

Exposure of Secondary School Adolescents from Argentina and Mexico to Smoking Scenes in Movies: a Population-based Estimation

Exposición de adolescentes de escuela secundaria de la Argentina y México a escenas de tabaco en películas de cine: una estimación poblacional

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ABSTRACT

Background: Smoking scenes in movies promote adolescent smoking onset; thus, the analysis of the number of smoking images in movies really reaching adolescents has become a subject of increasing interest.

Objective: The aim of this study was to estimate the level of exposure to images of smoking in movies watched by adolescents in Argentina and Mexico.

Methods: First-year secondary school students from Argentina and Mexico were surveyed. One hundred highest-grossing films from each year of the period 2009-2013 (Argentina) and 2010-2014 (Mexico) were analyzed. Each participant was assigned a random sample of 50 of these movies and was asked if he/she had watched them. The total number of adolescents who had watched each movie in each country was estimated and was multiplied by the number of smoking scenes (occurrences) in each movie to obtain the number of gross smoking impressions seen by secondary school adolescents from each country.

Results: Four-hundred and twenty-two movies were analyzed in Argentina and 433 in Mexico. Exposure to more than 500 million smoking impressions was estimated for adolescents in each country, averaging 128 and 121 minutes of smoking scenes seen by each Argentine and Mexican adolescent, respectively. Although 15, 16 and 18-rated movies had more smoking scenes in average, movies rated for younger teenagers were responsible for the highest number of smoking scenes watched by students (67.3% in Argentina and 54.4% in Mexico) due to their larger audience.

Conclusion: At the population level, movies aimed at children are responsible for the highest tobacco burden seen by adolescents.

Key words: Smoking - Motion Pictures - Adolescents - Argentina - Mexico

RESUMEN

Introducción: Las escenas de consumo de tabaco en películas promueve el inicio del tabaquismo en adolescentes, por lo que el análisis de la cantidad de imágenes de tabaco en películas que realmente llega a los adolescentes se ha convertido en un tema de interés creciente.

Objetivo: Estimar el nivel de exposición a imágenes de tabaco contenidas en películas vistas por adolescentes de la Argentina y México.

Material y métodos: Se realizó una encuesta a alumnos de primer año de nivel secundario de la Argentina y México. Se analizaron las 100 películas con mayor recaudación en cada año del período 2009-2013 (Argentina) y 2010-2014 (México). A cada participante se le asignó una muestra aleatoria de 50 de estas películas, preguntándosele si la había visto. Se estimó el número total de adolescentes que habían visto cada película en cada país y se multiplicó por el número de escenas que contenían tabaco (ocurrencias) en cada película para así obtener el número de impresiones crudas de tabaco vistas por los adolescentes escolarizados de cada país.

Resultados: Se analizaron 422 films en la Argentina y 433 en México. Más de 500 millones de imágenes de tabaco fueron vistas por la población joven de cada país, lo que promedia 128 y 121 minutos de escenas con tabaquismo por cada adolescente en la Argentina y México, respectivamente. Si bien los films calificados para mayores de 15/16/18 años tenían mayor promedio por película de escenas de tabaco, las películas calificadas para menores de esta edad fueron responsables de la mayor cantidad de escenas de tabaquismo vistas por adolescentes (67,3% en la Argentina y 54,4% en México) debido a su mayor audiencia.

Conclusión: A nivel poblacional, las películas para niños son las máximas responsables de la carga de tabaco vista por adolescentes.

Palabras clave: Tabaquismo - Cine - Adolescentes - Argentina - México

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Abbreviations

DMRL Dartmouth Media Research Laboratory
WHO World Health Organization

INCAA National Institute of Cinema and Audiovisual Arts
 (Instituto Nacional de Cine y Artes Audiovisuales)

INTRODUCTION

Recent investigations have reported that 6.3% of global disease burden could be attributed to tobacco smoking. (1) In Argentina, 22.1% of the adult population smokes, according to the results of the Global Adult Tobacco Survey. (2) Tobacco use is responsible for 40,000 deaths per year and generates a direct annual cost of about 21 thousand million Argentine pesos, equivalent to 1% of the gross domestic product (GDP) and to 12% of the total health costs in Argentina. (3) In Mexico, 15.9% of adults smoke; (4) tobacco consumption is responsible for 25,000 to 60,000 deaths per year, and the total healthcare expenditure associated with smoking in Mexico has been estimated in 75.2 billion Mexican pesos. (5) Tobacco use generally starts during adolescence and at increasingly earlier ages, with onset age estimated between 11 and 13 years. (6)

Several studies have demonstrated that the mechanism of smoking is complex and depends on biological, psycho-social and environmental factors. (7-9) Among the latter, promotion of tobacco products through the presence of smoking in movies has been used as an advertising campaign since the beginning of the 20th century. (10) In the same sense, images of smoking in movies are associated with high risk of smoking in youths. (11-14) In 2012, the report of the National Health Service Directory in the United States concluded that the evidence clearly points to a causal relationship between smoking in movies and adolescent smoking initiation. (7) In the same line, the third edition of the World Health Organization (WHO) smoke-free movies report establishes a number of recommendations to limit the impact smoking in movies exerts on the population, and suggests movies with smoking scenes should be rated as "R-18". (15) Taking into account that a dose-response relationship between the presence of tobacco and smoking has been demonstrated, many studies have analyzed the variations in the content of smoking scenes in movies. While in a few countries as Mexico and the United States the content of smoking in movies is decreasing over time, in Argentina the trend remains stable. (16) (Mejía R. et al., in press)

Therefore, the analysis of the number of smoking images in movies really reaching adolescents has become a subject of increasing interest. Similarly to the field of advertising, the evaluation of the number of depictions of smoking seen by a target audience is considered a key indicator of the impact a campaign has. Tobacco depictions seen by a relatively small proportion of adolescents would be unlikely to have a

large population effect on smoking. For movies popular among adolescents, however, a single smoking depiction may reach a large audience. (17) Although estimations about the smoking content delivered to youths have been reported in the United States and Canada, Latin American countries lack this information. (17-20) The aim of this study was thus to estimate the level of exposure to images of smoking in movies seen by adolescents in Argentina and Mexico.

METHODS

Sampling

First-year secondary school students from Argentina and Mexico were surveyed to evaluate the exposure of youths to smoking scenes in movies and its association with tobacco consumption. In Argentina, 18 public and 15 private schools were selected in three of the most populated cities: Buenos Aires, Cordoba and Tucuman. (21) The surveys were conducted between May and July 2014. In Mexico, 60 public schools were selected through stratified randomized sampling in the 3 largest cities of the country (Mexico City, Guadalajara and Monterrey). The surveys were conducted between February and March 2015. All the first-year students who were present in each school during that day participated in the survey. The questionnaire included social, demographic and personal aspects, and personal use of tobacco, alcohol and other drugs.

Each participant was assigned a random sample of 50 films from a general sample of movies from the corresponding country and was asked if he/she had watched them. Each student received a list of different movie titles to estimate the percentage of students that had seen each film (the Beach method). (22)

Movie Selection

In each country, the sample included 100 box office hits per year released in Argentina between 2009 and 2013 and those released in Mexico between 2010 and 2014 according to the information from the National Institute of Cinema and Audiovisual Arts (Instituto Nacional de Cine y Artes Audiovisuales, INCAA, Argentina) and the Mexican Institute of Cinematography (Instituto Mexicano de Cinematografía, IMCINE).

In Argentina, INCAA issues ratings for films based on the following system: ATP: suitable for all ages, M13: suitable for 13-year-olds, M16: suitable for 16-year-olds, and M18: suitable for 18-year-olds. In Mexico, movies are rated as follows: AA: suitable for 3 year-year-olds, A: suitable for 7 year-year-olds; B suitable for 12 year-year-olds; B15: suitable for 15 year-year-olds; C: suitable for 18 year-year-olds, and D: Adult movies. Adult movies (considered to have important violent or sexual content, D-rated in Mexico) were excluded from the sample. Overall, categories 15, 16 and 18-rated movies are considered as a whole for an older audience and the rest of the categories are suitable for children.

Definition of exposure

Exposure to tobacco content in movies in each student and in the population was determined by definitions previously used; (17) moreover, tobacco content in movies was coded using a previously validated method. (16, 23-27) Each movie was analyzed by a trained investigator who identified explicit or implicit tobacco depictions on screen (“occurrences”) as well as their duration. The films were analyzed and coded in their country of origin (Argentina, Mexico or the United States). Ten percent of the American films were randomly selected and analyzed by two different coders in the Dartmouth Media Research Laboratory (DMRL) to evaluate inter-coder agreement, and a Cohen’s kappa of 0.97 was obtained. In the case of Argentine and Mexican movies, 20% of the films were double-coded, with kappa of 0.84 and 0.71, respectively.

Because adolescents were randomly assigned to the movies, we assumed that the proportion of adolescents who had seen each movie reflected the proportion of adolescents in the population who had seen the movie, hereafter referred to as the movie “audience”. For each movie, we multiplied the movie audience by the number of first-year secondary school students from Buenos Aires, Cordoba and Tucuman in 2014 (n= 802,669) in Argentina, (28) and by the number of students aged 12 years in the cities of Monterrey, Guadalajara and Mexico City in 2010 (n=522,724) in Mexico, (29) to obtain an estimate of the number of first-year secondary school students who had seen the movie, constituting a measure of reach.

“Gross impressions” were determined by multiplying the estimate of the number of adolescents who had seen the movie by the number of smoking “occurrences” in the movie. “Duration of gross impressions” was obtained by multiplying the duration (in minutes) of all the smoking occurrences in a movie by the estimated number of adolescents who had seen the movie. Per capita gross impressions were obtained by dividing the total number of gross smoking impressions across all the movies in the sample by the total population of first-year students in the three cities of Argentina or by the number of 12-year old adolescents in the three cities of

Mexico. This measure is conservative as it does not account for multiple viewing of one movie by an adolescent. (17)

Statistical analysis

Categorical variables were expressed as absolute numbers and percentages and continuous variables as mean and standard deviation.

Ethical considerations

The surveys were anonymous. Passive consent was requested from the parents and active consent from the students.

The protocol was approved by the Ethics Committee of the Centro de Educación Médica e Investigaciones Clínicas (CEMIC) from Argentina and of the National Institute of Public Health from Mexico. A more detailed description about data collection has been previously published. (23)

RESULTS

In Argentina, 3,172 students completed the survey (survey completion rate: 82.9%), among whom 1,335 (42%) were women and 2,159 (69%) belonged to public schools. Mean participant age was 12.8 years. In Mexico, the final sample consisted of 10,123 participants (survey completion rate: 94.0%). Among them, 5,041 (49.8%) were women and mean age was 12.4 years.

Four-hundred and twenty-two movies were analyzed in Argentina and 433 in Mexico. In addition to the exclusion of adult movies, the final number decreased because a few movies were not encoded (movies which were not popular in the US were not coded in DMRL) and due to the impossibility of finding a few movie titles in the country of origin. In Argentina, only 4 movies were rated M18, and therefore we decided to unify this category with movies rated M16.

Table 1 shows the smoking occurrences (total and in minutes) for each rating category in both countries.

Table 1. Movie smoking scenes according to movie rating and country

Rating	Movies n (%)	Total occurrences n (%)	Occurrences per movie mean (SD)	Duration of smoking scenes minutes (%)	Length of tobacco scenes per movie mean in minutes (SD)
Argentina					
ATP	130 (30.8)	417 (11.7)	3.2 (10.9)	68 (13.7)	0.5 (1.9)
M13	207 (49.1)	2,099 (59.0)	10.1 (29.0)	262 (52.7)	1.3 (3.1)
M16 or M18	85 (20.1)	1,044 (29.3)	12.3 (22.5)	167 (33.6)	2.0 (4.0)
Total	422 (100)	3,560 (100)	8.4 (23.7)	497 (100)	1.2 (.0)
Mexico					
A	75 (17.0)	332 (8.6)	4.4 (16.7)	51 (11.5)	3 (3.7)
AA	33 (7.5)	1 (0.03)	0.03 (0.17)	0.21 (0.05)	0.21 (NA) (*)
B.	195 (44.1)	1,557 (40.1)	7.98 (21-4)	196 (44.3)	2.5 (4.2)
B15	128 (29.0)	1,760 (45.3)	13.8 (27.2)	170 (38.5)	1.9 (2.7)
C	12 (2.5)	233 (6.0)	19.4 (31.2)	24 (5.4)	3.1 (3.5)
Total	443 (100)	3,883 (100)	8.8 (22.4)	442 (100)	2.3 (3.5)

ATP: Suitable for all ages. M13: Suitable for 13-year-olds. M16: Suitable for 16 year-olds. M18: Suitable for 18-year-olds. AA: Suitable for 3 year-olds. A: Suitable for 7 year-olds. B: Suitable for 12 year-olds. B15: Suitable for 15 year-olds. C: Suitable for 18 year-olds. SD: standard deviation. NA: Not applicable

(*) Only one movie rated AA had tobacco occurrences

Table 2. Total number and minutes of gross impressions, by movie rating and country

Rating	Average adolescent audience* %	Gross impressions† n (%)	Gross impressions per capita	Time of gross impressions† minutes (%)	Time of gross impressions per capita minutes
Argentina					
ATP	45.9	69.7 (10.7)	87	10.8 (10.5)	13
M13	36.3	368.7 (56.6)	459	60.7 (59.0)	76
M16 or M18	32.9	212.8 (32.7)	265	31.4 (30.5)	39
Total	38.7	651.2 (100)	811	102.9 (100)	128
Mexico					
A	47.1	61.1 (12.2)	117	9.2 (14.5)	18
AA	61.9	0.4 (0.1)	1	1 (0.1)	0.2
B.	36.2	211.4 (42.1)	404	30.8 (48.8)	59
B15	28.3	192.1 (38.2)	367	19.0 (30.1)	36
C	37.1	37.9 (7.5)	73	4.1 (6.5)	8
Total	37.7	502.9 (100)	962	63.2 (100)	121

* Average audience: average percentage of adolescents that saw each movie according to each movie rating

† In millions

ATP: suitable for all ages. M13: suitable for 13-year-olds. M16: suitable for 16-year-olds. M18: suitable for 18 year-olds. AA: suitable for 3 year-olds. A: suitable for 7 year-olds. B: suitable for 12 year-olds. B15: suitable for 15 year-olds. C: suitable for 18 year-olds.

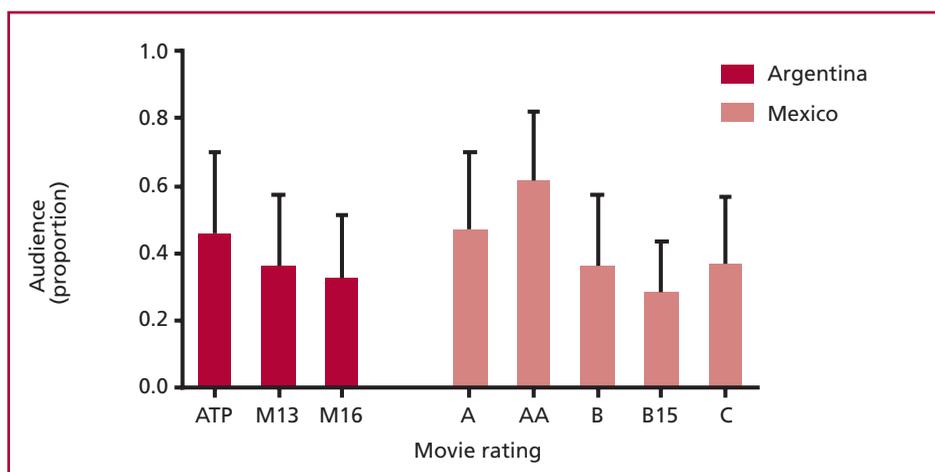


Fig. 1. Adolescent audience (proportion) according to movie rating and country (mean, standard deviation) ATP: suitable for all ages. M13: suitable for 13-year-olds. M16: suitable for 16-year-olds. AA: suitable for 3 year-olds. **A:** suitable for 7 year-olds. **B:** suitable for 12 year-olds. **B15:** suitable for 15 year-olds. **C:** suitable for 18 year-olds.

In Argentina, 20.1% were 16-rated movies while in Mexico 31.5% were rated for persons ≥ 15 years.

Then, the number and the time of gross impressions in each rating category were analyzed (Table 2). Mean smoking occurrences were higher for 15, 16 and 18-rated movies (12.3 occurrences per movie in Argentina; 13.8 and 19.4 occurrences per movie in Mexico), but the greatest extent of gross impressions as a measure of exposure (both in number and duration) came from movies rated for younger persons because they reached a larger audience (546 gross impressions per capita in Argentina and 522 in Mexico).

Figure 1 illustrates mean movie audience and

standard deviation for each motion picture rating in both countries. Although the highest audiences correspond to movies targeted at children, M16/M18 rated movies were seen by an average of 32.9% of adolescents in Argentina and by 28.3% (B15) and 37.1% (C) of Mexican youths.

Table 3 shows that 84.8% of Argentine and 89.6% of Mexican participants reported having seen at least one 15, 16 or 18-rated movie.

Table 4 presents the list of the 10 movies with the highest number of gross impressions in each country. In Argentina, 40% of these films were 15, 16 and 18-rated movies and 50% had these ratings in Mexico.

Table 3. Adolescents reporting having seen at least one 15, 16 or 18-rated movie according to age and country*

Age	Argentina n (%)	Mexico n (%)
11	63 (81.8)	52 (92.9)
12	1,032 (82.2)	5,423 (88.8)
13	1,005 (86.0)	3,137 (90.7)
14	404 (88.8)	345 (91.8)
15	148 (85.1)	43 (93.5)
16	26 (96.3)	6 (100)
Total	2,678 (84.8)	9,006 (89.6)

* In Argentina, movies rated for an older audience include 16-rated movies (M16) and 18-rated movies (M18); in Mexico, adult-rated movies include 15-rated movies (B15).

Particularly in Mexico, 2 of these 10 movies were rated for a public above 18 years old.

DISCUSSION

The results of this investigation show that in agreement with other countries, millions of smoking scenes in movies are delivered to youths in Argentina and Mexico, which in average represents more than 2-hour exposure to tobacco content for each adolescent. (17-20) If we consider that a TV commercial lasts an average of 25 seconds, this exposure would be equivalent to watching 280 TV commercials.

While most smoking occurrences appear in movies rated for an older audience, most gross impressions correspond to movies rated for those below 12/13 years, because movies for children reach a larger au-

Table 4. List of the 10 movies with the highest number of gross impressions according to each country

Title	Year	Rating	Occurrences	Adolescent audience %	Gross impressions*	Gross impressions* minutes
Argentina						
The Hobbit	2012	M13	92	57.6	42.5	3.98
Boogie, the Oily	2009	M13	248	12.5	24.9	1.64
Gangster Squad	2013	M13	174	16.3	22.8	1.31
The Flight	2012	M16	73	33.8	19.8	3.05
Lincoln	2013	M13	117	19.9	18.7	2.17
Django Unchained	2013	M16	123	16.8	16.6	1.93
The Butler	2013	M13	81	22.7	14.8	0.79
The Hangover, Part 3	2013	M16	32	53.3	13.7	0.76
The Expendables 2	2012	M16	29	57.5	13.4	0.79
The Curious Case of Benjamin Button	2009	M13	38	43.4	13.2	2.53
Mexico						
Cantinflas	2014	A	118	52.9	32.6	3.2
The Hobbit	2012	B.	92	49.6	23.9	2.2
Transformers: Age of Extinction	2014	B.	55	66.9	19.2	1.1
Gangster Squad	2013	B15	174	17.0	15.4	0.9
Inferno	2010	C	61	36.5	11.6	1.5
The Flight	2012	B.	73	30.5	11.6	1.8
The Wolf of Wall Street	2014	C	100	21.1	11.1	1
The Butler	2013	B.	81	24.2	10.2	0.5
The Hangover, Part 3	2013	B15	32	58.3	9.8	0.5
The Expendables 3	2014	B15	32	57.6	9.6	0.7

• In millions

M13: Suitable for 13-year-olds, M16: Suitable for 16 year-olds. A: Suitable for 7 year-olds; B: Suitable for 12 year-olds; B15: Suitable for 15 year-olds; C: Suitable for 18 year-olds.

dience: whereas in Mexico movies for older audiences delivered 46% of gross impressions, in Argentina it decreased to 33%. This duality has been described in previous studies and demonstrates the importance of restricting the access of adolescents to movies rated for older spectators (more than 80% of the participants reported to have seen a 15, 16 or 18-rated movie at least once) to achieve an individual effect. Yet, on a population basis, children-rated movies are mainly responsible for the tobacco burden watched by adolescents as these movies reach a larger audience. (17-19) In this sense, WHO recommends that all movies with smoking scenes should be given an M18 rating to avoid the impact “low doses” could have in large audiences, reducing the amount of tobacco that is currently delivered to the most vulnerable population to start smoking. (15)

This study has some limitations. Firstly, this survey used non-probability school sampling in Argentina. However, the three participant provinces are among the six most populated provinces of the country and account for 19% of the national population. (21) In addition, public and private schools were included to have representation of every socio-economic status. Secondly, this survey is based on adolescents attending school and does not represent youths not receiving education. Nevertheless, school enrollment in both countries is high: >85% for secondary education in Argentina and 82.4% (net enrollment rate for the 12 to 14-year age group) in Mexico. (31-33) Adolescent recollection of whether they had seen a movie title is subject to recall bias. However, a previous study in the US reported that adolescents correctly reported having seen a movie in 90% of cases even after a year. (34) In addition, the cases in which a participant saw a film but did not recall it at the moment of the survey would increase the number of gross impressions reported in this study. Finally, we did not analyze the context of the movie smoking depiction (as the traits of the character using tobacco and the background in which he/she smoked). In this sense, the impact on the adolescent population of smoking scenes in a movie like “The Hangover, Part 3” is greater than that of “The Hobbit”.

Despite these limitations, and as far as we are concerned, this is the first study evaluating tobacco content in popular movies in two Latin American countries presenting direct evidence of the extent that smoking depictions have in the population of Argentina and Mexico, and providing a quantifiable measure to compare tobacco content in movies in the future. In addition, this study highlights the importance of considering tobacco content at the moment of rating movies, so that movies with smoking scenes should be rated as M18.

CONCLUSIONS

At the population level, movies aimed at children are responsible for the highest tobacco burden seen by ad-

olescents. Finally, it would be desirable to implement public policies, adopting the WHO recommendations to reduce the content of tobacco in movies. Movies with smoking scenes should be given an adult rating as part of a broader strategy to combat the tobacco epidemic and thus help to reduce one of the most important cardiovascular risk factors.

Conflicts of interest

None declared. (See authors' conflicts of interest forms in the web / Supplementary Material)

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