# Determining factors of physical activity opportunities for rural area adolescents

#### Rudney da Silva <sup>1\*</sup>, Carla Regiane Vargas <sup>2</sup>, Danielle Biazzi Leal <sup>3</sup>, Gisele Graziele Bento <sup>4</sup>, Paulo José Barbos Gutierres Filho <sup>5</sup>

<sup>1</sup>Laboratory of Adapted Motor Activity, Graduate Program in Human Movement Sciences, Center for Health Sciences and Sports, State University of Santa Catarina. Pascoal Simone St. 327, Florianópolis, 88080-350, Brazil

<sup>2</sup> Msc.; Laboratory of Adapted Motor Activity, Center for Health Sciences and Sports, State University of Santa Catarina. Pascoal Simone St. 358, Florianópolis, 88080-350, Brazil

<sup>3</sup> Msc.; Laboratory of Adapted Motor Activity, Center for Health Sciences and Sports, State University of Santa Catarina. Pascoal Simone St. 358, Florianópolis, 88080-350, Brazil

<sup>4</sup> Msc.; Laboratory of Adapted Motor Activity, Center for Health Sciences and Sports, State University of Santa Catarina. Pascoal Simone St. 358, Florianópolis, 88080-350, Brazil

<sup>5</sup> PhD.; Laboratory of Adapted Motor Activity, Center for Health Sciences and Sports, State University of Santa Catarina. Pascoal Simone St. 358, Florianópolis, 88080-350, Brazil

#### \* Corresponding Author: Rudney da Silva

Center for Health Sciences and Sports, State University of Santa Catarina. Pascoal Simone St. 358, Florianópolis, 88080-350, Brazil Phone: 55 (48) 3321 8651/55 (48) 3321 8195 | Email: rudney.silva@udesc.br

#### Abstract

**Background:** Adolescence is a critical stage for the physical inactivity and the obesity, and the knowledge of factors that influence the opportunities for physical activity and nutritional status is very important, especially for the health of rural populations.

**Objective:** To analyse associations between determining the factors of the physical activity opportunities and nutritional status and demographical characteristics of adolescents from rural areas of the Santa Catarina state, in southern Brazil.

**Methods:** Cross-sectional study with 991 randomly selected subjects, using the Physical Activity Questionnaire – Child.

**Results:** Girls tend to be more sedentary whereas boys tend to be more active and moderately active, including the performance of all school and extracurricular physical activities. Physical activities in physical education classes show the greatest proportion of adolescents classified as more active. Significant correlations were identified between the physical activity opportunities for males when the head of household has studied beyond the ninth grade.

**Conclusion:** In the rural areas of Santa Catarina school and extracurricular physical activities are determined by the sex and by the educational level of the head of household. Physical activities in physical education show the greatest proportion of active

adolescents, whereas physical activities done in the evenings show the lowest proportion of active adolescents.

Key words: Adolescence, physical activity, rural health.

## Introduction

Adolescence can be considered a critical stage with regard to the decrease in physical activity opportunities and the increase of being overweight and obesity.<sup>1-2</sup> Studies show that the level of physical activity and nutritional status are subject to social, economic and cultural factors,<sup>3-9</sup> presenting significant differences between populations with rural and urban resources.<sup>10-12</sup>

Rural populations have specific characteristics that vary according to the regional characteristics in which they are in such as time of year,<sup>13</sup> location<sup>11</sup> and the type of prevailing agricultural activity.<sup>14</sup> Studies done in Brazil indicate that adolescents in rural areas show the widespread predominance of greater physical activity than those in the urban areas in the northeastern and southeastern areas<sup>15</sup> and a similar predominance in the southern area, except for the girls.<sup>6</sup> However, studies ascertained different results on the level of physical activity in adolescents in the State of Santa Catarina.<sup>16,17</sup>

Official data show that 15.4% of the population live in rural areas and that approximately 85% are engaged in family farms on small properties, prevailing manual and homeproduced labor.<sup>18,19</sup> In this rural setting there are daily activities that affect adolescents' physical activity opportunities, such as breaks between classes, physical education classes and after-school, evening and weekend activities.<sup>2,20-23</sup> However, studies indicate a lack of research on physical activities performed by adolescents in rural areas in Brazil.<sup>12,16,24</sup>

Considering the importance of physical activity opportunities for adolescents' health, particularly in regard to being overweight and obese, the objective of this study is to verify the associations between the determining factors of the physical activity opportunities and level of physical activity, nutritional status and socioeconomic level of adolescents with 11 to 17 year old from rural.

# Methods

This cross-sectional study with randomly selected subjects, was approved by Institutional Review Board (IRB). The population was estimated from official Brazilian data showing the Brazilian state of Santa Catarina has a total of 6,248,436 residents, with 1,000,533 in the rural area, and with 129,349 of those rural area residents being between 11 and 17 years old.<sup>18</sup> Official data indicate 16.1% of the population of the State of Santa Catarina is in rural areas and approximately 90% of this population is engaged in family farms.<sup>18,24</sup> The state of Santa Catarina is located in the southern area of Brazil, is predominantly from Italian, German and Portuguese descent, and has the second highest human growth rate in the country (0.840).

The subjects were described as adolescents, between 11 and 17 years old, both sexes, residents in rural areas, from the eight regions of the state of Santa Catarina - Brazil. The sampling was designed and conducted by proportional groups in two stages. In the first stage a regional population survey was done and it was identified the population of the state of Santa Catarina (N=129,349).<sup>18</sup> The sample quantity was calculated assuming a prevalence of 50% of physical activity in adolescents, with a error of less than 5% and additional 10% for refusals and 20% losses, resulting in an estimate of 988 subjects. In the second stage was done the calculation of the proportional quantity per region, attempting to protect a representative sample. To determine the representative sample was used to calculate the sample fraction. The calculation of minimum sample fraction was multiplied by quantitative population of each one of the eight regions of the Santa Catarina state. 1,026 subjects in eight regions of the state were identified (West: 83; Northeast: 67; Northern Plateau: 114; Midwest: 141; Valley of Itajaí: 18; Highland Plateau: 73; South: 257; Coast: 38). 35 cases of the sample were excluded that did not fill out the date of birth (3.4%). The final sample included 605 boys and 386 girls, a total of 991 subjects (n) and making a return rate of 96.6%.

After getting voluntary informed consent from the subjects and their caregivers, the collection of data commenced. Raters trained for the research collected the data. The use of questionnaires and anthropometric measurements were done pursuant and date previously scheduled. The level of physical activity and its corresponding opportunities were assessed by the Physical Activity Questionnaire – Child (PAQ-C).<sup>20,26</sup> The PAQ-C was adapted to the Brazilian context.<sup>20</sup> The PAQ-C assesses moderate and intense physical activities of adolescents in the seven days preceding its application. This instrument has nine questions with values from 1 to 5 points on exercise in sports, games, school and extracurricular physical activities including those on weekends (Appendix 1). The socioeconomic level was rated by the Brazilian Economic Classification Criterion (BECC).<sup>26</sup> The BECC is extensively used in the Brazilian context and is made up of an issue consisting of 10 items on household goods rated on a five-point scale, and one issue made up of an ordinal scale on the different levels of educational attainment for the head of household of the family. The socioeconomic level classifies the points the subjects receive as belonging to classes A1 (46-42), A2 (41-35), B1 (34-29), B2 (28-23), C1 (22-18), C2 (17-14), D (13-8) and E (7-0).<sup>26</sup> Anthropometric assessments were done according to techniques and procedures recommended for the measurements of body weight and height.<sup>27</sup> Anthropometric assessments were carried out with the subjects barefoot, wearing light clothes, by professionals trained in these procedures. Body weight was measured with a mechanical scale with a capacity of up to 150 kg, and body height was measured with an anthropometric aluminum ruler with a scale of up to 2 meters.

The level of physical activity was calculated using the average of the questions provided in the guidelines of The Physical Activity Questionnaire for Older Children (PAQ-C) and Adolescents (PAQ-A) Manual.<sup>28</sup> The level of physical activity allowed classifying subjects as very sedentary (1 to 1.99 points), sedentary (2 to 2.99 points), moderately active (3 to 3.99 points), active (4 to 4.99 points) and very active (5 to 5.99 points).<sup>20,21,25,28</sup> The opportunities for physical activity were calculated using the values of Lickert type scale contentions about school activities during recess (4-5 points), physical education (4-5 points), after school (4-5 points) and in lunchtime extracurricular activities (4-5 points) in the evenings (4-5 points) and on weekends (4-5 points) to classify the most active.<sup>2,22,28</sup> Socioeconomic level was calculated according to criteria for classification of economic class.<sup>26</sup> The calculation of classification relating to economic class was done by the number

of points assigned to the material goods available at home and educational level of the head of household. The socioeconomic level estimates the average monthly family income of the family according to economic class: A1 (\$ 5,750.00), A2 (\$ 4,250.00), B1 (\$ 2,500.00), B2 (\$ 1,500.00), C1 (\$ 750.00), C2 (\$ 500.00), D (\$ 350.00) and E (\$ 250.00).<sup>28</sup> Nutritional status was estimated from the classification of the body mass index (BMI), calculated by weight (kg) divided by height (meters) squared, according to the reference values for age and sex, which classifies individuals as underweight (<17.5 kg/m2), normal weight (17.6 to 24.9 kg/m2), overweight (25-29.9 kg/m2) and obese ( $\ge$  30 kg/m2).<sup>29</sup>

Statistical analyses were performed using SPSS version 17.0 and STATA version 11. Reliability calculations of the instruments were performed using the Cronbach coefficient, adopting an alpha value equal to or greater than .70 ( $\alpha$ ). The descriptive analyses were performed using the mean and confidence interval of 95% (CI95%). Data normality was assessed using the Kolmogorov-Smirnov test. Sex differences for the variables weight, height and BMI, and comparisons between the predominance of physical activity levels and sex were tested by analysis at the 95% confidence interval (CI95%). Correlations between physical activity opportunities and independent variables were estimated by random ratios (95%) and were calculated using Bivariate logistic regression using backward method with robust variance. The independent variables that showed bivariate correlation with p< .20 with physical activity opportunities were included in the adopted regression model and removed according to the backward elimination procedure. The variables selected for correlational analysis were age, sex, economic level, educational level of the head of household, being overweight, watching TV. The significance level used was  $p \le .05$ . Binary categorization was done with the following variables: not overweight (BMI <25 kg/m2); overweight (BMI  $\ge$  25 kg/m2); 14 to 18 years old; 11 to 13 years old; upper economic class (A1, A2, B1, B2) lower socioeconomic class (C1, C2, D, E); time spent watching television <4 hours, time spent watching television  $\geq$  4 hours; educational attainment level  $\leq 9$  educational attainment level  $\geq 9$  years.

## Results

The results of the Kolmogorov-Smirnov test indicated normality of the collected data. The BECC Cronbach coefficient had regular reliability with the adopted value, determining a rate of  $\alpha$ =0.625 ( $\alpha$ =0.573 -  $\alpha$ =0.625) and the PAQ-C had excellent reliability with the adopted value, determining a rate of  $\alpha$ =0.833 ( $\alpha$ =0.824 -  $\alpha$ =0.837). Based on Table 1 it can be verified that most subjects are in their early years of adolescence and girls were significantly younger than boys. As a result, boys had a greater Body Mass Index.

Widespread physical activity, nutritional status and socioeconomic level by sex widespread physical activity can be relatively confirmed by sex on the basis of Table 2, in which most boys (87.6%) and girls (74.8%) were classified as active, and the girls were more sedentary than boys, while boys were more active and moderately active than girls. In regard to the widespread nutritional status according to sex, it can be discerned that based on Table 2, the majority of boys (72.4%) and girls (80.1%) were classified as normal weight, and boys were more overweight whereas girls were more obese. Regarding their socioeconomic level, it can be verified that most adolescents are classified in class B (Table 2).

With regard to school and extracurricular physical activity opportunities by sex, age, economic class, nutritional status, educational attainment of the head of household, and time spent watching TV, it was verified that according to Table 3, the largest proportion of adolescents are categorized as "more active" in physical activities during physical education classes and the lowest prevalence in the physical activities are done during lunch.

In relation to the correlations between school physical activity opportunities of the most active adolescents, it can be verified based in Table 4 there were significant values (p<.20) between the afterschool activities with sex; social class, being overweight and educational level of the head of the household; and between physical education activities and sex (p<.05). With regard to gross analysis in school activities, it can be verified in accordance with Table 4 that boys are 1.5 times more likely to be active in physical education activities. Analyses adjusted for curricular physical activity opportunities maintained significant values (p<.05) in correlation with afterschool physical activities only for boys and with educational level of the head of household. These results show that in afterschool physical activities boys are 1.7 times more likely to be active and youth whose parents studied beyond the ninth grade are 1.6 times more likely to be active. (Table 4).

Regarding the correlations between extracurricular physical activity opportunities of the most active adolescents, it can be verified based on Table 5 there were significant values (p<.20) between the lunchtime activities and sex; between evening activities and sex and with the educational level of the head of the household; and among weekend activities with sex and being overweight. Analyses adjusted for physical activity opportunities did not identify significant values (p<.05) in correlation with the activities carried out during lunch with males. Adjusted analyses kept significant values in correlation with evening physical activities and sex and the educational level of head of household. These results show that in evening physical activities boys are 1.6 times more likely to be active. Adjusted analyses for physical activity opportunities identified significant values (p<.05) in correlation with activities done on weekend only based on sex, showing that boys are 1.5 times more likely to be active (Table 5).

## Discussion

With regard to adolescents' anthropometric features in the rural area of Santa Catarina, our results are supported by national and international studies that link higher body weight and height in boys,<sup>24,30</sup> but differ in the prevalence of obesity<sup>2,31-33</sup>. The results on the sociodemographic characteristics are different than studies on the low economic class,<sup>2,17,32</sup> but correlate with the low educational level of the head of household.<sup>31,34</sup> Our results regarding the level of physical activity that indicate adolescents are classified as active and moderately active are supported by national and international studies,<sup>9,24,35</sup> identically regarding the lower physical activity level in girls<sup>2,36</sup> and about the time spent watching TV.<sup>24,37</sup> It should be noted that our results indicate that the highest percentage of adolescents classified as more active in physical activities in physical education classes are supported by international study.<sup>2</sup>

In relation to opportunities for physical activity at school, our results are confirmed by studies that found significant correlations between after-school activities with sex<sup>35,38</sup> and educational level of the head of household, as well as between activities in physical education and sex.<sup>35</sup> In a study conducted in the United States with children and adolescents from rural areas, were discovered significant correlations between sex and afterschool physical activity opportunities, illustrating those boys were more active than girls during this period.<sup>38</sup> In a study conducted in the Canada with children and adolescents from rural areas, was found that 74.1% of girls reported having participated in physical activities at school during the target week.<sup>35</sup> With respect to afterschool opportunities with the educational level of the head of household, no correlations were found in the Canadian study.<sup>36</sup> and in the north American study.<sup>38</sup>

Regarding extracurricular physical activity opportunities, our results were confirmed by studies that found significant correlations between lunchtime activities and sex,<sup>2</sup> between evening activities and sex<sup>2</sup> and educational level of the head of household, as well as weekend physical activities and sex.<sup>36</sup>

In a study conducted in the United States with children and adolescents between 8 and 12 years old from rural areas, was found that girls achieved lower physical activity levels than boys and that, despite having observed correlations, were not identified significant values in evening physical activities and sex, recognizing that boys have proven to be more active than girls during this period.<sup>2</sup>

In a study conducted in the United States with adolescents from two rural areas with an average age of 11, was found that most girls in rural areas did not perform sufficient vigorous physical activity.<sup>36</sup> Regarding extracurricular lunchtime and evening physical activities and the sex with the educational level of the head of household, no correlations were found in the north American study.<sup>2</sup>

Even considering study conducted in Brazil, which showed that adolescents from rural areas are 28% more likely to be classified as insufficiently active,<sup>39</sup> our results are confirmed by several studies that show the opposite.<sup>9,24,35</sup> However, it must be noted that the population of this study frequently spends its afterschool activities in voluntary solidarity social projects, significantly reducing idle time and encouraging involvement in physical, recreational and leisure activities.

In addition, there are particular cultural, social and environmental factors that affect opportunities for physical activity in the rural context, such as: the specifics of family farming; growth of rural violence; use of Internet, television and videogames, eating habits; local laws; among others.<sup>3-6,9,10,39-41</sup>

It should also consider that this study has some limitations. The first limitation is the use of self-report for assessment the physical activity. Self-report measure is influenced by the capacity to recall exactly physical activity of a specific period. The second limitation is the scope of the questionnaire about physical activity. The instrument adopted should be used to assess the exercise in sports, games, school and extracurricular physical those activities including on weekends. Not including activities out the school system, for example, the activities related to work on the family farm.

## Conclusion

In conclusion in the rural area of Santa Catarina boys are heavier, taller and have a higher body mass index than girls. Adolescents prevail in economic class B and the largest proportion of those classified as more active are in physical education classes. Moreover, it can be concluded that school and extracurricular physical activities correlate with the sex and educational level of the head of household. Also, whereas physical education activities show the greatest ratio of active adolescents, lunchtime physical activities show the lowest ratio of active adolescents. Thus, boys are likely to be more active than girls in afterschool physical activities, physical education, during lunch, at night and on weekends. In addition, adolescents from families in which the head of house has a higher level of education are likely to be more active in the evenings and after school. Thus, it is recommended that opportunities for physical activity of girls in rural areas be largely increased, contributing to the health of adolescents in Santa Catarina. It is also recommended further investigations about physical activities related to work on family farms of adolescents of the Santa Catarina state.

**IRB permission**: This study was approved by the Research Ethics Committee involving Human Beings, from the State University of Santa Catalina (Protocol no. 0087/2010).

Conflict of Interest: None declared.

### References

- 1. Dollman J, Norton K, Norton L. Evidence for secular trends in children's physical activity behavior. Br J Sports Med. 2005;39(12):892-897.
- Joens-Matre RR, Welk GJ, Calabro MA, Russell, DW, Nicklay E, Hensley LD. Rural-Urban Differences in physical activity, physical fitness, and overweight prevalence of children. J Rural Health. 2008;24(1):49-54.
- 3. Alves JGB. Physical activity in children: promoting adult health. Rev Bras Saude Mater Infant. 2003;3(1):5-6.
- 4. Rennie KL, Johnson L, Jebb SA. Behavioural determinants of obesity. Best Pract Res Clin Endocrinol Metab. 2005;19(3):343-358.
- 5. Ferreira VA, Magalhães R. Obesity in Brazil: Current Trends. Rev Port Sau Pub. 2006;24(2):71-81.
- Gonçalves H, Hallal PC, Amorim TC, Araujo CLP, Menezes AMB. Sociocultural factors and physical activity level in early adolescence. Rev Panam Salud Publ. 2007;22(4):246-253.

- 7. Silva KSS, Nahas MV, Peres CG, Lopes AS. Factors associated with physical activity, sedentary behavior and participation in physical education in high school students in Santa Catarina, Brazil. Cad Saude Publica. 2009;25(10):2187-2200.
- 8. Dupuis JR, Semchuk KM, Baxter-Jones ADG, Rennie DC. Predictors of overweight and obesity in a sample of Saskatchewan rural children. Online J Rural Nurs Health Care. 2011;11(2):51-62. Available at: http://rnojournal.binghamton.edu/. Accessed November 10, 2011.
- 9. Khoo S, Al-Shamlou AK. Leisure-time physical activity and physical fitness of male adolescents in Oman. Asia Pac J Public Health. 2010, May. Available at: http://aph.sagepub.com/. Accessed November 10, 2011.
- 10. Patterson PS, Moore CG, Probst JC, Shinogle JA. Obesity and physical inactivity in rural America. J Rural Health. 2004;20(2):151-159.
- 11. Shores KA, Moore JB, Yin Z. An examination of triple jeopardy in rural youth physical activity participation. J Rural Health. 2010;26(4):352-360.
- Bicalho PG, Hallal PC, Gazzinelli A, Knuth AG, Velásquez-Meléndez G. Physical Activity and Associated Factors in Adults in a Rural Area in Minas Gerais, Brazil. Rev Saude Publica. 2010;44(5):884-893.
- Loucaides CA, Chedzoy SM, Bennett N. Differences in physical activity levels Between urban and rural school children in Cyprus. Health Educ Res. 2004;19(2):138-147.
- 14. Rodrigues LP, Bezerra P, Saraiva L. Influence of environment (urban and rural) in the standard of physical fitness of boys of Viana do Castelo, Portugal. RPCD. 2005;5(1):77-84.
- 15. Monteiro CA, Conde WL, Matsudo SM, Matsudo VR, Bonsenor IM, Lotufo PA. The descriptive epidemiology of leisure-time physical activity in Brazil, 1996-1997. Rev Panam Salud Publ. 2003;14(4):246-254.
- 16. Glaner MF. Physical activity level and fitness related to health in rural and urban boys. Rev Paul Educ Fis. 2002;16(1):76-85.
- 17. Farias Jr JC. Correlation between Widespread Physical Inactivity and Socioeconomic Class Indicators in Adolescents. Rev Bras Med Esporte. 2008;14(2):109-114.
- 18. Brazilian Institute of Geography and Statistics (2011) Census 2010 to 2011. Available at: http://www.ibge.gov.br/. Retrieved November 10, 2011.
- National Institute for Colonization and Agrarian Reform (2000) Novo Retrato da Agricultural Familiar – O Brasil redescoberto, [New Portrait of the Family Farming -Brazil rediscovered]. Available at: http://www.incra.gov.br/fao/. Retrieved November 10, 2011.
- 20. Kowalski K, Crocker P, Faulkner R. Validation of the Physical Activity Questionnaire for older children. Pediatr Exerc Sci. 1997;9:174-186.

- 21. Silva RR, Malina RM. Physical activity in adolescents in the municipality of Niterói, Rio de Janeiro, Brazil. Cad Saude Publica. 2000;16(4):1091-1097.
- 22. Hohepa M, Scragg R, Schofield G, Kolte GS, Schaaf D. Self-Reported Physical Activity Levels during the Segmented School Day in a Large Multiethnic Sample of High School Students. J Sci Med Sport. 2009;12:284-292.
- 23. Jennings-Aburto N, Nava F, Bonvecchio A, et al. Physical activity During the school day in public primary schools in Mexico City. Salud Publ Mex. 2009;51(2):141-147.
- Ripka WL, Ulbrich L. Analysis of time spent watching television and levels of physical activity in students from public schools in rural Paraná. Revista Uniandrade. 2009;10(1):39-48.
- 25. Crocker PRE, Bailey DA, Faulkner RA, Kowalski KC, McGrath R. Measuring general levels of physical activity: Preliminary Evidence for the Physical Activity Questionnaire for Older Children. Med Sci Sports Exerc. 1997;29(10):1344-1349.
- 26. Brazilian Association of Research Companies. Critério de Classificação Econômica. 2011 Available at: http://www.abep.org/novo/Utils/FileGenerate.ashx?id=197. Retrieved November 10, 2011.
- 27. Lohman TG, Roche AF, Martorell R. Anthropometric Standardization Reference Manual. Human Kinetics, Champaign, Ill; 1988.
- Kowalski KC, Crocker PRE, Donen RM. The Physical Activity Questionnaire for Older Children (PAQ-C) and Adolescents (PAQ-A) Manual. College of Kinesiology, University of Saskatchewan; 2004.
- 29. Conde WL, Monteiro CA. Body mass index cutoff points for evaluation of nutritional status in Brazilian children and adolescents. J Pediatr. 2006;82(4):266-272.
- Dupuis JR, Semchuk KM, Baxter-Jones ADG, Rennie DC. Predictors of overweight and obesity in a sample of Saskatchewan rural children. Online J Rural Nurs Health Care. 2011;11(2):51-62. Available at: http://rnojournal.binghamton.edu/. Accessed November 10, 2011.
- 31. Veiga GV, Burlandy L. Socio-economic, demographic indicators and nutritional status of children and adolescents living in a rural settlement in Rio de Janeiro. Cad Saude Publica. 2001;17(6):1465-1472.
- 32. Davy BM, Harrell K, Stewart J, King DS. Body weight status, dietary habits, and physical activity levels of middle school-aged children in rural Mississippi. South Med J. 2004;97(6):571-577.
- 33. Simen-Kapeu A, Kuhle S, Veugelers PJ. Geographic differences in childhood overweight, physical activity, nutrition and neighbourhood facilities: implications for prevention. Can J Public Health. 2010;101(2):128-132.

- Martins PO, Trinity ZA, Adams AMO. Having and being: social representations of adolescence among adolescents in urban and rural integration. Psicol Refl Crit. 2003;16(3):555-568.
- 35. Bilinski H, Semchuk KM, Chad K. Understanding physical activity patterns of rural Canadian children. Online J Rural Nurs Health Care. 2005;5(2):73-82. Available at: http://www.rno.org/journal/issues/Vol-5/issue-2/Bilinski\_article.htm. Accessed November 10, 2011.
- 36. Pate RR, Trost SG, Felton GM, Ward DS, Dowd M, Saunders R. Correlates of physical activity behavior in rural youth. Res Q Exerc Sport. 1997;68(3):241-248.
- 37. Özdirenç M, Özcan A, Akin F, Gelecek N. Physical fitness in rural children compared with urban children in Turkey. Pediatr Int. 2005;47(1):26-31.
- 38. Savage MP, Scott LB. Physical Activity and Rural Middle School Adolescents. J Youth Adolesc. 1998;27(2):245-253.
- 39. Tenorio MCM, Barros MVG, Tassitano RM, Bezerra J, Tenorio JM, Hallal PC. Physical activity and sedentary behavior in adolescent high school students. Rev Bras Epidemiol. 2010 13(1), 105-117.
- 40. Guedes DP, Paula IG, Guedes JERP, Stanganelli LCR. Prevalence of being overweight and obese in children and adolescents: estimates related to sex, age and socioeconomic class. Rev Bras Educ Fis Esporte. 2006;20(3):151-163.
- 41. Azevedo Junior MR, Araújo CLP, Pereira FM. Physical activity and sports in adolescence: changes in preferences over recent decades. Rev Bras Educ Fis Esporte. 2006;20(1):51-58.

# Appendix 1.

The Physical Activity Questionnaire for Older Children (PAQ-C)<sup>22</sup> questions:

1. Quantity of times per week doing physical activity in spare time in the past seven days.

2. Subjective assessment of frequency that was "very active" in the last seven days, during physical education classes.

3. Subjective assessment of physical activity behaviors during the time at recess, in the last seven days.

4. Subjective assessment of physical activity behaviors during the time at lunch (besides eating lunch), in the last seven days.

5. Quantity (stratified) of times per week doing physical activity in after school in the past seven days.

6. Quantity (stratified) of times per week evenings doing sports, dance, or play games, in which was "very active" in the past seven days.

7. Quantity (stratified) of times in the last weekend doing sports, dance, or play games, in which was "very active".

8. Quantity of hours per day watching tv (last week).

9. Subjective assessment of physical activity behaviors during the free time, in the last seven days.

10. Subjective assessment of the comparison with adolescents of same sex and age about physical fitness.

11. Occurrence of diseases or anything that prevented from doing normal physical activities.

12. Subjective assessment of the comparison with adolescents of same sex and age about physical activity level.

13. Frequency (stratified) of times per day of the week doing physical activity in the past seven days.

icatules											
	Boys	Girls	Total								
	Mean (CI)	Mean (CI)	Mean (CI)								
Age (years)	12.8 (12.7; 12.9)	12.3 (12.2; 12.4)	12.7 (12.6; 12.8)								
Weight (kg)	42.7 (41.9; 43.5)	40.6 (39.7; 41.5)	41.9 (41.3; 42.5)								
Height (cm)	147.1 (146.1; 148.1)	144.2 (143.0; 145.4)	146.0 (145.2; 146.8)								
BMI (kg/m2)	19.5 (19.3; 19.7)	19.3 (19.1; 19.6)	19.4 (19.2; 19.6)								

**Table 1:** Description of mean values and confidence intervals of age and anthropometric features

Legend: CI, Confidence Interval 95%; \*Significant difference.

**Table 2:** Prevalence (%) of physical activity, nutritional status and socioeconomic level

	I	Boys		Girls
	%	CI	%	CI
Physical Activity				
Sedentary	12.4	(10.4; 14.6)	25.1	(22.5; 27.9)*
Moderately Active	69.9	(67.0; 72.7)	63.7	(60.6; 66.7)*
Active	17.7	(15.3; 20.2)	11.1	(9.2; 13.2)*
<b>Nutritional Status</b>		, ,		,
Normal weight	72.4	(69.3; 75.2)	80.1	(77.4; 82.7)*
Overweight	25.9	(23.2; 28.9)	17.1	(14.7; 19.6) *
Obesity	1.7	(0.98; 2.8)	2.8	(1.8; 4.0)
<b>Economic Class</b>		,		
Class A1	1.5	(0.85; 2.5)	1.8	(1.1; 2.8)
Class A2	17.2	(14.8; 19.7)	14.8	(12.7; 17.2
Class B1	34.9	(31.9 <sup>°</sup> ; 37.9)	31.3	(28.4; 34.3)
Class B2	19.0	(16.6; 21.5)	18.7	(16.3; 21.2)
Class C1	18.5	(16.1; 21.2)	22.5	(19.9; 25.3)*
Class C2	6.4	(4.9; 8.0)	7.8	(6.2; 9.6)
Class D	2.1	(1.3; 3.2)	2.6	(1.7; 3.8)
Class E	0.3	(0.06; 0.9)	0.5	(0.16;1.2)
Legend: CI, Confid	ence I	nterval	95%;	*Significant

difference.

		Phys	sical Activities	opportu	nities	
	PE class	At recess	After school	At lunch	Evening	Weekend
	%	%	%	%	%	%
Total	82.3	30.2	35.7	9.8	14.9	29.3
Gender						
Male	84.7	30.7	40.6	11.2	12.2	33
Female	78.4	29.4	28.1	7.7	11.3	23.4
Age						
11-13 years	81.8	31	35.9	10.3	15	29.2
14-17 years	83.5	28.3	35.2	8.8	14.6	29.4
Economic Class						
High class	82.6	29.8	31.7	10.9	14.0	27.8
Low class	82.2	30.3	37.4	9.4	15.3	29.9
<b>Nutritional Status</b>						
Normal weight	82.9	30.4	34.9	11.3	14.5	29.1
Overweight	80.5	27.4	39.8	9.7	17	33.6
<b>Educational level</b>						
<9 years	81.9	29.8	33.8	10	13.3	28.9
$\geq 9$ years	84	32.1	45	8.9	22.9	30.8
Watching TV						
<4 hours	82.3	31	36.4	9.8	14.2	28.6
$\geq$ 4 hours	82.1	29.1	33.7	9.7	15.7	30

**Table 3:** Proportion of participants categorized as "more active" during physical activities opportunities with regard to sociodemographic, economic and anthropometric features

Legend: PE, Physical Education; TV, Television.

			More Activ	e at Rec	ess		More Active After School					More Active in PE Class			
		Gross			Adjusted †		Gross		Adjusted †			Gross		Adjusted †	
	n	%	OR(95%IC)	р	OR(95%IC)	%	OR(95%IC)	р	OR(95%IC)	р	%	OR(95%IC)	р	OR(95%IC)	
Age															
11-13 years	681	31.0	1.1 (0.8; 1.5)	0.39	NA	35.9	1 (0.8; 1.4)	0.83	NA		81.8	0.89 (0.6; 1.3)	0.51	NA	
14-18 years	294	28.3	1			35.2	1				83.5	1			
Gender															
Male	597	30.7	1.1 (0.8; 1.4)	0.67	NA	40.6	1.8(1.3;2.3)	>0.01	1.7(1.3;2.2)	>0.01	84.7	1.5(1.1;2.1)	0.01	*‡	
Female	378	29.4	1			28.1	1				78.4	1			
<b>Economic Class</b>															
High class	292	31.4	1.01 (0.8; 1.4)	0.86	NA	41.0	1.3 (0.96; 1.7)	0.09	*§		83.8	0.87 (0.7; 1.4)	0.87	NA	
Low class	692	29.7	1			33.5	1		-		81.7	1			
Overweight															
No	230	30.4	1			34.9	1.3 (0.9; 1.7)	0.17	*§		82.9	0.85 (0.6; 1.2)	0.40	NA	
Yes	700	27.4	1.2 (0.8; 1.6)	0.38	NA	39.8	1		-		80.5	1			
Level of educatio	n														
<9 years	807	29.8	1			33.8	1				81.9	1			
$\geq$ 9 years	168	32.1	0.9 (0.6; 1.3)	0.54	NA	45.0	1.6(1.1;2.2)	0.01	1.6(1.1;2.3)	0.012	84.0	0.86 (0.5; 1.3)	0.51	NA	
Watching TV															
<4 years	693	31.0	0.91 (0.7; 1.2)	0.52	NA	36.4	0.89 (0.7; 1.1)	0.38	NA		82.3	0.98 (0.7; 1.3)	0.92	NA	
>4 years	298	29.1	1			33.7	1				82.1	1			

Table 4: Adjusted and gross odds-ratios relating of participants categorized as "more active" during school physical activity opportunities

Legend: PE, Physical Education; TV, Television; OR, Odds Ratio; CI, Confidence Intervals 95%; \* Backward: Wald entry 0.20; † p>0.20; ‡ p>0.05-<0.20; § p>0.05; || Head of the household

Table 5: Adjusted and gross odds-ratios relating of participants categorized as	"more active" during extracurricular physical activity							
opportunities								

			More active a	t lunch			More active at night					More a	kend	nd	
			Gross		Adjusted † Gro		Gross	Adjusted		Ť		Gross		Adjusted †	
	n	%	OR(95%IC)	р	OR(95%IC)	%	OR(95%IC)	р	OR(95%IC)	р	%	OR(95%IC)	р	OR(95%IC)	р
Age															
11-13 years	681	10.3	1.2 (0.7; 1.9)	0.49	NA	15.0	0.96(0.6; 1.4)	0.85	NA		29.4	1.0(0.7;1.3)	0.94	NA	
14-18 years	294	8.8	1			14.6	1				29.3	1			
Gender															
Male	597	11.2	1.5 (0.9; 2.4)	0.07	*‡	17.2	1.6(1.1;2.4)	0.01	1.6(1.1;2.4)	0.01	33.0	1.6(1.2;2.1)	0.01	1.5(1.1;2.1)	0.004
Female	378	7.7	1			11.3	1				23.4	1			
Economic Class															
High class	288	9.4	1.2 (0.7; 1.8)	0.49	NA	18.2	0.90(0.6; 1.3)	0.60	NA		32.1	0.9 (0.7; 1.3)	0.51	NA	
Low class	687	10	1			13.5	1				28.1	1			
Overweight															
No	230	11.3	1			14.5	1.2 (0.8; 1.8)	0.34	NA		29.1	1.2 (0.9; 1.7)	0.19	*§	
Yes	700	9.7	1.2 (0.7; 1.9)	0.48	NA	17.0	1				33.6	1		Ŭ	
Level of educatio	n∥														
<9 years	807	10.0	1			13.3	1				28.9	0.9 (0.7; 1.3)	0.63	NA	
$\geq$ 9 years	168	8.9	1.1 (0.6; 2)	0.66	NA	22.9	1.9 (1.2; 2.9)	0.002	1.9(1.2;2.9)	0.002	30.8	1			
Watching TV															
<4 hours	693	9.8	0.98 (0.6; 1.5)	0.94	NA	14.2	0.89(0.7;1.3)	0.51	NA		30.0	0.93 (0.7; 1.2)	0.63	NA	
>4 hours	298	9.7	1			15.7	1				29.2	1			

Legend: PE, Physical Education; TV, Television; OR, Odds Ratio; CI, Confidence Intervals 95%; \* Backward: Wald entry 0.20; † p>0.20; ‡ p>0.05-<0.20; § p>0.05; || Head of the household