

# PREDICTABILITY OF SMOKING ONSET AMONG ROMANIAN ADOLESCENTS

## PREDVIDEVANJE ZAČETKA KAJENJA MED ROMUNSKIMI MLADOSTNIKI

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### Abstract

**Objectives:** Research identifying reliable and country-specific predictors of smoking is needed in order to develop effective adolescent smoking prevention programmes. The objective of this study was to assess the cognitive and socio-demographic factors associated with smoking onset among Romanian teenagers, using both cross-sectional and longitudinal data.

**Methods:** The data were obtained from a two-wave, one-year longitudinal study carried out among 316 senior high school non-smokers from Cluj-Napoca, Romania.

Questionnaires assessed smoking behaviour, attitudes, social influence, self-efficacy and intention regarding smoking (motivational variables) as well as different sociodemographic features.

**Results:** The cross-sectional analyses showed that socio-demographics and motivational variables were strongly associated with smoking behaviour; the explained variance was 76%. The longitudinal analyses revealed that four variables explained 33% of the variance in change of status from non-smoking to regular smoking over a period of one year. Regular smoking onset after one year was predicted by baseline low self-efficacy in refraining from smoking in different situations, having more smoking friends and playing truant from school. Having a brother was a protective factor.

**Conclusion:** The results suggest that smoking prevention programmes in Romania should strengthen self-efficacy beliefs and resistance against peer modelling and help Romanian young people to develop skills and action plans to cope with pressure to smoke and challenging situations.

**Key words:** smoking predictors, Romanian adolescents, smoking prevention

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### Izveček

**Namen:** Za razvoj učinkovitih programov za preprečevanje kajenja med mladostniki je potrebna raziskava, ki bi opredelila zanesljive dejavnike začetka kajenja, značilne za posamezno državo. Cilj te študije je bil oceniti kognitivne in socialno-demografske dejavnike, povezane z začetkom kajenja med romunskimi mladostniki, in sicer na podlagi presečnih in vzporedno primerljivih podatkov.

**Metode:** Podatki so bili pridobljeni z enoletno študijo, ki je vzporedno potekala v dveh vejah in je vključevala 316 dijakov zadnjih letnikov, ki niso kadili, iz romunskega mesta Cluj-Napoca. Z vprašalniki so se ocenjevali kadilsko vedenje, odnos do kajenja, družbeni vpliv, samoučinkovitost in namera v povezavi s kajenjem (motivacijske spremenljivke) ter razni socialno-demografski podatki.

**Rezultati:** Analiza presečnih podatkov je pokazala, da so bile socialno-demografske in motivacijske spremenljivke močno povezane s kadilskim vedenjem; navedena varianca je bila 76-odstotna. Analiza vzporedno primerljivih podatkov pa je razkrila, da so štiri spremenljivke pojasnile 33 odstotkov variance v spremembi statusa od nekadilca do rednega kadilca, in to v obdobju enega leta. Začetna nizka samoučinkovitost pri vzdržnosti od kajenja v različnih situacijah, večje število prijateljev kadilcev in izostajanje od pouka so nakazovali začetek rednega kajenja po enem

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*letu. Pri mladostnikih/-cah, ki imajo brata, se je ta sorodstvena vez pokazala kot zaščitni dejavnik.*

**Zaključki:** *Izsledki kažejo, da bi morali programi za preprečevanje kajenja v Romuniji okrepiti prepričanje o samoučinkovitosti in upiranje vzorčnemu vedenju med vrstniki ter pomagati mladim v Romuniji razviti sposobnosti in načine ukrepanja, s katerimi bodo lahko obvladovali pritiske, ki jih napeljujejo h kajenju, in druge zahtevne situacije.*

**Ključne besede:** dejavniki kajenja, romunski mladostniki, preprečevanje kajenja

## 1 INTRODUCTION

In countries in South-East Europe, such as Romania, smoking is an important public health problem (1). Research identifying reliable and country-specific predictors of smoking is needed. This information can be used to develop effective, country-specific adolescent smoking prevention programmes. Thus, the present study aims to identify the socio-demographics and motivational factors that predict smoking onset in Romanian adolescents aged 15 to 17. Both cross-sectional and longitudinal outcomes are presented. Current smoking prevention programmes are characterised by the use of comprehensive theories (2, 3) such as the Integrated Model of Change (the I-Change Model) (4). This model as well as its predecessor (Attitude-Social Influences-Self Efficacy Model) has proven to be a useful tool in assessing the determinants of smoking as well as developing and evaluating smoking prevention programmes in several European countries (5-10). Based on these positive European experiences, we adopted the model to guide our Romanian study.

The I-Change Model, like other social-cognitive health behaviour models (11, 12, 13), assumes that an important determinant of behaviour is behavioural intention, which is in turn influenced by three proximal factors: individuals' overall evaluations of the behaviour (attitude), their beliefs about the beliefs and behaviours of significant others (social influence) and the control that they perceive themselves to have over performing a behaviour (self-efficacy). Distal factors such as demographics (e.g. age, gender) and psychological factors (e.g. self-esteem) are assumed to influence behaviour via these proximal factors (5).

Our present study has the following objectives. First, we aim to cross-sectionally and prospectively assess the importance of socio-demographic factors as well as attitudinal, social, self-efficacy and intentional beliefs in predicting smoking onset among Romanian adolescents. Based on the assumptions from the I-Change Model and findings from previous studies (14-19), we expect that more favourable attitudes to smoking, more social influences in favour of smoking from peers and family, lower self-efficacy beliefs in refraining from smoking in different situations and

stronger intention to smoke in the future will predict smoking onset. Second, we compare the outcomes and amount of variance explained when using a cross-sectional compared to a longitudinal design.

## 2 METHODS

### 2.1 Sample and procedure

In spring 2004, five senior high schools from Cluj-Napoca, a city in north-west Romania with approximately 330,000 inhabitants and 39 high schools, were randomly chosen and approached to participate in a survey about adolescent smoking behaviour. Time and financial constraints limited the inclusion of more schools in the study. The principals of the five schools were informed about the survey during individual meetings with the research team; all principals agreed to participate, and all first-year classes from the five schools were involved in the survey. Consent was obtained from the school administration only, in line with standard procedure in Romania.

Data were gathered in two waves. A baseline measurement was conducted in May–June 2004 (T1) among students from 19 first-year senior high school classes (aged 15 to 17), and a follow-up measurement was performed 12 months later (T2).

The students were not informed in advance about the date on which the assessment would take place. The research team administered the questionnaires to each class; classroom completion of the questionnaire took approximately 50 minutes.

Students were asked to read an introductory letter. They were assured that the researchers would treat their questionnaires confidentially and that they could refuse to participate by leaving the questionnaire blank. They put their completed questionnaires in an envelope, sealed it and wrote their names on the envelope and then the researchers collected the envelopes. No refusals were recorded; non-participation was exclusively due to absence of students on the day of assessment. The questionnaires were filled in by 473 students at T1 and 482 students at T2. A total of 416 students participated in both measurements; 66.5% of these were girls.

## 2.2 Questionnaire

An existing questionnaire based on the I-Change Model (5) was translated from the version used for OCTOPUS, a European three-country study (23), and for the European Smoking Prevention Framework Approach (ESFA), a collaboration of six European countries (7). It was designed to be sensitive to changes in smoking levels in primary and high school settings and has shown satisfactory scale reliability and item homogeneity (3, 7, 9). It assesses smoking behaviour, motivational factors regarding smoking (attitudes, social influences, self-efficacy expectations, intention) and several socio-demographic items, which are described in more detail below.

In a pilot test, the instrument was given to 30 Romanian first-year senior high school students to evaluate item clarity. The students' comments revealed no lack of clarity in the wording of the items about motivational factors and showed completeness of most relevant items. Adaptations were needed of only a few items on socio-demographic characteristics such as ethnicity, religion and pocket money spent per month.

Smoking behaviour was assessed by a combination of five questions. First, students were asked to choose a statement that best described their smoking behaviour (e.g. 'I smoke less than weekly'; 'I smoke at least once a week'). The responses were cross-validated using an algorithm of concepts measuring current smoking (smoking in the last month, the last week and the last 24 hours) and lifetime smoking (number of cigarettes smoked during lifetime). The adolescents were then categorised into two groups: regular smokers and non-smokers. Regular smokers were defined in line with the definition of the Centre for Disease Control and Prevention's Behavioural Risk Factor Surveillance System (21) and other international studies (5) as smoking at least one cigarette per week or smoking less than weekly but having smoked more than 100 cigarettes during their lifetime. The remaining respondents were classified as non-smokers, in line with another European study (5).

Attitudes were measured on a seven-point scale using 12 items. The answer categories ranged from 'I totally disagree' (= -3) to 'I totally agree' (= +3). A factor analysis on the attitudes was conducted using oblimin rotation and two scales were created: pros (six items referring to the expected positive outcomes of smoking such as 'It helps to calm my nerves'; Cronbach's  $\alpha = .75$  at T1;  $\alpha = .77$  at T2) and cons of smoking (six items referring to the perceived negative outcomes such as 'It's bad for my health'; Cronbach's  $\alpha = .62$  at T1;  $\alpha = .69$  at T2).

To assess social influences, we measured perceived social norms, perceived social pressure and perceived smoking behaviour. Social norms were measured by a 7-point scale assessing adolescents' perceptions of whether their parents ( $\alpha = .64$  at T1;  $\alpha = .67$  at T2), siblings (sister and brother;  $\alpha = .45$  at T1;  $\alpha = .49$  at T2) and peers (best friend, other friends and people in the same school year;  $\alpha = .60$  at T1;  $\alpha = .72$  at T2) thought they should smoke or not (e.g. 'My best friend thinks I definitely should smoke' (+3) to 'should not smoke' (-3). Social pressure was assessed using items with five answer categories on perceived pressure from parents (mother and father;  $\alpha = .82$  at T1;  $\alpha = .78$  at T2), siblings (sister and brother;  $\alpha = .40$  at T1;  $\alpha = .60$  at T2) and peers (best friend, other friends, people in the same school year;  $\alpha = .77$  at T1;  $\alpha = .78$  at T2) (e.g. 'Have you ever felt pressure from your mother to smoke?' where never = 0 and very often = +4). For both social norms and social pressure, the three scales regarding parents', siblings' and peers' influences were created based on the results of the factor analysis using oblimin rotation. Perceived behaviour was measured by asking whether those in their social circles (mother, father, sister(s), brother(s) and best friend) smoked (no = 0, yes = 1) as well as how many friends and people in the same school year smoked, with five answer possibilities (nobody = 0; everybody = 4). Because these items are not assumed to be one-dimensional, perceived behaviour was analysed separately for each measured person in the social environment.

Self-efficacy expectations to avoid smoking were measured by 12 items on a 7-point scale. The items measured the adolescents' perception of their ability to refrain from smoking when pressured by others (e.g. when with friends who smoke), when under emotional strain (e.g. when feeling upset) or when undertaking daily routines (e.g. when watching TV). Answer categories ranged from 'I'm sure I will smoke' (= -3) to 'I'm sure I won't smoke' (= +3). Factor analysis revealed one factor for self-efficacy; consequently one scale was created ( $\alpha = .95$  at T1;  $\alpha = .97$  at T2).

Intention was measured by one question on a 7-point scale and evaluated adolescents' intention to smoke in the next year (+3 = definitely yes; -3 = definitely not). For each motivational concept, we calculated the mean of the scale items.

The assessed demographic variables included: age, gender, religious background, ethnic background and family structure. The literature had indicated that the following risk factors influence smoking behaviour: spending pocket money, school performance, choice of leisure time location, involvement in several health-risk

behaviours (14, 16, 17, 22, 23). Pocket money spent per month by adolescents was measured using eight response categories ranging from nothing per month to the equivalent of more than €25/month; previous studies showed that smoking was statistically significantly more frequent among Romanian adolescents who spent more than €15 per month than among those who spent less money (24). Analyses were carried out using a dichotomous variable: spending less than €15/month (0) and at least €15/month (1); the €15 represents around twice the monthly governmental scholarship received by each Romanian high school student. Perceived school performance in the previous year was assessed as follows: 0 = in the bottom third of their class, 1 = in the middle third, 2 = in the top third. Each student also had to choose three places where they frequently spent their leisure time (home, friends' houses, street, shops, bars/discos/parties, sport clubs, youth clubs, and work) (23). Involvement in other risk behaviours (using alcohol, marijuana and other drugs, gambling, playing truant from school, physically fighting with other people, stealing, destroying things) was measured with eight items on a 5-point scale ranging from never (= 0) to at least once a week (= 4).

An identification code was used in the data file for each questionnaire for data connection; researchers replaced the names of students before the data were entered.

### 2.3 Analyses

A logistic regression analysis was used to compare participating and non-participating subjects in the second measurement, with data from the first measurement as predictors of dropout.

The sample consisted of students who participated at both measurements and were non-smokers at T1 (N = 316). Due to the limited sample size, the analyses were performed for the whole sample and not for boys and girls separately.

The prevalence of different socio-demographic characteristics and risk behaviours was assessed for the non-smokers at T1 at baseline and at follow-up;  $\chi^2$  tests were used to compare the results from the two waves.

Mean scores and standard deviations were calculated for the motivational concepts. Bivariate correlation was used to assess both cross-sectional and longitudinal association between smoking onset at T2 and motivational factors measured at T2 and T1 respectively. Differences between the new regular smokers (n = 44) and those who remained non-smokers

(n = 272) at T2 were tested using cross-sectional logistic regression analyses. The independent variables as measured at the second wave were entered in four blocks. Demographic variables were included in block 1: gender, family structure and pocket money spent per month. Several risk behaviours (school achievement, use of alcohol on a monthly basis, playing truant from school at least once a month, frequently spending free time in bars/discos/parties) were added in block 2. Attitudes, social influence and self-efficacy items were included in block 3, while intention to smoke in the future was added in block 4. Forward method was used within the first three blocks and enter method applied in the last block.

To gain deeper insight into the process of transition from non-smoking to smoking between the two waves, multiple logistic regression analyses were also conducted for the longitudinal data with the aim of assessing the association between smoking onset at T2 and explanatory variables measured at T1. The logistic regression analyses used the same procedure as described above.

Data analysis was performed with the SPSS-12 statistics programme. Significant results are reported at  $p < 0.05$ .

## 3 RESULTS

### 3.1 Characteristics of the sample

A total of 416 students participated in both measurements. The dropouts (N = 57) did not differ significantly from the rest of the sample in terms of gender, smoking behaviour or other risk behaviours such as alcohol use or frequently spending their free time in bars or discos.

Among the 416 students who participated in both measurements, regular smoking at T1 was 24% (N = 100). The non-smokers in the first wave (N = 316) represented the base for this study. The mean age of the non-smokers was 15.9 (SD = 0.3; range 15–17 years) at T1; 69.9% were female. Table 1 presents the socio-demographic characteristics as well as several health-risk behaviours of the non-smokers at T1. It reveals that all risk behaviours increased from T1 to T2. A percentage of 13.9% of the non-smokers at T1 became regular smokers at T2 (N = 44).

Table 2 indicates the mean scores of the motivational concepts measured at both T1 and T2.

Table 1. Socio-demographic characteristics and risk behaviours of the sample.  
Tabela 1. Sociodemografske značilnosti in tvegane oblike vedenja.

Variables/ Spremenljivke	T1 % N=316	T2 % N=316
Family structure/ Družinska struktura		
Living with the mother/ Živi z materjo	90.5	89.9
Living with the father/ Živi z očetom	80.1	79.4
Living with the brother(s)/ Živi z bratom/-oma/-i	33.5	34.2
Living with the sister(s)/ Živi s sestro/-ama/-ami	32.1	29.4
Spending ≥ 15 Euros/month/ Poraba ≥ 15 evrov/mesec	4.1 <sup>a</sup>	9.3
Risk behaviours/ Tvegane oblike vedenja		
Playing truant from school at least once/month/ Izostanek od pouka vsaj enkrat/mesec	20.1	25.6
Bad school achievements last year/ Slab lanskoletni šolski uspeh	1.9 <sup>a</sup>	5.4
Using alcohol at least once/month/ Uživanje alkohola vsaj enkrat/mesec	19.9 <sup>a</sup>	29.8
Spending time in bars/discos/parties/ Preživljanje časa v barih/diskotekah/zabavah	16.6 <sup>a</sup>	22.9

Statistically significant difference between T1 and T2 variables at chi<sup>2</sup> test (p<0.05)

a- Statistično pomembna razlika med spremenljivkami T1 in T2 pri hi-kvadrat preizkusu (p<0.05)

Table 2. Mean scores of cognitive variables/scales at T1 and T2 and their bivariate correlations with smoking onset at T2.

Tabela 2. Srednje vrednosti kognitivnih spremenljivk/lestvic pri T1 in T2 in njihovih bivariatnih korelacij z začetkom kajenja pri T2.

Variables/Scales/ Spremenljivke/ lestvice	Mean (SD) of T1 variables/ Srednja vrednost (SD) spremenljivk T1	Mean (SD) of T2 variables/ Srednja vrednost (SD) spremenljivk T2	Associations between smoking onset at T2 and T1 variables <sup>i</sup> / Povezave med začetkom kajenja pri T2 in spremenljivkami T1 <sup>i</sup>	Associations between smoking onset at T2 and T2 variables <sup>i</sup> / Povezave med začetkom kajenja pri T2 in spremenljivkami T1 <sup>i</sup>
Pro smoking attitude (-3 to +3) <sup>b</sup> / Pozitiven odnos do kajenja (-3 do +3) <sup>b</sup>	0.37(0.56)	0.36(0.55)	NS	0.31
Con smoking attitude (-3 to +3) <sup>b</sup> / Negativen odnos do kajenja (-3 do +3) <sup>b</sup>	2.02(0.75)	1.81(0.85)	-0.25	-0.45
Social norms parents (-3 to +3) <sup>c</sup> / Socialne norme staršev (-3 do +3) <sup>c</sup>	-2.49(0.81)	-2.42(0.86)	0.20	0.27
Social norms siblings (-3 to +3) <sup>c</sup> / Socialne norme bratov, sester (-3 do +3) <sup>c</sup>	-0.99(1.07)	-1.00(1.08)	0.13	0.21
Peer social norms (-3 to +3) <sup>c</sup> / Socialne norme vrstnikov (-3 do +3) <sup>c</sup>	-1.32(0.97)	-1.30(1.13)	0.11	0.31
Mother smokes (0 to 1) <sup>d</sup> / Mati kadilka (0 do 1) <sup>d</sup>	0.37(0.48)	0.36(0.48)	0.10	0.12

Father smokes (0 to 1) <sup>d</sup> / Oče kadilec (0 do 1) <sup>d</sup>	0.44(0.49)	0.43(0.49)	NS	NS
Brother smokes (0 to 1) <sup>d</sup> / Brat kadilec (0 do 1) <sup>d</sup>	0.15(0.35)	0.18(0.39)	NS	NS
Sister smokes (0 to 1) <sup>d</sup> / Sestra kadilka (0 do 1) <sup>d</sup>	0.08(0.27)	0.09(0.29)	NS	0.15
Friends smoke (0 to 4) <sup>e</sup> / Prijatelji kadilci (0 do 4) <sup>d</sup>	1.48(1.31)	1.65(1.36)	0.20	0.29
Best friend smoke (0 to 1) <sup>d</sup> / Najboljši prijatelj kadilec (0 do 1) <sup>d</sup>	0.18(0.38)	0.24(0.43)	NS	0.25
People in the same school year smoke (0 to 4) <sup>e</sup> / Dijaki v istem letniku, ki so kadilci (0 do 4) <sup>d</sup>	1.47(1.22)	1.89(1.27)	0.15	0.11
Parents pressure (0 to 4) <sup>f</sup> / Pritisk staršev (0 do 4) <sup>f</sup>	0.05(0.33)	0.06(0.34)	NS	0.10
Siblings pressure (0 to 4) <sup>f</sup> / Pritisk bratov, sester (0 do 4) <sup>f</sup>	0.10(0.38)	0.09(0.37)	NS	0.11
Peer pressure (0 to 4) <sup>f</sup> / Pritisk vrstnikov (0 do 4) <sup>f</sup>	0.59(0.66)	0.62(0.67)	0.12	0.12
Self-efficacy (-3 to +3) <sup>g</sup> / Samoučinkovitost (-3 do +3) <sup>g</sup>	2.47(0.77)	2.20(1.17)	-0.33	-0.71
Intention to smoke in the next year (-3 to +3) <sup>h</sup> / Namerava kaditi v naslednjem letu (-3 do +3) <sup>h</sup>	-2.20(1.83)	-1.83(1.65)	0.23	0.64

b-(-3)= I totally disagree to (+3)= I totally agree

c-(-3) = I definitely should not smoke to (+3)= I definitely should smoke

d-0=no; 1=yes

e-0=nobody; 4=everybody

f-0=never; 4=very often

g-(-3)=I am sure I will smoke to(+3) =I am sure I won't smoke

h-(-3)=I am sure I will not smoke to(+3) =I am sure I will smoke

i-All correlations with depicted correlation coefficient are significant: P<0.05

NS=Non-significant

b-(-3) = Sploh se ne strinjam do (+3) = Povsem se strinjam

c-(-3) = Zagotovo ne bi smel/-a kaditi do (+3)= Zagotovo bi moral/-a kaditi

d-0 = ne; 1 = da

e-0 = nihče; 4 = vsi

f-0 = nikoli; 4 = zelo pogosto

g-(-3) = Prepričan/-a sem, da bom kadil/-a do (+3) = Prepričan/-a sem, da ne bom kadil/-a

h-(-3) = Prepričan/-a sem, da ne bom kadil/-a do (+3) = Prepričan/-a sem, da bom kadil/-a

i – Vse korelacije s prikazanim korelacijskim koeficientom so pomembne: P < 0,05.

NS = Ni statistično pomembno.

### 3.2 Cross-sectional correlates of regular smoking

Table 2 shows the cross-sectional bivariate correlations of cognitive variables measured at T2 with smoking behaviour at the second wave (smoking onset N=44; non-smokers N= 272). All variables except the perceived

behaviour of father and brother were significantly correlated with regular smoking. Low self-efficacy and high intention to smoke in the future correlated most strongly with smoking behaviour.

Table 3 presents the results of the cross-sectional regression analyses. Adolescents with lower self-

efficacy and stronger intention to smoke in the next year were more likely to smoke. So, too, were those who frequently spent their free time in bars/discos and who had less strong attitudes against smoking and a higher proportion of smoking friends. The model variables explained 76% of the variance in smoking behaviour at the second wave.

### 3.3 Longitudinal predictors of regular smoking onset

Table 2 also presents the results of the longitudinal bivariate correlation analysis. It shows that the variables measured at T1 associated with smoking onset at T2 were less distinct attitudes against smoking, lower social norms against smoking, more perceived behaviour of the mother, friends and colleagues, more perceived peer pressure towards smoking, lower self-efficacy and higher intention to smoke in the next year. The associations of the baseline factors with behaviour

one year later were generally lower when longitudinal associations were evaluated than when cross-sectional associations were assessed. Baseline self-efficacy and baseline cons of smoking correlated most strongly with smoking onset one year later.

Table 4 shows the results of the longitudinal regression analysis. Socio-demographic and health-risk behaviours predicted 15% of the variance in regular smoking onset. When the cognitive variables were also included, self-efficacy explained 13% of the variance of adolescents' smoking behaviour, while the smoking behaviour of their friends added 5% of explained variance. The inclusion of intention in the model made no significant contribution. The final model shows that the transition to regular smoking over a period of one year was predicted by low self-efficacy in refraining from smoking in different situations, having more smoking friends at first measurement and playing truant from school. Having a brother was a protective factor.

Table 3. Results of T2 independent variables in the cross-sectional logistic regression model for those who remained non-smokers at T2 and those who became smokers at T2 (N = 299<sup>a</sup>).

Tabela 3. Rezultati neodvisnih spremenljivk pri T2 v presečnem logistično-regresijskem modelu za tiste, ki so pri T2 ostali nekadilci, in za tiste, ki so pri T2 postali kadilci (N = 299<sup>a</sup>).

	Variables / scales at T2 <sup>b</sup> / Spremenljivke/ lestvice pri T2 <sup>b</sup>	Model 1		Model 2		Model 3		Model 4	
		OR	R <sup>2</sup> Change/ sprememba	OR	R <sup>2</sup> Change/ sprememba	OR	R <sup>2</sup> Change/ sprememba	OR	R <sup>2</sup> Change/ sprememba
1	Spending ≥ 15 Euros/month/ Poraba ≥ 15 evrov/mesec	6.23	0.09	-		-		-	
2	Using alcohol at least once/month/ Uživanje alkohola vsaj enkrat/mesec			5.84	0.16	-		-	
	Spending time in bars/discos/parties/ Preživljanje časa v barih/diskotekah/zabavah			7.33	0.10	6.37		6.03	
	School achievement/ Šolski uspeh			11.52	0.07	-		-	
3	Con smoking attitude/ Negativen odnos do kajenja					0.38	0.02	0.41	
	Modelling friends smoke/ Prijatelji, ki jih posnema, kadijo					2.09	0.03	1.87	
	Self-efficacy/ Samoučinkovitost					0.14	0.28	0.24	
4	Intention/ Namera							1.65	0.01
	R <sup>2</sup> of the model/ R <sup>2</sup> modela		0.09		0.42		0.75		0.76

a - Due to missing values on several variables the population was reduced to 299

b - All variables/scales with depicted OR are significant: P < 0.05

a - Zaradi manjkajočih vrednosti pri več spremenljivkah je bila populacija zmanjšana na 299.

b - Vse spremenljivke/lestvice s prikazanim razmerjem obetov (OR) so pomembne: P < 0,05.

Table 4. Results of the T1 independent variables in the longitudinal logistic regression model for those who remained non-smokers at T2 and those who became smokers at T2 (N =298<sup>a</sup>).

Tabela 4. Rezultati spremenljivk, neodvisnih od T1, v longitudinalnem logistično-regresijskem modelu za tiste, ki so pri T2 ostali nekadilci, in za tiste, ki so pri T2 postali kadilci (N = 298<sup>a</sup>).

	Variables / scales at T1 <sup>b</sup> /Spremenljivke/lestvice pri T1 <sup>b</sup>	Model 1		Model 2		Model 3		Model 4	
		OR	R <sup>2</sup> change	OR	R <sup>2</sup> change	OR	R <sup>2</sup> change	OR	R <sup>2</sup> change
1	Living with the father/ Živi z očetom	0.43	0.03	0.44		-		-	
	Living with the brother/ Živi z bratom	0.36	0.04	0.27		0.16		0.16	
2	Spending time in bars/discos / parties/ Preživljanje časa v barih/diskotekah/zabavah			3.00	0.05	-		-	
	Playing truant from school at least once/month/ Izostanek od pouka vsaj enkrat/mesec			2.53	0.03	3.64		3.64	
3	Modelling friends smoke/ Prijatelji, ki jih posnema, kadijo					1.59	0.05	1.58	
	Self-efficacy/ Samoučinkovitost					0.27	0.13	0.28	
4	Intention/ Namera							-	
	R <sup>2</sup> of the model/ R <sup>2</sup> modela		0.07		0.15		0.33		0.33

a - Due to missing values on several variables the population was reduced to 298

b- All variables/scales with depicted OR are significant: P<0.05

a – Zaradi manjkajočih vrednosti pri več spremenljivkah je bila populacija zmanjšana na 298.

b – Vse spremenljivke/lestvice s prikazanim razmerjem obetov (OR) so pomembne: P < 0,05.

## 4 DISCUSSION

Several findings from this study provide important information on the process of smoking initiation among Romanian adolescents. As in other studies (25), playing truant from school predicted regular smoking onset. This underlines the fact that preventing truancy among Romanian adolescents may also have important benefits on smoking prevention.

Regular smoking onset was also predicted by baseline low self-efficacy expectations to avoid smoking. Other studies also found this to be an important predictor of smoking initiation (6, 16, 26).

As regards social influences, the longitudinal results confirmed the strong influence of smoking friends on adolescents' smoking behaviour. The results of other international studies also showed important influences of friends in explaining smoking uptake (14, 15, 18). Having a brother was a protective factor. Other studies have also found some support for family bonding in influencing smoking behaviour (14, 18, 27). Since no

information was recorded on the age of the brother or bonding between the siblings, no further interpretation of this finding is possible. Yet, why the study did not find a similar impact of having a sister remains unclear. Although one interpretation may be that brothers may serve as a more important role model or bonding factor, more in-depth research is needed to further explain this result.

The influence of smoking parents on the smoking behaviour of Romanian adolescents aged 15 to 17 was not confirmed by our results. Several studies from other countries also showed that when controlling for peer influence, the effect of parental smoking behaviour has non-significant results (14, 15). According to other studies (28-31) parental smoking can also be a strong predictor of the transition to regular smoking. Our study population had recently transitioned to senior high school; this may have prompted feelings of increasing maturity among the students, which caused them to turn away from parental influence and towards the influence of their friends' smoking behaviour.



Contrary to our hypothesis, attitudes to smoking did not predict smoking initiation after one year. Several studies showed that more positive attitudes toward smoking were associated with an increased likelihood of smoking among adolescents. However, other studies have found that such attitudes did not predict smoking uptake in the presence of other socio-demographic, environmental and behavioural factors (14). It is conceivable that teenagers alter their attitudes and intention and start smoking over a short period of time, and that longitudinal studies with several months between the waves do not capture this process (19). As other studies also suggested (19, 32), another explanation is, however, that for adolescents at this age smoking related attitudes follow behaviour instead of predicting it; our finding that the cons of smoking were cross-sectionally associated with smoking behaviour may support this.

While some studies found intention to smoke in the future to be an important predictor of smoking onset (33, 34), others did not (35). In our study, intention did not predict smoking initiation among Romanian adolescents. It is not quite clear why we did not find a predictive role of intention, as one would have expected according to the notions of the Theory of Planned Behaviour (36). It is, however, conceivable that intention for Romanian adolescents at this age is quite unstable and thus does not predict behaviour but, as with attitudes, follows behaviour.

Several studies have argued that smoking initiation among adolescents is unplanned behaviour (32). Romanian young people were widely exposed to tobacco product advertisement and promotional activities (37-39) before 2007, when these activities were banned in Romania (40). They also frequently see many adolescents and adults smoking and are exposed to passive smoking in public places or even in the home, as the smoking prevalence in Romania is high and the law prohibiting smoking in public places is poorly enforced (37-39, 41). Under these circumstances, it is not unexpected that some Romanian young people start to feel unable to refrain from smoking in different situations and at certain moments start smoking regularly, even if this was not their intention.

As in other studies (6, 19), the cross-sectional findings showed that much of the variance in smoking behaviour could be explained by demographic and cognitive variables. Nevertheless, these variables could explain only 33% of the variance between becoming regular smokers and remaining non-smokers in the longitudinal logistic regression analysis; this may be explained in terms of the long interval (one year) between the two waves. The explained variance found by other

prospective studies over a period of one year was similar (6, 19, 42) and decreased when the interval between the measurements increased (6). Many studies have demonstrated that social cognitive models explained behaviour in cross-sectional studies well, but that the explained variance of these models to predict behaviour might be more limited (43, 44). Nevertheless, even small effect sizes can have theoretical and practical utility (45). Thus, although the explained variance of our longitudinal study implies that much remains unknown about why Romanian children start smoking, it still offers some tools for prevention efforts.

The most important finding of this study is that in a society with high social acceptability of smoking such as Romania, even if intention might not predict smoking onset, self-efficacy beliefs play an important role in smoking initiation. The results imply that smoking prevention programmes should strengthen self-efficacy beliefs and resistance against peer influences and help Romanian young people to develop skills as well as action plans to cope with pressure to smoke and with challenging situations; these findings are similar to those from other international studies (6, 14, 16, 18, 26, 27).

This study is subject to certain limitations. First, we included only first-year high school students from Cluj-Napoca. Moreover, despite the fact that the schools offered diverse curricula, which should attract girls and boys, the percentage of girls in each class was generally higher. This meant our sample unexpectedly consisted of more girls. Second, the sample size limited the performing of analyses separately for boys and girls. Future Romanian studies should include a nationally representative sample of adolescents and analyse subpopulations based on age and gender. Third, like other studies (5, 19), we classified smoking behaviours in just two categories: non-smokers and regular smokers. The results from another European study have identified five stages of smoking initiation (46); future Romanian studies should also use more categories. Information on siblings' age and smoking behaviour as well as the bond between siblings could be also useful in further explaining smoking onset. Fourth, the results are based on adolescents' self-reports of smoking behaviour. Several studies, however, have found high correlations between self-reports and biochemical assessments of adolescent smoking behaviour when confidentiality of responses is assured (47, 48) (as it was in our study).

In short, this study presents similar patterns of smoking onset among Romanian adolescents as other European and international studies (6, 14, 16, 18, 26, 27),

showing that the smoking prevention programmes to be developed in Romania can benefit from the extensive experience in this field from other countries.

### Conflict of interest

None

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