

# Physical activity and eating habits in public high schools from different regions in Brazil: the *Saude na Boa* project

## *Atividade física e hábitos alimentares em escolas públicas do ensino médio em diferentes regiões do Brasil: o projeto Saúde na Boa*

Markus Vinicius Nahas<sup>I</sup>

Mauro Virgílio Gomes de Barros<sup>II</sup>

Bernard D. Goldfine<sup>III</sup>

Adair da Silva Lopes<sup>I</sup>

Pedro Curi Hallal<sup>IV</sup>

José Cazuza de Farias Júnior<sup>I,V</sup>

Elusa Santina de Oliveira<sup>I</sup>

<sup>I</sup> Universidade Federal de Santa Catarina (UFSC)

<sup>II</sup> Universidade de Pernambuco (UPE)

<sup>III</sup> Kennesaw State University (KSU/EUA)

<sup>IV</sup> Universidade Federal de Pelotas (UFPEL)

<sup>V</sup> Universidade Federal da Paraíba (UFPB)

**Corresponding author:** Markus Vinicius Nahas. Centro de Desportos da Universidade Federal de Santa Catarina (UFSC) - Campus Universitário - Trindade CEP 88040-900 - Florianópolis, SC, Brazil. E-mail: markus@cds.ufsc.br

## Abstract

**Purpose:** To analyze physical activity and dietary patterns of adolescents and young adults attending evening classes in high schools at two socioeconomic and culturally contrasting Cities in Brazil: Recife (in northern Brazil) and Florianópolis (in southern Brazil). **Methods:** This is a cross-sectional analysis (baseline data) of a school-based randomized trial (the *Saude na Boa* project), including 2,147 students (15-24 years of age; 55.7% females) from 10 schools in each city, pair-matched by size and location. Data were collected by questionnaire. **Results:** Males were more active than females ( $p < 0.001$ ) in all three physical activity measures in the questionnaire: days/wk of 60+min of moderate-to-vigorous physical activity (MVPA) - males 3.8 d/wk ( $s=2.3$ ), females 3.2 d/wk ( $s=2.4$ ); walk/bike to school - males 4.5 d/wk ( $s=2.4$ ), females 4.1 d/wk ( $s=2.4$ ); and, strength exercises - males 2.3 d/wk ( $s=2.5$ ), females 0.8 d/wk ( $s=1.7$ ). The prevalence of physical inactivity (zero d/wk of 60+ min MVPA) was significantly higher in Recife ( $p < 0.001$ ). Consumption of fruits was significantly higher in Recife than in Florianópolis ( $p < 0.001$ ), but no differences were observed for vegetable ( $p=0.28$ ) and soda consumption ( $p=0.09$ ). In general, one out of five students (21.7%) consumed fruits and vegetables  $< 5$  d/wk. **Conclusions:** Students attending evening classes (public high schools) in Recife tend to be older but are less likely be employed than their counterparts in Florianópolis. Participation in physical education classes was much more prevalent in Florianópolis (87.6% x 19.4% in Recife), especially for females. The prevalence of less than optimal eating habits and insufficient levels of physical activity justify the efforts to promote healthier behaviors in this transitional phase in life.

**Keywords:** Youth. Physical activity. Eating behavior. High School.

## Resumo

**Objetivo:** Analisar os padrões de atividade física e hábitos alimentares de adolescentes e jovens adultos matriculados no ensino noturno de escolas públicas do ensino médio em duas cidades com características culturais e socioeconômicas diversas no Brasil: Recife (Região Nordeste) e Florianópolis (Região Sul). **Métodos:** Estudo observacional transversal dos dados de base de uma intervenção escolar randomizada (Projeto Saúde na Boa), incluindo 2.147 estudantes (15-24 anos; 55,7% do sexo feminino) de 10 escolas em cada uma das cidades, pareadas por tamanho e localização. Os dados foram coletados por questionário. **Resultados:** Os rapazes foram mais ativos que as moças ( $p < 0,001$ ) em todas as três medidas de atividade física no questionário: dias/sem com 60+min de atividade física moderada a vigorosa (AFMV) – rapazes 3,8 d/sem (DP=2,3), moças 3,2 d/sem (DP=2,4); caminhar ou pedalar para a escola – rapazes 4,5 d/sem (DP=2,4), moças 4,1 d/sem (DP=2,4); e exercícios de força muscular – rapazes 2,3 d/sem (DP=2,5), moças 0,8 d/sem (DP=1,7). A prevalência de inatividade física (zero dias/sem com 60+min de AVMV) foi significativamente mais alta em Recife ( $p < 0,001$ ). A frequência de consumo de frutas foi mais elevada em Recife do que em Florianópolis ( $p < 0,001$ ), não havendo diferença no consumo de legumes e verduras ( $p = 0,28$ ) e consumo de refrigerantes ( $p = 0,09$ ). Em geral, um em cada cinco estudantes (21,7%) consumia frutas e verduras em menos de cinco dias da semana. **Conclusões:** Estudantes matriculados no período noturno em escolas públicas do ensino médio em Recife tendem a ser mais velhos, mas apresentam menor proporção de trabalhadores. A participação em aulas de Educação Física era bem mais frequente em Florianópolis (87,6% x 19,4% em Recife), particularmente para as moças. A prevalência de hábitos alimentares inadequados e insuficiente atividade física justificam os esforços para promoção de comportamentos mais saudáveis nesta fase de transição da adolescência para a vida adulta.

**Palavras-chave:** Jovens. Atividade física. Comportamento alimentar. Ensino Médio.

## Introduction

Physical inactivity and inadequate nutrition are considered important risk factors for several chronic diseases, and major determinants of the worldwide obesity epidemics<sup>1,2</sup>. Initially thought as a problem specific to developed countries, excess body weight is becoming a great challenge to public health in developing countries as well, primarily because of increased consumption of energy-dense foods and reduced physical activity<sup>2</sup>. Excess body weight (BMI  $\geq 25$ ) affects over 50% of the adult population in Brazil, and approximately 11% of adult Brazilians (men 8.9%; women 13.1%) are considered obese<sup>3</sup>. Similarly to what has been observed in developed countries, such as in the United States<sup>4</sup>, the prevalence of overweight in the Brazilian population has increased at a rapid rate in recent years, particularly among men, people living in the South, and in urban areas of the Country<sup>5,6</sup>.

Data from several countries indicate that physical activity significantly declines as adolescents transition into adulthood<sup>7,8</sup>, and evidence suggest that the developmental transitions of this phase in life may be an important aspect in understanding the age-related decline in physical activity<sup>9,10</sup>. Particularly in developing countries, such transitions during youth (15-24 years) include concurrent pressures such as: economic demands to be in the workforce, the desire to seek college education; getting married; in addition to the lack of information, time or opportunities for a healthier lifestyle.

A previous survey with high school students in Santa Catarina<sup>7</sup>, indicated that approximately half of the students in public schools reported poor eating habits (especially low consumption of fruits and vegetables), and one-third was insufficiently active (less than 300 min/wk of moderate-to-vigorous physical activity [MVPA]). These negative behaviors were more prevalent among students attending evening classes.

The purpose of this study was to analyze

the physical activity and dietary patterns of adolescents and young adults attending evening classes in high schools at two socio-culturally contrasting Cities in Brazil: Recife (Northeast; lower Human Development Index - HDI) and Florianopolis (South; higher HDI).

## Methods

This is a cross-sectional analysis (baseline data) of a school-based randomized trial (the *Saude na Boa* project)<sup>11,12</sup>, including 2,147 students (15-24 years of age; 55.7% females) from 10 schools in Florianopolis and 10 schools in Recife, pair-matched by size and location. Data were collected by a previously validated questionnaire at the beginning of the 2006 school year in Brazil (March).

The population in this investigation included students attending evening classes in public high schools in Florianopolis, in the state of Santa Catarina, and Recife, in the state of Pernambuco. Official data indicated that in March 2006, the total number of students attending the 25 public high schools in Florianopolis was approximately 13,000 students (including morning, afternoon, and evening classes), and approximately 75,000 attending 114 public schools in Recife<sup>13</sup>.

The target population (evening-class students from public schools, ages 15-24 years) is justified by the following reasons: (a) approximately 70% of high school students attend public schools<sup>13</sup>; (b) almost half of high school students in Brazil attend evening classes, mainly because a large proportion of them work during the day (e.g., in Santa Catarina, 68% of the students attending evening classes work 6 to 8 hours per day)<sup>7</sup>; (c) physical inactivity and poor quality diet (as well as other health risk behaviors) are more prevalent among students who work and, in general, attend evening classes<sup>7</sup>; and (d) the choice for Florianopolis and Recife was justified by the socio-cultural contrast (the southern region has better overall socioeconomic indicators than the northeastern

and other contrasting factors, for instance: Recife has a much higher proportion of non-white students in public schools and seasonal temperature variation is much more significant in the south, compared to the northeastern region.

A questionnaire was developed and validated for this population<sup>14</sup>, which included measures for physical activity and eating habits from the PACE+ Project<sup>15,16</sup>. Two single items were used to assess the number of days students accumulated at least 60 minutes of MVPA in the past seven days, and in a typical week. A composite score was computed, as suggested by Prochaska, Sallis and Long<sup>16</sup>, averaging the scores of the two reference periods. Information on active transportation (walking/biking), physical education attendance, exercise and sports outside the school, in addition to TV/computer hours per day was also included in the activity module of the questionnaire.

Eating habits included the frequency (days per week) that the student reported eating selected types of food, disregarding the number of portions per day (fruits and fruit juices, vegetables, milk, rice and beans, sodas, sweets, and pastries). The reliability was high for the combined physical activity score (intraclass correlation coefficient – ICC = 0.93; 95%CI 0.90; 0.95) and food frequency questionnaire (ICC ranging from 0.83 to 0.95). Other information on validity and reliability of the instrument used in data collection is already reported elsewhere<sup>11,14</sup>.

Physical activity indicators were: reported days per week engaged in moderate to vigorous physical activity – MVPA, biking and/or walking to school, performing strength exercise, and attending physical education classes. Subjects who reported no engagement in moderate to vigorous physical activity in at least one day per week were classified as “inactive”. Eating habit indicators were based on reported days per week of consumption of fruits, vegetables, and soft drinks (sodas).

Body weight (kg), height (cm), and waist circumference (cm) were assessed by trained staff following the standard procedures sug-

gested by Lohman et al.<sup>17</sup> BMI was calculated (kg/m<sup>2</sup>) and interpreted according to age and sex, as suggested by Cole et al.<sup>18</sup> to determine the prevalence of excess body weight.

Although there were no invasive procedures neither any activity of unusual risk to the students, assurance of the protection of human participants was provided. The proposal was submitted and approved by institutional review boards, both in Recife (Research Ethics Committee of the Instituto Materno Infantil de Pernambuco – protocol 587/2005), and Florianópolis (Research Ethics Committee of the Federal University of Santa Catarina – protocol 031/2003).

Parental passive consent was used among subjects under 18 years; the students took home one form that stated the purposes of the intervention and asked the parents to inform the school if they did not wish their son or daughter to participate. Students over 18 years were informed about the purpose and methods of the study and invited to participate, assuring that all information was to be kept anonymous.

For those 18 or older, verbal consent was obtained for both measurement procedures and for participation in the intervention activities.

Data analyses included a comparison of the results between the two independent groups (high-school students from Recife and Florianópolis). *T* tests were used to evaluate differences in means (days per week) while chi-square tests were performed to assess the differences in proportions. Statistical analyses were performed using SPSS software (version 15.0).

## Results

The sample included adolescents and young adult students (15-24 years of age), with a mean age was 18.4 years (SD=2.3). The proportion of students in the “older” group (20-24) was greater in Recife than in Florianópolis, with a contrasting pattern of distribution by gender in the two cities, i.e., there were more girls in Florianópolis, and more males in Recife (Table 1).

**Table 1** - Demographic, socioeconomic, and anthropometric characteristics of high-school students in Florianópolis (FLN) and Recife (REC).

**Tabela 1** – Características demográficas, socioeconômicas e antropométricas de estudantes do Ensino Médio em Florianópolis (FLN) e Recife (REC).

Variable *	Males		Females		Total	
	FLN (n=486)	REC (n=466)	FLN (n=664)	REC (n=531)	FLN (n=1150)	REC (n=997)
Age (%)						
15-19 years	86.4	45.3	78.6	53.5	81.9	49.6
20-24 years	13.6	54.7	21.4	46.5	18.1	50.4
Marital status (% single)	91.5	90.5	85.7	83.1	88.3	86.6
Ethnicity (% white)	53.8	23.7	58.9	28.2	56.7	26.1
Work (% no)	42.9	53.9	50.7	65.0	47.3	59.8
Anthropometry mean (SD)						
Body weight (kg)	65.6 (12.0)	66.9 (13.0)	56.5 (10.9)	55.5 (9.9)	60.4 (12.3)	60.8 (12.8)
Height (cm)	173.2 (6.7)	172.4 (7.1)	160.9 (6.3)	159.5 (5.9)	166.1 (8.9)	165.5 (9.1)
BMI (kg/m <sup>2</sup> )	21.8 (3.4)	22.4 (3.8)	21.8 (3.9)	21.8 (3.6)	21.8 (3.7)	22.1 (3.7)
Waist circumference (cm)	75.0 (8.3)	75.7 (8.2)	69.8 (8.3)	68.0 (7.7)	72.0 (8.7)	72.1 (8.6)

FLN=Florianópolis; REC=Recife\*

All anthropometric values showed in this table represents means and standard deviations (in parenthesis) while all other variables are presented in percentages.

Todos os valores antropométricos mostrados nesta tabela representam médias e desvios-padrão (entre parênteses, enquanto todas as outras variáveis estão apresentadas em percentagens.

Approximately 50% of the students reported some type of regular job. A greater proportion of males reported some type of regular job, as did those students living in Recife (Table 1).

Males were more active than females ( $p < 0.001$ ) in all three physical activity measures in the questionnaire: days/wk of 60+min MVPA - males 3.8 d/wk (SD=2.3), females 3.2 d/wk (SD=2.4); walk/bike to school - males 4.5 d/wk (SD=2.4), females 4.1 d/wk (SD=2.4); and, strength exercises - males 2.3 d/wk (SD=2.5), females 0.8 d/wk (SD=1.7).

In general, the prevalence of inactivity (zero d/wk of 60+ min MVPA) was 10.7% (95%CI: 9.4;12.1). This prevalence was significantly higher ( $p < 0.001$ ) among females (15.0%) than males (5.3%). In Recife, the prevalence of inactivity was higher in comparison to Florianopolis, but there was no statistical significance for this finding, except in the instance of females (Figure 1).

In general, 44.3% (95%CI 42.2; 46.5) of the students did not attend any physical education classes. Regardless of gender, the proportion of students not attending physical education classes was significantly higher in Recife (Figure 2), and among females in both cities ( $p = 0.009$ ).

Consumption of fruits was significantly higher in Recife than in Florianopolis ( $p < 0.001$ ), but no differences were observed

for vegetable ( $p = 0.28$ ) and soda consumption ( $p = 0.09$ ). In general, one out of five students (21.7%) consumed fruits and vegetables  $< 5$  d/wk (Table 3). This proportion did not differ according to gender ( $p = 0.18$ ), but this negative behavior was more prevalent in Florianopolis than in Recife ( $p = 0.004$ ).

## Discussion

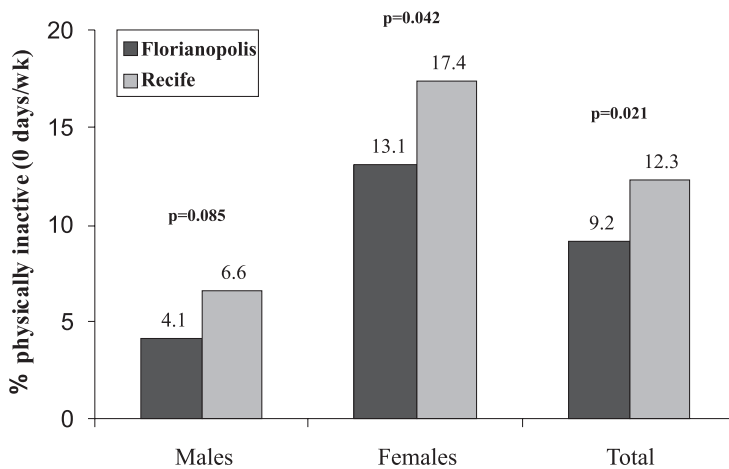
A number of studies of adolescents have aimed to identify characteristics of subgroups that exhibit higher levels of physical activity and greater consumption of fruits and vegetables, with the hope of gaining insights as to how these behaviors patterns can be promoted. Data from the CDC paints a less-than-optimal picture of adolescent activity levels within the United States, i.e., almost half of young people aged 12-21 are not vigorously active on a regular basis; furthermore, physical activity declines dramatically with age during adolescence<sup>19</sup>. Concerning the other major component of this study, adolescent studies on healthy eating habits (as defined mainly by the frequency of intake of fruits and vegetables), appears to be variable, dependent upon the countries under study. For example, in Europe, several studies have found a decline in fruit and vegetable intake as adolescents age, whereas, research in the United States has found no decline in the diet of these

**Table 2** - Physical activity indicators in each site stratified by sex.

**Tabela 2** – Indicadores de atividade física em cada local estratificados por sexo.

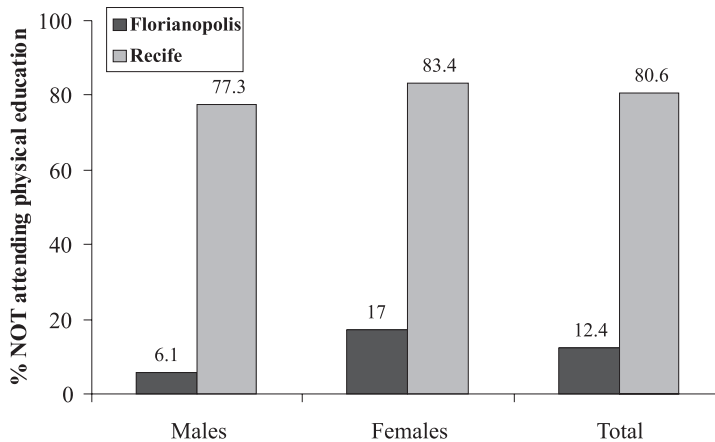
Physical activity indicator – mean (SD)	Males		Females		Total	
	FLN (n=486)	REC (n=466)	FLN (n=664)	REC (n=531)	FLN (n=1150)	REC (n=997)
MVPA (days/wk)	3.9 (2.2)	4.0 (2.3)	3.2 (2.3)	3.4 (2.5)	3.5 (2.3)	3.7 (2.4)
	NS		NS		NS	
Bike/walk to school (days/wk)	4.3 (2.5)	4.7 (2.2)	3.9 (2.5)	4.4 (2.3)	4.1 (2.5)	4.5 (2.2)
	$p < 0.01$		$p < 0.01$		$p < 0.001$	
Strength exercise (days/wk)	2.2 (2.3)	2.3 (2.6)	0.8 (1.7)	0.7 (1.6)	1.4 (2.1)	1.4 (2.3)
	NS		NS		NS	
Physical education (days/wk)	1.8 (0.6)	0.4 (0.8)	1.6 (0.8)	0.3 (0.7)	1.7 (0.8)	0.3 (0.8)
	$p < 0.001$		$p < 0.001$		$p < 0.001$	

FLN=Florianopolis; REC=Recife; NS=non significant ( $p \geq 0.05$ )



**Figure 1** – Prevalence of physical inactivity (0 days/wk) in each site stratified by gender ( $p < 0.001$ ).

**Figura 1** – Prevalência de inatividade (0 dias/semana) em cada local estratificada por gênero ( $p < 0,001$ ).



**Figure 2** – Proportion of students NOT attending physical education classes by gender and location ( $p < 0.001$ ).

**Figura 2** – Proporção de estudantes que NÃO frequentam aulas de educação física, por gênero e local ( $p < 0,001$ ).

**Table 3** – Diet indicators in each site stratified by sex.

**Tabela 3** – Indicadores de dieta em cada local estratificados por sexo.

Diet indicator – mean (SD)	Males		Females		Total	
	FLN (n=486)	REC (n=466)	FLN (n=664)	REC (n=531)	FLN (n=1150)	REC (n=997)
Fruits (days/wk)	3.9 (2.3)	4.3 (2.1)	4.1 (2.3)	4.6 (2.2)	4.0 (2.3)	4.4 (2.1)
	$p < 0.01$		$p < 0.01$		$p < 0.001$	
Vegetables (days/wk)	3.4 (2.4)	3.8 (2.6)	3.9 (2.5)	3.8 (2.7)	3.7 (2.5)	3.8 (2.7)
	$p < 0.01$		NS		NS	
Sodas (days/wk)	3.8 (2.2)	3.3 (2.3)	3.8 (2.0)	3.6 (2.2)	3.8 (2.1)	3.4 (2.3)
	NS		$p = 0.05$		NS	

FLN=Florianópolis; REC=Recife; NS=non significant ( $p \geq 0.05$ )

essential foods as adolescents age<sup>20</sup>.

The results also revealed a high consumption of soft drinks, with subjects reporting to consume this type of beverage on average more than three days a week. This finding is parallel with previous studies carried out in United States<sup>21</sup> and Brazil<sup>22</sup>.

In this study, inter-regional comparisons between students attending public high school evening classes in Recife and Florianópolis yielded the following findings: (1) students in Recife tend to be older, but the proportion of students with a regular job is higher in Florianópolis; (2) a much higher percentage of students in Florianópolis participate in physical education classes (87.6% x 19.4% in Recife), especially when comparing female populations. These characteristics are more than likely contributing factors to the higher prevalence of physical inactivity among students in Recife, vis-à-vis their counterparts in Florianópolis.

Additionally, the relatively lower socioeconomic status of the Recife population may have some impact upon the low degree of physical activity as reported, in that family socioeconomic status often correlates positively with youth activity levels<sup>23</sup>. Concerning inter-regional differences relative to diet, students in Recife consumed significantly more fruit than students in Florianópolis; however, no differences were found between groups in the consumption of vegetables or soft drinks. This trend of greater fruit consumption may be in part due to the fact that tropical fruits (mangos, papayas, guavas, passion fruit, and pineapples) are plentiful and popular in the northeastern region of Brazil.

The findings on fruit consumption run

counter to the majority of studies, which have found that lower socioeconomic status is associated with lower or less frequent intake of fruits and vegetables; however, the Recife students' higher consumption of fruits, is parallel to the findings in a handful of studies, which reported higher intake of fruits among lower socioeconomic groups<sup>20</sup>. Curiously, recent population-based surveys carried out in 2006 and 2007 in Brazil<sup>24,25</sup> registered a higher proportion of adults who reported consumption of fruits in five or more days per week in Florianópolis in comparison to Recife.

Turning from geographic to gender differences in the levels of physical activity in this study, consistent with the literature<sup>26,27</sup>, female adolescents reported much less physical activity than males of this age group. However, concerning diet, female subjects reported more frequent consumption of fruits and vegetables than the males in this study, which is congruent with the findings in the overwhelming majority of other studies considering gender differentiation<sup>20</sup>.

Further research is needed to assess the determinants of levels of physical activity and consumption of fruits and vegetables among adolescents and young adults. Age, gender, socioeconomic position, parental activity levels, and fruit/vegetable consumption all play a role in this complex equation as well as the availability and quality of physical education and health courses. There is no question that the results of studies like this one, which reveal prevalence of such negative eating habits and insufficient levels of physical activity justify the efforts to promote healthier behaviors in this transitional phase in life.

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Recebido em: 16/12/08

Versão final reapresentada em: 07/04/09

Aprovado em: 04/05/09