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Original Article

Tracking of sports practice from childhood to adolescence and its associations in a school-based study

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Abstract:
Objective: To analyze the tracking of sports practice and its associations in adolescents. Methods: A randomized scholar sample of 870 adolescents between 10-17 years was assessed. Tracking of sports practice from childhood to adolescence was assessed by questionnaire, such as ethnicity, socioeconomic status and parental education level. Associations between variables were analyzed by chi-square test and its magnitude by binary logistic regression. Results: Tracking of sports practice was 48.8%. Boys were about twice likely to tracking sports practice than girls. Older adolescents were 33% less likely to tracking than younger. Black / brown adolescents were respectively 67% and 33% less likely to tracking sports practice than white. Adolescents with low-middle socioeconomic levels and low education of mother were less likely to tracking sports practice than their counterparts. Soccer was most sport practiced in childhood (29.3%), and adolescents who practiced team sports were more likely to maintain the sports practice from childhood to adolescence than those who practiced individual sports. Conclusion: Tracking of sports practice was associated with sex, age, ethnicity, socioeconomic level, parental education, and sport modality.
Key words: adolescents; children; ethnicity; physical activity; students.

Introduction

The maintenance of physical activity practice during different periods of life constitutes the tracking of physical activity (Malina, 2001). Physically active children and adolescents are more likely to become physically active adults (Telama et al., 2014), and the level of physical activity over the years can prevent health risk factors as obesity (Chu, 2010), which corresponds to cardiovascular risk factors in youth (Tebar et al., 2018).

The sports practice is responsible for an important part of physical activities in youth (Curry, Dagkas & Wilson, 2016) and is widely diffused in school age, but with different participation between boys and girls (Drake et al., 2015), where being male was associated with sports practice in school environment and outside the school (Lee, Hunter, Leatherdale & Carson, 2017). Children and adolescents that have a sport participation were more likely to be physically active even after about four decades (Engström, 2008). The parcitipation in sports showed strong association with developmental assets in adolescents, been also influenced by environmental factors (Reverdito et al., 2017). However, policies about sports implementation in youth is considered as a complex process and needs to be mild and simple in regard the school environment and local context (Stylianou, Hogan & Enright, 2017), this means that a better understanding of the factors associated with the sports practice in youth helps strategies aimed at their promotion, since the variables associated with tracking of sports practice from childhood to adolescence are still not consensual in the literature, mainly in developing countries. Previous study observed association between parental schooling and physical activity tracking during early life (Walters, Barr-Anderson, Wall & Neumark-Sztainer, 2009; Suppli et al., 2013), while other have hinted no significant effect (Cleland et al., 2009). Besides that, the association of physical activity tracking in youth with ethnicity still remains unclear (Brodersen, Steptoe, Boniface & Wardle, 2007; Kjønniksen, Torsheim & Wold, 2008).

Therefore, this study aimed to analyze the sociodemographic factors associated with the tracking of sports practice in childhood to adolescence and if these associations are independent of confounders.

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Materials and Methods

Sample

The study sample consisted of students aged between 10 and 17 years, all regularly enrolled in the public or private school systems of the city of Presidente Prudente, a city with ~200,000 inhabitants located in the southeastern region of Brazil, with a Human Development Index of 0.806 (a measure of environmental factors conductive to positive development, which has a scale from 0 to 1.0). Based on data from the city's State Education Department, Presidente Prudente has about 37,000 public (80%) and private (20%) school students and were identified 36 public and private schools who met the specific inclusion criteria of this study: i) 10-17 years of age; ii) enrolled in primary or high and in public or private school. The Childhood was defined as the age between 7-10 years and the adolescence was defined as the age between 11-17 years.

For the sample calculation, was used a prevalence of 32% for physical activity practice in adolescence (Azevedo et al., 2014), a tolerable error of 4% and fixed the design effect at 1.5 due to the sample being evaluated by conglomerates. The required sample size was 772 subjects. However, predicting potential losses due to absences on the assessment day, another 10% were added to the minimum sample size, giving a necessary sample size of 850 adolescents. In the end of study, 870 subjects were assessed. There is no information about how many students there are in each geographic region of the city and, for this reason, an equal proportion of students was considered per region. At first, the schools was divided into five regions of the city (north, south, east, west, and central), according to geographic location, since the students are allocated in the school nearest their residence by the education department of the city. Thus, one school was randomly selected from each previously stratified region of the city in a simple random process. Since not all regions of the city contain private schools and as this population presents less representation (20%), two private schools were randomly selected from all private schools identified. In the second stage, in the selected schools, all classes that comprised 10-17 year old students were visited and all students in each class invited to take part in the research. Each classroom was visited a total of five times, aiming to minimize losses due to absences of the students on previous visits. In the third stage, students that agreed to participate were asked to present the consent term signed by their parents or guardians and only those with signed terms participated in the study. If the minimal sample size was not reached in any region, another school from the same region was randomly selected and the same invitation process made to all students in that school, however this process was not necessary and a total of 7 schools (5 public and 2 private) was selected, with approximately 4100 enrolled students. At the end of selection process, 1166 adolescents agreed to participate and presented a signed consent term from parents or guardians (28.4% of the total) and 1,074 of these adolescents were evaluated (26.2% of the total of students enrolled in selected schools. Among the adolescents assessed, 870 presented correctly answers about the tracking of sports practice (74,6% of those who agreed to participate) and were included in the study analysis.

Ethical approval

The study was approved by the Research Ethics Committee of the Sao Paulo State University (process number: 21600613.4.0000.5402). The informed consent was obtained from the participants and their parents or guardians before assessment procedures.

Tracking of sports practice

The practice of sports in childhood was assessed retrospectively by the following question:"Between the ages of 7 until 10 years, were you engaged in any supervised sports activity for at least one uninterrupted year regardless of school (considering the holiday periods in the middle and end of the year)?" The practice of sports in adolescence was assessed by the following question: "Between the ages of 11 and 17 years, were you engaged in any supervised sports activity for at least one uninterrupted year regardless of school (considering the holiday periods in the middle and end of the year)?" Although excluding school physical education classes, participation in training teams in school was considered. The tracking of sports practice was considered if the subject relates the sports practice in childhood and also in adolescence. This question was chosen to be easily understood and generally allow easy determination of the different sports activities in childhood. The same instrument has been used previously (Fernandes & Zanesco, 2010). The type of sport was also asked for the adolescents that answered affirmatively for sport practice, according to the options: i) soccer, ii) volleyball, iii) basketball, iv) swimming, v) martial arts, vi) other and vii) nothing.

Correlates of sport practice

The sociodemographic variables assessed were gender, age, ethnicity, parents' education level, mother's education level, and socioeconomic status. Regarding ethnicity, the adolescents were asked: "What is your ethnicity?" from the following options: white, black, brown/mixed black, oriental, or other. The educational level of the parents and mothers was evaluated by the number of years of study, categorized into 0-3 years, 4-7 years, 8-11 years, 12-15 and over sixteen years of study. Socioeconomic status was assessed by questionnaire (ABEP, 2009). This tool considers the education level of the household head and the number of certain items in the home, such as electrical appliances (TV, DVD, radio, refrigerator, washing machine), vehicles; number of bathrooms in the house, and if the family has housemaids. From this, the questionnaire generates a score that divides the economic classes from higher to lower, into: A1, A2, B1, B2, C1, C2, D, and E. Adolescents classified in A1, A2, and B1 were considered as having a high socioeconomic level; B2 and C1 as middle

socioeconomic level; and C2, D, and E as low socioeconomic level. The sports activities reported in childhood were classified as individual or team activities, in order to verify whether there were relationships between the type of sport practiced in childhood and tracking of sports practice to adolescence. Anthropometry was assessed by body mass and height, with the subjects barefoot and wearing light clothes. Body mass was obtained by digital scale with precision in 0.1kg and maximum capacity of 180kg, and height measure was collected by portable stadiometer with maximum length of 2.20 meters and precision in 0.1 centimeters. The sample was cathegorized into normal weight and overweight/obesity according to sex and age, as proposed by Cole et al. (2000).

Statistical analysis

The sample characterization variables are presented as mean and standard deviation. The association between the tracking of sports activities and the independent variables was performed using the chi-square test. The magnitude of the associations was verified by analysis of Binary Logistic Regression. In the adjusted analysis, all independent variables were inserted simultaneously, when they were not the main independent variable, for example: when analyzing the association between the tracking of sports and gender, the variables age, ethnicity, socioeconomic status, parents' education, and type of sport were inserted in the model as adjustments, and so on. The significance level and confidence interval were fixed at 5% and 95% respectively. The statistical program used was SPSS version 15.0.

Results

The study composed 870 adolescents, 382 male (43.2%) and 488 female (56.8%). The average age of the sample was 13.7 (±2.03) years. The average age of male adolescents (13.5 years) was lower than the average age of female adolescents (13.8 years [p=0.024]). The predominance in relation to ethnicity was white (47.8%), followed by brown/mixed black (35.3%), black (10.5%), oriental (4.1%), and other (2.3%). The Figure 1 shows the prevalence of practiced sports, where soccer was the most commonly played sport in childhood, with swimming second (p-value ≤ 0.001).

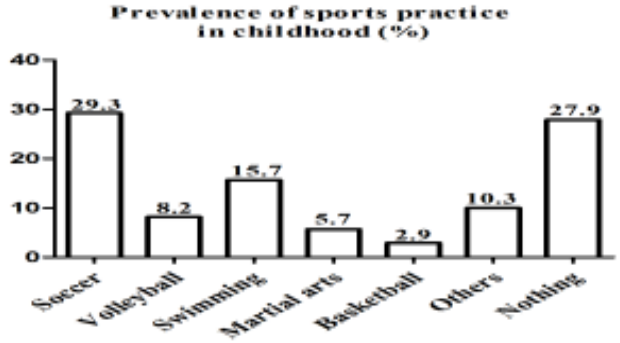

Fig.1. Prevalence of sports practiced in childhood.

The practice of sports from childhood to adolescence was observed in 425 adolescents (48.8%). Table 1 shows the characterization information of the stratified sample of adolescents who maintained the practice of sports from childhood to adolescence and young people who did not maintain the practice. The only variable that demonstrated a significant difference was age.

Table 1. Characterization of the sample.

	Boys (n= 382) Mean (95%CI)	Girls (n= 487) Mean (95%CI)	p-value
Age (years)	13.5 (13.3-13.7)	13.8 (13.7-14.0)	0.023
Body mass (kg)	52.1 (50.7-53.6)	52.3 (51.1-53.6)	0.831
Height (cm)	158.3 (157.1-159.6)	158.3 (157.5-159.3)	0.948
BMI (kg/m^2)	20.5 (20.1-20.9)	20.6 (20.2-21.0)	0.683
Socioeconomic level (score)	18.1 (17.7-18.6)	17.7 (17.4-18.2)	0.233
Father's education (years)	11.7 (11.4-12.1)	11.7 (11.4-12.0)	0.960
Mother's education (years)	12.1 (11.8-12.5)	12.1 (11.8-12.4)	0.925
Categorical variables	n (%)	n (%)	
BMI			
Normal weight	270 (71.1)	364 (74.9)	0.234
Overweight/Obese	110 (28.9)	122 (25.1)	
Sports modalities (n=538)			
Individual sports	71 (27.0)	116 (42.2)	≤0.001
Team sports	192 (73.0)	159 (57.8)	

BMI = Body Mass Index; CI = Confidence Interval.

Figure 2 presents the prevalence of tracking of sports practice according to the independent variables and differences of proportions among the categories of variables. There was a significant difference according to gender of adolescents, with higher tracking of sports practice in boys than girls. Regarding age, the prevalence of tracking of sports practice was higher in younger (11-14 years) compared to older (15-17 years) adolescents. Weight status presented no significant differences about the tracking of sports practice. Considering ethnic group, the highest prevalence of tracking of sports practice was observed in the white and oriental groups. High

socioeconomic level of and having fathers or mothers with high education presented higher tracking of sports practice from childhood to adolescence.

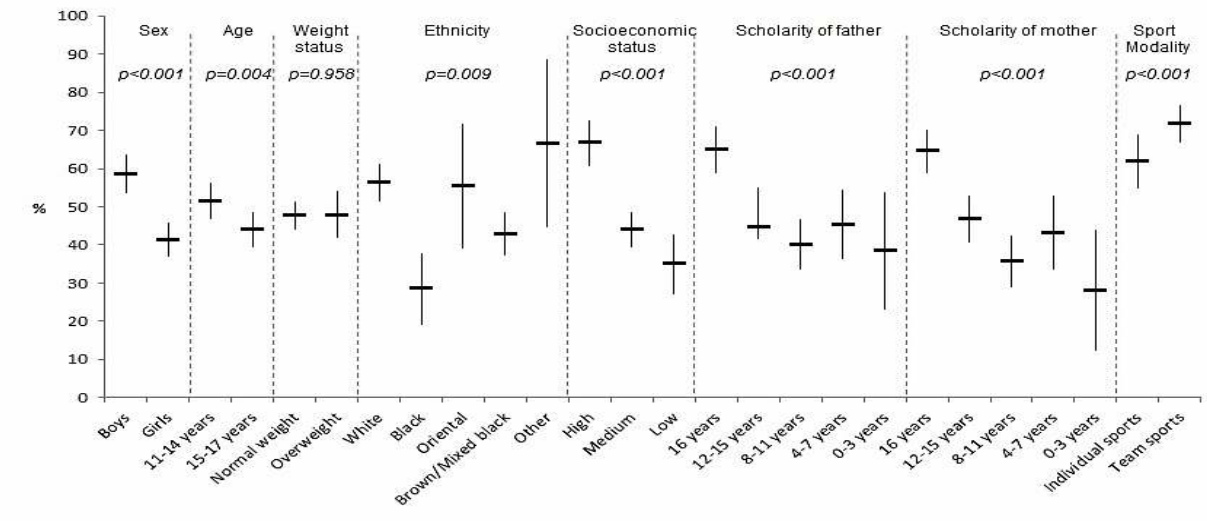

Fig.2. Prevalence and 95% confidence interval of tracking of sports practice from childhood to adolescence, according to independent variables.

The magnitude of the association was observed through multivariate analysis in Figure 3. The tracking of sports practice from childhood to adolescence was the dependent variable and the other variables were considered independent, when one of them was not considered the main independent variable subsequently entered as an adjustment in the model. Male adolescents were about twice as likely to maintain the practice of sports from childhood to adolescence when compared to female adolescents. Older adolescents (15-17 years) were 33% less likely to maintain tracking of sports when compared to younger adolescents (11-14 years). Lower chances were also observed in black (67%) and brown/mixed black (33%) adolescents when compared to white adolescents. Adolescents with average and low socioeconomic level also had lower chances of tracking sports. The weight status presented no association between the tracking of sports practice among adolescents. There was no significant difference between the tracking of sports practice and the education level of parents after the adjustments, however adolescents whose mothers had less education were less likely to maintain the tracking of sport.

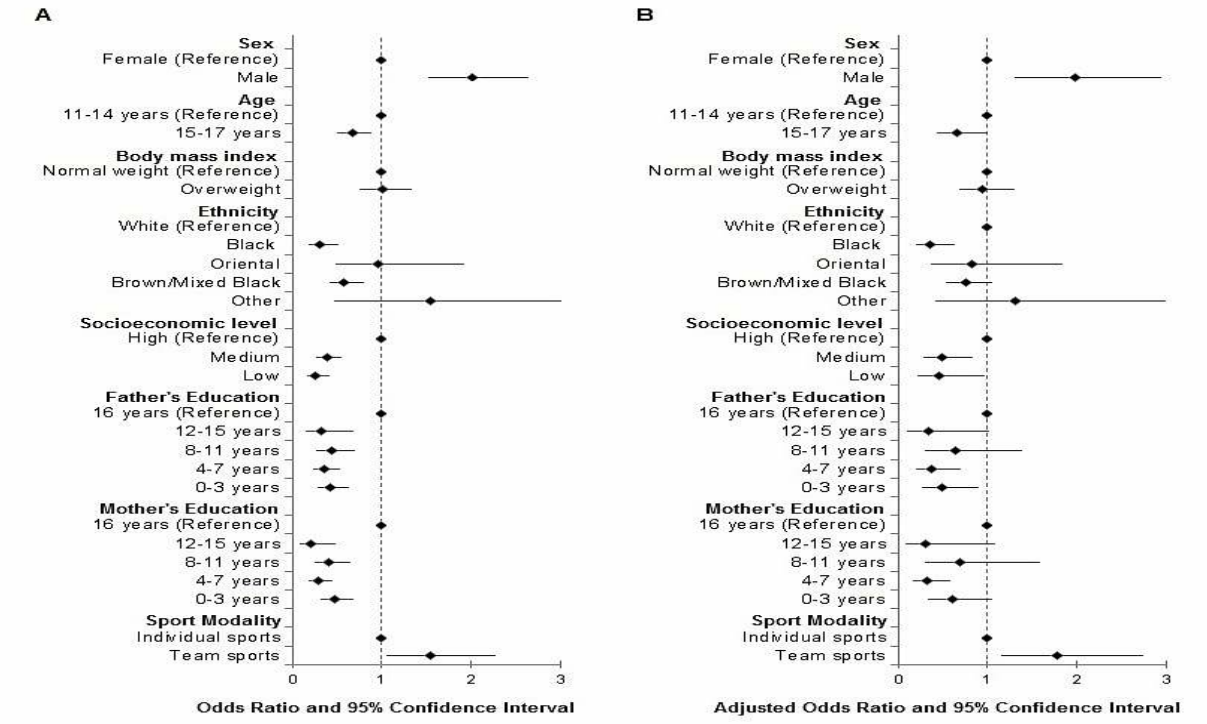

Fig. 3. Association between the tracking of sports practice from childhood to adolescence and independent variables.

Note. Forest plot of Binary Logistic Regression models. 95% Confidence interval values those not across the 1 were statistically significant when compared to reference category. A=Unadjusted analysis; B=Adjusted Odds Ratio by sex, age, ethnicity, socioeconomic level, parental education, and sport modality.

Discussion

The main findings of this study were that boys tend to maintain sports practice from childhood to adolescence more than girls and in younger adolescents when compared to older adolescents. Moreover, socioeconomic status, ethnicity, and parents' schooling were demonstrated to be relevant correlates of tracking of sports practice in these adolescents, regardless of confounding factors.

In terms of gender differences, a previous systematic review identified lower tracking of physical activity levels in girls when compared to boys (Dumith, Gigante, Domingues & Kohl, 2011). There is some evidence in the literature to support these differences in favor of boys: i) boys usually have greater freedom to move around at greater distances when compared to girls (Gonçalves et al., 2007) and later have higher chances of practicing sports together with friends; ii) dance activities are common among girls regardless of ethnicity (Grieser et al., 2006) and are not considered as sports practice in some studies, leading to underestimation of the outcome in girls; and iii) a 10 year follow-up study noted that physical activity level is less predictable in boys and they are more likely to change their patterns of physical activity over time (Francis et al., 2013).

The differences between gender and tracking of sports seem also to be affected by age, as older adolescents demonstrated lower tracking of sports when compared to younger ones. These findings agreed with studies identifying significant decreases in physical activity with advancing age in both sexes (Matton et al., 2006; Dumith et al., 2011). However, it was observed that the differences between genders are smaller when considering the biological age rather than chronological age of adolescents, reflecting also in lower differences in the tracking of sports between genders (Erlandson et al., 2011; Francis et al., 2013).

In our study, adolescents with higher socioeconomic status were more likely to maintain the practice of sports from childhood to adolescence. This association was observed by with other studies (Walters et al., 2009; Suppli et al., 2013) and could be justified by the fact that lower income parents have less possibility to transport their children to sports practice and, in some cases, with advancing age, these young people have to assist with household expenses, resulting in less time for physical activity (Walters et al., 2009).

In this study, adolescents whose parents had higher schooling were more likely to maintain sports practice than adolescents whose parents had lower schooling. A decline in physical activity of female adolescents whose mothers had less education was observed in another study (Sagatun et al., 2008). Therefore, parents and friends exert social influence on the physical activity of adolescents, by contributing to the modeling of their behavior and providing them with social support (Cheng et al., 2014). On the other hand, another study did not observe this association even after 20 years of follow-up (Cleland et al., 2012). One possible reason for the discrepancies between studies may originate from how education is assessed. In this study the education level was determined by the number of school years, while in the study by Cleland et al. (2012) it was dichotomized into low education (school only), medium (trade/vocational certificate), and high (parents who attended university). The low education levels seem to moderate the association between adulthood leisure-time physical activity and participation in competitive sports in youth, while high education levels present a direct effect on the association between exercise in late adolescence and adulthood leisure-time physical activity (Mäkinen et al., 2010).

Adolescents with black or brown/mixed black ethnicity were less likely to tracking sports practice. This association was also observed after 10 years of physical activity assessment between black and white girls, with a decrease in physical activity in both groups, but more significantly in the black females, including an increased number of pregnancies in black girls when compared with white (Kimm et al., 2002). The birth of a child affects life activities and responsibilities, which can be considered one of the reasons for the sharp reduction in physical activity in this population. Brazil has high fertility rates; about 20% of mothers are between 15 and 19 years of age and there is a consistent and positive association between income inequality and adolescent fertility (Chiavegatto Filho & Kawachi, 2015), where the number of adolescent mothers is higher in girls of "nonwhite" ethnicity (Gigante et al., 2004). Brodersen et al. (2007) also observed similar findings and reported that higher sedentary behavior among black adolescents could be another factor linked to lower physical activity when compared to white adolescents.

Adolescents who practiced team sports had higher tracking of physical activity than those who practiced individual modalities. It is possible that children practicing team sports in childhood are more likely to continue practicing sports in adolescence due to cooperative aspect and social relations provided by these kinds of sports (Verplanken & Melkevik, 2008). In addition, a larger variety of sports practiced during childhood and adolescence has been associated with higher levels of physical activity during leisure in adults (Kjønniksen et al., 2008). Nearly 30% of this study sample reported soccer as the most popular sport. Participation in team sports was associated with higher physical activity level and sports participation in childhood predicted adult total weekly physical activity and leisure activity (Cleland et al., 2012). Thus, the interdependent sports activities (i.e. football, hockey, basketball) showed a most sustained participation in youth across the time, encouraged by parents participation (Brunet, Gaudet, Wing & Bélanger, 2017).

As a limitation of this study we emphasize the assessment of sports practice through a questionnaire, which is susceptible to information bias. This questionnaire does not assess even the weekly frequency of sports practice, that may confound the results. Nevertheless it is highlighted that this study aimed to assess the practice

of sports using an easy reporting method and can lead prospective studies. Regardless the several limitations, the physical activity assessed by sports practice among children and adolescents can also be influenced by different climates, cultural and environmental conditions around the world and consequently preclude the extrapolation of the results. Positively, we point out the representative sampling process where the study was conducted and the control for different confounding factors in the analysis by multiple models. These findings allow better knowledge of the associated factors of tracking of physical activity and can guide interventions aiming health promotion in school environment through the sports practice in developing countries.

In conclusion, the tracking of physical activity from childhood to adolescence was associated with male gender, younger adolescents, high socioeconomic status, and higher parental education level. Adolescents with black and brown/mixed black ethnicity were less likely to maintain tracking of physical activity from childhood to adolescence, regardless confounding factors. Health promotion activities by means of sports practice should consider gender, ethnicity, and socioeconomic status.

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Conflict of interest

The authors report no conflict of interest.

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