

Original Article

Factors associated with cigarette experimentation among adolescents*

Fatores associados à experimentação do cigarro em adolescentes

Maristela Prado e Silva¹, Regina Maria Veras Gonçalves da Silva², Clovis Botelho³

Abstract

Objective: To assess the prevalence of and factors associated with smoking experimentation among adolescents. **Methods:** Cross-sectional study, using a specific questionnaire to interview 2,883 students from 7th to 10th grade in schools located in the urban area of the city of Cuiabá, in the state of Mato Grosso, Brazil. Prevalence was estimated, and the principal factors related to cigarette experimentation were analyzed. Subsequently, a hierarchical logistic model was used to describe the chances of cigarette experimentation related to the variables being investigated. **Results:** The prevalence of cigarette experimentation was 30.2%. In the final model of the analysis, the main variables related to cigarette experimentation were low maternal level of education (OR = 2.44; 95% CI: 1.72-3.47); low socioeconomic level (OR = 1.39; 95% CI: 1.01-1.93); studying in a public school (OR = 1.56; 95% CI: 1.22-2.00); being in 10th grade (OR = 3.45; 95% CI: 2.63-4.54); attending school in the evening (OR = 2.44; 95% CI: 1.85-3.22); having divorced parents (OR = 1.23; 95% CI: 1.02-1.49); having been held back for one school year (OR = 2.17; 95% CI: 1.78-2.70); having friends who smoke (OR = 3.75; 95% CI: 2.99-4.70) having a sibling who smokes (OR = 2.44; 95% CI: 1.82-3.27); and being older (age 17-19 years) (OR = 2.44; 95% CI: 1.39-4.17). **Conclusions:** A high proportion of adolescents have experimented with smoking. After adjusting for confounding variables, the factors most strongly associated with cigarette experimentation were maternal level of education, age of the adolescent, attending school in the evening, having been held back for one school year and having a sibling who smokes. Preventive measures must be directed at adolescents in schools in order to control smoking.

Keywords: Smoking; Adolescent; Students; Risk factors.

Resumo

Objetivo: Analisar a prevalência e os fatores associados à experimentação do cigarro em adolescentes. **Métodos:** Estudo transversal, utilizando-se questionário específico, onde foram entrevistados 2.883 estudantes do ensino fundamental e do 1º ano do ensino médio, de escolas localizadas na zona urbana da cidade de Cuiabá (MT). Estimou-se a prevalência e foram analisados os principais fatores relacionados à experimentação do cigarro. Após isso, obteve-se um modelo logístico hierarquizado descrevendo as chances da experimentação do cigarro relacionada com as variáveis investigadas. **Resultados:** A prevalência da experimentação do cigarro foi de 30,2%. No modelo final de análise, as principais variáveis relacionadas com a experimentação do cigarro foram menor nível de escolaridade da mãe (OR = 2,44; IC95%: 1,72-3,47); menor nível socioeconômico (OR = 1,39; IC95%: 1,01-1,93); estudar na escola pública (OR = 1,56; IC95%: 1,22-2,00); estar no 1º ano do ensino médio (OR = 3,45; IC95%: 2,63-4,54); estudar no período noturno (OR = 2,44; 1,85-3,22); ter pais separados (OR = 1,23; IC95%: 1,02-1,49); já ter sido reprovado na escola (OR = 2,17; IC95%: 1,78-2,70); ter amigos fumantes (OR = 3,75; IC95%: 2,99-4,70); ter irmãos fumantes (OR = 2,44; IC95%: 1,82-3,27); e ser mais velho (17-19 anos) (OR = 2,44; IC95%: 1,39-4,17). **Conclusões:** Foi alta proporção de adolescentes que experimentaram o cigarro. Após ajuste para variáveis de confusão os fatores mais fortemente associados à experimentação do cigarro foram nível de escolaridade da mãe, idade do adolescente, estudar no período noturno, já ter sido reprovado na escola e ter amigos e irmãos fumantes. Medidas preventivas devem ser direcionadas aos adolescentes, dentro das instituições escolares, como forma de controle do tabagismo.

Descritores: Tabagismo; Adolescente; Estudantes; Fatores de risco.

* Study conducted at the *Instituto de Saúde Coletiva da Universidade Federal de Mato Grosso* – ISC/UFMT, Collective Health Institute/Federal University of Mato Grosso – Cuiabá, Brazil.

1. Masters in Collective Health. *Universidade Federal de Mato Grosso* –UFMT, Federal University of Mato Grosso – Cuiabá, Brazil.

2. Adjunct Professor at the Nutrition School and in the Collective Health Masters Program. *Instituto de Saúde Coletiva da Universidade Federal de Mato Grosso* – ISC/UFMT, Collective Health Institute/Federal University of Mato Grosso – Cuiabá, Brazil.

3. Full Professor at the School of Medical Sciences and in the Collective Health Masters Program. *Instituto de Saúde Coletiva da Universidade Federal de Mato Grosso* – ISC/UFMT, Collective Health Institute/Federal University of Mato Grosso – Cuiabá, Brazil.

Correspondence to: Clovis Botelho. Rua Dr. Jonas Correa da Costa, 210, CEP 78030-510, Cuiabá, MT, Brazil.

Tel 55 65 3637-1471. Fax 55 65 3637-7539. E-mail: fbotelho@terra.com.br

Financial support: This study received financial support from the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES, Coordination of the Advancement of Higher Education).

Submitted: 29 November 2007. Accepted, after review: 25 February 2008.

Introduction

The World Health Organization (WHO) considers smoking the greatest isolated avoidable cause of illness and death worldwide. Approximately 25% of all regular smokers die prematurely due to diseases associated with tobacco, losing about 20 years of life.⁽¹⁾ Smoking accounts for 40–45% of all deaths due to cancer (90–95% of those caused by lung cancer), 75% of deaths due to chronic obstructive pulmonary disease, approximately 20% of deaths due to vascular diseases and 35% of deaths due to cardiovascular diseases.^(2,3)

As tobacco is the second most commonly consumed drug among youths worldwide, smoking is currently considered a pediatric disease,⁽⁴⁾ since most youths start smoking in adolescence. In a study carried out by the WHO between 1999 and 2002 in 23 Latin-American countries and English-speaking nations in the Americas, it was observed that the 13–15 year-age bracket presents the greatest susceptibility to developing the smoking habit.⁽⁵⁾

In Brazil, a study carried out by the National Ministry of Health⁽⁴⁾ revealed that the onset of smoking takes place rather early in the life of students in twelve Brazilian capitals, and that, in cities such as Vitória and Boa Vista, nearly 40% of youths try cigarettes by 11 years of age.

In Cuiabá, Brazil, there have been no studies on adolescent smoking experimentation. Considering experimentation as the determining factor for the prevalence of smoking in adult life, this study aims to analyze the principal variables associated with this event, in order to further the development of educational guidelines for schoolchildren.

Methods

This was an observational cross-sectional study involving adolescents (10 to 19 years of age) regularly enrolled in junior high or high school at schools located in the urban area of the city of Cuiabá, Brazil.

The Brazilian Statute for Minors⁽⁶⁾ defines as adolescent as an individual between 12 and 18 years of age. However, in the present study, we opted to use the WHO classification,⁽⁷⁾ in which an adolescent is defined as an individual between 10 and 19 years of age.⁽⁷⁾

In order to calculate the size of the sample, we defined a power of 80%, a sample error of 5%, a confidence level of 95% and an estimated preva-

lence of smoking experimentation of 12%. The estimate of the prevalence of smoking experimentation was based on a study carried out by the Brazilian Center for Information on Psychotropic Drugs, which showed that, in addition to the use of other drugs, tobacco use among junior high and high school students at public schools in Cuiabá, Brazil was 12.3% in 2004,⁽⁸⁾ totaling 2,248 students. To this number, a predicted 25% losses or refusals was added.

The study involved 2,883 students, 56.6% from public schools and 43.4% from private schools, from the 6th, 7th, 8th, 9th and 10th grades. Three visits were paid to the schools, in order to decrease the lack of response and to contact students who were absent in the previous visits. Students aged 20 years or more were excluded from the study. In addition, all questionnaires that were illegible, incomplete, torn or missing the date of birth were excluded.

For data collection, we used a multiple-choice self-report questionnaire, without identification of the students, as well as being standardized and pre-codified, that was developed by the authors based on the Brazilian National Cancer Institute questionnaire for students.⁽⁹⁾ The questionnaire was previously tested among adolescents at a school not included in this study, with the objective of testing student comprehension, as well as correcting possible flaws and standardizing the tool for data collection.

The following data were collected: socioeconomic level of the families, level of education of the parents, parental smoking and marital status, date of birth of the adolescent, age at which they experimented with smoking, gender, type of school (public or private), grade and study shift (morning, afternoon or evening), whether they had been held back a school year, whether the school had provided orientation on the hazardous effects of smoking as part of the class curriculum, and whether friends or siblings smoked. Students were also questioned regarding physical activities and whether they adhered to any religion.

Adolescents who reported having experimented with smoking were considered experimenters.

The level of education of the parents was divided into four categories: college or university (graduate); high school; junior high; and incomplete elementary school/illiterate.

The classification described by the Brazilian Association of Research Companies was used

in the analysis of the socioeconomic level of the families.⁽¹⁰⁾

Data analysis was carried out using the Epi Info 2000 program and the Statistical Package for the Social Sciences, version 9.0 (SPSS Inc., Chicago, IL, USA). In the bivariate analysis, the ratio of the prevalence and its respective 95% confidence interval were used as the measure of association between the dependent variable (smoking experimentation) and the other studied variables. In this phase, the chi-square test was used to evaluate the statistical differences among the proportions. The chi-square test for linear tendency was used in order to determine the linearity of the associations. All variables that showed significance in the bivariate analysis were included in the multivariate

analysis, which was carried out through hierarchical logistic regression.⁽¹¹⁾ The variables were included in blocks, and the most distal factors, the socio-demographic variables of the adolescents and their families were the first included (level 1), followed by variables related to school activities and parents' marital status (level 2) and, finally, those related to smoking and life-style of the adolescents (level 3), considered the closest to the outcome. Variables presenting no statistical significance were removed from the model.

The project was approved by the Federal University of Mato Grosso Ethics Committee (Process no. 237, 18 January 2006). Authorization for data collection was obtained from the State Secretary of

Table 1 - Smoking experimentation, according to sociodemographic variables of the adolescents and their families, Cuiabá, Brazil, 2006.

Variables	Prevalence, % (ratio ^a)	PR (95% CI)	p
Gender			
Female	28.9 (443/1531)	1.00	
Male	31.7 (429/1352)	1.10 (0.98-1.23)	p > 0.05
Current age, years			
10-12	7.2 (44/615)	1.00	
13-16	30.3 (543/1792)	4.24 (3.16-5.68)	
17-19	59.9 (285/476)	8.37 (6.24-11.23)	p < 0.0001*
Educational level of the father			
College or university (graduate)	24.2 (208/859)	1.00	
High school	31.0 (214/691)	1.28 (1.09-1.50)	
Junior high or middle school	36.5 (176/482)	1.51 (1.28-1.78)	
Illiterate and incomplete elementary school	43.0 (119/277)	1.77 (1.48-2.12)	p < 0.0001*
Educational level of the mother			
College or university (graduate)	23.2 (210/906)	1.00	
High school	30.2 (291/963)	1.30 (1.12-1.52)	
Junior high or middle school	41.6 (188/452)	1.79 (1.53-2.11)	
Illiterate and incomplete elementary school	47.9 (105/219)	2.07 (1.72-2.48)	p < 0.0001*
Socioeconomic level			
Highest	25.7 (414/1612)	1.00	
Intermediate	34.7 (345/993)	1.35 (1.20-1.52)	
Lowest	40.6 (113/278)	1.58 (1.34-1.87)	p < 0.0001*
Head of the household			
Father	26.5 (404/1526)	1.00	
Mother	33.3 (385/1157)	1.26 (1.12-1.41)	
Another	41.5 (83/200)	1.57 (1.30-1.89)	p < 0.0001
Separated parents			
No	26.5 (446/1686)	1.00	
Yes	35.6 (426/1196)	1.35 (1.21-1.50)	p < 0.0001

PR: prevalence ratio. ^aRatio of cigarette experimenters to nonexperimenters. *linear tendency.

Education of Mato Grosso and from the headmasters of the schools.

Results

We studied 2,883 adolescents. Of those, 1,531 (53.1%) were female and 1,352 (46.9%) were male, with mean age of 15.2 and 13.5 years, respectively. Of the 2,883 adolescents, 1,632 (56.6%) were from public schools, and 1,251 (43.4%) were from private schools. As for school grade, 67.6% of the students were in 6th, 7th or 8th grade, whereas 32.4% were in 10th grade.

When questioned about the age at which they experimented with smoking for the first time, 13.8% reported having done so at 9 years of age, compared with 46.2% at 10 to 13 years of age and 40.0% at 14 years of age or more, resulting in a 30.2% overall prevalence of experimentation in the studied population.

Table 1 presents the sociodemographic variables of the adolescents and their families in relation to smoking experimentation. We found no difference between genders in terms of smoking experimentation. As adolescents get older, the risk of experimenting with smoking increases. We observed a linear and inverse association between smoking

experimentation and parental educational and socioeconomic level, that is, the probability of the adolescent experimenting with smoking increased in direct relation to the educational and socioeconomic level of the parents, lower levels translating to increased probability. When the head of the family is a person other than the father, there is a greater probability that the adolescent will experiment with smoking. In addition, when the parents are separated, the probability that the student will experiment with smoking is 35% higher than when the parents live together.

In relation to school activities and smoking experimentation, we observed that students from public schools are at greater risk of experimenting with smoking than are those who study in private schools. In addition, the probability of experimenting with smoking increases linearly with the advance of the adolescent to the subsequent grades. Similarly, studying in the evening, having been held back a school year and not having received any classroom instruction regarding smoking can all increase the probability of the adolescent experimenting with smoking (Table 2).

Among the variables related to smoking and the lifestyle of the adolescents, we observed that

Table 2 – Smoking experimentation, according to variables related to school activities, Cuiabá, Brazil, 2006.

Variables	Prevalence, % (ratio ^a)	PR (95% CI)	p
Type of school			
Private	19.5 (244/1251)	1.00	
Public	38.5 (628/1632)	1.97 (1.74-2.24)	p < 0.0001
School grade			
6th	10.3 (35/339)	1.00	
7th	15.8 (71/448)	1.54 (1.05-2.24)	
8th	27.0 (145/537)	2.62 (1.86-3.69)	
9th	36.5 (228/625)	3.56 (2.56-4.96)	
10th	42.1 (393/934)	4.08 (2.95-5.63)	p < 0.0001*
Study shift			
Morning	26.3 (350/1331)	1.00	
Afternoon	25.1 (302/1202)	0.96 (0.84-1.09)	
Evening	62.9 (220/350)	2.39 (2.12-2.70)	p < 0.0001
Failed			
No	21.6 (421/1950)	1.00	
Yes	48.4 (451/932)	2.24 (2.01-2.50)	p < 0.0001
Classroom information about smoking			
Yes	24.5 (267/1090)	1.00	
No	34.9 (566/1620)	1.16 (1.11-1.22)	p < 0.0001

PR: prevalence ratio. ^aRatio of cigarette experimenters to nonexperimenters. *Linear tendency

those who have parents who smoke present a 54% higher probability of experimenting with smoking than do those whose parents do not smoke. Similarly, those who have friends or siblings who smoke are more than twice as likely to experiment with smoking as are those who do not have friends or siblings who smoke. The risk of experimenting with smoking also increases for those who do not engage in physical activity, practice no religion, work or receive some type of remuneration (Table 3).

Table 4 presents the results of the analysis of the hierarchical logistic regression. Children whose mothers had completed only nine years of schooling presented a greater chance of experimenting with smoking than did those whose mothers had completed 12 years of schooling or more. Adolescents who belonged to the lowest socioeconomic levels (D and E) had a 39% greater chance of experimenting with smoking than those who belong to families with higher socioeconomic level. In level 2, we observed that students from public schools with separated parents, studying in

the evenings and in the most advanced grades have greater chances of experimenting with smoking than do those who study in private schools, whose parents are not separated, who study during the day and are in the 6th or 7th grade. Variables considered closest to the outcome were included in level 3. We observed that the chance of experimenting with smoking is two times higher for youths that have a sibling who smokes and more than three times higher for those who have a friend who smokes, when compared to those who have neither friends nor siblings who smoke. Similarly, as the adolescents grow older, the chance of experimenting with smoking increases.

Discussion

The 30.2% prevalence of smoking experimentation found among the adolescents in this study can be considered high when compared with that reported in studies conducted in other Brazilian capitals.⁽¹²⁾ This might be a consequence of an increase in experimentation over the years, since adolescents between 10 and 19 years of age were

Table 3 – Smoking experimentation, according to variables related to the smoking habits and lifestyles of the adolescents, Cuiabá, Brazil, 2006.

Variables	Prevalence, % (ratio ^a)	PR (95% CI)	p
Parental smoking			
No	44.6 (90/202)	1.00	
Yes	29.2 (782/2681)	1.54 (1.30-1.82)	p < 0.0001
Smoking sibling			
No	27.0 (455/1688)	1.00	
Yes	57.5 (195/339)	2.13 (1.89-2.41)	p < 0.0001
Smoking friend			
No	21.6 (443/2050)	1.00	
Yes	62.4 (370/593)	2.89 (2.60-3.20)	p < 0.0001
Physical activity			
Yes	29.0 (617/2124)	1.00	
No	33.6 (225/759)	1.16 (1.03-1.30)	p < 0.05
Religion			
Yes	29.2 (752/2576)	1.00	
No	41.1 (115/280)	1.20 (1.09-1.33)	p < 0.0001
Employed			
No	26.4 (637/2412)	1.00	
Yes	49.9 (235/471)	1.89 (1.69-2.11)	p < 0.0001
Paid			
No	26.5 (611/2304)	1.00	
Yes	45.2 (261/578)	1.70 (1.52-1.91)	p < 0.0001

PR: prevalence ratio. ^aRatio of cigarette experimenters to nonexperimenters.

Table 4 – Factors associated with smoking experimentation among adolescents, Cuiabá, Brazil, 2006.

Variables	OR (95% CI)	p
Level 1		
Educational level of the mother		
Junior high or middle school <i>vs.</i> High school and college or university (graduate)	1.85 (1.34-2.55)	p < 0.05
Illiterate and incomplete elementary school <i>vs.</i> High school and college or university (graduate)	2.44 (1.72-3.48)	p < 0.05
Socioeconomic level		
Intermediate (C) <i>vs.</i> Highest	1.09 (0.80-1.49)	p > 0.05
Lowest (D and E) <i>vs.</i> Highest	1.39 (1.01-1.93)	p < 0.05
Level 2		
Type of school		
Public <i>vs.</i> Private	1.56 (1.22-2.00)	p < 0.05
Study shift		
Evening <i>vs.</i> Daytime	2.44 (1.85-3.22)	p < 0.05
School grade		
8th grade <i>vs.</i> 6th and 7th grades	1.96 (1.43-2.70)	p < 0.05
9th grade <i>vs.</i> 6th and 7th grades	3.70 (2.78-5.00)	p < 0.05
10th grade <i>vs.</i> 6th and 7th grades	3.45 (2.63-4.54)	p < 0.05
Failed		
Yes <i>vs.</i> No	2.17 (1.78-2.70)	p < 0.05
Separated parents		
Yes <i>vs.</i> No	1.23 (1.02-1.49)	p < 0.05
Level 3		
Smoking sibling		
Yes <i>vs.</i> No	2.44 (1.82-3.27)	p < 0.05
Unknown <i>vs.</i> No	2.60 (1.89-3.59)	p < 0.05
Smoking friend		
Yes <i>vs.</i> No	3.75 (2.99-4.70)	p < 0.05
Unknown <i>vs.</i> No	3.27 (2.21-4.86)	p < 0.05
Current age		
13 to 16 years <i>vs.</i> 10 to 12 years	1.67 (1.06-2.56)	p < 0.05
17 to 19 years <i>vs.</i> 10 to 12 years	2.44 (1.39-4.17)	p < 0.05

OR: Adjusted odds ratio.

studied. However, in a study involving adolescent students in the city of Belém, Brazil,⁽¹³⁾ a greater proportion of adolescents (44%) reported having experimented with smoking.

In relation to the sociodemographic variables, the results of this study showed that the socio-economic and educational level of the mother affected independently the smoking experimentation. Although included in the model, the level of the education of the father showed no association with the outcome. It is known that the level of the education of the father is more related to earning power and to family income, whereas the level of

the education of the mother is more related to the maternal care of the family.⁽¹⁴⁾

Many studies have shown that the level of maternal education is an important predictor of the health of the family,^(14,15) that is, as the mother has more access to information, she is better prepared to care for the family. Knowing that smoking is a harmful habit, she surely will attempt to prevent the children from becoming smokers. In the present study, this is proven by the lower prevalence of smoking experimentation found among adolescents of mothers with higher levels of education (23.2% *vs.* 47.9%). Other studies have also shown

an inverse association between schooling and the prevalence of smoking.⁽¹⁶⁾

Although some authors have demonstrated that smoking is more prevalent in males,^(17,18) we found no significant association between smoking experimentation and the gender of the adolescents, after the multivariate analysis.

The participation of women in the numbers of smokers has been increasing, mainly in the younger age brackets. Until a few decades ago, it was believed that the effects of tobacco use were more pronounced in males. However, as new generations of smokers came along, it was observed that women are equally or more susceptible to the harmful effects of smoking, due to the peculiarities inherent to the gender, such as pregnancy and the concomitant use of oral contraceptives.⁽¹⁹⁾ In addition, the fact that women smoke as much as men is very worrisome, from a biological viewpoint, due to the risk to their health and to the health of their children, as well as to the social functions, since the woman is a powerful role model for her children and for society.⁽²⁰⁾

Some studies involving adolescents have shown that the smoking habits of the parents constitute a risk factor for smoking experimentation among their children.⁽⁹⁾ However, in the present study, after adjustments for confounding factors in the multivariate analysis, no significant association between the smoking habits of the parents and smoking experimentation among adolescents was observed.

As for the marital status of the parents, this study showed that children whose parents are separated have a 23% greater chance of experimenting with smoking than do those whose parents live together. It is possible to think that this greater risk is related to social aspects and emotional interaction into which the separation is inserted, that is, the withdrawal of one or both parents, economical difficulties, moving house and greater affective distancing, among other issues, which can lead the adolescent to search for a refuge in smoking. Similar results were obtained by another group of authors,⁽²¹⁾ who found that adolescents whose parents are separated present a higher probability of experimenting with smoking (16.7%).

When the type of school in which the adolescent is enrolled is considered, we observe that the chance of experimenting with smoking is 56% higher for students in public schools than for those in private

schools. If we consider that smoking is more prevalent among people with lower earning power,⁽²²⁾ it is probable that the higher prevalence found among students in public schools results from the lower socioeconomic level of their families.

We observed that higher grade level translates to a greater risk of experimenting with smoking. Therefore, those in the 10th grade have a 3.5 times greater chance of experimenting with smoking than those in 6th or 7th grade. In contrast, another study⁽²³⁾ showed that adolescents with 4 years of schooling had a 3.5 times greater chance of experimenting with smoking when compared with adolescents with 9 years of schooling or more.

As observed in other studies,^(24,25) there was greater proportion of smoking experimentation among those who studied in the evening, who presented more than double the chance of experimenting with smoking than did those who studied during the daytime (OR = 2.44; 95% CI, 1.85-3.22) This might be explained by the higher age bracket of those students as well as by the fact that they work.

Students who had already been held back a school year had a 2.2 times greater chance of experimenting with smoking than did those who had never been held back. Similar results were also found in other studies, showing an association between smoking experimentation in adolescence and failure in school.^(21,26)

In accordance with the findings of other studies,^(27,28) we observed an independent effect for the variables having friends and siblings who smoke. It means that, even after adjustments for the socioeconomic variables, potential factors of confusion, having friends and siblings who smoke remained associated with smoking experimentation. The adolescents who claimed to have friends who smoke presented almost 4 times the chance of smoking experimentation. Similarly, if the adolescent has siblings who smoke, the chance of experimenting with smoking increases by almost three times. This can be explained by the great influence of their peers, where the coexistence and acceptance of one or more smokers create repeated opportunities for the offer and consequent introduction to experimentation.⁽⁴⁾ In addition, adolescents tend toward similar behaviors and attitudes among themselves, facilitating the integration into groups, which

reinforces the importance of the relationships of proximity.⁽²⁹⁾

In the present study, we observed that the older adolescents (those between 17 and 19 years of age), had more than twice the chance of experimenting with smoking than did those aged 10 to 12 years. It was expected that, as the adolescents grew up and had more information about the harms caused to health by smoking, they would refrain from smoking. However, that did not happen to the adolescents in this study. Similar results were obtained by other authors,⁽⁹⁾ who observed a positive and direct association between smoking experimentation and the age bracket of the adolescents. In contrast, in a study⁽³⁰⁾ involving children and youths between 8 to 22 years of age, it was observed that the age bracket with the highest prevalence for experimentation was between 13 and 14 years.

The cross-sectional design, used in the present study, presents the advantage of relative quickness and lower costs. One limitation, however, is in the nonutilization of temporality as a causal criterion, since risk factors and outcome are observed at the same moment. Another limitation to be discussed is that the outcome was measured using a questionnaire. However, due to the fact that an anonymous questionnaire was used, we sought to minimize the occurrence of false-positive and false-negative results. However, we cannot rule out the possibility that some adolescents omitted or information or lied about experimenting with smoking.

The high proportion of adolescents who have experimented with smoking, principally those from public schools, shows the need for continuous educational measures inside educational institutions as a form of controlling smoking experimentation among adolescents.

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