



ORIGINAL ARTICLE

## Television viewing habits and their influence on physical activity and childhood overweight<sup>☆,☆☆</sup>



Gisele F. Dutra<sup>a,\*</sup>, Cristina C. Kaufmann<sup>b,c</sup>, Alessandra D.B. Pretto<sup>a</sup>, Elaine P. Albernaz<sup>a,d</sup>

<sup>a</sup> Post-Graduate Program in Health and Behavior, Universidade Católica de Pelotas (UCPEL), Pelotas, RS, Brazil

<sup>b</sup> Universidade Católica de Pelotas (UCPEL), Pelotas, RS, Brazil

<sup>c</sup> School of Nutrition, Universidade Federal de Pelotas (UFPEL), Pelotas, RS, Brazil

<sup>d</sup> Universidade Federal de Pelotas (UFPEL), Pelotas, RS, Brazil

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### KEYWORDS

Children;  
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Sedentary lifestyle;  
Television

### Abstract

**Objectives:** To assess the prevalence of television (TV) viewing habits and their association with childhood sedentary lifestyle and overweight in 8-year-old children, from a cohort in a city in Southern Brazil.

**Methods:** A prospective cohort study with hospital screening of all births that occurred from September of 2002 to May of 2003. This study refers to a cross-sectional analysis of data collected during the cohort's follow-up conducted at 8 years of age. To evaluate the level of physical activity, a physical activity questionnaire for children and adolescents was used (PAQ-C), during the consultation at 8 years of age.

**Results:** Of the 616 interviewed children, a prevalence of sedentary lifestyle > 70% was found, as well as the habit of watching TV for more than two hours a day in 60% of the sample, regardless of gender ( $p=0.30$ ), income ( $p=0.57$ ), or family socioeconomic level ( $p=0.90$ ). The daily time spent watching TV was inversely associated with physical activity ( $p<0.05$ ) and positively associated with excess weight ( $p<0.01$ ). Regarding physical activity, running was the most frequently practiced sports modality among the population.

**Conclusions:** Considering the high prevalence of sedentary lifestyle and children who watch TV for an excessive period of time, it is necessary to motivate such individuals to perform interactive activities, as well as promote a more active lifestyle, by decreasing the time children spend in front of the TV.

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<sup>☆☆</sup> Study performed at the Post-Graduate Program in Health and Behavior, Universidade Católica de Pelotas (UCPEL), Pelotas, RS, Brazil.

\* Corresponding author.

E-mail: gisele\_fd@yahoo.com.br (G.F. Dutra).

**PALAVRAS-CHAVE**

Crianças;  
Estudos de coorte;  
Atividade física;  
Sedentarismo;  
Televisão

**Hábito de assistir televisão e sua influência sobre a atividade física e o excesso de peso infantil****Resumo**

**Objetivos:** Avaliar a prevalência do hábito de assistir televisão (TV) e sua relação com o sedentarismo infantil e o excesso de peso, em crianças aos oito anos de idade, pertencentes a uma coorte de uma cidade do Sul do Brasil.

**Métodos:** Estudo de coorte prospectivo, com triagem hospitalar de todos os nascimentos ocorridos entre setembro de 2002 a maio de 2003. O presente estudo refere-se a uma análise transversal dos dados coletados no acompanhamento da coorte ocorrido aos 8 anos de idade. Para avaliar o nível de atividade física, um questionário de atividade física para crianças e adolescentes foi utilizado (PAQ-C), durante a visita aos oito anos de idade.

**Resultados:** Nas 616 crianças entrevistadas, encontrou-se uma prevalência de sedentarismo superior a 70%, e o hábito de assistir TV por um período superior a 2 horas diárias em 60% da amostra, independente do gênero ( $p = 0,30$ ), renda ( $p = 0,57$ ) ou nível socioeconômico ( $p = 0,90$ ). O tempo diário assistindo televisão associou-se inversamente à prática de atividade física ( $p < 0,05$ ) e positivamente ao excesso de peso ( $p < 0,01$ ). Com relação à atividade física, corrida foi a prática esportiva mais frequente na população.

**Conclusões:** Diante da elevada prevalência de sedentarismo e de jovens que assistem TV por um período excessivo, faz-se necessário o estímulo a atividades interativas, bem como a promoção de um estilo de vida mais ativo, com a redução do tempo que jovens dispõem em frente à TV.

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**Introduction**

According to data from the latest Household Budget Survey (HBS), the Brazilian population in all age groups older than 5 years has followed the global trend of weight gain<sup>1</sup> However, also in the preschool population, data from the National Health and Nutrition Research (PNSN-1989) and the National Research on Demographics and Health of Children and Women (PNDS-1996 and 2006/07) show that excess weight has increased dramatically over the last 17 years.<sup>2</sup> Although the proportion of obese adults is higher than that of children and adolescents, the prevalence of childhood obesity is continuously and rapidly growing in the country, having increased three-fold in the last 20 years.<sup>1</sup>

The importance of childhood obesity prevention is widely recognized; however, many interventions tend to reach only a small part of the population, especially in developed countries. Therefore, population-based prevention strategies seek to support and facilitate increased levels of physical activity and healthier diets, as they are factors amenable to intervention.<sup>3</sup>

Satisfactory results in childhood obesity control have been obtained through tactics that stimulate the decrease in sedentary behaviors.<sup>4</sup> According to Santaliestra-Pasías et al.,<sup>5</sup> children and adolescents spend much of their leisure time with low intensity and low caloric expenditure activities. Additionally, in a recent study, Ghavamzadeh et al.<sup>6</sup> showed a direct association between the habit of watching television (TV) and excess weight in Iranian adolescents, regardless of physical activity and consumption of obesogenic food.

Conversely, a study by Giammattei et al.<sup>7</sup> showed that more sedentary schoolchildren consumed soft drinks more frequently and, therefore, were more obese. Furthermore, according to Thivel & Chaput,<sup>8</sup> the time spent on sedentary behaviors is exacerbated by excessive calorie intake. Thus, spending more time in less vigorous activities, such as watching TV, using the computer, and playing video games, has contributed to the weight gain of adolescents, as the main physiopathology of this disorder is the positive balance of energy intake.<sup>9</sup> In this sense, Friedrich et al.<sup>10</sup> suggested, based on a systematic review, that intervention programs in schools can have a positive effect in reducing the time in front of the screen.

Thus, the aim of this study was to evaluate the prevalence of the habit of watching TV and its association with childhood sedentary lifestyle and excess weight in children aged 8 years, from a cohort in a city in Southern Brazil.

**Methods**

Between the months of September of 2002 and May of 2003, all hospital births that occurred in the city of Pelotas were identified. This study refers to a cross-sectional analysis of data collected in the follow-up of a cohort that occurred at 8 years of age. Details of the methodology are described in previous studies.<sup>11,12</sup>

This study described the practice of physical activity in children aged 8 years. For this purpose, it used a physical activity questionnaire for children and adolescents (PAQ-C)<sup>13</sup> characterizing the level of physical activity performed on the seven days before the questionnaire is applied, which

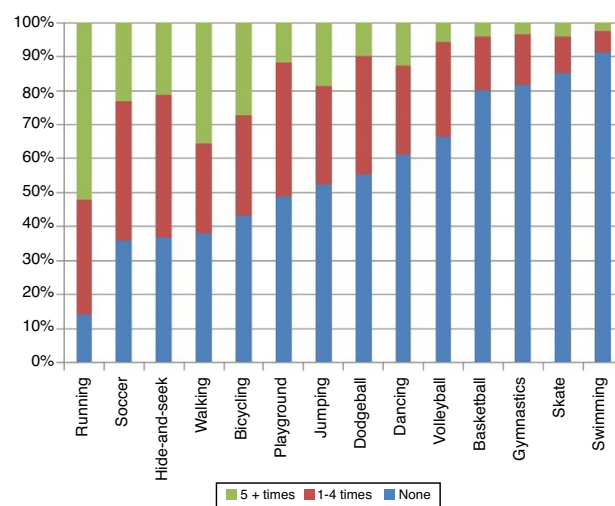
has been translated and adapted to exclude physical activities and sports not practiced in Brazil.<sup>14</sup> The questionnaire consists of questions about sports and games, physical activities at school, and those during leisure time, including the weekend. Each question is scored from 1 to 5, with the final score obtained through the means of the question scores. The scores 1-5 represent, respectively, the very sedentary, sedentary, moderately active, active, and very active categories. Thus, individuals can be classified as active (score  $\geq 3$ ) or sedentary (score  $< 3$ ). It also contains a question on the mean daily time spent watching TV.

For homogeneity of data collection, an instruction manual was made available to the interviewers, who were previously trained. The standardized questionnaire was applied to the mothers or caregivers and the children regarding aspects of childhood health, including the frequency, type, and intensity of physical activity in the previous week. A random sample of 10% answered a summarized questionnaire, applied by the field work supervisor, to evaluate the quality and accuracy of the collected information. The Kappa coefficient (0.94) was used for comparison purposes.

To calculate the cohort study sample size, a significance level of 95% and statistical power of 80% were used, estimating exposures ranging from 15% to 80% and a relative risk of 2.0. To the initially calculated size, 15% was added for possible losses and control of potential confounding factors. For the consultation at 8 years of age, all children from previous follow-ups were attempted to be located, but due to new objects of study and the large number of losses, *a posteriori* calculation of statistical power was performed with the sample of 616 children. To analyze the main outcome (physical inactivity, excess weight, and time spent in front of the TV), the statistical power was greater than 80%, maintaining an alpha value of 5%.

The following variables were analyzed: demographic (sex of the child - male, female, and maternal age in complete years) and socioeconomic factors (family income, economic class according to the Brazilian Association of Research Companies [Associação Brasileira de Empresas de Pesquisa - ABEP]<sup>15</sup> and maternal education), parity (number of children, including the one in the study), marital status (living or not living with a partner), and child characteristics (gestational age, birth weight in grams, nutritional status, physical activity, and habit of watching TV). To characterize the sample, univariate analysis was performed (frequency and percentage). In order to verify the difference in the frequency of physical activities and time spent watching TV, gender, income and economic strata, and their association with excess weight, bivariate analysis was performed, assessing the outcomes in relation to those variables using the chi-squared test, with significance level of  $p < 0.05$ .

Data were entered in duplicate using Epi Info 6.0 (Epi Info™ Help Desk Centers for Disease Control and Prevention, USA) for identification and correction of typos. Data analysis was carried out using the statistical package SPSS, release 21.0 (IBM Corp. SPSS Statistics for Windows, USA). The research project was approved by the Ethics Committee of Universidade Católica de Pelotas. After receiving detailed information on the study, parents or guardians signed the Informed Consent, agreeing to their children's participation in the study.



**Figure 1** Weekly frequency of performance of different types of physical activity at 8 years of age, Pelotas, RS, Brazil.

## Results

Of the 3,449 births that occurred in the study screening period, 81.0% (2,799) were newborns whose mothers lived in the city of Pelotas. Of these, ten had early discharge, 26 mothers were HIV positive (which were excluded, as the initial objectives of the cohort were related to breastfeeding), and another 22 refused to participate in the study, totaling 2,741 newborns, from which a random sample of 30% was selected, corresponding to 973 babies.

At the follow-up at 8 years old, 616 children were interviewed, which represented 63.3% of the initial sample, with losses related to five refusals, 17 deaths, 93 moves to other states or cities, and 242 addresses that were not found. Despite the losses, the sample interviewed at 8 years of age showed no statistically significant differences when compared with the initial cohort.

It was verified that a little more than half of the sample were males, 60% watched TV more than two hours daily, and 71% were sedentary. Other characteristics are shown in Table 1. It can be observed that inactivity rate was higher in girls (75.3%) than in boys (67.4%) ( $p < 0.05$ ). However, it was independent from income ( $p = 0.95$ ) or socioeconomic status ( $p = 0.78$ ), and was not associated with excess weight, with a prevalence ratio (PR) of 1.12 and 95% confidence interval (95% CI) of 0.86 to 1.46;  $p = 0.38$  (data not shown in table). The habit of watching TV for more than two hours a day was not associated with the child's gender ( $p = 0.30$ ), family income ( $p = 0.57$ ), or socioeconomic status ( $p = 0.90$ ), but was inversely associated with physical activity (PR = 0.78, 95% CI: 0.61 to 0.99;  $p < 0.05$ ). Moreover, it was positively associated with excess weight (PR = 0.83; 95% CI: 0.73 to 0.95;  $p < 0.01$ ).

Regarding physical activity, Fig. 1 shows that running was the most frequent activity in the general population. The analysis by gender shows that this practice was also more prevalent in both genders.

Regarding the participation in each activity according to gender, soccer ( $p < 0.01$ ), basketball ( $p < 0.01$ ), and skating ( $p < 0.01$ ) were significantly more frequently practiced by

**Table 1** Characteristics of the study sample, Pelotas, RS, Brazil, 2011.

Variable	N	%
<i>Family income<sup>a</sup></i>		
≤ 1	85	13.8
1.01 to 3	308	50.0
3.01 to 6	144	23.4
> 6	66	10.7
Unknown	13	2.1
<i>Economic class (ABEP)<sup>b</sup></i>		
A1 and A2	24	3.9
B1 and B2	202	32.8
C1 and C2	325	52.8
D and E	65	10.5
<i>Maternal age<sup>c</sup></i>		
≤ 25	52	8.4
26-35	311	50.5
> 35	249	40.4
Unknown <sup>d</sup>	4	0.6
<i>Maternal schooling</i>		
Illiterate/3 <sup>rd</sup> year Elementary School	34	5.5
Finished 4 <sup>th</sup> year Elementary School	176	28.6
Finished Elementary School	133	21.6
Finished High School	213	34.6
Finished College/University	53	8.6
Unknown <sup>e</sup>	7	1.1
<i>Mother lives with partner</i>		
Yes	480	77.9
No	128	20.8
Unknown <sup>e</sup>	8	1.3
<i>Number of children</i>		
One	143	23.2
More than one	473	76.8
<i>Gestational age</i>		
< 37 weeks	66	10.7
≥ 37 weeks	550	89.3
<i>Newborn birth weight</i>		
< 2,500 g	49	8.0
≥ 2,500 g	567	92.0
<i>Number of daily hours watching TV</i>		
≤ 2 hours	250	40.6
> 2 hours	366	59.4
<i>Physical activity level</i>		
Sedentary	439	71.2
Active	177	28.8
<i>Excess weight</i>		
Yes	231	37.5
No	385	62.5
<b>Total</b>	<b>616</b>	<b>100.0</b>

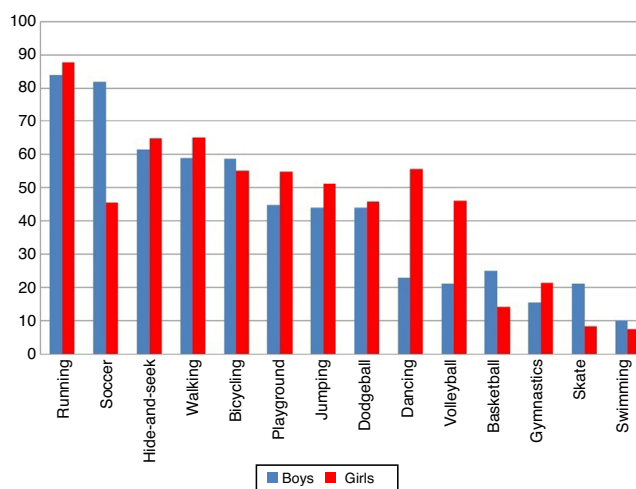
<sup>a</sup> In Brazilian minimum wages.

<sup>b</sup> Classification according to the Brazilian Association of Research Companies (ABEP); it emphasizes the purchasing power of individuals, without classifying them in social classes. Economic class A comprises individuals with highest purchasing power, and economic class E, those with least purchasing power.

<sup>c</sup> In complete years.

<sup>d</sup> Maternal death.

<sup>e</sup> Children who do not live with the mother.

**Figure 2** Percentage of different types of physical activities performed, according to gender, Pelotas, RS, Brazil.

boys than by girls. Among girls, dancing ( $p < 0.01$ ) and volleyball ( $p < 0.01$ ) were the more frequently practiced activities (Fig. 2).

## Discussion

Running was the most often practiced activity in both genders in this population, which differs from the results found in the study by Azevedo et al.,<sup>16</sup> performed in adolescents also from the city of Pelotas, in which most reported soccer as the most often practiced physical activity. Analyzing the activities that were more frequently carried out according to gender, running was also the most often practiced by both boys and girls. This result differs from that of previous studies, which found that soccer is the most prevalent physical activity in males, while volleyball is the most practiced sports modality in girls.<sup>16,17</sup>

However, in this study, when analyzing the most prevalent activities in each gender, it can be observed that soccer was practiced significantly more by boys ( $p < 0.01$ ), as well as basketball ( $p = 0.01$ ) and skating ( $p < 0.01$ ). Volleyball, which was reported in the aforementioned studies as the most often practiced by girls, was also practiced significantly more often by girls in the present study, in addition to dancing ( $p < 0.01$ ). It is noteworthy that also in the study by Azevedo et al.,<sup>16</sup> the practice of dancing was one of the most popular activities among girls, second only to volleyball. Also according to these authors, these differences between the types of activity practiced by the genders can be explained in part by cultural and social factors. The more prevalent practice of soccer by boys would be due to the influence of this sport in the country, while volleyball among girls is related to the fact that, in the past, there was a greater incentive for the practice of this modality due to the fact that there is no physical contact between the players.<sup>16</sup>

The fact that running was the most popular sport in this sample may be due to the lower validity of the questionnaire for our culture, as the socio-cultural environment directly influences the practice of physical activity, which is a limiting factor of the study.<sup>14</sup> In addition, another limitation is the large number of losses compared to the initial



sample, but, in spite of this fact, the sample visited at 8 years of age was representative of the original population. Furthermore, the hypothesis that the association between time spent watching TV with a sedentary lifestyle and excess weight might be a reflection of reverse causality bias cannot be ruled out, as these variables were collected simultaneously.

In relation to the time spent watching TV, approximately 60% of children spend more than two hours per day on this activity. This is a matter of concern, as according to the American Academy of Pediatrics,<sup>18</sup> children should watch no more than two hours daily. Moreover, it differs from that proposed by the World Health Organization (WHO) for the prevention of obesity in children and adolescents, which implies, among other practices, the promotion of an active lifestyle, with restricted screen time.<sup>19</sup>

In this context, previous studies have shown a direct association between hours spent in front of the TV and weight.<sup>20,21</sup> This fact may be associated with lack of parental control over this habit, which often causes children to wish to acquire sweets and candy shown in TV advertisements.<sup>22</sup> In a study designed to evaluate food choices of children and adolescents exposed and not exposed to food advertisements shown on TV, Mattos et al.<sup>23</sup> demonstrated that advertised foods were more often chosen than other products. This fact is important, as in another study that aimed to analyze the amount of food advertisements shown on TV and the time they were shown, the authors identified 239 advertisements throughout 336 hours of programming; 85% of these products advertised source of sugars, oils, and fats, in addition to the total absence of fruits and vegetables.<sup>24</sup>

The lack of association between time spent watching TV and gender, socioeconomic, status and income differs from previous studies. Vasconcellos et al.,<sup>25</sup> when evaluating screen time in schoolchildren from Niterói, RJ, found that among females, this practice was significantly more prevalent. Regarding socioeconomic status, a previous study showed a positive association between this variable and screen time. According to the authors, this is probably due to the difficulty of access to electronic equipment of the lower classes.<sup>26</sup> Moreover, according to Keihner et al.,<sup>27</sup> lower-income children spend more time on activities such as watching TV when compared to those belonging to higher income families.

The high prevalence of physical inactivity (71.2% in sedentary and very sedentary individuals) observed in the population can be explained, in part, by the habit of watching TV for a period longer than two hours daily, as a significant and direct association between the two was observed ( $p < 0.05$ ). This result is similar to that observed by Hallal et al.,<sup>17</sup> which also found a positive association between these variables when assessing the prevalence of physical inactivity and associated factors in adolescents aged 10-12 years in Pelotas.

Corroborating these results, Babey et al.<sup>28</sup> also found that adolescents more involved in physical activities spent less time watching TV or using the computer. Furthermore, the association found in this study between excess weight and daily hours watching TV confirms the results found by Vasconcellos et al.,<sup>25</sup> which also found a significant direct association between these variables. Moreover, it supports the results reported by Santalíestra-Pasías et al.,<sup>5</sup>

who found that the reduction of time spent in sedentary behaviors can be used as a strategy to fight childhood obesity.

According to the present results, a high prevalence of physical inactivity was found, as well as children who watch TV for an excessive period of time. Additionally, the association of this habit with low levels of physical activity and excess weight in this sample confirms previous studies that demonstrated the association between sedentary behavior and excess weight in children.<sup>20,21</sup> Thus, interventions that aim to reduce such habits can help fight the obesity epidemic.

Therefore, it is necessary to stimulate interactive activities and promote a more active lifestyle, by reducing the time that young individuals spend in front of the TV, which contributes to the reduction of physical inactivity and, therefore, of excess weight in this population.

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## Conflicts of interest

The authors declare no conflicts of interest.

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