



Original

## Aerobic fitness in adolescents in southern Brazil: Association with sociodemographic aspects, lifestyle and nutritional status



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### ABSTRACT

**Objective:** The purpose was to investigate the factors related to aerobic fitness levels of adolescents in southern Brazil.

**Methods:** The sample consisted of 1081 students (545 males and 536 females), with mean age of 12.8 ( $\pm 1.2$ ) years. This is a cross-sectional epidemiological study. Aerobic fitness was assessed by the 9-min running test. The independent variables analyzed were: age, socioeconomic status, school system (public/private), sedentary behavior, physical activity level, nutritional status and body adiposity. Analyses were stratified by sex. We used the Student "t" test for independent samples and logistic regression to estimate odds ratio (OR) and confidence intervals of 95% (95% CI).

**Results:** The prevalence of low aerobic fitness levels was 92.5%. Boys aged 13–14 years were 2.44 times more likely to have low aerobic fitness levels; poorer boys were 4.31 times more likely to have low aerobic fitness levels. Girls aged 13–14 years were 5.35 times more likely to have low aerobic fitness levels; poorer girls were 10.70 times more likely to have low aerobic fitness levels; girls with sedentary behavior were approximately 4 times more likely to have low aerobic fitness levels.

**Conclusion:** Thus, it was concluded that almost all adolescents show low aerobic fitness levels, which makes necessary effective interventions in the school environment with the promotion of sports and regular practice of physical activity.

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### La condición física aeróbica en adolescentes del sur de Brasil: asociación con aspectos sociodemográficos, estilo de vida y el estado nutricional

### RESUMEN

**Objetivo:** El presente estudio tuvo como objetivo investigar los factores relacionados con los niveles de aptitud aeróbica de los adolescentes en el sur de Brasil.

**Métodos:** La muestra estuvo conformada por 1081 alumnos (545 varones y 536 mujeres), con edad media de 12.8 ( $\pm 1.2$ ) años. Se trata de un estudio epidemiológico transversal. La condición física aeróbica se evaluó mediante Test de Caminata de 9 minutos. Las variables independientes analizadas fueron: edad, nivel socioeconómico, el sistema escolar (público/privado), el sedentarismo, el nivel de actividad física, el estado nutricional y la adiposidad corporal. Los análisis fueron estratificados por sexo. Se aplicó la prueba de "t" Student para muestras independientes y regresión logística para estimar la *odds ratio* (OR) y los intervalos de confianza de 95% (IC95%).

**Resultados:** La prevalencia de bajos niveles de aptitud aeróbica fue de 92.5%. Los niños de edades de 13 a 14 años fueron 2.44 veces más propensos a tener bajos niveles de condición física aeróbica; los niños más pobres fueron 4.31 veces más propensos a tener bajos niveles de condición física aeróbica. Las niñas de 13 a 14 años fueron 5.35 veces más propensas, a tener bajos niveles de condición física aeróbica; las niñas más pobres eran 10.70 veces más propensas a tener bajos niveles de condición física aeróbica; las niñas

#### Palabras clave:

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con el comportamiento sedentario, fueron aproximadamente 4 veces más propensas a tener bajos niveles de condición física.

**Conclusión:** Se concluyó que casi todos los adolescentes muestran bajos niveles de condición física aeróbica, lo que hace necesarias intervenciones eficaces en el ámbito escolar para la promoción del deporte y la práctica regular de actividad física.

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## R E S U M O

**Objetivo:** O objetivo foi investigar os fatores relacionados aos níveis de aptidão aeróbia dos adolescentes no Sul do Brasil.

**Métodos:** A amostra foi constituída por 1081 estudantes (545 do sexo masculino e 536 do sexo feminino), com idade média de 12.8 ( $\pm$  1.2) anos. Este é um estudo epidemiológico transversal. Aptidão aeróbica foi avaliada pelo teste de corrida de 9 minutos. As variáveis independentes analisadas foram: idade, nível socioeconômico, sistema de escola (pública/privada), comportamento sedentário, nível de atividade física, estado nutricional e adiposidade corporal. As análises foram estratificadas por sexo. Foi utilizado o teste de Student “t” para amostras independentes e regressão logística para estimar odds ratio (OR) e intervalos de confiança de 95% (CI95%).

**Resultados:** A prevalência de baixos níveis de aptidão aeróbia foi de 92.5%. Meninos com idades entre 13-14 anos foram 2.44 vezes mais propensos a ter baixos níveis de aptidão aeróbia; meninos mais pobres eram 4.31 vezes mais propensos a ter baixos níveis de aptidão aeróbia. Meninas com idades entre 13-14 anos foram 5.35 vezes mais propensas a ter baixos níveis de aptidão aeróbia; as moças pobres foram 10.70 vezes mais propensas a ter baixos níveis de aptidão aeróbia; Meninas com comportamento sedentário foram aproximadamente 4 vezes mais propensas a ter baixos níveis de aptidão aeróbia.

**Conclusão:** Assim, concluiu-se que quase todos os adolescentes apresentam baixos níveis de aptidão aeróbica, o que faz intervenções eficazes no ambiente escolar com a promoção do desporto e da prática regular de atividade física necessária.

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### Palavras-chave:

Aptidão física  
Exercício  
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## Introduction

The lifestyle of children and adolescents has undergone modifications along the last decades. Part of the free time is occupied by sedentary activities, mainly related to the technological advancement and to the wide offer of electronic games.<sup>1,2</sup> In addition, the decreased safety in streets and other public places in urban centers reduce the possibility of playing popular games that encourage physical activity.<sup>3</sup> Such changes reflect in low physical activity levels among young people and, consequently, in low health-related physical fitness levels.<sup>4</sup>

Among the health-related physical valences, aerobic fitness is considered a protective factor for cardiovascular diseases such as type-2 diabetes mellitus, hypertension, atherosclerosis and metabolic syndrome.<sup>5</sup> Reduced aerobic fitness among young people has been reported in some studies.<sup>6–8</sup> In the U.S. state of Georgia, 52% of adolescents were below the healthy condition in relation to aerobic fitness.<sup>8</sup>

Recent studies investigating factors associated with aerobic fitness<sup>6–8</sup> observed that adolescents who participated in sports and lived in rural areas had higher aerobic fitness levels. Some factors still need elucidation such as socioeconomic status that in some studies is directly associated with low aerobic fitness levels<sup>9</sup> and in others, it is inversely proportional.<sup>10</sup>

Thus, considering the importance of investigating aerobic fitness in adolescents, since low levels of this physical fitness component in adolescence is associated with chronic diseases in adulthood<sup>11</sup> and taking into account the possible association of this physical fitness component with sociodemographic factors in order to direct intervention actions in this population, this study aims to investigate factors related to aerobic fitness among adolescents in southern Brazil.

## Method

### Population and sample

This cross-sectional study was approved by the Ethics Committee on Human Research of the “Extremo Sul Catarinense” University under protocol 225/2009. Adolescents who participated in the survey and parents/guardians signed the consent form authorizing their participation in the study.

The study was conducted at the city of Criciúma, southern Brazil, located in the Brazilian state of Santa Catarina, with human development index of 0.788, considered high, and life expectancy at birth of 75.8 years.<sup>12</sup>

The target population for this study consisted of 13 508 elementary school students from Criciúma, Santa Catarina, Brazil. The sample size was calculated using an unknown prevalence for the outcome (50%), confidence level of 95%, estimated error of 5%, design effect of 2.0 and increment of 20% for losses and refusals. Given these parameters, a sample of 897 adolescents was estimated.

To ensure that the sample represented the target population, distribution considered school system (public and private), and school size (small, with fewer than 200 students; intermediate, with 200–499 students and large, with 500 students or more). The sample selection used the sampling procedure of clusters in two stages: the school was the sampling unit of the first stage and the classes were the sampling unit of the second stage. All schools in Criciúma with basic education were eligible for inclusion in the study. In the first stage, school density was adopted as stratification criterion, according to system and size, so proportionately more schools in the school system that had more schools and higher density were selected. In the second stage, the density of classes

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