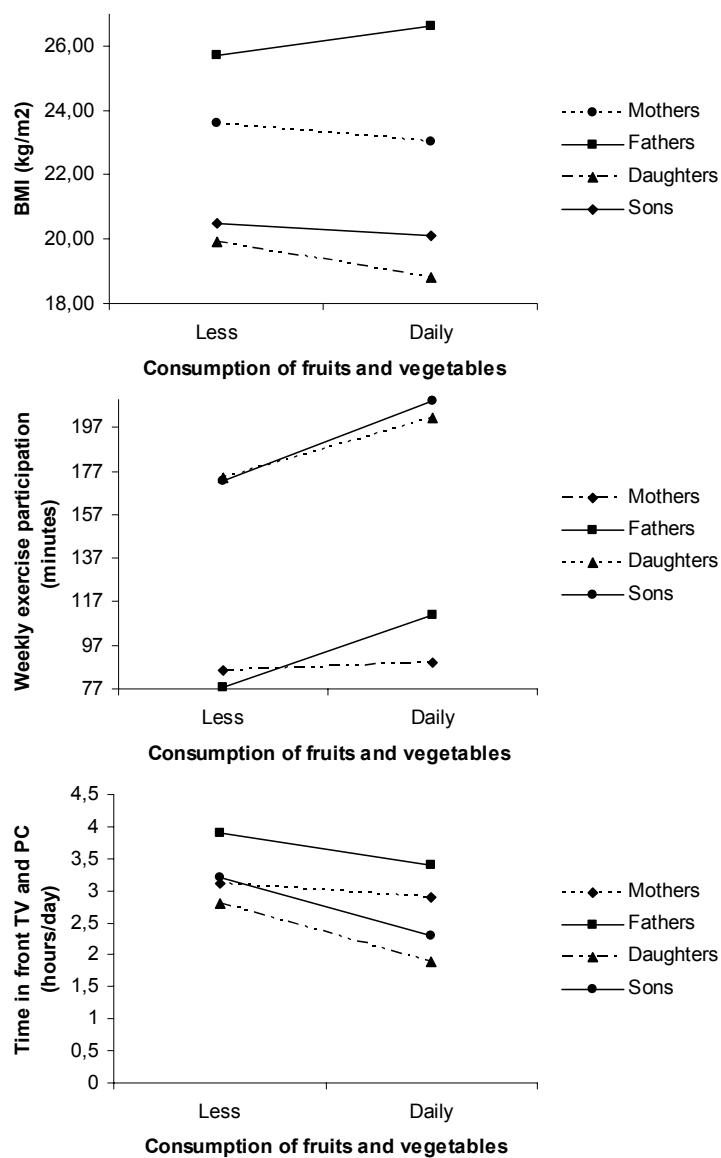

Fig. 5.   Association between consumption of fruits and vegetables, BMI, weekly exercise participation and time spent in front of the TV and PC.

Use of stairs versus elevator. With respect to their preference between the use of stairs and the elevator, the majority of parents chose the elevator, whereas the majority of the offspring chose the stairs. In particular, 49.4% of the mothers and 55.7% of the fathers preferred the elevator to the stairs (45.6% and 42.1% respectively), whilst 59% of the daughters and 50% of the sons preferred the stairs instead of the elevator (38% and 47.5% respectively). A comparison of these proportions revealed that family groups had different behavior with respect to preference between the stairs and elevator (χ^2=9.52, df=3, P<0.05).

The behavior of the participants with respect to the above mentioned parameters was linked to their body mass index and their exercise levels. Regarding the BMI, the association was not similar for the various family groups. The mothers, who preferred the elevator, had a decreased body mass index in comparison with those who chose the stairs (22.24 kg·m^{-2} vs. 24.5 kg·m^{-2}), whereas the opposite pattern occurred for the other groups (27.04 kg·m^{-2} vs. 24.89 kg·m^{-2} for the fathers, 19.85 kg·m^{-2} vs. 19.29 kg·m^{-2} for the daughters and 20.45 kg·m^{-2} vs. 20.15 kg·m^{-2} for the sons). Weekly exercise participation was consistently higher in those who favored the stairs instead of the elevator (88.6 min vs. 83 min for the mothers, 114.2 min vs. 77.8 min for the fathers, 201.7 min vs. 156.5 min for the daughters and 201.5 vs. 181.9 min for the sons).

DISCUSSION

Regarding the inactivity index, i.e. the time spent daily in front of the television and computer, the findings [2.9 (median 2.5), 3.7 (3), 2.3 (2.5) and 2.7 (2.3), mean (median) for the mothers, fathers, daughters and sons respectively] did not differ from those found in the existing literature. For instance, for children aged 9.6±0.4 (32.8±7.6 kg, 1.38±0.07 m and 17.2±2.7 kg·m^{-2} for the girls and 33.3±6.9 kg, 1.38±0.06 m and 17.4±2.7 kg·m^{-2} for the boys), daily television viewing was 1.5±1.1 hours and 1.6±1.1 hours respectively (Ekelund *et al.*, 2006).

The television viewing pattern of the adolescents (12.7±1 years) was similar on non-school days for both genders, with approximately 75% of them watching 2 hours or more television per day, whereas on school days approximately 56% of the males and 51% of the females watched more than 2 hours of television, with more males watching 3 hours per day than the females did (McMurray *et al.*, 2000). More than 70% of the adolescents (14.9±1.2 years old) exceeded the sedentary behavior standard of two hours of screen time daily in a research where boys were significantly more likely to exceed the sedentary recommendation than girls (76.3% vs. 65.7%; Lee and Trost, 2006).

In adolescents aged 11 - 21 (*M*=15.5 years; Gordon-Larsen *et al.*, 2000), the high inactivity group included 22.8% of the girls and 35.6% of the boys, the medium 35.2% and 34.9% and the low inactivity 42% and 29.5% respectively. In 2005, an average Brazilian child aged 4 - 11 watched TV almost five hours per day (Fiates, Amboni and Teixeira, 2008), which was close to the findings for the adolescents (Da Silva and Malina, 2000), where girls and boys (15±0.5 years old) with corresponding body mass, stature and body mass index 51.8±8,8 kg, 1.60±0.06 m, 20.2±2.9 kg·m^{-2} and 55.1±11.3 kg, 1.67±0.08 m, 19,7±2.8 kg·m^{-2} spent 4.9±3 and 4.4±2.4 hours per day in front of the television. Other adolescents aged 15.5±0.5 (body mass 55.9±8.6 kg, stature 1.64±0.07 m and BMI 20.8±2.8 kg·m^{-2} for the girls and 62.3±10.8 kg, 1.73±0.08 m and 20.8±2.8 kg·m^{-2} for the boys) had a daily TV viewing time of 1.9±1.1 hours for both genders (Ekelund *et al.*, 2006).

Adolescents aged 16.7 (*SD*=0.5) years, spent 168.3 minutes daily watching TV and using the computer (Lubans and Sylva, 2006), whereas the corresponding values for students (21±4 years old; Buckworth and Nigg, 2004) were 141.6 minutes. In the latter research, hours of television per week were greater for males than for females and men reported that they spent more time using the computer than their female counterparts did. In older female (55.4 years) and male (58.8 years) adults (Wareham *et al*., 2002), their corresponding TV viewing was 21 (±10.3) and 20.2 (±9.7) hours per week, which was approximately three hours daily.

CONCLUSIONS

Inactivity was found to be closely related to nutrition and selected lifestyle habits in children and their parents. A practical implication of these findings indicated that a proper physical activity intervention should consider a change in all of the nutritional and lifestyle parameters in order to be beneficial for health. Therefore, attention should be paid not only to an increase in physical activity through an organized exercise plan, but also to the improvement in lifestyle habits, like optimal sleeping, consuming fruit, vegetables and breakfast every day, using the stairs instead of elevator, and avoiding watching TV.

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NEAKTIVNOST, NAVIKE U ISHRANI I SVAKODNEVNOM ŽIVOTU: PREGLEDNA STUDIJA ŠKOLSKE DECE I NJIHOVIH NAJUŽIH PORODICA U ČEŠKOJ

Pantelis Nikolaidis

Cilj ovog istraživanja bio je da se ispita neaktivnost, navike u ishrani i svakodnevnom životu školske dece i njihovih roditelja. Ukupno 610 učesnika (156 majki, 140 očeva, 156 ćerki i 158 sinova) iz 175 porodica, sa prosečnim brojem članova 3.49, popunili su testiran i pouzdan upitnik koji se sastojao od 16 pitanja vezanih za fizičku aktivnost. Ustanovljeno je da je neaktivnost usko povezana sa ishranom i odabranim stilom života dece i njihovih roditelja. Praktična posledica ovih zaključaka bila je da je neophodna intervencije u smislu ispravne fizičke aktivnosti, da bi se unele promene u parametre navika u ishrani i načinu života koji bi imali pozitivan uticaj na zdravlje. Dakle, više pažnje bi trebalo da se posveti ne samo većoj fizičkoj aktivnosti kroz organizovan program, već su potrebne izmene u svakodnevnim navikama, kao što je optimalni san, unos voća, povrća i obavezni doručka svakodnevno, korišćenje stepenica umesto lifta i izbegavanje prekomernog gledanja televizije..

Ključne reči: *upitnik, vežbanje, zdravlje, godište, pol*