

## Characteristics of family nucleus as correlates of regular participation in sports among adolescents

Rômulo A. Fernandes · Felipe F. Reichert · Henrique Luiz Monteiro ·  
Ismael F. Freitas Júnior · Jefferson R. Cardoso · Enio Ricardo V. Ronque ·  
Arlí R. de Oliveira

Received: 19 March 2010/Revised: 8 October 2010/Accepted: 18 October 2010/Published online: 3 November 2010  
© Swiss School of Public Health 2010

### Abstract

**Objectives** To estimate the relationship between family nucleus and sport practice among adolescents.

**Methods** A school-based cross-sectional study carried out with 1,752 Brazilian adolescents (812 male and 940 female), aged 11–17 years. Characteristics of the family nucleus (parental education, socioeconomic status and number of siblings) and sport practice ( $\geq 240$  min/week)

were assessed by questionnaires. Adjusted prevalence ratios were estimated using Poisson regression models.

**Results** The overall prevalence of sport practice was 14.8% (boys 21.2% and girls 9.4%,  $P = 0.001$ ). Higher socioeconomic status, number of siblings and parents' educational level were associated with more sport practice.

**Conclusion** Despite the low engagement, family nucleus plays an essential role in the sport practice of our sample of Brazilian adolescents.

R. A. Fernandes (✉) · H. L. Monteiro  
Department of Physical Education, Institute of Biosciences,  
UNESP Univ Estadual Paulista, Sao Paulo State University,  
Av 24A, 1515, Rio Claro, Sao Paulo 13506-900, Brazil  
e-mail: romulo\_ef@yahoo.com.br

H. L. Monteiro  
e-mail: heu@fc.unesp.br

F. F. Reichert  
Superior School of Physical Education, Universidade Federal  
de Pelotas, Pelotas, Rio Grande do Sul, Brazil  
e-mail: ffreichert@gmail.com

E. R. V. Ronque · A. R. de Oliveira  
Department of Physical Education, Universidade Estadual  
de Londrina (UEL), Londrina, Parana, Brazil

E. R. V. Ronque  
e-mail: enioronque@uel.br

A. R. de Oliveira  
e-mail: aril@uel.br

I. F. Freitas Júnior  
Department of Physical Education, UNESP Univ Estadual  
Paulista, Presidente Prudente, Sao Paulo, Brazil  
e-mail: ismael@fct.unesp.br

J. R. Cardoso  
Department of Physical Therapy, Universidade Estadual  
de Londrina (UEL), Londrina, Parana, Brazil  
e-mail: jeffcar@uel.br

**Keywords** Physical activity · Adolescents · Brazil ·  
Cross-sectional study

### Introduction

Evidences have shown that physical inactivity is an important risk factor for a variety of chronic diseases and it has been responsible for increased healthcare costs in adults (Chenoweth and Leutzinger 2006; Fernandes and Zanesco 2010). On the other hand, it has been demonstrated that regular physical activity and/or sport practice track from childhood to adulthood (Azevedo et al. 2007; Fernandes and Zanesco 2010) and play a health-promotion effect throughout life (Ara et al. 2004; Fernandes and Zanesco 2010).

Sport promotion is a global public health strategy to enhance the physical activity in overall population. Although studies show that in developed countries, the leisure-time physical inactivity of adults is lower than in developing countries (Varo et al. 2003; Fernandes et al. 2010), few studies exist identifying the correlates of physical activity in children and adolescents from developing nations.

Previous studies demonstrated that some socio-cultural, demographic, and economic characteristics are the major barriers for the improvement of the physical activity in all

population, and more specifically in children and adolescents (Hallal et al. 2006a, b; Stalsberg and Pedersen 2010). However, in developed countries the correlates of physical activity are different in children and adolescents; as well family influence/parental educational level are associated with physical activity (Van Der Horst et al. 2007). In developing settings, authors have identified that family support exerts elevated influence in behaviors related to physical activity (Gonçalves et al. 2007).

The aim of this study was to estimate the relationship between characteristics of family nucleus and sport practice in adolescents of both genders.

## Methods

### Participants

A cross-sectional study was carried out from July to October 2007, in the city of Presidente Prudente, located in the western region of Sao Paulo state, Brazil, with approximately 200,000 inhabitants, of whom, about 37,000 are students. From the 36 schools with students of the target age, we randomly selected four public and two private schools. This ratio was selected to be representative of the proportion of public and private schools in the city. From a total of 2,200 eligible students, after the field work and consequent exclusion of some subjects [adolescent who refused to participate ( $n = 46$ ); absence of any data of the parents' questionnaire ( $n = 361$ ); parent who refused to participate ( $n = 41$ )], the final sample size was composed by 1,752 adolescents from 11–17 years old [812 male and 940 female (participation rate of 79.6%)]. Additional information about this sample is presented in previous publication (Fernandes et al. 2008). A written informed consent was obtained from parents and adolescents prior to the survey. The ethical committee of the UNESP Univ Estadual Paulista (Presidente Prudente) approved this study.

### Engagement in organized sports

Sport practice was estimated by the Baecke Questionnaire (Baecke et al. 1982). Data were collected through interview by trained researchers, at school, during physical education classes. The Baecke physical activity questionnaire was used to assess habitual physical activity and distinguish between different dimensions of physical activity using an ordinal scale of sport, leisure, and work activity. Sport practice during leisure time was assessed, and the adolescents were considered regularly engaged if they had participated in moderate to vigorous activities more than 4 h per week (240 min per week) in the last 4 months prior

to the study. Additional information was used to calculate the total amount of time dedicated to all domains of physical activity [International Physical Activity Questionnaire, short version (IPAQ)]. The time spent in moderate to vigorous physical activities (MVPA) per week was calculated and adolescents who achieved at least 300 min were classified as physically active. This classification is in accordance with recommended guidelines for adolescents (Biddle et al. 1998). Physical activities performed during the physical education classes were excluded.

The Kappa statistic analysis was used to indicate concordance between (1) the subjects who reported less than 4 h per week in sport practice [yes or no] and (2) the time reported by the same students in the IPAQ [more or less 300 min a week]. The observed values indicated higher concordance ( $k = 0.81$ ).

Family nucleus: socioeconomic status, parent's educational level, and number of siblings

A questionnaire based on the Brazilian Criterion for Economic Classification (ABEP 2003) was sent to the participant's parents with questions to estimate their socioeconomic status (parents' educational level, number of siblings living in the same home of the adolescent, number of home appliances and presence of domestic servants). Individuals were classified into five categories from A (highest socioeconomic level) to E (lowest). The type of school (public or private) was also analyzed as an indicator of socioeconomic status. To test the reproducibility of the parents' questionnaire, 30 parents were randomly selected to be interviewed at school. The Kappa coefficient of the two measurements was 1.0 for parent's educational level ( $\geq 15$  years/ $< 15$  years), number of siblings living in the same home of the adolescent ( $\geq 4$ / $< 4$  siblings) and socioeconomic status (category A/categories B–E).

### Statistical analysis

Data were analyzed using STATA 8.0. Chi-squared tests ( $\chi^2$ ) were used to verify the differences between categorical variables. Adjusted prevalence ratios were calculated by the Poisson regression with robust variance, as indicated for binary outcomes with high prevalence (Barros and Hirakata 2003). All variables (sex, type of school, parent's educational level, socioeconomic status, and number of siblings) were entered into the multivariable model simultaneously. All analyses were performed accounting for the sample design (*svy* set of commands available in STATA 8.0) and the significance level was set as  $P < 0.05$ .

**Table 1** General characteristics of the sample according to sex [Presidente Prudente 2007, Brazil ( $n = 1,752$ )]

Variables	Male ( $n = 812$ )	Female ( $n = 940$ )	<i>P</i>
Age [years: mean (SD)]	13.8 (2.1)	13.7 (1.8)	0.659 <sup>a</sup>
Private school (%)	27.7	25.1	0.225
Parent's educational level (%)			
Father ( $\geq 15$ years)	23.7	23.1	0.822
Mother ( $\geq 15$ years)	26.2	19.8	0.002
Socioeconomic status (%)			
A (wealthiest)	20.1	24.5	0.011
B	49.6	49.2	
C–D–E (poorest)	30.3	26.4	
Number of siblings (%)			
None	13.1	12.3	0.247 <sup>b</sup>
1	70.1	68.6	
2–3	13.2	14.6	
$\geq 4$	3.7	4.4	

*SD* Standard deviation

<sup>a</sup> Student's *t* test

<sup>b</sup>  $\chi^2$  for trend

## Results

Table 1 shows the stratification of the sample by sex. There was no difference, between sexes, in mean of age, socioeconomic status, type of school (private or public), number of siblings and parents' educational level. However, a statistically higher proportion of male (26.2%) than female (19.8%) had mother with  $\geq 15$  years of schooling. The prevalence of sport practice was 14.8% (21.2% male and 9.4% female,  $P = 0.001$ ).

Table 2 shows the relationship between sports practice and different family nuclei characteristics stratified by sex. There was no significant relationship between sport practice and socioeconomic status among boys while for girls, sport practice was positively associated with paternal schooling.

Boys were more likely to meet the  $\geq 240$  min/week through sport practice [PR = 2.26 (1.75–2.92)]. Similarly, the students from the highest socioeconomic status were more physically active [PR = 1.31 (1.02–1.70)]. There was a positive relationship between the number of siblings and sport practice [ $\geq 4$  siblings: PR = 1.98 (1.08–3.61)].

## Discussion

A cross-sectional study with adolescents aged 11–17 years was carried out and a low prevalence of sport practice was observed, and the results suggest that the family nucleus may exert a significant influence on sport practice of adolescents (as shown in Table 1).

The observed prevalence of sport practice in adolescents was of 14.8%. Previous studies of different physical activity domains have observed higher rate of physically active adolescents ( $\geq 300$  min/week) (Hallal et al. 2006a, b; Ortega et al. 2007). This discrepancy between the above-mentioned studies and our results might be explained by the fact that in the present study only sport activities during leisure time were taken into account, excluding other physical activity domains. However, our rate is also markedly lower than those 46.1% observed in primary school student in Hong Kong participants in organized sports (Lee et al. 2010). Thus, the low number of adolescents engaged in sport practice during leisure times observed in this particular population shows that preventive actions should be taken as an important matter for public health organizations.

Male adolescents were considered to be more active than female and the present data are in agreement with other studies from different nations (Hallal et al. 2006a, b; Ortega et al. 2007). The reason may be the sociocultural factors, in which is included the family influence. Indeed, a previous study reported that boys have more social and family support to engage in physical activities than girls (Gonçalves et al. 2007), the differences between sexes regarding the preferred physical activities can influence the higher practice of boys. In Brazil, boys were more prone to practice soccer while volleyball and dance were the most frequently reported activities of girls.

As expected, higher sport practice during leisure time was found in adolescents from the highest socioeconomic status, which are directly associated with easier accessibility to facilitations such as sportive materials, private fitness and sports centers. In fact, this association was observed in developing and developed countries (Fernandes et al. 2008; Fernandes and Zanesco 2010; Stalsberg and Pedersen 2010).

High number of siblings was associated with a higher participation in sports-related physical activities during leisure time. This positive effect could be due to the greater opportunity to perform leisure time physical activities in groups. Evidences have shown an inverse association between birth order and prevalence of physical inactivity (Hallal et al. 2006a, b). It has also been reported a positive association between companion and higher prevalence of physical activity practice in adults (Reichert et al. 2007). These findings indicate that the practice of sport activities has more adherences when practiced in groups and these data are important for public health organizations.

Particularly, in female adolescents, the parents' educational level was positively associated with higher physical active levels. However, when overall sample was analyzed, no association was found. Interestingly, a positive association was found only between the higher father's

**Table 2** Association between sport practice and independent variables, stratified by sex [Presidente Prudente 2007, Brazil ( $n = 1,752$ )]

Variables	Sports practice ( $\geq 240$ min/week)		
	Overall ( $n = 1,752$ ) PR <sub>Adjusted</sub> (95% CI)	Male ( $n = 812$ ) PR <sub>Adjusted</sub> (95% CI)	Female ( $n = 940$ ) PR <sub>Adjusted</sub> (95% CI)
Sex			
Female	1.00	–	–
Male	2.26 (1.75–2.92) <sup>a</sup>		
Type of school			
Public	1.00	1.00	1.00
Private	0.70 (0.49–1.00) <sup>b</sup>	0.73 (0.46–1.14) <sup>b</sup>	0.63 (0.33–1.18) <sup>b</sup>
Socioeconomic status			
Groups B–C–D–E	1.00	1.00	1.00
Group A (wealthiest)	1.31 (1.02–1.70) <sup>b</sup>	1.47 (0.98–2.22) <sup>b</sup>	1.30 (0.69–2.42) <sup>b</sup>
Number of siblings <sup>c</sup>			
None	1.00	1.00	1.00
1	1.25 (0.82–1.89) <sup>b</sup>	1.10 (0.64–1.88) <sup>b</sup>	1.64 (0.70–3.83) <sup>b</sup>
2–3	1.39 (0.85–2.28) <sup>b</sup>	1.20 (0.61–2.32) <sup>b</sup>	1.80 (0.68–4.74) <sup>b</sup>
$\geq 4$	1.98 (1.08–3.61) <sup>b</sup>	1.93 (0.83–4.45) <sup>b</sup>	2.07 (0.62–6.91) <sup>b</sup>
Parent's educational level			
Father (<15 years)	1.00	1.00	1.00
Father ( $\geq 15$ years)	1.37 (0.99–1.86) <sup>b</sup>	1.05 (0.67–1.66) <sup>b</sup>	2.14 (1.20–3.83) <sup>b</sup>
Mother (<15 years)	1.00	1.00	1.00
Mother ( $\geq 15$ years)	0.78 (0.56–1.08) <sup>b</sup>	0.80 (0.51–1.25) <sup>b</sup>	0.79 (0.42–1.50) <sup>b</sup>

PR prevalence ratio, 95% CI 95% confidence interval

<sup>a</sup> Prevalence ratio calculated from Poisson regression adjusted for parents school level, socioeconomic level, and number of siblings

<sup>b</sup> Prevalence ratio calculated from Poisson regression adjusted for sex, parents school level, socioeconomic level, and number of siblings

<sup>c</sup> *P* value for linear trend in the adjusted analyses

educational level and the adolescents' physical activity practice. This finding suggests that fathers and mothers have different influence on the physical activity level of their offspring. Further investigations should analyze the effect of the parental schooling over sport practice.

Some methodological aspects of the present study should be highlighted. Few studies have been carried out in developing nations with a large sample size. Furthermore, the Baecke Questionnaire, which was applied in this study, is widely accepted to estimate physical activity practice, and has been shown to be valid and reliable when applied in adults (Florindo et al. 2006). Measurement of agreement (Kappa statistic) as an indicator of internal validity of the reported data was also applied. It is noteworthy that only sport practice during leisure time was evaluated, and the prevalence of sedentary lifestyle might be overestimated. Additionally, the absence of physical education classes should be identified as limitations in our study.

In summary, the data of the present study suggest that some characteristics of family nucleus could play an essential role in the sport practice in Brazilian adolescents, and father's educational level seems to be an essential factor to improve the level of physical activity practice of

the offspring. Additionally, a very low proportion of adolescents achieved the 240 min/week of physical activity through sport practice. Therefore, public policies toward health intervention, including sport practice promotion, should involve the family nucleus.

**Conflict of interest** The authors declare that there are no conflicts of interest in this study.

## References

- Ara I, Vicente-Rodríguez G, Jimenez-Ramirez J et al (2004) Regular participation in sports is associated with enhanced physical fitness and lower fat mass in prepubertal boys. *Int J Obes Relat Metab Disord* 28:1585–1593. doi:10.1038/sj.ijo.0802754
- Associação Brasileira de Empresas de Pesquisa (2003). [http://www.abep.org/codigosguias/ABEP\\_CCEB.pdf](http://www.abep.org/codigosguias/ABEP_CCEB.pdf). Accessed 2 February 2003
- Azevedo MR, Araujo CL, Silva MC et al (2007) Tracking of physical activity from adolescence to adulthood: a population-based study. *Rev Saude Publica* 41:69–75. doi:10.1590/S0034-89102007000100010
- Baecke JA, Burema J, Frijters JE (1982) A short questionnaire for the measurement of habitual physical activity in epidemiological studies. *Am J Clin Nutr* 36:936–942

- Barros AJ, Hirakata VN (2003) Alternatives for logistic regression in cross-sectional studies: an empirical comparison of models that directly estimate the prevalence ratio. *BMC Med Res Method* 3:21. doi:[10.1186/1471-2288-3-21](https://doi.org/10.1186/1471-2288-3-21)
- Biddle S, Cavill N, Sallis J (1998) *Young and active? Young people and health-enhancing physical activity—evidence and implications*. Health Education Authority, London
- Chenoweth D, Leutzinger J (2006) The economic cost of physical inactivity and excess weight in American adults. *J Phys Activ Health* 3:148–163
- Fernandes RA, Zanesco A (2010) Early physical activity promotes lower prevalence of chronic diseases in adults. *Hypertens Res* 33:926–931. doi:[10.1038/hr.2010.106](https://doi.org/10.1038/hr.2010.106)
- Fernandes RA, Júnior IF, Cardoso JR et al (2008) Association between regular participation in sports and leisure time behaviors in Brazilian adolescents: a cross-sectional study. *BMC Public Health* 8:239. doi:[10.1186/1471-2458-8-329](https://doi.org/10.1186/1471-2458-8-329)
- Fernandes RA, Christofaro DG, Casonatto J et al (2010) Leisure time behaviors: prevalence, correlates and associations with overweight in Brazilian adults. A cross-sectional analysis. *Rev Med Chil* 138:29–35. doi:[10.4067/S0034-98872010000100004](https://doi.org/10.4067/S0034-98872010000100004)
- Florindo AA, Latorre Mdo R, Santos EC et al (2006) Validity and reliability of the Baecke questionnaire for the evaluation of habitual physical activity among people living with HIV/AIDS. *Cad Saude Publica* 22:535–541. doi:[10.1590/S0102-311X2006000300008](https://doi.org/10.1590/S0102-311X2006000300008)
- Gonçalves H, Hallal PC, Amorim TC et al (2007) Sociocultural factors and physical activity level in early adolescence. *Rev Panam Salud Publica* 22:246–253
- Hallal PC, Bertoldi AD, Gonçalves H et al (2006a) Prevalence of sedentary lifestyle and associated factors in adolescents 10 to 12 years of age. *Cad Saude Publica* 22:1277–1287. doi:[10.1590/S0102-311X2006000600017](https://doi.org/10.1590/S0102-311X2006000600017)
- Hallal PC, Wells JC, Reichert FF et al (2006b) Early determinants of physical activity in adolescence: prospective birth cohort study. *BMJ* 332:1002–1007. doi:[10.1136/bmj.38776.434560.7C](https://doi.org/10.1136/bmj.38776.434560.7C)
- Lee RL, Loke AY, Wu CS, Ho AP (2010) The lifestyle behaviours and psychosocial well-being of primary school students in Hong Kong. *J Clin Nurs* 19:1462–1472. doi:[10.1111/j.1365-2702.2009.03057.x](https://doi.org/10.1111/j.1365-2702.2009.03057.x)
- Ortega FB, Ruiz JR, Sjostrom M (2007) Physical activity, overweight and central adiposity in Swedish children and adolescents: the European Youth Heart Study. *Int J Behav Nutr Phys Act* 4:61. doi:[10.1186/1479-5868-4-61](https://doi.org/10.1186/1479-5868-4-61)
- Reichert FF, Barros AJ, Domingues MR (2007) The role of perceived personal barriers to engagement in leisure-time physical activity. *Am J Public Health* 97:515–519. doi:[10.2105/AJPH.2005.070144](https://doi.org/10.2105/AJPH.2005.070144)
- Stalsberg R, Pedersen AV (2010) Effects of socioeconomic status on the physical activity in adolescents: a systematic review of the evidence. *Scand J Med Sci Sports* 20:368–383. doi:[10.1111/j.1600-0838.2009.01047.x](https://doi.org/10.1111/j.1600-0838.2009.01047.x)
- Van Der Horst K, Paw MJC, Twisk JWR, van Mechelen W (2007) A brief review on correlates of physical activity and sedentariness in youth. *Med Sci Sports Exerc* 39:1241–1250
- Varo JJ, Martínez-González MA, De Irala-Estévez J (2003) Distribution and determinants of sedentary lifestyles in the European Union. *Int J Epidemiol* 32:138–146. doi:[10.1093/ije/dyg018](https://doi.org/10.1093/ije/dyg018)