

8-2008

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James F. Thrasher

University of South Carolina - Columbia, thrasher@mailbox.sc.edu

Christine Jackson

Edna Arillo-Santillán

James D. Sargent

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### Publication Info

Postprint version. Published in *American Journal of Preventive Medicine*, Volume 35, Issue 2, 2008, pages 95-102.

Thrasher, J. F., Jackson, C., Arillo-Santillán, E., & Sargent, J. D. (2008). Exposure to smoking imagery in popular films and adolescent smoking in Mexico. *American Journal of Preventive Medicine*, 35(2),95-102. DOI: 10.1016/j.amepre.2008.03.036

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<http://www.ajpmonline.org/article/S0749-3797%2808%2900413-3/abstract>

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Published in final edited form as:

*Am J Prev Med.* 2008 August ; 35(2): 95–102. doi:10.1016/j.amepre.2008.03.036.

## Exposure to Smoking Imagery in Popular Films and Adolescent Smoking in Mexico

James F. Thrasher, PhD, Christine Jackson, PhD, Edna Arillo-Santillán, MA, and James D. Sargent, MD

From the Department of Health Promotion, Education, and Behavior, University of South Carolina (Thrasher), Columbia, South Carolina; Departamento de Investigación sobre Tabaco, Centro de Investigaciones en Salud Poblacional, Instituto Nacional de Salud Pública (Thrasher, Arillo-Santillán), Cuernavaca, México; RTI International (Jackson), Research Triangle Park, North Carolina; Norris Cotton Cancer Center, Dartmouth Medical School (Sargent), Lebanon, New Hampshire

### Abstract

**Background**—Exposure to smoking imagery in films is consistently associated with smoking behavior and its psychological antecedents among adolescents in high-income countries, but its association with adolescent smoking in middle-income countries is unknown.

**Methods**—In 2006, a cross-sectional sample of 3876 Mexican adolescents in secondary school was surveyed on smoking behavior, smoking risk factors, and exposure to 42 popular films that contained smoking. Participants were classified into quartiles of exposure to smoking imagery across all films they reported having seen. Models were estimated to determine associations among quartiles of film-smoking exposure, smoking behavior, and the psychological antecedents of smoking, adjusting for age, gender, sensation seeking, self-esteem, parental smoking, sibling smoking, best-friend smoking, having a bedroom TV, and private versus public school attendance. Analyses were conducted in 2007.

**Results**—Adolescents were exposed to an average of 51.7 (SE=1.3) minutes of smoking in the films they viewed. Crude and adjusted ORs indicated positive associations between quartiles of film-smoking exposure and both current smoking (AOR<sub>4v1</sub>=3.13;  $p<0.0001$ ) and having ever smoked (AOR<sub>4v1</sub>=2.42;  $p<0.0001$ ). Data from never-smokers ( $n=2098$ ) were analyzed to determine associations between film-smoking exposure and psychological antecedents of smoking uptake. Crude and adjusted coefficients indicated significant, positive associations between exposure and susceptibility to smoking (AOR<sub>4v1</sub>=1.66;  $p<0.05$ ); favorable attitudes toward smoking (Adjusted B<sub>4v1</sub>=0.44;  $p<0.0001$ ); and perceived peer prevalence of smoking (Adjusted B<sub>4v1</sub>=0.26;  $p<0.0001$ ).

**Conclusions**—Exposure to smoking in films appears associated with smoking among Mexican adolescents. Policies could aim to decrease youth exposure to smoking in nationally and internationally distributed films.

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Address correspondence and reprint requests to: James F. Thrasher, PhD, Department of Health Promotion, Education, and Behavior, University of South Carolina, 800 Sumter Street, Room #215, Columbia SC 29208. E-mail: thrasher@gwm.sc.edu.

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No financial disclosures were reported by the authors of this paper.

## Introduction

Tobacco-attributable mortality is increasing in developing countries, which by 2030 will bear 70% of the global burden, or 7 million deaths each year.<sup>1</sup> Growing evidence that smoking portrayals in films promote youth smoking suggests that films be considered for policy development and action,<sup>2,3</sup> particularly since top-grossing U.S.-produced films contain multiple smoking portrayals and generate more than half of their earnings in foreign markets.<sup>4</sup>

Smoking imagery in films appears to influence youth smoking behavior by fostering positive attitudes, beliefs, and social norms related to smoking.<sup>2</sup> Among U.S. adolescents who have never smoked, exposure to smoking in films has been associated with pro-tobacco beliefs and norms.<sup>5</sup> Furthermore, the relationship between film-smoking exposure and smoking initiation is consistent across both cross-sectional<sup>6-8</sup> and longitudinal studies in the U.S.,<sup>9-11</sup> and a recent meta-analysis concluded that greater exposure more than doubles the likelihood of smoking initiation.<sup>12</sup> Convergent findings from a cross-sectional study of German adolescents<sup>13</sup> suggest that this relationship generalizes to youth outside the U.S. However, no studies on this topic have been conducted in the low- and middle-income countries that increasingly bear the burden of the global tobacco epidemic.

The present study aimed to assess whether the pro-smoking effects of smoking imagery in films generalize to Mexican adolescents. It was hypothesized that greater exposure to film smoking would be positively associated with current smoking status, having ever smoked, and, among those who have never smoked, with psychological antecedents of smoking uptake.

## Methods

The sample population consisted of 18 secondary schools from the 2003 Mexican administration of the Global Youth Tobacco Survey (GYTS). For the GYTS, a proportional sampling strategy was used to randomly select 25 schools from the largest metropolitan areas for each state, with 97% of schools selected for that study agreeing to participate.<sup>14</sup> The current study sample involves a subset of these schools in Zacatecas ( $n=4$ ) and Cuernavaca ( $n=14$ ), which were selected due to pre-existing relationships with study coordinators that ensured their participation in follow-up surveys. All schools approached for the current study agreed to participate. Within each school, all Grade-One classrooms were surveyed (mean age=12.9 years), whereas classrooms in Grades Two (mean age=13.9 years) and Three (mean age=14.7 years) were randomly selected for inclusion. Passive parental consent procedures were followed, and no parent refused participation. In June 2006, 90.6% of registered students in selected classrooms ( $n=3874$ ) completed a self-administered survey, which took approximately 45 minutes.

## Measurement

**Exposure to smoking in films**—Each survey included the same list of 42 popular films that portrayed tobacco for at least 1 minute (Figure 1). Mexican National Film and Video Industry Chamber (CANACINE) box office earnings data for Mexico City were used to determine the top 50 grossing films each year from 2003 to 2005 ( $n=150$ ) and the top 60 grossing films each year from 2000 to 2002 ( $n=180$ ). All 150 films from the 2003 to 2005 period were eligible for inclusion on the list of films (138 U.S. films; 12 Mexican films; 10 films from other countries). Also considered as eligible were Mexican-made films from the 160 top grossing films from 2000 to 2002 ( $n=15$ ).

For the 165 eligible films, potential exposure to tobacco imagery involved assessing the total seconds of screen time in which tobacco products, tobacco packaging, and smoke known to

emanate from lighted tobacco products were portrayed. Although portrayals of all tobacco products were assessed, “smoking” exposure is referred to because cigarette smoking composes the vast majority of tobacco use in popular films.<sup>15</sup> Other assessments of film-smoking exposure have involved assessments of the number of distinct tobacco-use events by each character across scenes.<sup>6</sup> Total exposure time was chosen to estimate exposure primarily because it would capture the total time over which tobacco occurrences took place. Standard assessments of “occurrence” do not distinguish between short and long occurrences of a single tobacco-use episode. Types of characters who smoked were not assessed, even though some evidence suggests that the dose–response curve associated with exposure to smoking among “bad” characters is steeper than for “good” characters. However, because there is more smoking among good characters, both types of characters contribute about equally to youth smoking (SE Tanski, et al., Dartmouth-Hitchcock Medical Center, unpublished findings, 2008). Coding films’ total exposure time was relatively reliable and allowed the use of existing data on total smoking exposure time for 131 films that were already coded for another project.<sup>15</sup> For the remaining 34 films on the list of eligible films, screen smoking time was determined after a reliable replication of the smoking time in five films that were previously assessed for the other project ( $r = 0.96$ ). Finally, 17 of the 34 films were independently assessed for matching times. The extremely high correlation between assessments ( $r = 0.99$ ) and the lack of consistent over- or under-counting of exposure by one coder versus another confirmed the reliability of these assessments.

Once films were coded, only films with at least one minute of screen-time smoking were considered for exposure assessment (59/165), in order to ensure a reasonable range of variation across students. All Mexican films that met this criterion were included in the final list (15/15). However, due to concerns about response burden associated with a long checklist of films at the end of a survey, approximately 60% of the remaining U.S. (23/38) and other foreign films (4/6) were randomly selected for inclusion on the film list. Average screen-time exposure to smoking was somewhat higher in the included films than the eligible but excluded films (4.0 vs 3.5 minutes, respectively). Two bogus film titles were also inserted to estimate false exposure attribution. In order to control for the possibility that youth who overestimated exposure confounded the analyses, a dummy variable was derived to indicate the report of having seen either of these bogus films (1) or not (0). To determine individual exposure, total seconds of smoking portrayals were summed across all films that students reported having seen. Quartiles of total film tobacco exposure were derived for both the entire sample and for the subsample of never-smokers, with the lowest quartile as the reference group.

**Smoking behavior**—Students who indicated that they had ever smoked even a puff of a cigarette were classified as ever-smokers and the rest as never-smokers. Students were classified as current smokers if they reported smoking at least once in the previous 30 days.

**Antecedents of smoking behavior**—Susceptibility to smoking, which predicts later smoking uptake,<sup>16,17</sup> was determined with standard measures. Never-smokers who indicated that they would definitely not accept a cigarette if a friend offered it to them and definitely not smoke in the next year were classified as not susceptible to smoking. Never-smokers who stated otherwise to either question were classified as susceptible. Attitudinal antecedents of smoking behavior were measured with the following questions: *How [good or bad; pleasant or unpleasant; safe or dangerous] is smoking?* with seven response options ranging from extremely good/pleasant/safe to extremely bad/unpleasant/dangerous. These items showed good internal consistency ( $\alpha=0.85$ ). Perceived peer and adult norms have been shown to predict smoking uptake among youth<sup>18–20</sup> and were assessed by asking students to report the prevalence of smoking among comparably aged youth at their school and among adults in their community. Response options were in 10% increments, and ranged from *none* and *1 of every 10 (youths/adults)* up to *8 or more of every 10 (youths/adults)*.

**Control variables**—The present study examined age, gender, public versus private school attendance, sensation seeking, self-esteem, social influences to smoke, and exposure to mass media as potential confounders of the hypothesized association between exposure to smoking in films and smoking outcomes. Sensation seeking is a psychological trait that involves seeking and enjoying high sensory experiences,<sup>21</sup> including risk behaviors<sup>9,22,23</sup> and frequent media exposure.<sup>24</sup> The Brief Sensation Seeking Scale-4 (BSSS-4) has good measurement properties in surveys of U.S.<sup>25,26</sup> and Mexican youth,<sup>27</sup> and had good internal consistency in the study sample ( $\alpha=0.81$ ). A 5-point Likert response format was used, with responses averaged across questions and higher scores indicating higher sensation seeking. Response format *low self-esteem* also predicts adolescent smoking uptake among U.S. youth<sup>9</sup> and is associated with susceptibility to smoking among Mexican adolescents.<sup>27</sup> Higher mass-media exposure has been associated with related psychological constructs, such as low personal adjustment<sup>28</sup> and contentedness.<sup>29</sup>

Self-esteem was assessed using items from the Coopersmith Self-Esteem Inventory (SEI), which has been validated for Mexican adolescents.<sup>30</sup> Three SEI items were used (i.e., *I hate how I am; I would like to be someone else; I feel ashamed of myself*) with 5-point Likert response options. These items had good internal consistency in the study sample ( $\alpha=0.86$ ), and were reverse scored and averaged so that higher values indicated higher self-esteem. Social network members who smoke may also account for both adolescent smoking and the selective viewing of films that contain smoking. These influences were assessed with three dichotomous variables: any (1) versus no (0) parent who smoked; any (1) versus no (0) siblings who smoked; and a best friend smoked (1) or not (0). Participants were also asked if they had a TV in their bedroom (1) or not (0), which is a proxy for higher levels of media exposure among U.S. youth.<sup>24</sup> Finally, private-school attendance was used as an indicator of socioeconomic status, since upper- and middle-class students mostly attend private school.

## Analyses

All data analyses were conducted in 2007, adjusting for clustering within schools. When analyzing dichotomous outcomes, STATA version 8.0 was used to estimate bivariate and multivariate adjusted logistic regression models. ORs were estimated across quartiles of exposure to film smoking portrayals, and nonstandardized coefficients were estimated for adjustment variables. When analyzing the relationship between film-smoking exposure and nondichotomous antecedents of smoking behavior, MPlus version 4.2 structural equation modeling (SEM) software was used. Unstandardized coefficients were reported for both bivariate and multivariate adjusted models. SEM was selected over linear regression because the multi-item scales and dependent variables of interest were highly skewed, and SEM allowed treatment of indicators as ordinal.<sup>31</sup> Multivariate models involved the dependent variable simultaneously regressed on all independent variables, with no mediation paths specified. In other words, these models were structurally equivalent to standard linear or logistic regression models, while taking advantage of SEM's capability to measure latent constructs with skewed, ordinal indicators. Comparison fit index (CFI) and Tucker–Lewis index (TLI) values above 0.90 and root mean square error of approximation (RMSEA) values lower than 0.08 were viewed as indicating reasonable overall model fit to the data.<sup>32,33</sup> When estimating models for antecedents of smoking, analyses were limited to never-smokers.

## Results

Surveys were administered to 3874 adolescents, 80% of whom attended the 11 public schools and 20% the seven private schools in the sample (Table 1). Their mean age was 13.4 years, and slightly more young women (52%) than young men participated. About half (58%) of the students reported at least one parent who smoked, 23% reported at least one sibling who



smoked, and 22% reported that their best friend smoked. Twelve percent of students were current smokers, whereas 59% of the sample reported never having smoked. Of those who never smoked, 40% were susceptible to smoking. Almost three quarters (72%) of the students had a TV in their bedroom. On average, students reported having viewed 12.1 of the 42 films queried (range 0–42; Figure 2), and were exposed to an average of 51.7 minutes of tobacco portrayals (range 0–177 minutes; Figure 3) in the films they saw. Between 7% and 73% of students reported viewing any particular film queried, with 5% and 7% reporting having viewed the two films with bogus titles, indicating reasonable validity of self-report.

### Film-smoking exposure and dichotomous smoking outcomes

Crude ORs indicated significant, positive associations between quartiles of exposure to film smoking and increased likelihood of being a current smoker ( $OR_{2v1}=1.26$ ;  $OR_{3v1}=1.94$ ;  $OR_{4v1}=4.58$ ); ever-smoker ( $OR_{2v1}=1.45$ ;  $OR_{3v1}=2.82$ ;  $OR_{4v1}=3.83$ ); and, among never-smokers, being susceptible to smoke ( $OR_{2v1}=1.19$ ;  $OR_{3v1}=1.68$ ;  $OR_{4v1}=1.72$ ). In multivariate models (Table 2), the adjusted odds associated with exposure were generally maintained across outcomes. However, the increased odds for current smoking among those with higher levels of exposure were significant only when comparing the highest and lowest quartiles of exposure ( $OR_{4v1}=2.65$ ; 95% CI=1.48, 4.74). The increased odds for having ever smoked were significant when comparing the two highest quartiles of exposure with the lowest quartile ( $OR_{3v1}=1.84$ , 95% CI=1.41, 2.39;  $OR_{4v1}=2.33$ , 95% CI= 1.51, 3.60). Finally, the increased odds associated with susceptibility to smoking were significant across all three categories of higher exposure; however, the adjusted point estimates were generally comparable ( $OR_{2v1}=1.50$ ;  $OR_{3v1}=1.76$ ;  $OR_{4v1}=1.55$ ), suggesting a threshold effect.

### Film-smoking exposure and antecedents of smoking among never-smokers

The measurement model with the three latent variables under consideration (i.e., sensation seeking, self-esteem, and smoking attitudes) indicated good, significant factor loadings ( $\lambda$  range = 0.73–0.93) and reasonable overall model fit (CFI=0.98; TLI=0.98; RMSEA=0.08). In all bivariate analyses, model fit was adequate when there were enough degrees of freedom to calculate these indices. The fit indices remained adequate in multivariate models (see Table 3 for variables included in these models and for model fit indicators). Dummy variables signified quartiles of exposure to film smoking portrayals, with the lowest exposure as the reference group.

Higher levels of exposure to smoking in film was associated with a significant increase in positive attitudes toward smoking, in both bivariate ( $B_{2v1}=0.16$ ;  $B_{3v1}=0.26$ ;  $B_{4v1}=0.52$ ) and multivariate models ( $B_{2v1}=0.17$ ;  $B_{3v1}=0.18$ ;  $B_{4v1}=0.41$ ). When estimating associations with perceived peer smoking prevalence, greater film-smoking exposure exhibited a similar positive association with higher perceived prevalence in both bivariate ( $B_{2v1}=0.14$ ;  $B_{3v1}=0.29$ ;  $B_{4v1}=0.39$ ) and multivariate adjusted models ( $B_{2v1}=0.21$ ;  $B_{3v1}=0.30$ ;  $B_{4v1}=0.34$ ). Finally, film-smoking exposure was not independently associated with perceived adult smoking prevalence.

### Adjustment variables, smoking behavior, and its antecedents

Age was consistently associated with smoking behavior (Table 2) and its psychosocial antecedents, except for perceived adult smoking prevalence (Table 3). Young men were more likely than young women to attribute higher smoking prevalence to adults and peers (Table 3), but otherwise no gender differences were found. Higher sensation seeking was independently associated with all smoking behavior and antecedent variables considered. Self-esteem was inversely and independently associated with smoking behaviors and antecedents except for perceived peer smoking prevalence. This construct was positively associated with perceived adult smoking prevalence only in multivariate models. When examining the role of social

network members who smoked, having parents who smoked was most inconsistently associated with the dependent variables, exhibiting positive, independent associations only with having ever smoked and perceived adult smoking prevalence. Having a best friend who smoked was associated with all outcome variables, and having at least one sibling who smoked was associated with all outcomes except perceived peer smoking prevalence. Having a TV in the bedroom was weakly associated with less positive attitudes about smoking among never-smokers, but only in the multivariate, not the bivariate, model. Finally, students who attended private schools appeared no different from public school students except for having slightly more positive attitudes about smoking.

## Discussion

The results from this study are consistent with studies in the U.S.<sup>7,9,11</sup> and Germany,<sup>14</sup> which concluded that exposure to smoking imagery through films promotes adolescent smoking. When comparing adolescents with the highest and lowest exposures to film smoking, the adjusted odds of being a current smoker was higher in the present study (OR=2.65) than in a cross-sectional German study (OR=2.0).<sup>14</sup> When comparing high and low exposure groups to determine the likelihood of having ever tried smoking, study results (OR=2.33) were similar to those from the German study (OR=2.2), a cross-sectional U.S. study (OR=2.6),<sup>7</sup> and two longitudinal U.S. studies (OR=2.7).<sup>9,11</sup> These other studies assessed exposure by quantifying the “occurrences” of tobacco use for each character in a scene, with occurrences registered independent of the amount of screen time over which tobacco was portrayed. The exposure measure in the present study is a more sensitive indicator of how long characters model smoking behavior on screen. In spite of different methods to determine exposure within distinct populations, the consistency of results across studies suggests that the observed association is robust.

Analyses limited to adolescents who had never smoked aimed to rule out the confounding influence of smoking behavior on subsequent viewing of films that portray smoking. When smoking susceptibility was analyzed, greater exposure did not appear to further increase risk of susceptibility after surpassing a certain threshold. Nevertheless, exposure to film smoking was independently associated with monotonic increases in positive attitudes toward smoking and perceived peer smoking prevalence, both of which appear to mediate film influences on smoking behavior.<sup>5,17,34</sup> Further evidence from a longitudinal study suggests that more exposure to film smoking predicts greater affiliation with peer smokers at 18-month follow-up.<sup>35</sup>

A number of limitations characterize this study, including causal inferences based on cross-sectional data. For example, the sequencing of film exposure and smoking behavior could not be determined. However, the results reported here are consistent with those found in other studies,<sup>9–12</sup> and when the study sample was limited to never-smokers, the results provided evidence of an independent association with psychological constructs that predict later adolescent smoking uptake. Longitudinal data are nevertheless needed to confirm whether film-smoking exposure predicts smoking uptake among Mexican adolescents.

Despite the inclusion of key confounding variables, omitted variables may have confounded the results. Parenting practices, for example, could account for both smoking behavior and exposure to media with smoking content. However, similar dose–response curves relate film-smoking exposure and smoking initiation across U.S. adolescents exposed to distinct parenting styles that could confound this relationship.<sup>2</sup> Parental rules against watching certain media content are associated with having a TV in the bedroom,<sup>24</sup> which was used as a proxy for overall media exposure. Since this measure potentially captures mass media consumption beyond parental monitoring efforts, it may be a better adjustment variable than overall media

exposure. Future research should nevertheless directly assess parenting practices and overall media consumption among Mexican youth, since their impact may differ in this population. For example, having a bedroom TV has been associated with smoking among white but not among black adolescents.<sup>36</sup> Additional research is needed to clarify what accounts for ethnic differences in the associations between indicators of media exposure and health-related outcomes among adolescents. Finally, the data came from a convenience sample in two cities, and hence, the results may not apply to other Mexican adolescents. Nevertheless, the sample was selected from among randomly selected schools used to estimate tobacco use in Mexico.<sup>14</sup>

Overall, these results are consistent with other studies, indicating that exposure to portrayals of smoking in films promotes adolescent smoking. Policymakers in low- and middle-income countries may consider developing policies to reduce youth exposure to smoking portrayals in film and other mass media. The Motion Picture Association of America (MPAA) recently stated that it will consider smoking when rating films; however, their proposal does not give an adult rating (i.e., R) to all films that contain smoking, which many advocates recommend. Nevertheless, ratings for U.S. films do not necessarily carry over to other countries, since most countries have their own rating systems. Other proposed strategies to stave off pro-tobacco messages in movies include<sup>37</sup>: certifying that film makers did not receive anything of value in exchange for portraying tobacco, prohibiting tobacco brand appearances, requiring anti-tobacco ads before films with tobacco content, and increasing pressure on national and international film industries to abide by these policies. These policies should be considered for incorporation into the WHO's Framework Convention on Tobacco Control (FCTC), particularly as amendments are developed to address national and cross-border issues that could undermine existing FCTC policies.

## Acknowledgements

This study was funded as part of a larger project supported by the Mexican National Council on Science and Technology (Convocatoria Salud-2003-C01-78), with additional funding provided by the Initiative for Cardiovascular Research in Developing Countries. Content analysis of U.S. films supported by CA 77026 and a grant from the American Legacy Foundation.

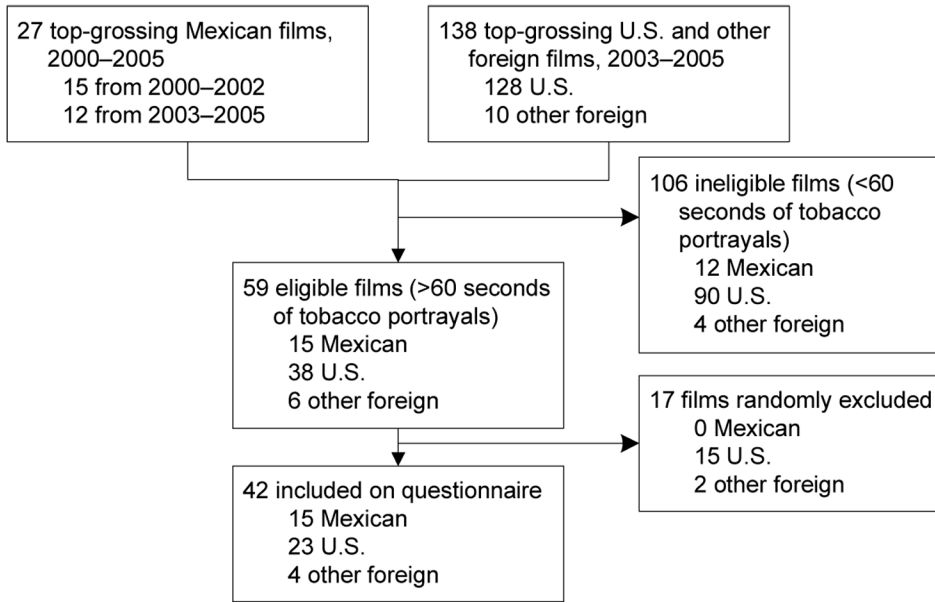
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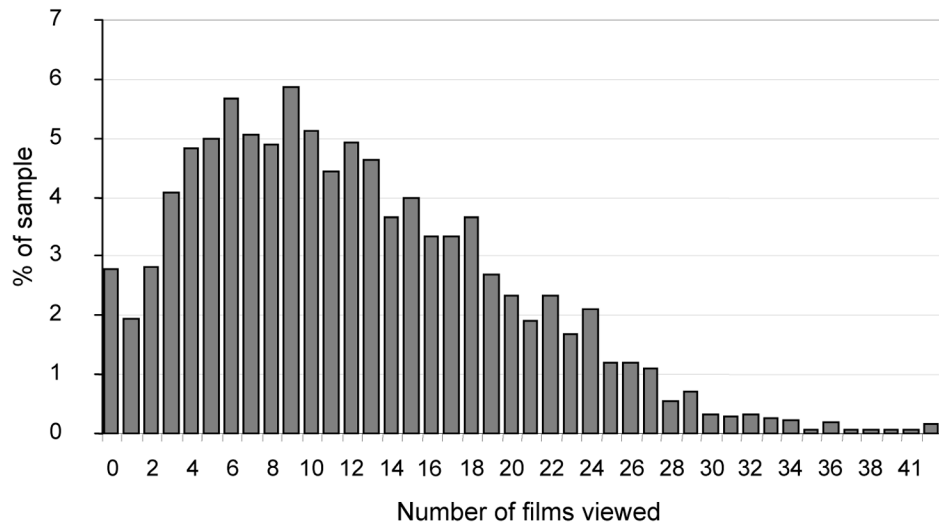


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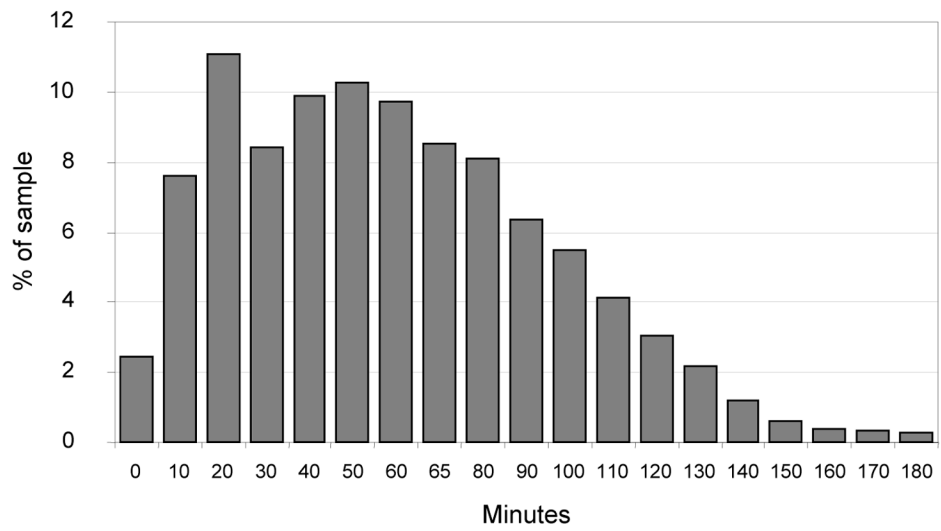
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**Figure 1.** Selection of top grossing films for inclusion in questionnaire



**Figure 2.**  
Distribution of reported exposure to the 42 films queried



**Figure 3.**  
Distribution of minutes of exposure to tobacco imagery in films



**Table 1**

## Characteristics of the sample

Characteristic	% (n/n <sub>total</sub> )
<b>Age (years)</b>	
11–12	16 (597/3731)
13	46 (1730/3731)
14	25 (915/3731)
15–16	13 (489/3731)
<b>Young men</b>	48 (1733/3612)
<b>1 or more parents smoke</b>	58 (2088/3626)
<b>1 or more siblings smoke</b>	23 (842/3646)
<b>Best friend smokes</b>	22 (803/3654)
<b>TV in bedroom</b>	72 (2414/3337)
<b>Current smoker</b>	12 (448/3846)
<b>Ever-smoker</b>	41 (1444/3542)
<b>Susceptible to smoke (never-smokers only)</b>	40 (782/1971)
<b>School type</b>	
Public	80 (3091/3846)
Private	20 (755/3846)
<b>Mean number of movies viewed</b>	12.1
<b>Mean minutes of smoking exposure in movies viewed</b>	51.7
<b>Quartiles of film-smoking exposure (minutes)</b>	
Entire sample	
0–22.83	25 (962/3846)
22.84–47.92	25 (961/3846)
47.93–74.13	25 (963/3846)
74.14–176.95	25 (960/3846)
<b>Never-smokers</b>	
0–18.36	25 (524/3846)
18.37–40.93	25 (525/3846)
40.94–65.78	25 (526/3846)
65.79–176.95	25 (523/3846)

Bivariate and multivariate adjusted relationship between dichotomous smoking outcomes, film-smoking exposure and other variables\*

Table 2

Independent variables	Current smoking		Ever smoked		Susceptibility to smoking among never-smokers	
	Bivariate B(SE) / OR (95%CI)	Multivariate B(SE) / OR (95%CI)	Bivariate B(SE) / OR (95%CI)	Multivariate B(SE) / OR (95%CI)	Bivariate B(SE) / OR (95%CI)	Multivariate B (SE) / OR (95%CI)
Age						
Young men vs young women	0.39 (0.06) ****	0.27 (0.08) **	0.43 (0.04) ****	0.34 (0.06) ****	0.19 (0.06) **	0.18 (0.08) *
Sensation seeking	1.33 (1.04, 1.71) *	0.94 (0.71, 1.26)	1.27 (1.10, 1.47) **	1.07 (0.89, 1.29)	1.15 (0.92, 1.43)	1.05 (0.78, 1.42)
Self-esteem	0.58 (0.04) ****	0.32 (0.06) ****	0.50 (0.03) ****	0.24 (0.07) **	0.47 (0.06) ****	0.38 (0.06) ****
Parent(s) who smoke(s) vs no parents who smoke	-0.30 (0.05) ****	-0.17 (0.05) **	-0.32 (0.04) ****	-0.16 (0.06) *	-0.36 (0.04) ****	-0.23 (0.05) ****
Siblings who smoke(s) vs no siblings who smoke	1.36 (1.11, 1.66) **	1.16 (0.82, 1.65)	1.41 (1.18, 1.69) ****	1.26 (1.01, 1.58) *	1.26 (1.04, 1.55) *	1.20 (0.95, 1.53)
Best friend smokes vs best friend does not smoke	2.52 (2.00, 3.17) ****	1.41 (1.04, 1.90) *	2.48 (1.96, 3.16) ****	1.78 (1.39, 2.28) ****	1.85 (1.47, 2.34) ****	1.57 (1.17, 2.11) **
TV in bedroom vs no TV in bedroom	5.16 (4.26, 6.25) ****	3.59 (2.71, 4.75) ****	4.31 (3.60, 5.16) ****	2.88 (2.29, 3.64) ****	2.06 (1.64, 2.58) ****	1.67 (1.19, 2.34) **
Private vs public school	1.74 (1.38, 2.30) ****	1.36 (0.98, 1.89)	1.13 (0.91, 1.43)	0.94 (0.75, 1.19)	1.00 (0.84, 1.19)	0.87 (0.73, 1.04)
Reported seeing bogus film not seen	1.00 (0.56, 1.79) ****	0.95 (0.60, 1.53)	0.90 (0.58, 1.39)	0.75 (0.50, 1.13)	0.95 (0.74, 1.23) ****	0.86 (0.73, 1.04)
Minutes of movie smoking exposure	2.99 (2.02, 2.41) ****	1.40 (0.71, 2.76)	1.92 (1.55, 2.40) ****	0.85 (0.63, 1.16)	1.89 (1.39, 2.58) ****	1.55 (0.90, 2.69)
Quartiles of exposure	0.02 (0.00) ****	—	0.01 (0.00) ****	—	0.01 (0.00) ****	—
2 <sup>nd</sup> vs 1 <sup>st</sup>	1.26 (0.81, 1.91)	1.42 (0.86, 2.37)	1.45 (1.10, 1.91) *	1.28 (0.89, 1.62)	1.19 (0.88, 1.61)	1.50 (1.11, 2.03) *
3 <sup>rd</sup> vs 1 <sup>st</sup>	1.94 (1.28, 2.93) **	1.78 (0.97, 3.24)	2.82 (1.68, 2.67) ****	1.84 (1.41, 2.39) ****	1.68 (1.32, 2.13) ****	1.76 (1.21, 2.54) **
4 <sup>th</sup> vs 1 <sup>st</sup>	4.58 (3.14, 6.68) ****	2.65 (1.48, 4.74) ****	3.83 (2.83, 5.17) ****	2.33 (1.51, 3.60) ****	1.72 (1.36, 2.18) ****	1.55 (1.05, 2.28) *

Note: Dashes indicate that the variable was not included in the multivariate adjusted model.

\* ORs were calculated for all dichotomous independent variables. In the variable list, dichotomous independent variables are indicated by posing one group versus another, with the first group mentioned coded as 1 and the second group coded as 0.

\*  $p < 0.05$

\*\*  $p < 0.01$

\*\*\*  $p < 0.001$

\*\*\*\*  $p < 0.0001$

\*\*\*\*\*  $p < 0.00001$

**Table 3**  
Bivariate and multivariate adjusted association between psychological antecedents of smoking, film-smoking exposure, and other variables among never-smokers<sup>d</sup>

Independent variables	Positive attitude toward smoking		Perceived peer smoking prevalence		Perceived adult smoking prevalence	
	Bivariate B(SE)	Multivariate B(SE) <sup>b</sup>	Bivariate B(SE)	Multivariate B(SE) <sup>c</sup>	Bivariate B(SE)	Multivariate B(SE) <sup>d</sup>
Age	0.14 (0.02) ****	0.10 (0.02) ****	0.28 (0.03) ****	0.25 (0.03) ****	0.03 (0.03)	0.03 (0.03)
Young men vs young women	0.16 (0.04) ****	0.06 (0.04) ****	-0.17 (0.05) ****	-0.22 (0.03) ****	-0.12 (0.05) ***	-0.17 (0.04) ****
Sensation seeking	0.48 (0.03) ****	0.27 (0.05) ****	0.19 (0.04) ****	0.17 (0.06) **	0.14 (0.03) ****	0.17 (0.04) ****
Self-esteem	-0.32 (0.02) ****	-0.19 (0.04) ****	-0.02 (0.03)	0.08 (0.05)	-0.03 (0.03)	0.10 (0.04) **
Parent(s) who smoke(s) vs no parents who smoke	0.09 (0.03) ****	0.06 (0.04)	0.01 (0.06)	-0.02 (0.06)	0.17 (0.05) ****	0.17 (0.06) **
Sibling(s) who smoke(s) vs no siblings who smoke	0.25 (0.05) ****	0.19 (0.06) **	0.17 (0.09)	0.09 (0.07)	0.24 (0.12) *	0.22 (0.10) *
Best friend smokes vs best friend does not smoke	0.39 (0.08) ****	0.37 (0.08) ****	0.45 (0.10) ****	0.40 (0.12) ****	0.31 (0.11) **	0.25 (0.11) *
TV in bedroom vs no TV in bedroom	-0.04 (0.04)	-0.12 (0.05) *	0.02 (0.06)	0.02 (0.06)	0.01 (0.06)	0.05 (0.07)
Private vs public school	0.14 (0.07) *	0.15 (0.06) *	0.14 (0.13)	0.08 (0.14)	0.01 (0.10)	-0.02 (0.11)
Reported seeing bogus vs not seen	0.41 (0.08) ****	0.15 (0.07)	0.06 (0.07)	0.04 (0.12)	-0.10 (0.09)	-0.10 (0.09)
Minutes of movie smoking exposure	0.01 (0.00) ****	—	0.01 (0.00) ****	—	0.00 (0.00)	—
Quartiles of exposure						
2 <sup>nd</sup> vs 1 <sup>st</sup>	0.16 (0.06) **	0.17 (0.07) **	0.14 (0.08)	0.21 (0.09) *	0.09 (0.04) *	0.03 (0.06)
3 <sup>rd</sup> vs 1 <sup>st</sup>	0.26 (0.06) ****	0.18 (0.08) **	0.29 (0.06) ****	0.30 (0.07) ****	0.23 (0.05) ****	0.11 (0.07)
4 <sup>th</sup> vs 1 <sup>st</sup>	0.52 (0.06) ****	0.41 (0.08) ****	0.39 (0.05) ****	0.34 (0.08) ****	0.18 (0.07)	0.09 (0.08)

<sup>a</sup> Unstandardized coefficients are shown, reflecting the units of measurement indicated in the measurement section.

<sup>b</sup> CFI=0.97, TLI=0.97, RMSEA=0.06

<sup>c</sup> CFI=0.97, TLI=0.97, RMSEA=0.07

<sup>d</sup> CFI=0.97, TLI=0.97, RMSEA=0.07

\*  $p < 0.05$

\*\*  $p < 0.01$

\*\*\*  $p < 0.001$

\*\*\*\*  $p < 0.0001$

CFI, comparison fit index; TLI, Tucker-Lewis index; RMSEA, root mean square error of approximation