Sedentary behavior in adolescents: the 11-year follow-up of the 1993 Pelotas (Brazil) birth cohort study

Comportamento sedentário em adolescentes: a visita de 11 anos da coorte de nascimentos de Pelotas, Rio Grande do Sul, Brasil, 1993

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Abstract

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The aim of this study was to estimate the prevalence of sedentary behavior and investigate associated factors in adolescents 11 years of age from the 1993 birth cohort in Pelotas, Rio Grande do Sul State, Brazil. Sedentary behavior was investigated with a questionnaire, and was defined as spending more than two hours per day watching television, playing videogames, or using the computer. Of the 4,452 adolescents interviewed, 98% reported watching television, 44% playing videogames, and 22% using the computer. The average time spent on each of these electronic media was 197, 36, and 17 minutes per day, respectively. Prevalence of sedentary behavior was 79.7% (95%CI: 78.6; 80.9) and showed a positive association with socioeconomic level and nutritional status and a negative association with well-being. These 11-year-olds spent extensive time at TV viewing, videogames, and the computer. Special attention should be given to the most exposed groups of adolescents, including the more affluent, overweight, and those with limited schooling.

Sedentary Lifestyle; Adolescent; Cohort Studies

Introduction

Sedentary behavior includes low-intensity activities with reduced calorie expenditure [1]. Television viewing is the most commonly studied indicator, since it represents the single largest share of sedentary behavior [2], but the latter encompasses not only TV, but also videogames and the computer, reading, listening to music, talking on the telephone, and other activities [3]. The first three activities (TV, videogames, and computer), also known as screen time or electronic media exposure, account for more than half the time spent in sedentary behaviors [4].

Studies on sedentary behavior are scarce in the literature, especially in developing countries. However, there is strong evidence that greater exposure to sedentary behavior, especially electronic media time (TV, videogames, and computer) can have a harmful effect on health, in both adolescence [5] and adulthood [6]. Additionally, sedentary behavior shows moderate stability during childhood and adolescence, which is known as the tracking effect [7,8,9].

Although most research on sedentary behavior focuses on its association with obesity, electronic media use by children and adolescents also correlates with various other unfavorable health outcomes, including violence and aggressive behavior [10], early sexual initiation and affected sexuality [11], increased intake of foods with low nutritional value and high calorie density [12],

distorted body image [13], use of substances like alcohol and cigarettes and other drugs [14], decreased school performance [15], decreased sleep time [16], and low physical aptitude [6].

In response to the growing problem of obesity in childhood and adolescence and other health problems involving electronic media exposure, in 1995 the American Academy of Pediatrics Committee on Communications launched guidelines for limiting screen time to no more than 2 hours/day for children beginning at two years of age [17]. Even so, it is estimated that the time children and adolescents spend in front of the TV set exceeds the time they spend in school, and that by the time they finish secondary school, they will have spent approximately three years watching television [18]. In addition, various studies have shown that sedentary behavior tends to increase during adolescence [7].

The aim of this study was to determine the prevalence of sedentary behavior and investigate associated factors in adolescents, with a mean age of 11 years, in a birth cohort from southern Brazil.

Methodology

Subjects in this study are part of a prospective cohort study monitoring all hospital births in 1993 in the city of Pelotas, Rio Grande do Sul State, Brazil. At the time, the mothers answered a questionnaire and the newborns were weighed and measured. Sub-samples of these individuals were visited at 1, 3, and 6 months and 1, 4, 6, and 9 years of age. In 2004-2005, all the cohort members were searched for a new follow-up, the methodological details of which are described elsewhere [19]. The findings presented in this article refer to this last visit, when the mean age of the adolescents was 11 years.

The principal variable – sedentary behavior – was collected through face-to-face interviews using a previously tested and standardized questionnaire. This instrument included questions about whether the adolescent watched TV, played videogames, and used the computer. The mean time spent in front of each of these electronic media (in a typical week) was asked separately for weekdays and weekends. The outcomes were constructed by adding the weighted mean screen time (TV + videogame + computer), assigning weight 5 to weekdays and weight 2 to weekends and dividing the result by 7 to obtain the mean time in minutes per day. The cutoff used to define sedentary behavior was screen time greater than 2 hours/day, in accordance with international guidelines for this age bracket [17]. An additional analysis was performed using a cutoff of 4 hours/day, for purposes of comparison.

To investigate factors associated with sedentary behavior, the following data were collected: demographic (gender and skin color), socioeconomic (assets index, constructed from a principal components analysis involving 18 indicators of socioeconomic status), family (how the adolescent was raised as compared to friends the same age), environmental (whether the adolescent likes the neighborhood where he or she lives), behavioral (level of physical activity greater versus less than 300 minutes/week), nutritional (nutritional status), and health (level of well-being, measured with the faces scale, from 1 to 7 in decreasing order).

The data were analyzed in three different ways. First, we described the percentage of adolescents that watched TV, played videogames, and used the computer. The chi-square test was used to compare the proportions among the categories of independent variables. Next, we present the mean time (in minutes/day) spent at each of these electronic media, and compare the means using the ANOVA test. Finally, we analyze the prevalence of sedentary behavior (with cutoffs of 2 hours/day and 4 hours/day) according to the target factors. In this case, both the crude and adjusted analyses were performed using Poisson regression with robust variance [20].

We should highlight that in order to adjust for possible confounders a conceptual model was elaborated that determines the order of the variables' entry into the multivariate analysis. This model consists of various levels, organized hierarchically according to the causal sequence in each factor's influence on the outcome [21]. The first (more distal) level includes the demographic and socioeconomic factors (gender, skin color, and assets index); the intermediate level includes the family and environmental factors (upbringing and liking the neighborhood); and the more proximal contains the behavioral (physical activity), nutritional (nutritional status), and health characteristics (well-being). Each variable was controlled for those at the same level or above, and all were submitted to analysis, keeping in the model only those with a p-value less than 0.20 [22]. Significance was set at 5%, and all the analyses were performed with Stata, version 9.2 (Stata Corp., College Station, USA).

The research was approved by the Institutional Review Board of the School of Medicine at the Federal University in Pelotas. Parents or guardians signed a free and informed consent form authorizing the children to participate in the study.

Results

Of the 4,452 adolescents interviewed, complete information on outcome was obtained for 4,431 (99.5%). The proportions that watched TV, played videogames, and used the computer were 98.2%, 43.9%, and 22.4%, respectively (Table 1). Factors associated with watching more TV were: higher income, being raised more indoors, liking one's neighborhood, and obesity. Playing videogames was associated with male gender, white skin color, higher household assets index, physical activity, and obesity. Computer use was more frequent among white, upper-class, overweight or obese boys with intermediate well-being scores.

As for the various electronic media, the adolescents spent an average of more than 3 hours/day watching TV, 30 minutes playing videogames, and 15 minutes on the computer (Table 2). While girls watched more TV, boys spent more time on videogames and the computer. The same was true for those raised more indoors as compared to those with a freer upbringing. TV time did not differ according to skin color or household assets index, but white and more affluent adolescents spent more time playing videogames and using the computer. Liking the neighborhood was not associated with any of the target behaviors. Physically active adolescents watched less TV but spent more time playing videogames. As for

Table 1

Proportion of adolescents that watch television, play videogames, or use the computer, according to target characteristics. 1993 Pelotas (Brazil) birth cohort study, 2004-2005 follow-up.

Variable	Television (%)	Videogames (%)	Computer (%)
Gender	p = 0.134	p < 0.001	p = 0.023
Male	97.9	58.5	23.9
Female	98.5	29.8	21.0
Skin color	p = 0.087	p < 0.001	p < 0.001
White	98.5	46.3	27.4
Black/Brown	97.6	38.7	12.1
Assets index (quintiles)	p < 0.001	p < 0.001	p < 0.001
1st (lowest)	95.6	34.1	5.2
2nd	97.9	39.0	9.1
3rd	99.5	43.6	9.1
4th	99.4	53.1	19.7
5th	100.0	52.2	71.0
Upbringing	p = 0.035	p < 0.001	p = 0.077
Freer	97.5	50.6	24.3
More indoors	98.4	41.6	21.8
Likes the neighborhood	p = 0.005	p = 0.623	p = 0.570
No	97.1	44.7	21.7
Yes	98.5	43.8	22.6
Level of physical activity	p = 0.933	p < 0.001	p = 0.098
Inactive	98.2	39.6	23.7
Active	98.3	49.4	21.5
Nutritional status	p = 0.012	p < 0.001	p < 0.001
Underweight	96.2	43.0	21.2
Normal	98.2	42.3	20.5
Overweight	98.6	44.6	27.8
Obese	99.2	53.4	28.9
Well-being	p = 0.112	p = 0.122	p < 0.001
1 (happiest)	97.8	42.5	20.4
2	98.7	45.8	26.3
≥ 3	98.4	44.6	20.0
Total	98.2	43.9	22.4

Table 2

Time (minutes/day) for each sedentary behavior and the combination of the three (watching television, playing videogames, and using the computer), according to categories of independent variables. 1993 Pelotas (Brazil) birth cohort study, 2004-2005 follow-up.

Variable	Television Mean (SD)	Videogames Mean (SD)	Computer Mean (SD)	Screen time Mean (SD)
Gender	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$
Male	190 (119)	55 (82)	20 (53)	265 (164)
Female	203 (119)	18 (40)	13 (38)	234 (135)
Skin color	$p = 0.095$	$p = 0.001$	$p < 0.001$	$p < 0.001$
White	199 (117)	39 (67)	21 (52)	258 (151)
Black/Brown	192 (122)	31 (63)	8 (30)	231 (148)
Assets index (quintiles)	$p = 0.263$ *	$p < 0.001$ *	$p < 0.001$ *	$p < 0.001$ *
1st (lowest)	185 (122)	26 (56)	3 (16)	215 (138)
2nd	202 (122)	33 (64)	4 (18)	239 (145)
3rd	200 (121)	37 (71)	5 (24)	243 (148)
4th	206 (119)	45 (69)	10 (30)	261 (147)
5th	190 (105)	43 (70)	62 (80)	295 (162)
Upbringing	$p < 0.001$	$p = 0.001$	$p = 0.008$	$p = 0.127$
Freer	182 (118)	42 (67)	20 (53)	244 (156)
More indoors	202 (119)	34 (65)	16 (43)	252 (149)
Likes the neighborhood	$p = 0.232$	$p = 0.143$	$p = 0.457$	$p = 0.072$
No	201 (125)	39 (74)	18 (49)	258 (159)
Yes	196 (117)	36 (64)	16 (46)	247 (149)
Level of physical activity	$p = 0.002$	$p < 0.001$	$p = 0.103$	$p = 0.736$
Inactive	201 (120)	30 (57)	18 (48)	249 (146)
Active	190 (117)	45 (76)	15 (44)	250 (157)
Nutritional status	$p = 0.015$	$p < 0.001$	$p = 0.002$	$p < 0.001$
Underweight	188 (120)	33 (72)	17 (48)	238 (164)
Normal	194 (119)	35 (65)	15 (44)	244 (149)
Overweight	209 (117)	33 (57)	19 (45)	261 (139)
Obese	204 (120)	49 (73)	23 (54)	276 (162)
Well-being scale	$p < 0.001$ *	$p = 0.019$ *	$p = 0.012$ *	$p < 0.001$ *
1 (happiest)	187 (117)	34 (63)	14 (42)	235 (146)
2	202 (119)	37 (66)	20 (51)	260 (151)
≥ 3	217 (123)	41 (74)	16 (46)	274 (161)
Total	197 (119)	36 (66)	17 (46)	249 (151)

SD: standard deviation.

* p-value for linear trend.

nutritional status, obese adolescents spent more time front of the TV, videogames, and computer. Screen time was inversely related to level of well-being.

Considering total screen time, kids spent an average of more than 4 hours/day in front of the TV, videogames, or computer (last column, Table 2). Time was greater for boys, whites, and the obese. It also increased according to household assets index and decreased according to level of well-being.

Overall prevalence of sedentary behavior (screen time ≥ 2 hours/day) was 79.7% (95% confidence level, 95%CI: 78.6; 80.9). Table 3 shows the results of the sedentary behavior analysis according to target factor categories. According to the crude analysis, prevalence was higher among white, more affluent, and overweight adolescents and those that did not classify themselves as very happy. In the adjusted analysis, skin color lost the association after controlling for assets index. The other variables (gender, upbringing, liking

Table 3

Prevalence of sedentary behavior (screen time greater than 2 hours/day) according to target factors. 1993 Pelotas (Brazil) cohort study, 2004-2005 follow-up.

Variable	Prevalence (%)	Crude analysis		Adjusted analysis	
		PR (95%CI)	p-value	PR (95%CI)	p-value
Gender			0.127		0.095
Male	80.7	1.02 (0.99; 1.05)		1.03 (1.00; 1.06)	
Female	78.8	1.00		1.00	
Skin color			< 0.001		0.171
White	81.5	1.07 (1.03; 1.11)		1.03 (0.99; 1.06)	
Black/Brown	76.2	1.00		1.00	
Assets index (quintiles)			< 0.001 *		< 0.001 *
1st (lowest)	70.6	1.00		1.00	
2nd	78.9	1.12 (1.06; 1.18)		1.12 (1.06; 1.18)	
3rd	79.0	1.12 (1.06; 1.18)		1.11 (1.05; 1.18)	
4th	83.9	1.19 (1.13; 1.25)		1.18 (1.12; 1.24)	
5th	88.5	1.25 (1.19; 1.32)		1.24 (1.18; 1.30)	
Upbringing			0.065		0.174
Freer	77.9	1.00		1.00	
More indoors	80.5	1.03 (1.00; 1.07)		1.03 (0.99; 1.06)	
Likes the neighborhood			0.238		0.411
No	78.3	0.98 (0.94; 1.02)		0.98 (0.95; 1.02)	
Yes	80.2	1.00		1.00	
Level of physical activity			0.473		0.915
Inactive	80.1	1.01 (0.98; 1.04)		1.00 (0.97; 1.03)	
Active	79.2	1.00		1.00	
Nutritional status			< 0.001 *		0.002 *
Underweight	76.6	1.00		1.00	
Normal	78.4	1.02 (0.96; 1.09)		1.02 (0.96; 1.09)	
Overweight	83.3	1.09 (1.01; 1.17)		1.06 (0.98; 1.14)	
Obese	85.8	1.12 (1.04; 1.20)		1.08 (1.00; 1.16)	
Well-being scale			< 0.001 *		< 0.001 *
1 (happiest)	76.6	1.00		1.00	
2	82.4	1.08 (1.04; 1.11)		1.06 (1.03; 1.10)	
≥ 3	84.4	1.10 (1.06; 1.15)		1.10 (1.05; 1.14)	
Total	79.7	-	-	-	-

PR: prevalence ratio; 95%CI: 95% confidence interval.

* p-value for linear trend.

one's neighborhood, and level of physical activity) were not statistically associated with sedentary behavior.

When considering the 4 hours/day cutoff, prevalence of sedentary behavior was 47.2% (95%CI: 45.7; 48.7). Most of the associations showed similar results to those in the previous paragraph for Table 3. However, some differences appeared in relation to gender, liking one's neighborhood, and nutritional status (Table 4). Prevalence was 15% greater in boys than girls; those that reported not liking the neighborhood were more prone to exceeding the cutoff; and nutritional status lost its association in the adjusted analysis (Table 4).

Discussion

This is one of the first studies on the association between sedentary behavior and demographic, socioeconomic, family, environmental, nutritional, behavioral, and health characteristics in a sample of Brazilian adolescents. Most studies on

Table 4

Prevalence of sedentary behavior (screen time greater than 4 hours/day) according to target factors. 1993 Pelotas (Brazil) birth cohort study, 2004-2005 follow-up.

Variable	Prevalence (%)	Crude analysis		Adjusted analysis	
		PR (95%CI)	p-value	PR (95%CI)	p-value
Gender			< 0.001		< 0.001
Male	50.5	1.15 (1.08;1.22)		1.14 (1.07;1.22)	
Female	44.0	1.00		1.00	
Skin color			< 0.001		0.087
White	49.6	1.16 (1.08;1.25)		1.07 (0.99;1.16)	
Black/Brown	42.6	1.00		1.00	
Assets index (quintiles)			< 0.001 *		< 0.001 *
1st (lowest)	39.1	1.00		1.00	
2nd	44.1	1.13 (1.01;1.26)		1.13 (1.01;1.26)	
3rd	42.6	1.09 (0.97;1.22)		1.08 (0.96;1.21)	
4th	50.8	1.30 (1.17;1.44)		1.29 (1.15;1.43)	
5th	59.8	1.53 (1.38;1.69)		1.49 (1.34;1.65)	
Upbringing			0.062		0.094
Freer	44.8	1.00		1.00	
More indoors	48.1	1.07 (1.00;1.15)		1.07 (0.99;1.15)	
Likes the neighborhood			0.068		0.018
No	49.9	1.07 (1.00;1.16)		1.10 (1.02;1.18)	
Yes	46.5	1.00		1.00	
Active (≥ 300 minutes/week)			0.309		0.534
No	46.4	1.00		1.00	
Yes	48.0	1.03 (0.97;1.10)		1.02 (0.96;1.09)	
Nutritional status			< 0.001 *		0.123 *
Underweight	43.6	1.00		1.00	
Normal	45.7	1.05 (0.92;1.20)		1.01 (0.88;1.15)	
Overweight	52.9	1.22 (1.05;1.41)		1.11 (0.96;1.25)	
Obese	52.4	1.20 (1.04;1.40)		1.05 (0.90;1.23)	
Well-being scale			< 0.001 *		< 0.001 *
1 (happiest)	42.7	1.00		1.00	
2	50.6	1.19 (1.11;1.27)		1.15 (1.07;1.23)	
≥ 3	54.8	1.29 (1.18;1.41)		1.27 (1.16;1.39)	
Total	47.2	-	-	-	-

PR: prevalence ratio; 95%CI: 95% confidence interval.

* p-value for linear trend.

this theme have been done in developed countries like the United States and Australia [7,8,9,12,16], with rare studies in developing countries.

A positive aspect of this study is the three-way analysis of sedentary behavior. First, we analyzed factors associated with TV, videogames, and the computer. Next, we analyzed the mean time spent daily at each of these electronic media separately and all three combined (screen time) according to the independent variables. Finally, screen time was dichotomized (according to two cutoff) and the associations with the study variables were established. However, the lack of psychometric indicators (reproducibility and validity) in the instrument used to measure sedentary behavior posed a limitation to the current study.

It is difficult to compare the findings from the first and second way of operationalizing the outcome (continuous variable) with those in the literature, since most studies have analyzed sedentary behavior by categorizing it according to a given cutoff [7,23,24]. Among the studies that have measured prevalence of sedentary behav-

ior using the 2 hours/day cutoff, a major survey focused on adolescents 11 to 15 years of age in 32 countries including the Europe continent, United States, Canada, and Israel [24]. Sedentary behavior varied from 40% (Switzerland) to 80% (Ukraine). However, the study only considered TV viewing time. In an Australian study focusing on 8-to-13-year-olds, prevalence of sedentary behavior (considering TV, videogames, and the computer) was 82% [7]. This finding is consistent with that of our study (80%). However, considering the mean total sedentary behavior time, the results are slightly different (23.8 hours/week in the Australian study versus 29.1 hours/week in the current study).

In Brazil, a study of adolescents 15 to 19 years of age in the State of Santa Catarina found 73% prevalence of sedentary behavior (screen time greater than 2 hours/day), with no difference by gender [25]. Another population-based study in Pelotas with adolescents 10 to 19 years of age detected 75% prevalence of sedentary behavior (TV time greater than 2 hours/day) 75% [243]. If the current study had considered only TV time to define sedentary behavior, the prevalence would have been some 70%, very close to that of the previously cited study.

As for factors associated with sedentary behavior, a systematic review published in 2004 reached the following conclusions: prevalence of sedentary behavior (estimated as TV viewing time) was greater for individuals 9 to 13 years of age, with lower socioeconomic status, from families with separated parents, from ethnic minorities, with a TV in the child's room, and with higher body weight [2]. Another recent systematic review found that sedentary behavior in adolescents (including TV, videogames and computer) was more frequent among boys, non-Caucasians and was directly associated with body mass index (BMI) and inversely associated with socioeconomic status and parents' schooling [26].

The positive association between sedentary behavior and socioeconomic status in this study differs from that reported by the two above-mentioned systematic reviews. A possible explanation for this discrepancy is the fact that most of the studies came from countries in which the population's purchasing power is much higher than in Brazil. Thus, in the developed countries, lower-income people have greater access to electronic media devices, unlike Brazil, where many poor people lack home videogames and computers. The same arguments apply to skin color, since individuals from ethnic minorities in developed countries are more exposed to sedentary behavior, contrary to the Brazilian context, where whites are at greater risk.

When the factors included in the creation of the sedentary behavior variable are analyzed separately, some peculiarities emerge. For example, while girls watch more TV, boys spend more time at videogames and the computer. This can probably be explained by cultural aspects and deserves a qualitative approach in order to understand it better. Importantly, there was no association between gender and screen time using the 2 hours/day criterion, but when the 4 hours/day cutoff was used, boys showed a higher prevalence of sedentary behavior.

Another important observation is that active adolescents watch less TV, but spend more time playing videogames. A similar finding was reported in a study of Canadian adolescents [27]. The explanation for this phenomenon is not totally clear, but videogames clearly involve more action and energy expenditure than watching TV. Another hypothesis is that videogames featuring sports may encourage playing sports in real life. However, when screen time was analyzed as a single variable, there was no association with physical activity, which is also consistent with the literature, since they are two different and independent behaviors [28].

As for liking one's neighborhood, this variable did not show an association with the time spent on each of the electronic media or with sedentary behavior. However, considering the 4 hours/day cutoff for screen time, adolescents that reported not liking their neighborhood showed 10% higher odds of exceeding this cutoff. This finding may explain the effect that environmental factors (e.g. place of residence) have on individual behavior, even among school-age children.

The positive association in the current study between nutritional status and sedentary behavior is consistent with the literature [2,26]. However, sedentary behavior may not only be a risk factor for obesity [1], but also be caused by it [7]. However, the current study design did not allow making causal inferences, since the association was analyzed at a single moment. Thus, the absence of association based on the 4 hours/day cutoff may be explained by a possible reverse causality effect, namely, obese adolescents may have reduced the time spent at the electronic media due to their excess weight, either at their own initiative or due to recommendations by others.

The inverse association between well-being and sedentary behavior was also an interesting finding. Less happy adolescents were the ones with the most screen time, regardless of which media (TV, videogame, or computer). This association could also be interpreted in the other direction, since all the factors were measured at the same moment, and it was not possible to es-

tablish a temporal relationship between the two phenomena. Thus, it could be that adolescents that spend more time at TV, videogames, and the computer, which are sedentary and individual activities, acquire a lower level of well-being.

The identification of factors associated with sedentary behavior, especially those considered modifiable (environmental factors, for example) may contribute effectively to the implementation of strategies and programs that aim to combat excess sedentary behavior in childhood and adolescence and consequently help reduce the high levels of adiposity observed in this age group [29]. However, regardless of the adolescent's characteristics, both screen time and prevalence of sedentary behavior were substantially high, varying respectively from 3.5 to 5 hours/day and from 71% to 89%. Even considering the 4 hours/day cutoff, nearly half the adolescents in our sample exceeded this level.

Finally, we recommend further research on this issue, since the associated factors have still not been fully elucidated and may vary according to the specific study context. In addition, as found in the current study, sedentary behavior affects a large proportion of children in early adolescence. Longitudinal studies are also useful for better identifying the determinants and mediators of change in this behavior during adolescence, as well as its effect in adulthood.

Resumo

O objetivo deste estudo foi determinar a prevalência e investigar os fatores associados ao comportamento sedentário em adolescentes de 11 anos, pertencentes à coorte de nascimentos de 1993 de Pelotas, Rio Grande do Sul, Brasil. O comportamento sedentário foi coletado por meio de questionário, e definido como ficar mais de duas horas por dia assistindo à televisão, jogando videogame *ou usando computador. Dos 4.452 adolescentes entrevistados, 98% assistiam à televisão, 44% jogavam* videogame *e 22% usavam computador. O tempo médio na frente de cada um desses meios eletrônicos foi, respectivamente, 197, 36 e 17 minutos por dia. A prevalência de comportamento sedentário foi de 79,7% (IC95%: 78,6; 80,9), e teve uma associação positiva com nível socioeconômico e com estado nutricional, e negativa com a escala de bem-estar. O tempo despendido em atividades como ver televisão, jogar* videogame *e usar computador foi elevado (média superior a 4 horas/dia). Maior atenção deve ser dada aos grupos mais expostos, tais como adolescentes de classe alta, acima do peso e com menor nível de bem-estar.*

Estilo de Vida Sedentário; Adolescente; Estudos de Coortes

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