Original article

Sedentary lifestyle in active children admitted to a summer sport school

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Abstract. Aim of this study was to investigate the sedentary patterns of school-aged active children admitted to a summer sport school. One hundred-twelve children aged 9-11 years were interviewed through a questionnaire about sedentary behaviours and nutrition habits. Seventy-one per cent of children reported they watch TV seven days a week, girls less than boys (84±45 minutes vs 110±75 minutes) (t=2,056; p=0,042). The habit of TV viewing during meals was widespread (38% breakfast, 31% lunch, 62% dinner, 18% every meal). The prevalence of overweight or obesity (58.5%) was significantly higher among boys watching TV at dinner compared to the boys viewing TV only in the afternoon (35%) (χ^2=4.976; p=0.026). Fifty-seven per cent of children (65% boys) were accustomed to nibble snacks during TV viewing, and this habit was widespread in overweight or obese boys (χ^2=4.546; p=0.033). The dietary patterns of children watching TV include more snack foods and fewer fruits than the dietary patterns of the same children exercising (χ^2=4.199 p=0.040). Also in active children the habit to watch television is widespread and, in spite of the tendency to physical activity, 46% of them were overweight or obese; in fact the time spent looking at a TV may be associated to overweight/obesity and this relationship could be explained by the amount of high-density foods consumption during inactivity. Playing video games, read a book and listening to music are sedentary lifestyle patterns but these seem not to represent a risk factor for an increased BMI. (www.actabiomedica.it)

Key words: Physical activity, television watching, videogames, obesity

Introduction

Over the past 20 years the prevalence of obese people has tripled in many European countries (1, 2). In Italy obesity has increased by 18% (1). The phenomenon is alarming especially among children and adolescents. A recent national survey has showed that 23.6% of Italian children aged 7-17 years are overweight and 12.3% obese (1).

The reasons for this trend have been related to excessive and unhealthy nutritional habits and sedentary lifestyle (2). In a previous paper our group reported that children skipping breakfast are at high risk for overweight and obesity compared to breakfast consumer peers (3).

Several studies showed that overeating is not the only cause of overweight/obesity (4). Sedentary activities have been suggested to play an equally determinant role in overweight development. The time spent by children and adolescents watching television, playing videogames, listening to music has dramatically increased in the past years. Thirty-one percent of

overweight or obese children living in the Parma area are inactive and 32% are reported to spend from 2 to 4 hours a day watching television or playing videogames (1).

It has been suggested that children devoted to watch TV consume hyper-caloric foods under the influence of food advertising (5-11). It has been speculated that the child's Body Mass Index (BMI) increases for each additional hour spent in front of a television set (12, 13).

Sedentary behaviour has been usually studied in unselected school-age children populations, so that it is hard to draw out information on sedentary habits of children normally involved in physical activities. In the present study we evaluated sedentary lifestyle patterns in active children admitted to a summer sport school.

Materials and methods

Data for the current analysis came from the participants in "Giocampus Barilla", a Summer Sport School for children, aged 6 to 14 years, which took place in the Campus sport area of the University of Parma from 16th June to 15th September 2008, in collaboration with Barilla Group, Postgraduate Medical School of Paediatrics and the Graduate School of Sport and Exercise Sciences of the University of Parma.

Four hundred children at a time were admitted to the Summer Sport School for a period of time lasting 15 days, spending 8 hours a day (9 a.m. to 5 p.m., Monday to Friday) in physical activities (i.e. soccer, volleyball, basketball, artistic dance, tennis, fencing and athletics) under the supervision of professional instructors. During this time, snacks, lunch and beverage were regularly distributed. Breakfast was not included. Parents of participants were asked to exhibit at admittance a medical declaration about health and nutrition of their children.

To be admitted to the study, the children have to prove to perform at least 300 minutes a week of physical activities comprehensive of "competitive sports" (40-50%) such as soccer, volley-ball, tennis, basketball, and "activities in spare time" (i.e. walking, cycling, skating or swimming). Informed consent and assent for participation in this survey were obtained from parents and children respectively. For privacy reasons, family socio-economic status was not recorded. The survey was approved by the Ethical Committee of the University of Parma.

Interview procedures

The questionnaire was developed by the residents of the Postgraduate School of Paediatrics of the University of Parma after a review of medical literature. At the start of the first shift, between 9 and 10 in the morning, before beginning any scheduled exercise, the children were interviewed by two of the Authors (V.F. and G.M), previously trained to communicate equally with children.

The questionnaire included 28 questions with multiple responses about sedentary behaviours and nutrition habits during the 7 days before attending summer sport school (Appendix B).

Children were asked how many times a day they spent watching TV, playing videogames, reading and listening to music, doing homework; how they are used to reach the school; what they ate and drank during television viewing and during physical activity.

Harpenden stadiometers were used for height, and every child was measured according to the standard technique elsewhere described (14). Body weight was measured in minimal clothes on portable and calibrated scales. Body mass index (BMI) was calculated using the formula: weight (kg)/height (m^2). Overweight and obesity were defined according to the international cut off points for body mass index for overweight and obesity proposed by Cole et al. (15).

Statistical analyses

The data collected were analyzed using SPSS for Windows and expressed as mean ± SD. Numerical differences were calculated by the student's t-test. The χ^2 test was used to evaluate the differences between proportions. Simple correlation test was used to evaluate the relationship between children's BMI and time spent playing videogames. Differences were considered significant if $p < 0.05$.

Results

Children's features

Out of 150 subjects estimated to participate to the study, 112 (74.6%) children (61% boys) met the inclusion criteria, and accepted to answer the questionnaire. The average age was 9.4±0.5 years (range: 9-10 years).

The grand mean of BMI was 18.71±3.51 (range: 12.43-27.30). Boys and girls had the same BMI mean value (18.9±3.3 vs 18.6±4.4; t=0.516; p=0,607). Altogether the participants appeared to be underweight (4%; BMI: 13.09±0.5), normal-weight (50%; BMI: 16.81±1.4), overweight (23%; BMI: 20.19±0.7) or obese (23%; BMI: 24,3±2.8). Overweight or obesity were more frequent in boys (56%) than in girls (30%; χ^2=6,720 p=0,035).

Sedentary habits

• Television (TV)

All tested children replied to watch TV at least 1 day a week, but 61% were used to watch TV 6 days a week. The mean time spent in front of a television set was 5.8±1.8 days a week (range: 1-7 days) and 100.6±96.0 minutes a day (range: 0-720 minutes). In particular, 56 % of children watched TV 1 hour, 27% between 1 and 2 hours and 17% more than 2 hours a day (Figure 1). Girls watched TV less than boys (84±45 minutes vs 110±75 minutes) (t=2,056; p=0,042).

Twenty-seven per cent of children usually watched TV alone, 32% with the parents, 25% with brothers or sisters, 9% with friends and 7% with grandparents.

Only 28% of children never watched TV during meal times, on the contrary 38% usually watched TV during breakfast, 31% during lunch and 62% during dinner, and 18% during every meal. Among boys watching TV at dinner the percentage of overweight or obesity (58.5%) was significantly higher (χ^2=4.976; p=0.026) compared to the boys viewing TV during the other meals (Table 1).

Forty-one per cent of participants reported to have a TV set in the bedroom, but this habit seemed to be irrelevant for BMI.

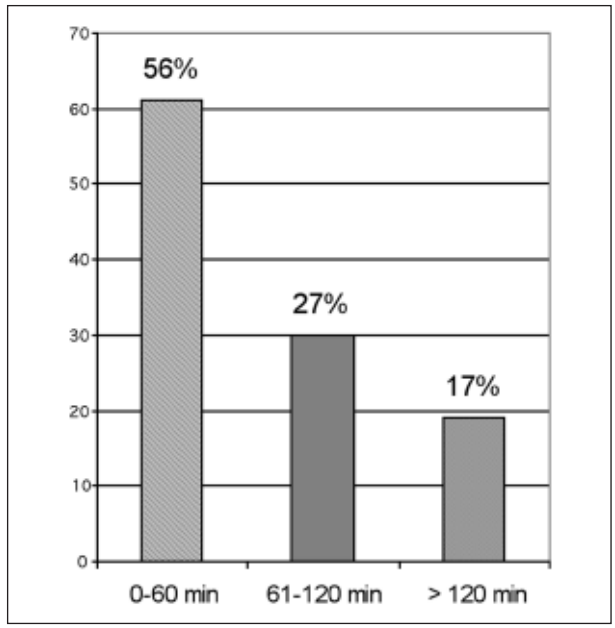

Figure 1. Amount of time (minutes) spent by the children (%) watching TV

Table 1. Difference in TV viewing habit during meals among males and females

	Males n.	Females n.	χ^2	p
Do you watch TV:				
- during breakfast?				
- Yes	29	14	1.90	0.341
- no	39	30		
- during lunch?				
- Yes	22	13	0.01	0.917
- no	46	31		
- during dinner?				
- Yes	48	21	4.97	0.026
- no	20	23		
- during all meals?				
- Yes	15	6	0.73	0.386
- no	53	38		

• Videogames

The children reported to play videogames 3.1±3.5 days a week (range: 0-7 days) for an amount of 57.6±33.5 minutes a day (range: 10-150 minutes). Boys played videogames more frequently than girls (3.7±2.3 vs 2.2±2.5 days; t = 3.182; p=0.002), but no

correlation was found between time spent playing videogames and BMI (r=0.065; p=0.484).

• Means of transport to reach school

The majority of participants, without difference between normal-weight and overweight/obese subjects (χ^2=5.438; p=0.189), was used to go to school by car (55%), by foot (17%), by bike (17%) or by bus (11%). Eighty-six per cent of school-children said to live close to school, and despite this nearby location most of them (71%) reported to use a car to reach school.

• Music and reading

Eighty-one per cent of children said to listen to music on average 3.6±2.3 days a week (range: 1-7 days) for an average global time of 39.5±34.1 minutes a day (range: 5-240 minutes). Thirty-four per cent played a musical instrument on average for 97.5±90.1 minutes a week (range: 15-420 minutes).

The time spent in listening to music or in playing an instrument did not influence BMI (χ^2=2,975; p=0,085).

Nutrition habits

Fifty-seven per cent of televiewer children (65% boys) were accustomed to nibble snacks during TV viewing (Table 2), and this habit was particularly widespread in overweight or obese boys (χ^2=4.546; p=0.033). On the contrary, when a physical activity was performed children preferred to eat fruit, yoghurt and fruit juices more than when they watched TV or played videogames (24% vs 8%; χ^2=4.199 p=0.040).

Table 2. Qualitative difference of food consumed by children during TV viewing and before doing physical activity

	Snack consumed watching TV	Snack consumed before physical activity
Confectionery snacks	44%	45%
Crisps	37%	8%
Pop corn, savouries	14%	10%
Crackers	5%	5%
Ice cream	29%	10%
Fruit, yoghurt, fruit juice	8%	24%
Sandwich, cake, white pizza, pizza	41%	27%

Discussion

Watching television, playing digital games, using computer are the most frequent sedentary lifestyle patterns of the contemporary young people, and are frequently associated with the increasing prevalence of overweight and obesity in childhood (16, 17). This sedentary behaviour, concerning general and unselected school-aged children populations, does not add information on sedentary habits of children routinely devoted to physical activities. All children enrolled into this study were active children so that they decided to spend a part of the holiday attending the Barilla summer sport school. Previous studies did not focus on a similar selected population.

In spite of the tendency to physical activity, the majority of active children enrolled into this study reported to watch TV seven days a week, showing that daily television watching became a without distinction habit in the new generations. Nevertheless, the young people devoted to physical activities appeared less sedentary compared to an unselected school children population from the same area of Parma as previously reported (1).

This difference does not exclude that also an active child is at risk for overweight and obesity. According to our data, the risk was higher in boys than in girls and was related to the longer time spent in front of a TV set. The girls participating in this study were less overweight/obese compared to their peer boys, and this could be due to more physical activity they spent during holiday, confirming a recent report on viewing television during summer which failed to find a correlation with obesity in comparison with the other seasons (18).

Many theories have attempted to explain the association between TV watching and overweight/obesity such as reducing resting energy expenditure during TV viewing (19), overweight and obesity increasing their self watching TV (20), consumption of sweets, cakes and fast foods (21). About this last explanation many studies showed that TV watching is really associated with higher caloric intake (22), and an increased amount of high-density foods consumption (23). In the present study, active children watching TV reported to eat sweet snacks and crisps during

inactive time, but when exercising the same children like best to consume fruits, yogurts and fruit juices.

Family environment may encourage the poor eating habits. Seventy-two percent of our subjects were used to watch TV during meals. It has been reported that the dietary patterns of children from high television families include fewer fruits and vegetables and more pizza, snack foods and caffeine than the habits of children from families in which TV viewing and eating are separate activities (9). In our study, a significant prevalence of overweight and obesity was observed in boys routinely watching TV during supper. The same boys had a television set in the bed-room. This practice irreparably cancels any attempt not to allow television viewing after a certain time of the night (24). A study has established that children with a television in their bedroom watch more TV than children without a television (24). Several Authors have reported a strong relationship between hours of TV watching and increased obesity (25-27). In order to prevent this risk, few parents are used to restrict television use to their children during the week to encourage homework and early bedtime, and others take away television privileges when children report poor results at school (24).

A further impressive finding comes out from this study: 38% of children have breakfast in front of a television set. This means that a large amount of young people is used to take breakfast alone and to begin a day without talking with parents. This habit has to be added to the data on skipping breakfast, previously reported, in the 22% of children attending Barilla Summer sport school (3). In this population a strong relationship between skipping breakfast and overweight/obesity was observed (3).

Playing digital games is a sedentary activity which has increased in the past few decades. Despite TV watching, videogame use has not been definitively associated with overweight or obesity in the young players. No relationship could be attribute to: less days and time spent playing games than viewing TV, as found also in this study; higher energy expenditure compared to watching TV; both hands busy to manage videogame device affect the possibility to take snacks and other unhealthy foods. Based on our data, boys spend more time than girls at video games console, but in spite of this preference no association was found with body composition.

Using buses or cars to go to school is a further sedentary lifestyle pattern rarely evaluated in school children. According to our data, this sedentary behaviour is more frequent than believed. More than half of our subjects reaches the school by car and only 2 out of 10 children are used to go to school by foot. The car users are paradoxically more numerous among children living close to school. Despite this sedentary lifestyle no relationship with an increased BMI has been found.

Among the sedentary lifestyle patterns in active children, the time spent reading a book or listening to music is surprisingly high, ranging between 170 minutes a week and 40 minutes a day respectively. Under the intellectual point of view, this behaviour is encouraging and has to be improved, but only if it is associated with a regular physical activity.

Summarising: also in active children the habit to watch television is widespread; the time spent looking at a TV may be associated to overweight/obesity; this relationship could be explained by the amount of high-density foods consumption during inactivity; playing video games, read a book and listening to the music are sedentary lifestyle patterns but these seem not to represent a risk factor for an increased BMI.

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Appendix

A) List of Students of the Post-Graduate School of Paediatrics, University of Parma, Italy, who actively participated in this survey: Anna Bernardini, Matteo Corchia, Giulia Cremonini, Silvia Fantoni, Silvia Lacava, Maddalena Petraroli, Matteo Zanzucchi.

B) Questionnaire

1. Nell'ultima settimana quanti giorni hai guardato la televisione?

   numero di giorni _____

2. Quanto tempo al giorno hai passato davanti alla televisione nell'ultima settimana?

   numero di (ore e minuti) _____

3. Guardi la televisione mentre fai colazione, pranzi o ceni?

	colazione	pranzo	cena
si			
no			

non vuole rispondere |__|
non lo sa |__|

4. Con chi guardi la televisione?

   da solo |__|
   con uno o entrambi i genitori |__|
   con fratelli o sorelle |__|
   con gli amici |__|
   con i nonni |__|
   con altri |__|
   non vuole rispondere |__|
   non lo sa |__|

5. Che programmi preferisci guardare?

   telegiornale |__|
   cartoni animati |__|
   film |__|
   telefilm |__|
   documentari |__|
   quiz |__|
   programmi musicali |__|
   programmi sportivi |__|
   altro (specificare) _____ |__|

6. In quale momento della giornata guardi di più la televisione?

   durante la colazione |__|
   al mattino |__|
   durante il pranzo |__|
   al pomeriggio |__|
   durante la cena |__|
   dopo cena |__|

7. A che ora vai a letto in genere? |__|__| : |__|__|

8. Hai la televisione in camera da letto?

si	|__|
no	|__|
non vuole rispondere	|__|
non lo sa	|__|

9. Guardi la televisione a letto?

si	|__|
no	|__|
non vuole rispondere	|__|
non lo sa	|__|

10. Quanti giorni giochi a video-giochi (play station, ecc) e al computer (internet, giochi, altro) in una settimana tipo durante l'anno scolastico? numero di giorni _____ (se numero di giorni = 0 vai a 17)

11. Quanto tempo trascorri davanti ai video-giochi (play station, ecc) e al computer (internet, giochi) ogni giorno? numero di (ore/minuti/ore e minuti) _____

12. Con chi giochi ai videogiochi?

da solo	|__|
con uno o entrambi i genitori	|__|
con fratelli o sorelle	|__|
con gli amici	|__|
con i nonni	|__|
con altri	|__|
non vuole rispondere	|__|
non lo sa	|__|

13. In una settimana tipo durante l'anno scolastico ascolti musica?

si	|__|
no	|__|
non vuole rispondere	|__|
non lo sa	|__|

14. Quanti giorni ascolti musica in una settimana tipo durante l'anno scolastico?

numero di giorni _____ (se numero di giorni = 0 vai a 16)

15. Quanto tempo ascolti musica ogni giorno?

numero di (ore e minuti) _____

16. Mangi qualcosa mentre guardi la televisione, giochi ai video-giochi (play station, ecc) e al computer (internet, giochi, altro), o ascolti musica?

si	|__| (vai a 17)
no	|__| (vai a 18)
non vuole rispondere	|__| (vai a 18)
non lo sa	|__| (vai a 18)

17. Se sì, cosa?

merendine	|__|
patatine	|__|
pop corn	|__|
salatini	|__|
torta	|__|
crackers	|__|
gelato	|__|
focaccia	|__|
pizza	|__|
altro (specificare)	|__|

18. Suoni qualche strumento?

si	|__| (vai a 19)
no	|__| (vai a 20)
non vuole rispondere	|__| (vai a 20)
non lo sa	|__| (vai a 20)

19. Quanto tempo dedichi allo studio della musica complessivamente in una settimana tipo durante l'anno scolastico?

numero di (ore e minuti) _____

20. Ti piace leggere?

si	|__| (vai a 21)
no	|__| (vai a 22)
non vuole rispondere	|__| (vai a 22)
non lo sa	|__| (vai a 22)

21. Quanto tempo dedichi alla lettura complessivamente in una settimana tipo durante l'anno scolastico?

numero di (ore e minuti) _____

22. Quante ore al giorno dedichi in media allo studio in una settimana tipo durante l'anno scolastico (comprese le ore passate a scuola)?

numero di (ore e minuti) _____

23. Quanto è distante la tua scuola da casa?

molto vicina	|__|
vicina	|__|
lontana	|__|
molto lontana	|__|

24. Con che mezzo vai a scuola?

in macchina/scooter	|__|
in autobus	|__|
a piedi	|__|
in bicicletta	|__|
altro (specificare)_____	

25. Mangi qualcosa prima di praticare attività fisica?

si	|__| (vai a 26)
no	|__| (vai a 27)
non vuole rispondere	|__| (vai a 27)
non lo sa	|__| (vai a 27)

26. Se sì, cosa?

merendine	|__|
patatine	|__|
pop corn	|__|
salatini	|__|
torta	|__|
crackers	|__|
gelato	|__|
focaccia	|__|
pizza	|__|
altro (specificare)	|__|

27. Mangi qualcosa dopo aver praticato attività fisica?

si	|__| (vai a 28)
no	|__|
non vuole rispondere	|__|
non lo sa	|__|

28. Se sì, cosa?

merendine	|__|
patatine	|__|
pop corn	|__|
salatini	|__|
torta	|__|
crackers	|__|
gelato	|__|
focaccia	|__|
pizza	|__|
altro (specificare)	|__|