

## CLINICAL STUDY

# Socioeconomic predictors of smoking behaviour among school-aged children, in the Slovakia

Marcinkova D<sup>1</sup>, Majdan M<sup>1</sup>, Gergelova P<sup>1</sup>, Rusnak M<sup>1</sup>, Pekarcikova J<sup>1</sup>, Baska T<sup>2</sup>

*Department of Public Health, Faculty of Health Care and Social Work, Trnava University, Slovakia.*  
 dmarcin@truni.sk

**Abstract:** *Objective:* The aim of this study was to describe the relationship between smoking habits and socioeconomic determinants among adolescents.

*Background:* Tobacco use among young people is a formidable social health concern. The aim of this paper is to describe the situation in selected localities surveyed, and to elucidate the relations among experiments with tobacco in adolescent youth and behaviour of parents, friends and teachers and media influence. The objectives of this study are to describe patterns of self-reported smoking and to describe the association of trying smoking with other variables, such as social, or socio-demographics among a sample of young students.

*Methods:* Global Youth Tobacco Survey to track tobacco use among youth across countries using a common methodology and core questionnaire. In Slovakia, GYTS was carried out at the turn of 2002 to 2003. A total of 4.594 students participated in the study.

*Results:* The results indicate that the majority of the students (74.3 %) have tried smoking where both parents are smokers. We found that gender, parents', friends' and teachers' smoking had a significant influence on whether the children ever tried smoking. A parent who smokes was found as a strong significant predictor for trying smoking in the group of students [OR=1.6 (1.39–1.92)].

*Conclusion:* Predictors of smoking behaviour include parents', teachers' and friends' smoking. Public health interventions aim at conducting effective health promotion programs tailored to specific population groups and known predictors should be central to the design of such endeavours (Tab. 5, Ref. 18). Full Text (Free, PDF) [www.bmj.sk](http://www.bmj.sk).  
 Key words: smoking, socioeconomic, adolescents, GYTS.

**List of abbreviations:** CDC – Centers for Disease Control and Prevention, GYTS – Global Youth Tobacco Survey, GTSS – Global Tobacco Surveillance System, WHO – World Health Organisation, CPHA – Canadian Public Health Association, OR – Odds ratio, ETS – environmental tobacco smoke.

<sup>1</sup>Department of Public Health, Faculty of Health Care and Social Work, Trnava University, and <sup>2</sup>Jessenius Faculty of Medicine, Comenius University Martin, Slovakia

**Address for correspondence:** D. Marcinkova, PhD, Trnava university, Faculty of Health Care and Social Work, Univerzitne nam 1, SK-918 43 Trnava, Slovakia.  
 Phone: +421.33.5939402

**Acknowledgement:** The GYTS is a collaborative project of WHO/CDC/participating countries. The collaborative group in the Slovak Republic was: Tibor Baska, MD, PhD, Jessenius Faculty of Medicine, Comenius University in Martin, research coordinator of GYTS Slovakia, 2002, Mgr. Anna Beresova, Medical Faculty of the P.J. Safarik University in Kosice, field administrator, Andrea Cucova, Faculty of Humanities and Natural Sciences, University of Presov, field administrator, Mgr. Ludmila Jackova, State Health Institute in Banska Bystrica, field administrator, Dr. Lucia Kobeticova, Faculty of Social Work and Health, Trnava University, field administrator, Dr. Jarmila Korcova, Faculty of Social Work and Health, Trnava University, field administrator, Assoc. Prof. Maria Kovarova, M.D., PhD., Medical Faculty of the P.J. Safarik University in Kosice, field administrator, Dr. Daniela Marcinkova, Faculty of Social Work and Health, Trnava University, field administrator, Dr. Anna Pakosova, Faculty of Social Work and Health, Trnava University, field administrator

Children and teenagers are easy targets for the tobacco industry. They are heavily influenced by TV, movies, advertising, and by what their friends do and say. Nearly all first attempts of tobacco use occur before high school graduation. A 2005 survey from the US Centres for Disease Control and Prevention (CDC) found that 54 % of high school students had tried cigarette smoking at some point. For the most part, people who do not start using tobacco when they are teenagers never start using it (1).

Smoking is the most important cause of premature death and loss of health in developed countries. In countries, where smoking has been common, it is estimated to cause over 90 % of lung cancer in men and about 70 % of lung cancer among women (2). Adolescents start smoking in response to social influences, emulating the behaviour of friends, family members, and other people they admire. The influence of smoking by friends and family members has been extensively studied, but less attention has been given to influences of the media other than tobacco advertising (3).

The tobacco use among young people is a formidable social health concern. Researchers, scholars, and others regularly criticize movies, television, and other mass media for directly and indirectly contributing to smoking among adolescents with tobacco advertising as a primary focus. Adolescents' receptivity to tobacco advertisements predicted cigarette smoking. In fact, children and teenagers comprise most of the tobacco industry's new customers (4).

The Global Youth Tobacco Survey (GYTS), as part of the Global Tobacco Surveillance System (GTSS), initiated by the World Health Organization (WHO), CDC, and the Canadian Public Health Association (CPHA), was developed to monitor the tobacco use, elicit attitudes about tobacco, and obtain information on exposure to tobacco smoke among youth. It has been completed so far by over 2 million students around the world (5).

Similar patterns were suspected to be confirmed in Slovak Republic. The aim of this paper is to describe the situation in selected localities surveyed and to elucidate the relations among experiments with tobacco in adolescent youth and behaviour of parents, friends and teachers and media influence. Parents influence the adolescents in multiple ways. First, using parenting strategies such as high monitoring, supervision, and involvement, parents act as figures of authority and exert control over their child directly. On the other hand, parents may influence the behaviour indirectly through the development of a close parent-child relationship. Direct control and close parent-child relationships are associated with lower levels of smoking (6).

A specific study was based on the GYTS framework. GYTS aimed to track tobacco use among youth across countries. Slovakia decided to take part in the study conducted in 2002 using a common methodology and a core questionnaire to assess the risk factors facilitating tobacco use by adolescents. Smoking tobacco remains a serious problem in Slovakia in spite of several activities aimed at reducing the consumption. In 1995, an act on “Protection of non-smokers” was passed by the Slovak Parliament and it has been recently updated. Although tobacco consumption has declined, the proportion of children and young people in Slovakia, who are occasional or regular tobacco consumers, remains high (7).

According to numerous studies, the onsets of the smoking habit, and attitudes towards tobacco have their roots in early childhood and preventive action should be implemented as early as possible. To develop an effective strategy, epidemiological data on smoking habits and smoking-related factors among schoolchildren are essential (8).

Social influences seem to be strong predictors of experimenting with smoking in early years.

The objectives of this study are to describe patterns of self-reported smoking and to describe the association of trying smoking with other variables, such as social, or socio-demographics (parent’s education, or seeing adults smoke, etc.) among a sample of young students. This information about the relation between social influences and smoking among youth should then be used in youth anti-smoking programmes to address better the causes of experiments with smoking.

Approximately 80 % of adult smokers began smoking before the age of 18 years. This trend of early initiation of cigarette smoking, together with the adverse consequences of smoking, suggests that understanding factors associated with adolescent smoking remains a public health priority (9). Our paper focuses mainly on individual, family, peer, media and school influences.

## Methods

WHO and CDC developed the GYTS to track tobacco use among youth across countries using a common methodology and core questionnaire. The survey carried out in 2003, provided estimates of the proportion of pupils who smoked and described their smoking behaviour. Similar surveys were carried out to monitor the trends in the prevalence of cigarette smoking in several other countries in the world. The GYTS project was launched in 1999 and until now has been completed in 97 countries, 16 of them in Europe. In Slovakia, GYTS was carried out at the turn of 2002 to 2003 and was administrated by the Jessenius Faculty of Medicine, Comenius University in Martin in co-operation with the Faculty of Social Work and Health, Trnava University, Medical Faculty of the P.J. Safarik University in Kosice, State Health Institute in Banska Bystrica, Faculty of Humanities and Natural Sciences, University of Presov, State Faculty Health Institute in Bratislava and WHO Liaison Office in Slovakia, Bratislava (10).

GYTS is the latest in a series of surveys of secondary-school children that is aimed at providing national estimates of the proportion of young people aged 11–15 who smoke. Similar surveys were carried out to monitor the trends in the prevalence of cigarette smoking in several other countries in the world. A two-stage cluster sample design was used to produce representative data for all of Slovakia plus all 8 regions. At the first stage, schools were selected with probability proportional to enrolment size. At the second stage, classes were randomly selected and all students in selected classes were eligible to participate. The school response rate was 98.3 %, the student response rate was 87.4 %, and the overall response rate was 85.9 %. A total of 4 594 students participated in the Slovakia GYTS (11).

The size and structure of the sample was estimated with the aim of obtaining a representative number of subjects to cover the entire country and to reflect different geographical regions and urban and rural areas. Collected patterns of self-reported smoking behaviour were used to describe the association of trying smoking with other variables, such as social or socio-demographics (gender, age, parent’s education, or seeing adults smoke in movies) among a sample of young students. To evaluate the relations between predictors and outcomes, the estimation of odds ratios were computed. The association of socio-demographic characteristics with young students’ self-reported smoking was calculated using logistic regression. Differences in proportions were tested by chi-square test. Associations were verified using a logistic model where variables with significant difference between two groups were found. *p* value of 0.05 and less has been considered as significant. R has been used for statistical computation.

## Results

### *Description of the sample*

The total sample interviewed comprised of 4 354 adolescents between the ages of 13 to 15 years. There were 2183 (50.1 %) boys and 2171 (49.9 %) girls. The sample was chosen so as to be

**Tab. 1. Descriptive statistics of smoking experiments and demographic variables.**

	Ever tried smoking	Never tried smoking	P
Boys	1508 (69.1%)	675 (30.9%)	<0.0001
Girls	1260 (58.0%)	911 (42.0%)	
<b>Age</b>			
11	44 (84.6%)	8 (15.4 %)	<0.0001
12	378 (49.6%)	384 (50.4%)	<0.0001
13	820 (57.7%)	601 (42.3%)	<0.0001
14	982 (62.2%)	438 (30.8%)	<0.0001
15	575 (77.5%)	167 (22.5%)	>0.05
16	23 (79.3%)	6 (20.7%)	>0.05
17 and more	18 (90%)	2 (10%)	>0.05

**Tab. 2. Descriptive statistics of smoking experiments and others smoking variables.**

	Ever tried smoking	Never tried smoking	Stat signif*/p
<b>Parents smoking</b>			
Neither of them	1167 (56.6%)	894 (43.6%)	<0.0001
Both	669 (74.3%)	231 (25.7%)	<0.0001
Father or a male-caretaker	697 (67.2%)	340 (32.8%)	>0.05
Mother or a female caretaker	340 (69.5%)	149 (30.5%)	>0.05
<b>Friends smoking</b>			
None of them	452 (38.4%)	726 (61.6%)	<0.0001
Some of them	1542 (67.2%)	754 (32.8%)	<0.0001
Most of them	689 (86.2%)	110 (13.8%)	<0.0001
All	172 (92.0%)	15 (8.0%)	<0.05
<b>Teachers smoking</b>			
Almost every day	342 (72%)	133 (28%)	<0.0001
Sometimes	945 (66.9%)	467 (33.1%)	<0.0001
Never	1190 (58.9%)	832 (41.1%)	<0.001
I do not know	361 (67.4%)	175 (32.6%)	<0.001

representative of the Slovak Republic as a whole, to reflect different geographical regions and to allow the analysis of urban and rural areas. Participants were not able to indicate ethnic backgrounds.

*Descriptive statistics of smoking and demographic variables*

Overall, 63.6 % (2768) of those surveyed indicated that they had at some point tried smoking cigarettes. 24.3 % of the interviewees had smoked in the past 30 days. Boys tried smoking significantly more frequently than girls ( $p < 0.0001$ ) (Tab. 1).

**Tab. 3. Descriptive statistics of trying smoking and occurrence of tobacco use in film media.**

	Ever tried smoking	Never tried smoking	Stat signif*/p
<b>Occurrence of tobacco use in film media</b>			
I never watch TV, video, nor go to cinema	48 (68.6%)	22 (31.4%)	>0.05
Often	1541 (65.5%)	810 (34.5)	>0.05
Sometimes	1096 (61.9%)	676 (38.1%)	>0.05
Never	160 (62.5%)	96 (37.5%)	>0.05

We found significant differences between the ages at which boys and girls had their first smoking experience. The first smoking experience is more frequent among younger boys (7 and less years) than among older girls (16 and more years) (Tab. 1).

Students whose parents are non-smokers have tried smoking significantly less than their peers with smoking parents. The results indicate that the majority of the students (74.3 %) have tried smoking where both parents are smokers. On the other hand, very low proportions (25.7 %) of students have never tried smoking where their parents are smokers (Tab. 2).

Trying smoking was also significantly associated with parents and friends smoking in our study. Friends' smoking is a very important social factor influencing the students' behaviour in general. In case all friends are smokers, 92.0 % of respondents have tried smoking, whereas in case none of the friends smoke, 61.6 % have never tried smoking.

Teachers may constitute an important factor in the social environment of the children when it comes to influencing their behaviour. Students seeing their teachers smoking in the school every day have tried smoking in 72 % of cases. If students have never seen their teachers smoking in the school, they have never tried smoking in a significantly higher number of cases (41.1 %) (Tab. 2).

No differences in proportions of trying smoking were found by occurrence of tobacco use in film media (Tab. 3).

In our group, a high proportion of children had never watched TV, video, or gone to cinema (68.6 %) with tobacco use occurrence (Tab. 3).

No significant differences were found in trying smoking by parent's employment, but significant differences were found by mother's education and father's education. If the father's education was only elementary, 71.8 % of the children had experience with smoking, and if the mother's education was elementary, 77.6 % had tried smoking, which is significantly more than in the group with parents who have achieved a higher level of education (Tab. 4).

We examined the effects of socio-demographic variables on trying smoking by young students by using a logistic regression model. Our aim was to determine whether the gender, age, parents', friends' or teachers' smoking, smoking in film media, education and employment of parents influenced their smoking behaviour.

Table 5 presents the results of the logistic regression model. Trying smoking was used as the effect variable. We found that gender as well as parents', friends' and teachers' smoking had a significant influence on whether the children ever tried smoking. Being a boy influenced the outcome by a factor of 0.57, seeing the teacher smoking by a factor of 1.26 (1.07–1.48), and having a friend who smokes by a factor of 4.18 (3.50–4.99). Age was not found to be a significant factor, although we found significant differences in proportions, for example, children aged 11 tried smoking more often than children at 12 or 13 years of age ( $p < 0.0001$ ).

Having a parent who smokes is a significant predictor – stronger than having teachers who smoke,  $OR = 1.64$  (1.39–1.92) (Tab. 5).

## Discussion

### Methodology

The questionnaire we used was designed and used in the Global Youth Tobacco Survey; the questionnaire is standardized and has been used worldwide. GYTS comprises the “core” country-approved questions designed to gather data on the following seven topics: prevalence of cigarette smoking and other tobacco use, knowledge and attitudes towards cigarette smoking, role of the media and advertising on the use of cigarettes, access to cigarettes, tobacco-related school curriculum, environmental tobacco smoke (ETS), and cessation of cigarette smoking. The questionnaire contains all the important issues connected to smoking behaviour among young students. The GYTS questionnaire is excellent for monitoring trends in smoking in Slovakia and the data could be used for future international comparisons.

### Parents, friends smoking

Our results indicate that parents, peers, intrapersonal (friends), and community factors (teachers) affect the experimenting with smoking among students. It is known that there are many factors that can influence smoking or trying smoking by children. It is well-established that parent's, sibling's, and peer's smoking influence the adolescent smoking (12). Sargent has found that thirty-nine per cent of smokers had at least one parent who smoked, and 37 % had friends who smoked. Oksuz has found that many active smokers had relatives or friends who also smoked, specifically, 46.5 % had a father who smoked, 13.3 % had a mother who smoked, 26.8 % had an older brother or sister who smoked, and 69.7 % had two or more close friends who smoked (13). Overall, 17.5 % of adolescents had tried smoking, and trying smoking was significantly associated with all the variables.

Increasingly, the onset of adolescent smoking is understood to be a function of social and marketing influences. It is well-established that parent's, sibling's, and peer's smoking influence the adolescent's smoking (12).

### Parents' education

It has been shown that the educational level is a strong predictor of smoking and quitting among the adult population as a whole. The few population-based studies of young adult smok-

**Tab. 4. Descriptive statistics of smoking experiments and parent's variables.**

Parent's employment	Ever tried smoking	Never tried smoking	Stat signif*/p
Only father is working	400 (62.5%)	240 (37.5%)	> 0.05
Only mother is working	268 (68.7%)	122 (31.3%)	> 0.05
Both parents are employed	2008 (63.1%)	1172 (36.9%)	> 0.05
Both parents are unemployed	149 (68.7%)	68 (31.3%)	> 0.05
Father's education			
Elementary education	94 (71.8%)	37 (28.2%)	>0.05
Secondary school without school leaving certificate	449 (67.3%)	218 (32.7%)	<0.05
Secondary school with school leaving certificate	1066 (66.4%)	539 (33.6%)	<0.05
College/University	539 (60.4%)	354 (39.6%)	<0.05
I don't know	669 (64.0%)	437 (39.5)	<0.05
Mother's education			
Elementary education	118 (77.6%)	34 (22.4%)	<0.001
Secondary school without school leaving certificate	383 (66.7%)	191 (33.3%)	<0.05
Secondary school with school leaving certificate	1298 (65.9%)	671 (34.1%)	<0.01
College/University	492 (59.2%)	339 (40.8%)	<0.001
I don't know	539 (59.7%)	364 (40.3%)	<0.001

ers have not provided comparative data on individuals with different educational backgrounds (14). We were interested in the association of parent's education with trying smoking among students. The education of parents is a significant predictor for children trying smoking in our sample. It has been well-documented that social stratification is related to health outcomes, individuals of disadvantaged socio-economic background being at greater risk of unhealthy behaviour, mortality and morbidity (15).

### Media

The influence of media on health behaviour has been described on many occasions. When compared to adults, the teenagers are three times more likely to visit cinema regularly and thus are particularly affected by onscreen depictions of tobacco use. Researchers have repeatedly found associations between youth viewing tobacco use in film and choosing to initiate tobacco use in reality (16).

**Tab. 5. Odds ratios and confidence intervals for predictors of trying smoking.**

Predictors	Coef.	OR	Significance /p	95 % CI	
				lower	upper
Gender	0.57	1.77	0.0***	1.50	2.08
Age	0.96	2.62	0.05	0.99	6.97
Parents smoking	0.49	1.64	0.0 ***	1.39	1.92
Friends smoking	1.43	4.18	0.0 ***	3.50	4.99
Teachers smoking	0.23	1.26	0.001 **	1.07	1.48
Occurrence of tobacco use in film media	-0.17	0.84	0.36	0.59	1.21
Parent's employment status	0.15	1.16	0.50	0.75	1.79
Father's education	0.06	1.06	0.60	0.85	1.32
Mother's education	-0.01	0.99	0.96	0.78	1.26

We have not found an association between seeing smoking in film media and trying smoking by the students in our sample. Much research has been done on tobacco use in film media and there are many studies describing the influence of media on young people's behaviour (13, 16, 17, 18). Tobacco use was most often associated with positive characterizations, working/middle class status, masculinity, and youth in film media (13).

In conclusion, predictors of smoking behaviour include parents', teachers' and friends' smoking. Perceived smoking norms among the same-age peers; parental attitude toward youth smoking; perceived ease of access to tobacco products; exposure to anti-tobacco activities; and youth involvement in outdoor activities should be priorities for future research. All these determinants should be taken into account in the design, planning and implementation of interventions aimed at decreasing the smoking prevalence among youth. It is a well-substantiated fact that the social environment is important for healthy behaviour in general. Relationships in families and parents as an example are basic components of smoking prevention activities. Public health interventions aim at conducting effective health promotion programs tailored to specific population groups, and known predictors should be central to the design of such endeavours.

**References**

1. **American Cancer Society:** Child and Teen Tobacco Use. Available online: [http://www.cancer.org/doctor/PED\\_10\\_2X\\_Child\\_and\\_Teen\\_Tobacco\\_Use.asp?sitearea=PED](http://www.cancer.org/doctor/PED_10_2X_Child_and_Teen_Tobacco_Use.asp?sitearea=PED)

2. **WHO: Addictive substances.** Available online: <http://www.who.int/whr/2002/chapter4/en/index6.html>

3. **Sargent JD, Beach ML, Dalton MA et al.** Effect of seeing tobacco use in films on trying smoking among adolescents: cross sectional study. *Brit Med J* 2001; 323 (7326): 1394—1397.

4. **Pinkleton BE, Weintraub AE, Cohen M, Miller A, Fitzgerald E.** A statewide evaluation of the effectiveness of media literacy training to prevent tobacco use among adolescents. *Health Commun* 2007; 21 (1): 23—34.

5. **Kyrlesi A, Soteriades ES, Warren CW et al.** Tobacco use among students aged 13—15 years in Greece: the GYTS project. *BMC Public Health* 2007; 7: 3.

6. **Nowlin PR, Colder CR.** The role of ethnicity and neighborhood poverty on the relationship between parenting and adolescent cigarette use. *Nicotine Tob Res* 2007; 9 (5): 545—556.

7. **Proposal of National Tobacco Control Programme.** Available online: [http://www.health.gov.sk/redsys/rsi.nsf/0/80464c59a26b20a8c125724c2345ce/FILE/2007\\_001.pdf](http://www.health.gov.sk/redsys/rsi.nsf/0/80464c59a26b20a8c125724c2345ce/FILE/2007_001.pdf)

8. **Slovakia GYTS goals.** Available online: [http://www.cdc.gov/Tobacco/Global/GYTS/reports/euro/2003/00\\_pdfs/Slovakia\\_goals.pdf](http://www.cdc.gov/Tobacco/Global/GYTS/reports/euro/2003/00_pdfs/Slovakia_goals.pdf)

9. **Xue Y, Zimmerman MA, Caldwell CH.** Neighborhood residence and cigarette smoking among urban youths: The protective role of pro-social activities. *Amer J Publ Health* 2007; 97 (10): 1865—1872.

10. **Baska T et al.** GYTS Country Report Slovakia, 2003, available online: [http://www.cdc.gov/tobacco/global/gyts/reports/euro/2003/slovakia\\_2003\\_EURO1.htm](http://www.cdc.gov/tobacco/global/gyts/reports/euro/2003/slovakia_2003_EURO1.htm)

11. **Global Youth Tobacco Survey (GYTS) Slovakia,** Fact Sheet. Available online: [http://www.cdc.gov/tobacco/global/GYTS/factsheets/euro/2002/slovakia\\_factsheet.htm](http://www.cdc.gov/tobacco/global/GYTS/factsheets/euro/2002/slovakia_factsheet.htm)

12. **Forrester K, Biglan A, Severson HH, Smolkowski K.** Predictors of smoking onset over two years. *Nicotine Tob Res* 2007; 9 (12): 1259—1267.

13. **Oksuz E, Mutlu ET, Malhan S.** Characteristics of daily and occasional smoking among youths. *Public Health* 2007; 121 (5): 349—356.

14. **Solberg LI, Asche SE, Boyle R, McCarty MC, Thoele MJ.** Smoking and Cessation Behaviors Among Young Adults of Various Educational Backgrounds. *Amer J Public Health* 2007; 97 (8): 1421—1426.

15. **Fergusson DM, Horwood LJ, Boden JM, Jenkin G.** Childhood social disadvantage and smoking in adulthood: results of a 25-year longitudinal study. *Research report. Addiction* 2007; 102 (3): 475—482.

16. **St Romain T, Hawley SR, Ablah E, Kabler BS, Molgaard CA.** Tobacco use in silent film: Precedents of modern-day substance use portrayals. *J Community Health* 2007; 32 (6): 413—418.

17. **Titus-Ernstoff L, Dalton MA, Adachi-Mejia AM, Longacre MR, Beach ML.** Longitudinal study of viewing smoking in movies and initiation of smoking by children. *Pediatrics* 2008; 121 (1): 15—21.

18. **Sargent JD, Beach ML, Adachi-Mejia AM et al.** Exposure to movie smoking: Its relation to smoking initiation among US adolescent. *Pediatrics* 2005; 116 (5): 1183—1191.

Received December 4, 2008.  
Accepted March 6, 2009.