Published in final edited form as:
Addict Behav. 2013 October ; 38(10): 2589–2595. doi:10.1016/j.addbeh.2013.06.008.

Smoking in European adolescents: Relation between media influences, family affluence, and migration background

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Keywords

Movies; smoking; socio-economic status; migration; adolescence; Europe

1.1. Introduction

Smoking remains the single greatest preventable cause of mortality worldwide, being a major risk factor for a number of life-threatening diseases, including various cancers, cardiovascular diseases and lung diseases (Ezzati & Lopez, 2003; Lopez, Mathers, Ezzati, Jamison, & Murray, 2006). Smoking is a learned behaviour, and the learning process usually starts in adolescence (Chassin, Prochaska, Rose, & Sherman, 1996). The likelihood of starting to smoke is affected by a range of individual, social and societal/political factors (Conrad, Flay, & Hill, 1992). It is not comprehensively explained why broader environments (e.g., countries) differ so much in their smoking rates, but there is empirical

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Conflict of Interest
All authors declare that they have no conflicts of interest.

Contributors
Conception and design of the study: RH, JS, MM
Analysis and interpretation of data: MM, RH
Collection and assembly of data: All authors
Drafting of the article: MM, RE, JS, RH
Critical revision of the article for important intellectual content: All authors
Final approval of the article: All authors

evidence for a number of factors that are predictive for smoking: Family income and educational level (Richter et al., 2009; Ringlever, Otten, de Leeuw, & Engels, 2011), tobacco control policies like taxes, smoking bans, and advertising bans (Ross & Chaloupka, 2003; Kostova, Ross, Blecher, & Markowitz, 2011; Lantz et al., 2000; Wakefield et al., 2000; Quentin, Neubauer, Leidl, & Konig, 2007), personal characteristics like sensation seeking, gender, and ethnicity (Sargent, Tanski, Stoolmiller, & Hanewinkel, 2010; Mermelstein, 1999; Harrell, Bangdiwala, Deng, Webb, & Bradley, 1998), parenting practices (Andersen, Leroux, Bricker, Rajan, & Peterson Jr, 2004; Chassin et al., 2005; Dalton et al., 2006), and smoking rates in the immediate social environment (de Vries, Engels, Kremers, Wetzels, & Mudde, 2003; de Leeuw, Scholte, Sargent, Vermulst, & Engels, 2010; Leonardi-Bee, Jere, & Britton, 2011). Another well-established environmental risk factor is media exposure. A number of cross-sectional (Sargent et al., 2001; Sargent et al., 2005; Hanewinkel & Sargent, 2007), longitudinal (Dalton et al., 2003; Hanewinkel & Sargent, 2008; Jackson, Brown, & L'Engle, 2007; Tanski, Stoolmiller, Gerrard, & Sargent, 2012), and experimental studies (Gibson & Maurer, 2000; Hanewinkel, 2009; Hines, Saris, & Throckmorton-Belzer, 2000; Pechmann & Shih, 1999; Lochbuehler, Kleinjan, & Engels, 2013) have found an association between seeing smoking imagery in movies and own smoking among adolescents. The evidence for this seems strong enough that a US National Cancer Institute (NCI) report (National Cancer Institute, 2008) as well as a report from the World Health Organization (World Health Organization, 2009) suggest a causal association. The NCI report concluded that youth smoking onset would be reduced by 38% if smoking in movies was eliminated as a risk factor (National Cancer Institute, 2008).

It is by far less studied how the above mentioned different risk factors for smoking are related to each other, e.g., if they can be seen as independent risk factors or rather have to be seen as marker variables. For example, some population sub-groups might have a greater risk for smoking, because they have higher average exposure to movie smoking. This would indicate a mediating relationship. Another possibility is a moderating relation between risk factors. Some population sub-groups might have a greater risk for smoking because they have a stronger average response to movie smoking. And indeed, there are studies that have shown such moderating effects. For example, there is empirical evidence that adolescents with higher estimates on other risk factors for smoking (e.g., high sensation seeking, high rate of smoking in their social environment) have a lower responsiveness to movie smoking exposure. Also, three U.S. studies showed differential impact of movie smoking dependent on race, with black adolescents being less affected by movie smoking than white adolescents (Jackson et al., 2007; Soneji, Lewis, Tanski, & Sargent, 2012; Tanski et al., 2012). One of these studies found additional evidence that in the group of white adolescents those with lower socio-economic status (SES) had a lower response to movie smoking (Soneji et al., 2012). However, a recent study conducted in six European countries, which is also the data base for the present analysis, showed a consistent association between exposure to movie smoking and adolescent smoking in all countries, indicating that the movie smoking effect occurred independently of the cultural environment (Morgenstern et al., 2011). But a significant movie smoking effect in all countries does not preclude moderating effects on individual level variables. There has been no formal test of moderation effects in this study up to now.

The aim of the present paper therefore is to further investigate the association between exposure to movie smoking and adolescent smoking in different sample sub-groups. The analysis focuses on indicators of family affluence and migration background, as these have been shown to be potential moderators in the past and are also of high relevance from a practical perspective. The two main research questions are: (1) Is there a difference in SES and migration background groups in movie smoking exposure, and (2) is the association

between movie smoking and adolescent smoking moderated by SES and migration background?

1.2. Materials and methods

1.2.1. Study sample and procedure

The research was conducted by study centers in six European countries, in Germany (Kiel), Iceland (Reykjavik), Italy (Turin and Novara), Poland (Poznan), The Netherlands (Nijmegen), and United Kingdom (Glasgow). The study samples were all recruited from state-funded schools (see Appendix 1 for sample details). Overall, a total of 19268 students from 114 schools and 865 classes were examined for eligibility. One thousand fifty nine students (5.5%) could not be included in the study due to missing parental consent, 1559 students (8.1%) were absent on the day of assessment and could not be reached by mail, 99 students (0.5%) refused to participate, resulting in a final overall sample of 16551 students (85.9% response rate). The mean age of the sample was 13.4 years (SD 1.18, range 10-19 years) with 51% being male.

1.2.2. Survey

In each country, data were collected through self-completion questionnaires, administered by trained research staff. Each completed questionnaire was placed in an envelope and sealed in front of the class. Students were assured that their individual data would not be seen by parents or school administrators. Study implementation was approved in all six study centers by the respective ethical boards and data protection agencies.

1.2.3. Measures

1.2.3.1. Family affluence—Family affluence was assessed with the Health Behaviour in School-Aged Children Family Affluence Scale (FAS) (Currie et al., 2008). This is a four-item measure that assesses *car ownership* (“Does your family own a car, van or truck?”, response categories: 0 = “no”, 1 = “yes, one”, 2 = “yes, two or more”), *own bedroom* (“Do you have your own bedroom for yourself?”, response categories: 0 = “no”, 1 = “yes”), *family holidays* (“During the past 12 months, how many times did you travel away on holiday with your family?”, response categories: 0 = “not at all”, 1 = “once”, 2 = “twice”, 3 = “more than twice”), and *family computers* (“How many computers does your family own?”, response categories: 0 = “none”, 1 = “one”, 2 = “two”, 3 = “more than two”). For the creation of the sum score, the last two categories of family holidays and family computers are combined, which results in a total range of the sum score of 0-7. Values between 0 to 3 are categorized as “low”, values 4 and 5 as “medium”, and values 6 and 7 as “high” family affluence. Validation studies of this scale found high parent-child agreements for the FAS items and a high correlation on country-levels with the Gross Domestic Product of a country (Andresen et al., 2008; Boyce, Torsheim, Currie, & Zambon, 2006).

1.2.3.2. Migration background—We asked the students to report the country of birth of mother and father (“Where was your mother born”, “Where was your father born”). Response categories for both questions were “In Germany/Iceland/Italy/Poland/The Netherlands/UK” (depending on the study center) vs. “In another country” vs. “I don’t know”. The two items were combined into the categories “no”, “one parent”, and “both parents” with migration background. “I don’t know” responses were classified as “no”.

1.2.3.3. Lifetime smoking—Lifetime smoking frequency was assessed with “How many cigarettes have you smoked in your life?”. Response categories were 0 = “none”, 1 = “just a few puffs”, 2 = “1–19 cigarettes”, 3 = “20–100 cigarettes”, and 4 = “more than 100

cigarettes". Students who reported "none" were classified as "never smokers", and all others as "ever smokers" (US Department of Health and Human Services, 1994).

1.2.3.4. Exposure to movie smoking—Exposure to smoking in movies was assessed using a variable data survey method developed by researchers of Dartmouth Medical School, which relies on the recall of seeing movies presented to respondents as a list of titles (Sargent, Worth, Beach, Gerrard, & Heatherton, 2008). Students in each country received a random selection of 50 movies out of a larger pool of 655 movies (box-office hits of the years 2004 to 2009). Students were asked to indicate how often they had seen each movie (from 0 = "never" to 3 = "more than two times"). For the present analysis, answers were dichotomized into "seen" and "not seen".

In a parallel procedure, all included movies were content coded with regard to tobacco occurrences, a procedure described elsewhere in more detail (Morgenstern et al., 2011). Fifty-six percent of the movies were content coded at the Dartmouth Media Research Laboratory. The remaining 44% were content coded in the six European study centres. Inter-rater reliability was studied via two types of correlations: (1) between the coding results of the European coders and the European trainer on a selected number of training movies; and (2) between the European trainer and the Dartmouth coders, based on a blinded European recoding of a random sample of 40 Dartmouth-coded movies. European coder-trainer correlations ranged between r = 0.92 (Iceland) and r = 0.99 (Italy); the European re-counts of tobacco occurrences in the random movie selection correlated r = 0.95 with the Dartmouth counts. The exposure to movie smoking was calculated for each student by summing the number of tobacco occurrences in each movie they had seen.

1.2.3.5. Potential confounders—We assessed a number of covariates that are known to be related to smoking as well media behaviour, including age and gender, behavioural and personality characteristics, as well as smoking of peers, parents and siblings (see Appendix 2).

1.2.4. Statistical Analysis

All data analyses were conducted with Stata 12.0 (Stata Corp, College Station TX, USA). Country differences in family affluence and migration background were tested with chi-square tests, pairwise comparisons after regression were Bonferroni adjusted. Bivariate associations between the dichotomized study variables were analyzed with Spearman rank correlation coefficients. The multivariate analysis was performed with multilevel mixed-effects logistic regressions (random intercepts for school and class, uncentered data in all analyses). We regressed ever smoking on movie smoking exposure, controlling for all assessed confounders. Moderation effects of family affluence and migration were tested with interaction terms. For data presentation purposes we also performed separate analyses for low, medium, and high family affluence, as well as for migration background (no migration background vs. at least one parent).

1.3. Results

1.3.1. Family affluence, migration background and lifetime smoking

Overall, the majority of students (54%) were categorized as having high family affluence (see Table 1). The six countries differed significantly from each other in the mean family affluence of their students (all $p < .01$), with the exception of Germany vs. UK and Italy vs. Poland. The proportion of students with migration background was low with most students' parents (89%) born in the country of data assessment. Again, all countries differed significantly from each other (all $p < .05$) with one exception (Iceland vs. The Netherlands).

The highest proportion of migration was found in Italy, the lowest in Poland with 99% without a migration background.

Twenty-nine percent of the students had ever tried smoking, with a substantial variation between the countries. The age- and gender-adjusted frequencies for ever smoking were 11%, 26%, 26%, 33%, 35%, and 36% for Iceland, the Netherlands, UK, Poland, Germany, and Italy, respectively.

1.3.2. Associations between study variables

Table 2 displays the zero-order correlations between the study variables with significant crude associations between most of the measures. Family affluence was significantly related to all other variables with a negative correlation to lifetime smoking and smoking in the social environment (lower number of ever smokers and smoking peers, parents and siblings in more affluent students). Other relevant figures are the correlation between family affluence and migration (r=−.08), the null correlation between migration and smoking, the positive correlation between family affluence and movie smoking exposure (r=.04), and the negative correlation between movie smoking exposure and migration background (r=−.04). Overall, although there were many significant associations between the study variables, most correlations were small. The highest correlation was found between peer smoking and lifetime smoking, with a proportion of about 20% shared variance.

1.3.3. Multivariate analysis and test of moderation effect

Table 3 shows the predicted frequencies and adjusted odds ratios (AORs) for ever smoking predicted by movie smoking exposure and confounders, with separate models for family affluence and migration background. Overall, there was little variation in the predictive value of each variable in the five models. All models showed a significant association between ever smoking and movie smoking exposure, also a significant AOR for age, school performance, sensation seeking, peer smoking, maternal smoking, and sibling smoking. Paternal smoking was significant in 4 out of 5 models.

Though the pattern of results seems very consistent, all the AORs within rows differ in size, making (small) moderation effects possible. A subsequent inclusion of affluence*predictor and migration*predictor interaction terms in an overall model revealed significant interaction effects for sensation seeking and peer smoking multiplied by family affluence (both $p < .01$). These interactions indicate that the positive association between sensation seeking and ever smoking as well as the positive association between peer smoking and ever smoking was stronger in more affluent students. However, the magnitude of the association between movie smoking exposure and adolescent ever smoking was not dependent on family affluence and migration background.

To account for potential within and between country variation regarding the moderating role of family affluence and migration, we performed two sensitivity analyses. First, we included a random intercept for the country of data assessment in all models. In this analysis, the non-significant moderation effects for family affluence and migration were still non-significant. Second, we added three-way-interaction terms with a dummy-coded country variable (affluence*exposure*country and migration*exposure*country) to test if family affluence and migration moderate the association between movie smoking and ever smoking in one of the country sub-samples. None of the interactions were significant.

1.4. Discussion

This paper presented a follow-up analysis of data from a cross-cultural study that examined the association between exposure to smoking in movies and adolescent smoking in six

European countries. The analysis showed an independent negative association between family affluence--but not migration background--and youth smoking in these countries, along with the association between higher exposure to movie smoking and youth smoking already reported (Morgenstern et al., 2011).

Regarding our main research questions (the interplay between family affluence, migration, and movie smoking exposure), we found that affluent students and students without migration background had generally fewer risk factors for smoking (better grades, lower TV screen times, fewer friends and family members that smoked) but *higher* exposure to movie smoking. A potential explanation for higher movie smoking exposure of affluent students is that the exposure measure was based on the frequency of having seen movies that were recently shown in cinemas. Going to the cinema or renting a DVD is a costly leisure time activity that is more easily available for higher economic status groups. Some of the older movies in the sample were surely also aired in television, but most were not at the time of the data assessment. Furthermore, we also found no evidence for a moderating role of family affluence and migration background, with SES and migration sub-groups all showing a similar average response to smoking in movies. This lack of moderation is different from results of a recent U.S. study showing a moderating role of SES, though this effect was found in white adolescents only (Soneji et al., 2012).

Policies aimed at movie smoking have been addressed by the Framework Convention on Tobacco Control (FCTC). Parties to this agreement have ratified to undertake a comprehensive ban on tobacco advertising, promotion and sponsorship according to Article 13. The implications of Article 13 are that the depiction of tobacco use in films represents a form of tobacco advertising, and Article 13 guidelines recommend, that “Parties should take particular measures concerning the depiction of tobacco in entertainment media products, including requiring certification that no benefits have been received for any tobacco depictions, prohibiting the use of identifiable tobacco brands or imagery, requiring anti-tobacco advertisements and implementing a ratings or classification system that takes tobacco depictions into account” (World Health Organization, 2011). Based on the results of this six-country study, it can be concluded that a reduction of adolescent exposure to images of smoking in movies would change the risks of smoking on a broad level, not only for specific groups of adolescents. As it is sometimes questioned whether such measures have undesirable, differential impact on subgroups of people in a society, our findings do not provide support for such a proposition in the six studied countries.

There are, of course, several limitations to the current study, an important one being the cross-sectional design. Cross-sectional data do not inform about the temporal sequence of events, and hence provide little information with regards to causality. However, the present analysis is not directly targeting the role of smoking in movies as a causal risk factor. It aimed at analyzing differential associations, which are less impaired by the cross-sectional design.

Another important limitation is the assessment of the social capital, the central construct of the paper. The Family Affluence Scale (FAS) is not measuring educational level of families and focuses on the economic status only. It produces a highly skewed distribution (at least when used in high affluent regions of the world like Europe) with little variation on the individual level. Most students were classified as medium or highly affluent which might mask actual differences in social capital in European societies. As previously shown, the FAS is highly correlated with the Gross Domestic Product of a country which seems to be a rather broad categorization (Boyce et al., 2006), not necessarily indicative of an individual’s parental income. However, FAS scores were significantly correlated with lifetime smoking and moderated the effect of sensation seeking and peer smoking suggesting that they are not

meaningless in terms of predicting health outcomes. The assessment of migration background was also rather unspecific, not separating between highly diverse cultural groups in each country. Therefore, it can only be seen as a proxy of an ethnicity measure.

A further limitation relates to the fact that self-reports are generally open to error and biases which might not be independent of the construct under study. However, there is no evidence to date that family affluence is related to the ability to recall movie titles or related to misrepresentations of lifetime smoking.

In summary, the results of the present analysis suggest that although we cannot exclude variations in other, more specific subgroups in each country, it is very likely that the effects of exposure to movie smoking can be strongly generalized to the population of youths across European countries.

Acknowledgments

We highly acknowledge the work of the Smoking in Movies Europe study group, especially Fabrizio Faggiano, Kate Hunt, Stefan Hrafn Jonsson, Solveig Karlsdottir, Federica Mathis, Evelien Poelen, Ron Scholte, and Helen Sweeting.

Role of Funding Sources

Funding for this study was provided by the European Commission and the Ministry of Health of the Federal Republic of Germany. The coding of the U.S. films was supported by the National Institutes of Health (grant NAH CA 077028)

Appendix A Study sample details

Appendix A

Study sample details

	Germany	Iceland	Italy	Poland	NL	United Kingdom
Setting	Public schools, 4 school types: Gymnasium, Gemeinschaft sschule, Regional-schule, Hauptschule	Public schools	Public schools, 2nd class of secondary school and 1st class of high school	Public schools, 1 school type (Gymnasium)	Public schools, 4 different school types: VMBO, HAVO, Atheneum, Gymnasium	Mainstream (state-funded) schools
Locations	Schleswig-Holstein, Germany District of Kiel, Flensburg, Schleswig-Flensburg, and Rendsburg-Eckernförde	Schools from each region (north, south, east, west) of Iceland in addition to the capital area (Reykjavik and surrounding municipalities)	Piedmont region, Italy Schools with head office in Turin and Novara provinces	Wielkopolska region	Gelderland, Limburg, Brabant	Central belt of Scotland
Time of data assessment	Nov-Dec 2009	Jan-Feb 2010	March – June 2010	April-June 2010	Dec 2009 – June 2010	Jan-Mar 2010
Eligibility criteria for schools	- location - number of classes > 8 - no special pedagogic education center - no	- number of participating students > 100	Location in Turin and Novara provinces	- location in Wielkopolska region - no special pedagogic education center	- no special pedagogic education center - no current participation in other	- location in either Midlothian or East Dumbarton shire - not providing

	Germany	Iceland	Italy	Poland	NL	United Kingdom
	participation in other studies of IFT-Nord				studies of the Behavioural Science Institute, Radboud University	special education - not providing private (non state-funded) education
N of schools potentially eligible	N = 104	Not known	N = 578	N = 253	Not known	N = 14
N of schools invited	N = 60	N = 23	N = 31	N = 253	N = 43	N = 7
Invitation criteria for schools	Random	Convenience sampling	Convenience sampling	All eligible schools	Random	Selected on the basis of deprivation, based on the most recent (2007-8) nationally available data relating to the proportion of free school meals *
N of schools that agreed to participate	N = 21	N = 20	N = 26	N = 35	N = 5	N = 7
Eligibility criteria for students	- active (“opt-in”) parental consent presence on the day of assessment or, if absent, willing to complete a questionnaire and return by post - willingness to participate	- passive (“opt-out”) parental consent - students presence on the day of assessment - willingness to participate - willingness to participate	- active or passive parental consent - willingness to participate or, if absent, willing to complete a questionnaire and return by post	- active (“opt-in”) parental consent - presence on the day of assessment - willingness to participate	- passive parental consent - presence on the day of assessment - willingness to participate	- passive (“opt-out”) parental consent - presence on the day of assessment or, if absent, willing to complete a questionnaire and return by post - willingness to participate
N of students examined for eligibility	N = 3,544	N = 2,798	N = 2,953	N = 5,078	N = 1,706	N = 3,189
N confirmed eligibility	N = 2,754	N = 2,664	N = 2,668	N = 4,105	N = 1,423	N = 2,937
Reasons for non-participation	no parental consent (n=515) absence (n=264) refusal (n=11)	no parental consent (n=19) absence (n=102) refusal (n=13)	no parental consent (n=100) absence (n=175) refusal (n=10)	no parental consent (n=396) absence (n= 527) refusal (n=50)	no parental consent (n=18) absence (n= 265) refusal (n=0)	no parental consent (n=11) absence (n=226) refusal (n=15)
N participated in the study	N = 2,754	N = 2,664	N = 2,668	N = 4,105	N = 1423	N = 2,937
N analysed Response rate	N = 2,754 78%	N = 2,664 95%	N = 2,668 90%	N = 4,105 81%	N = 1423 83%	N = 2,937 92%

Appendix B Covariates and their assessment

Appendix B

Covariates and their assessment.

Variable	Survey Question	Response Categories
Sociodemographics		
Age	How old are you?	Years
Sex	Are you a girl or a boy?	Boy / Girl
Inidivdual Characteristics		
School performance	How would you describe your grades last year?	Excellent/ Good/ Average/ Below average
TV screen time	On a school day, how many hours a day do you usually spend watching TV?	None / Less than 1 hour / 1 -2 hours / 3-4 hours / More than 4 hours
Sensation seeking / rebelliousness (Cronbach's alpha = 0.70)	How often do you do dangerous things for fun? How often do you do exciting things, even if they are dangerous? I believe in following rules (recoded). I get angry when anybody tells me what to do.	Not at all / Once in a while / Sometimes / Often / Very often Not at all / Once in a while / Sometimes / Often / Very often Not at all / A bit / Quite well / Very well Not at all / A bit / Quite well / Very well
Social Environment		
Peer smoking	How many of your friends smoke cigarettes?	None/ A few / Some/ Most/ A
Mother smoking	Does your mother / female guardian smoke cigarettes?	Yes / No / Don't know (coded "no") / Don't have (coded "no")
Father smoking	Does your father / male guardian smoke cigarettes?	Yes / No / Don't know (coded "no") / Don't have (coded "no")
Sibling smoking	Do any of your brothers or sisters smoke cigarettes?	Yes/ No / Don't have (coded "no")

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Research Highlights

- Seeing smoking depictions in movies has been identified as a determinant of smoking
- It is not clear whether such influences vary within social subgroups
- Affluent students had fewer risk factors for smoking but *higher* exposure to movies
- No evidence that social subgroups differed in their response to seeing movie smoking

Table 1

Descriptive statistics for family affluence, migration background, and lifetime smoking.

	Overall n = 16551	**Germany n = 2754**	**Iceland n = 2664**	**Italy n = 2668**	**Poland n = 4105**	**The Netherlands n = 1423**	**United Kingdom n = 2937**
Family Affluence	%	%	%	%	%	%	%
Low	10	8	2	14	17	2	10
Medium	36	37	21	45	42	27	39
High	54	55	77	41	41	71	51
Migration backgr.	%	%	%	%	%	%	%
No	89	81	90	79	99	89	92
One parent	5	8	7	7	0.9	5.5	6
Both parents	6	11	3	14	0.1	5.5	2
Lifetime smoking [a]	%	%	%	%	%	%	%
No	71	65	89	64	67	74	74
Yes	29	35	11	36	33	26	26

[a] Lifetime smoking adjusted for age and gender

Table 2

Zero-order Spearman rank correlation matrix[a]

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Family affluence	1.00											
2. Migration background	−.08	1.00										
3. Lifetime smoking	−.09		1.00									
4. Age	−.06	−.06	.26	1.00								
5. Gender (0=male; 1=female)	−.04		−.04		1.00							
6.School performance	.14	−.03	−.23	−.13	.10	1.00						
7. TV screen time	−.10	.05	.10	.06		−.07	1.00					
8. Sensation seeking & rebelliousness	−.03		.33	.14	−.19	−.17	.11	1.00				
9. Peer smoking	−.12		.45	.34		−.19	.13	.29	1.00			
10. Mother smoking	−.15		.17	.04		−.13	.07	.12	.15	1.00		
11. Father smoking	−.17		.17	.06		−.13	.08	.10	.16	.34	1.00	
12. Sibling smoking	−.11		.22	.08		−.12	.07	.12	.17	.19	.15	1.00
13. Movie smoking exposure	.04	−.04	.17	.17	−.16	−.07	.07	.22	.16	.05	.05	.07

[a] all displayed coefficients are significant at $p < .001$

Table 3

Predicted frequencies (%) and adjusted odds ratios (AOR) for ever smoking, dependent on all variables in the first column; separate analyses for family affluence and migration background groups. Results of multilevel logistic regressions with random effects for school and class

		Ever smoking (yes)														
		Family Affluence									Migration background					
Predictors (% in reference category)		Low n = 1596			Medium n = 5870			High n = 8555			No n = 14207			At least one parent n = 1712		
		%	AOR	95CI	%	AOR	95CI	%	AOR	95CI	%	AOR	95CI	%	AOR	95CI
Age (51)	*< 14 y.*	35.3	**1.53**	1.17-2.02	24.4	**1.94**	1.64-2.30	20.5	**1.82**	1.58-2.11	23.3	**1.74**	1.54-1.95	24.8	**2.05**	1.52-2.77
	≥ 14 y.	43.0			34.6			28.5			31.3			35.7		
Gender (51)	*male*	40.0	0.99	0.77-1.28	31.0	0.89	0.77-1.03	24.6	1.04	0.92-1.18	28.1	0.96	0.88-1.06	29.0	1.15	0.87-1.52
	female	39.9			29.3			25.1			27.6			30.9		
School performance (41)	*low*	45.0	**0.51**	0.40-0.66	34.8	**0.54**	0.47-0.63	29.8	**0.55**	0.48-0.62	32.9	**0.53**	0.49-0.59	34.3	**0.55**	0.42 0.72
	high	32.9			25.5			21.6			23.6			25.4		
TV screen time (74)	*< 3 hours*	40.6	0.91	0.70-1.17	29.6	1.14	0.99-1.33	24.8	1.00	0.87-1.16	27.8	1.01	0.91-1.12	28.9	1.21	0.92-1.60
	≥ 3 hours	38.9			31.6			24.9			27.9			31.6		
Sensation seeking (57)	*below Md*	31.4	**2.50[a]**	1.93-3.24	22.0	**2.82[a]**	2.44-3.26	17.1	**3.07[a]**	2.69-3.50	19.8	**2.91**	2.64-3.21	21.5	**3.02**	2.28-3.99
	above Md	48.8			38.7			32.8			36.2			38.5		
Peer smoking (68)	*none/few*	28.1	**3.59[b]**	2.75 4.69	20.3	**3.93[b]**	3.38 4.57	16.8	**4.55[b]**	3.95 5.23	18.9	**4.10**	3.70 4.54	21.0	**4.01**	2.97 5.41
	s./most/all	53.8			44.1			41.4			42.9			44.6		
Mother smoking (73)	*no*	37.0	**1.44**	1.11-1.87	28.6	**1.34**	1.15-1.56	23.9	**1.31**	1.13-1.52	26.5	**1.35**	1.22-1.50	28.7	1.33	0.97-1.82
	yes	43.5			33.1			27.5			30.9			32.8		
Father smoking (66)	*no*	37.8	1.25	0.97-1.62	28.8	**1.24**	1.07-1.43	23.1	**1.52**	1.32-1.74	26.3	**1.32**	1.19-1.46	26.2	**1.84**	1.38-2.45
	yes	41.8			32.0			28.7			30.3			35.2		
Sibling smoking (83)	*no*	36.7	**1.83**	1.40-2.41	27.3	**2.22**	1.88-2.62	23.0	**2.17**	1.85-2.54	25.5	**2.12**	1.89-2.37	27.6	**2.24**	1.60-3.13
	yes	47.8			40.2			34.1			37.1			40.0		
Movie smoking exp. (50)	*below Md*	36.6	**1.48**	1.15-1.90	27.6	**1.38**	1.19-1.59	21.1	**1.63**	1.43-1.86	24.6	**1.49**	1.36-1.65	25.3	**1.91**	1.45-2.50
	above Md	43.6			32.4			27.4			30.3			34.8		

Note: Significant AORs in bold (all $p < .01$); significant interaction term for AORs with same superscript

Md = Median; 95CI = 95% confidence interval