



Smoking in Movies and Adolescent Smoking Initiation: A Longitudinal Study among Argentinian Adolescents

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Objective To assess whether exposure to movie smoking is associated with cigarette smoking among Argentinian adolescents.

Study design A school-based longitudinal study involving 33 secondary schools in Argentina was performed. The sample included 2502 never smokers (average age at entry = 12.5 years), 1700 (67.9%) of whom completed follow-up surveys 17 months later. Exposure to the top 100 highest-grossing films for each year between 2009 and 2013 was assessed by content-coding films for tobacco and then by asking adolescents whether they had seen each of 50 titles, randomly selected from the larger pool, then parsing exposure into tertiles. Logistic regression models estimated aOR for the following transitions: nonsusceptible to susceptible never smoker, never smoker to ever smoker, and never smoker to current smoking (last 30 days).

Results At follow-up, 34.4% of nonsusceptible never smokers became susceptible, 24.1% reported having tried smoking, and 9.4% were current smokers. Most exposure to movie smoking was from US-produced films (average 60.3 minutes compared with only 3.4 minutes from Argentine films). Greater exposure to smoking in movies was significantly associated with increased odds of becoming susceptible (aOR_{first vs third tertile} 1.77, 95% CI 1.30-2.41), of trying smoking (aOR_{first vs third tertile} 1.54, 1.14-2.08), and marginally associated with current smoking (AOR_{first vs third tertile} 1.54, 0.99-2.40). Exposure to smoking in US- or Argentine-produced films had similar associations.

Conclusion In Argentina, exposure to smoking in the movies predicted future smoking transitions among early adolescents, with most exposure coming from viewing US movies. (*J Pediatr* 2017;180:222-8).

Despite a growing awareness of the health threat posed by tobacco use, many Latin American countries continue to experience high rates of smoking. An estimated 25.1% of Argentinian adults¹ and 21.5% of girls and 17.4% of boys (13-15 years old) were smokers in 2012.² Exposure to tobacco use in movies is considered a cause of adolescent smoking.^{3,4} The World Health Organization (WHO)⁵ has recommended multinational cooperation and governmental action to reduce adolescent exposure to smoking imagery in films.⁶ This conclusion is based on results from cross-sectional studies conducted in 14 countries⁷⁻¹³ and longitudinal studies in the US, Europe,¹⁴⁻²⁰ and Mexico.²¹

None of these studies, however, have examined whether exposure to tobacco imagery from films produced in the non-US country in which the study was conducted has the same impact as exposure to tobacco imagery from films produced in other countries and Hollywood. Indeed, studies have shown differential effects of exposure to film smoking among adolescents born in the US, especially for black adolescents, who seemed to respond to smoking by black film actors only.^{22,23} The lack of cultural congruence between characters in US-produced films and South American adolescents may dampen film influences. This study seeks a better understanding of the impact of nationally produced films on youth smoking in countries such as Argentina.

Previous studies have shown that tobacco depictions and brand appearances were significantly greater in Argentine films compared with US films, in which the placement of tobacco products is prohibited.²⁴ Furthermore, popular US and Argentine movies deliver millions of smoking images and depictions of characters smoking to Argentinian adolescents.²⁵ The Argentine National Tobacco Control Law includes a comprehensive ban on tobacco advertising, but it does not regulate the depiction of tobacco in movies. The National Rating System for films does not include tobacco content as a criterion. Because this system tends to assign younger age ratings for US films in general, including for adult-rated US films that are most likely to contain tobacco, films with tobacco are more likely to be rated for general audiences in Argentina than in the US.²⁶

The objective of this study was to assess whether exposure to tobacco smoking in movies was associated with progression towards cigarette smoking among early

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adolescents from Argentina. Our hypothesis was that exposure to tobacco smoking in movies would predict greater risk of progression to cigarette smoking after adjustment for other known risk factors for smoking onset and that there would be a stronger association for exposure to tobacco in domestically produced movies than in movies made in Hollywood. The results of this study could be used to inform policy development to limit movie portrayals that promote risk behaviors in Argentina and in other Latin American countries.

Methods

A school-based longitudinal study was conducted in 33 schools from 3 large cities in Argentina (Buenos Aires, Cordoba, and Tucuman), with public schools identified by the Ministry of Health and Ministry of Education ($n = 18$) and private schools identified through personal contacts ($n = 15$; 26% of Argentinian students attend private schools). The percentage of students by school whose parents had more than 12 years of educational attainment ranged from 14% to 98% (median 38%), indicating a wide range of economic diversity. A detailed description of school selection has been published already.²⁷

Baseline surveys were administered between May and July 2014 among students enrolled in the first year of secondary school (the US equivalent of eighth grade), with an 83% participation rate reported. The average age at entry was 12.5 years. Follow-up surveys were conducted between October and November 2015 (mean interval between waves 17.1 months; range 16-19.3 months) with 86% of students participating. Self-administered questionnaires were completed under the supervision of trained research staff unaffiliated with the schools. Participation involved passive consent from parents or caretakers and active consent from students. The surveys were conducted anonymously, with follow-up accomplished through an anonymous linking procedure.²⁸ The research protocol was approved by the human subjects research board at the Centro de Educación Médica e Investigaciones Clínicas, Buenos Aires, Argentina.

The questionnaire included items used in surveys for adolescents previously implemented in Argentina, Mexico, and in the US.²⁹⁻³² Items in English were translated and reviewed by Spanish-speaking research staff and pilot tested to ensure adequate understanding of questions, instructions, and confidentiality statements. The study questionnaire included a range of items on media use, tobacco marketing exposures, social influences, and perceptions of tobacco use.³³

Exposure to Smoking in Films (Independent Variable)

We selected all films released in Argentina between 2009 and 2013 and listed by the Argentinian National Institute of Cinema and Visual Arts as among the 100 highest-earning films released each year. The following films were excluded: those unavailable for purchase ($n = 6$ Argentine films); those produced in other countries besides the US and Argentina ($n = 20$); or those not popular in the US and therefore not coded by the

Dartmouth Media Research Laboratory ($n = 52$ US films). The final sample included 377 Hollywood films and 45 Argentine films. All movies were content coded for smoking occurrences with a standard method validated by the Dartmouth Media Research Laboratory.^{34,35} The total seconds in which tobacco products, tobacco packaging, smoke known to emanate from combusting tobacco products, and tobacco advertising (eg, billboards) appeared on screen were timed (hereafter referred to as movie smoking); other paraphernalia, such as ashtrays or matches, were not counted as movie smoking. To evaluate inter-rater reliability for the US films, a random sample of 10% of movies was coded by 2 coders, yielding a kappa of 0.97 for movie smoking time depictions. Because the sample of Argentine films was small (45 movies), 20% were double coded, yielding a kappa of 0.84.

The Beach method³⁶ was used to assess exposure. Each student received a randomly selected unique subsample of 50 film titles from the list of 422 films and indicated which ones they had seen. Movie smoking exposure was determined by (1) summing the seconds of movie smoking exposure across all films the adolescent reported having seen; (2) dividing seconds of movie smoking seen by the total seconds of movie smoking across all 50 films in the participant's unique list; and (3) multiplying the proportion in step 2 by the total seconds of movie smoking in the full list of films ($n = 30\,417$ seconds). Exposure to movie smoking was scaled to minutes of exposure, then classified into tertiles for use in logistic regression. We assessed movie smoking using the entire sample and separately for US-produced films and Argentine-produced films. There was much less exposure to smoking in the Argentine films; therefore, to allow the comparison, exposure was categorized as 0, >0 and <30 minutes, and ≥ 30 minutes.

Assessment of Substance Use and Smoking Susceptibility (Dependent Variable)

The analytic sample included all students who reported never smoking cigarettes (not even a puff) at baseline ($n = 1700$). At follow-up, a respondent was "initiating smoking" if he or she reported having ever smoked (even a puff) and a "current smoker" if he or she reported smoking any cigarettes during the previous 30 days (these categories are not exclusive).^{37,38} Among those who were never smokers at both waves, students were classified as not susceptible if they indicated both that they would "definitely not" accept a cigarette if a friend offered it to them and that they would "definitely not" smoke in the next year, and susceptible to smoke if they responded otherwise.

Covariates

Sociodemographic variables assessed included age (≤ 12 years, 13, 14, and older), sex, and highest educational attainment of either parent (≤ 7 , 8-12, ≥ 12 years of formal education). Smoking-related variables included friend and household smoking (ie, parents, siblings) (any vs none). We also controlled for sensation seeking (4 items, $\alpha = 0.79$)^{39,40}; parenting style (3 items to describe responsiveness, $\alpha = 0.82$, and another 3 items for demandingness, $\alpha = 0.70$)^{31,41}; and

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