

# PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

## **Exposure to Movie Smoking Among US Adolescents Aged 10 to 14 Years: A Population Estimate**

James D. Sargent, Susanne E. Tanski and Jennifer Gibson

*Pediatrics* 2007;119:e1167-e1176

DOI: 10.1542/peds.2006-2897

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://www.pediatrics.org/cgi/content/full/119/5/e1167>

PEDIATRICS is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. PEDIATRICS is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2007 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 0031-4005. Online ISSN: 1098-4275.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™



# Exposure to Movie Smoking Among US Adolescents Aged 10 to 14 Years: A Population Estimate

James D. Sargent, MD, Susanne E. Tanski, MD, Jennifer Gibson, MS

Norris Cotton Cancer Center, Dartmouth Medical School, Lebanon, New Hampshire

The authors have indicated they have no financial relationships relevant to this article to disclose.

## ABSTRACT

**BACKGROUND.** Several studies have linked seeing smoking in movies with adolescent smoking, but none have determined how much movie smoking adolescents see.

**OBJECTIVE.** Our aim was to determine exposure to movie smoking in a representative sample of young US adolescents.

**METHODS.** We surveyed 6522 nationally representative US adolescents aged 10–14 years. We content analyzed 534 contemporary box-office hits for movie smoking. Each movie was assigned to a random subsample of adolescents (mean: 613) who were asked whether they had seen the movie. Using survey weights, we estimated the total number of US adolescents who had seen each movie and then multiplied by the number of smoking depictions in each movie to obtain gross smoking impressions seen by adolescents.

**RESULTS.** The 534 movies were mainly rated PG-13 (41%) and R (40%), and 74% contained smoking (3830 total smoking occurrences). On average, each movie was seen by 25% of the adolescents surveyed. Viewership was higher with increased age and lower for R-rated movies. Overall, these movies delivered 13.9 billion gross smoking impressions, an average of 665 to each US adolescent aged 10–14 years. Although this sample's R-rated movies contained 60% of smoking occurrences, they delivered only 39% of smoking impressions because of lower adolescent viewership. Thirty popular movies each delivered  $\geq 100$  million gross smoking impressions. Thirty actors each delivered  $>50$  million smoking impressions, such that just 1.5% of actors delivered one quarter of all character smoking to the adolescent sample.

**CONCLUSIONS.** Popular movies deliver billions of smoking images and character smoking depictions to young US adolescents. Removing smoking from youth-rated films would substantially reduce exposure from new box-office hits. Furthermore, the popular actors who frequently smoke in movies could have a major impact on adolescent movie smoking exposure by choosing not to portray characters who smoke.

[www.pediatrics.org/cgi/doi/10.1542/peds.2006-2897](http://www.pediatrics.org/cgi/doi/10.1542/peds.2006-2897)

doi:10.1542/peds.2006-2897

### Key Words

movie smoking, adolescent smoking, reach, gross smoking impressions, population-based survey

### Abbreviation

MPAA—Motion Picture Association of America

Accepted for publication Nov 27, 2006

Address correspondence to James D. Sargent, MD, Dartmouth-Hitchcock Medical Center, One Medical Center Drive, Lebanon, NH 03756. E-mail: [james.d.sargent@hitchcock.org](mailto:james.d.sargent@hitchcock.org)

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275). Copyright © 2007 by the American Academy of Pediatrics

REPORTS OF AN association between seeing smoking in movies and adolescent smoking<sup>1-7</sup> have prompted greater scrutiny of smoking depicted in movies. Movie smoking has been quantified through content analyses, in which a specified sample frame of movies is assessed according to a set of predefined criteria. The published content analyses agree on multiple points: smoking is depicted in most movies<sup>8-14</sup>; movie smoking increases as the Motion Picture Association of America (MPAA) rating increases from G to R<sup>8,13,14</sup>; movie smoking rarely is associated with negative health outcomes<sup>8,9,11,14</sup>; and movie characters who smoke are more affluent than the typical US smoker.<sup>8,11</sup> Studies that report the prevalence of character smoking concur that 20% to 25% of characters in popular contemporary movies smoke<sup>12,15,16</sup> and that smoking rates are higher among male characters. One area that has been less thoroughly assessed is how much of the smoking in movies actually reaches adolescents. Movie smoking 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. In this context, as it is in the advertising arena, an assessment of the number of smoking depictions delivered to a defined audience is considered a key metric of the success of the campaign.

One 2004 non-peer-reviewed publication estimated the number of smoking impressions delivered to US adolescents.<sup>17</sup> By using an Internet parental review/screening service ([www.screenit.com](http://www.screenit.com)) for some 800 box-office releases to estimate smoking content and Nielsen figures to calculate the youth audience, they determined that the selected movies delivered some 8.3 billion smoking scenes to children and teens, or ~1350 per capita. Despite a higher concentration of smoking in R-rated movies, youth-rated movies delivered approximately half of the smoking scenes. The limitations of the study notwithstanding, this report underlines the potential impact of movie smoking because of the extensive reach into the adolescent population. A recent article looking at images of smoking included in 31 television trailers for movies found that even these brief advertisements resulted in substantial exposure, with 270 million smoking impressions delivered to youth in a single year.<sup>18</sup> Our aim in this study is to assess exposure to movie smoking in US adolescents aged 10 to 14 years using more rigorous quantitative methods that allow for an evaluation of smoking within a popular contemporary sample of films and aggregated at the levels of movie and leading actors.

## METHODS

Between June and October, 2003, we conducted a random-digit dial telephone survey of 6522 US adolescents aged 10 to 14 years. We have previously reported details

of the survey, including the survey completion rate (66%).<sup>1</sup> Briefly, the telephone surveys were conducted by trained interviewers using a computer-assisted telephone interview system, and interviewers were trained to administer the survey in English or Spanish. We obtained parental consent and adolescent assent before interviewing each respondent. To protect confidentiality, adolescents indicated their answers to sensitive questions by pressing numbers on the telephone, rather than speaking aloud. All aspects of the survey were approved by the institutional review boards at Dartmouth Medical School and Westat. The sample was broadly representative of the US adolescent population (as assessed by the US Census) with respect to age, gender, household income, and census region (Appendix 1). Compared with the 2000 US Census, our unweighted sample had higher percentages of Hispanics and slightly lower percentages of blacks; we adjusted for these differences using a post-stratification weighting procedure.

One aim of the survey was to assess the proportion of adolescents who had seen each movie of a sample of popular contemporary movies. We selected the top 100 US box-office hits per year for each of the 5 years preceding the survey (1998–2002;  $N = 500$ ) and 34 movies that earned at least \$15 million in gross US box-office revenues during the first 4 months of 2003. The computer-assisted telephone interview survey was programmed to randomly select 50 movie titles from the larger pool for each adolescent interview, such that adolescents were randomly assigned to movie titles, and a representative subsample of adolescents (mean number surveyed: 613; SD: 27) was queried on each title. Movie selection was stratified by the MPAA rating so that the distribution of movies in each list reflected the distribution of the full sample of movies (19% G/PG, 41% PG-13, and 40% R). Respondents were asked whether they had ever seen each movie title on their unique list. To assess the possibility of false-positive responses, we asked all of the adolescents whether they had seen a sham movie title, *Handsome Jack*, and <2% reported having seen it. We have shown previously that adolescents reliably remember movies they have seen 1 to 2 years before a survey.<sup>2</sup>

## Content Analysis

Trained coders counted the number of smoking occurrences in each of the 534 movies using previously validated methods.<sup>8</sup> A smoking occurrence was counted whenever a major or minor character handled or used tobacco in a scene (defined as a “smoking episode”) or when background smoking was present (defined as a smoking “incident”). The smoking occurrence was used as the unit of movie exposure in characterizing adolescent movie smoking exposure by movie. To determine exposure to movie smoking according to actor, we restricted the analysis to the smoking episodes by major

and minor characters. A major character was defined by the movie coders as someone “central to the development of the plot”; coders identified a median of 6 (interquartile range: 5–8) major characters in each movie. Smoking episodes were counted irrespective of the scene’s duration or how many times the tobacco product appeared during the scene. We used 2 movie coders and double-coded 10% of the movies. As a measure of interrater agreement, the Pearson correlation coefficient for the number of smoking episodes (character smoking) contained in each double-coded movie was 0.99 and for smoking incidents (background smoking or signage) was 0.86.

### Defining Exposure

In assessing advertising campaigns, it is important to determine how many individuals or households are exposed to a particular advertising media or message; this is what marketing researchers refer to as a determination of reach. Because adolescents were randomly assigned to a movie, we assumed that the proportion of adolescents within each subsample who had seen each movie reflected the proportion of adolescents in the US population who had seen the movie, hereafter referred to as the “movie viewership.” For each movie, we multiplied the movie viewership proportion by the number of US adolescents aged 10 to 14 years in 2002 (20.88 million) to obtain an estimate of the number of US adolescents who had seen the movie, our measure of reach. “Gross impressions” is the total number of exposures delivered by a media schedule. For movies, gross smoking impressions were determined by multiplying the estimate of the number of US adolescents who had seen the movie by the number of smoking occurrences in the movie. Per capita gross impressions of movie smoking were obtained by dividing the total number of gross smoking impressions across all of the movies in the sample by the total US population of adolescents. This measure is similar to that used to determine the success of a marketing campaign, the gross rating point, except that our measure is conservative in that it does not account for multiple viewing of 1 movie by an adolescent. In our determination of gross smoking impressions delivered by leading actors, we aggregated by actor, the movie smoking occurrences delivered by all of the major characters in  $\geq 1$  movie.

### RESULTS

As reported previously,<sup>1</sup> the movie sample was composed mainly of PG-13 (41%) and R-rated (40%) movies (Table 1) and contained a total of 3830 smoking occurrences. Sixty percent of all smoking occurrences appeared in R-rated movies, 36% in PG-13 movies, 4% in PG movies, and  $<1\%$  in G-rated movies. Mean movie viewership was 0.25 (SD: 0.21). Figure 1 shows the distribution for movie viewership by MPAA rating for

**TABLE 1** Movie Smoking Occurrences and Smoking Gross Impressions According to Rating

Motion Picture Rating	Movie Smoking			Per Capita
	Movies, n (%)	Occurrence, n (%)	Gross Impressions, n (%) <sup>a</sup>	
Adult (R-rated)	215 (40)	2288 (60)	5454 (39)	261
Youth				
PG-13	220 (41)	1377 (36)	7014 (50)	336
PG	71 (13)	151 (4)	1233 (9)	59
G	28 (5)	14 ( $<1$ )	188 (1)	9
Total	534	3830	13 890	665

Percentages do not add up to 100% because of rounding.

<sup>a</sup>Data are shown in millions.

the 534 movies. The mean of movie viewership was similar for G-rated movies (0.51) and PG-rated movies (0.47) but significantly lower for PG-13 movies (0.27) and for R-rated movies (0.14;  $P < .001$ ). Figure 2 illustrates the distribution of movie viewership by age of the respondent. Movie viewership increased in a linear fashion with age ( $P < .001$  for trend), from a mean of 0.19 for 10-year-old adolescents to 0.34 for 14-year-olds.

### Gross Smoking Impressions Delivered Overall

In aggregate, the 534 movies delivered some 13.9 billion impressions of smoking to this age group (Table 1). Examined on a per capita basis, an average of 665 impressions of smoking were delivered to each US adolescent aged 10 to 14 years as of the date of the survey, September 2003. Despite containing a higher number of smoking occurrences, R-rated movies accounted for a lower proportion of gross smoking impressions delivered to US adolescents (39%) than PG-13 movies (50%) because of lower viewership of R-rated movies. Figure 3 illustrates this: youth-rated movies contained  $\sim 40\%$  of smoking occurrences, yet they delivered  $\sim 60\%$  of all gross smoking impressions to young adolescents.

### Gross Smoking Impressions Delivered According to Movie

Table 2 lists all of the movies that delivered  $\geq 100$  million gross smoking impressions ( $N = 30$ ). The movies on the list shared 2 common characteristics: they included many smoking impressions and were popular, seen by 2 to 15 million of the estimated 21 million US 10- to 14-year-olds. Not all of the movies were intended for youths in this age range. For example, the R-rated movie *Hannibal* contained graphic violence scenes, yet was seen by  $\sim 25\%$  of adolescents in this age range. Most of the movies on this list depicted cigarette smoking. However, *Lord of the Rings: The Fellowship of the Ring* depicted pipe smoking, *Wild Wild West* depicted cigar smoking, and *Atlantis: The Lost Empire* depicted animated cigarette smoking.

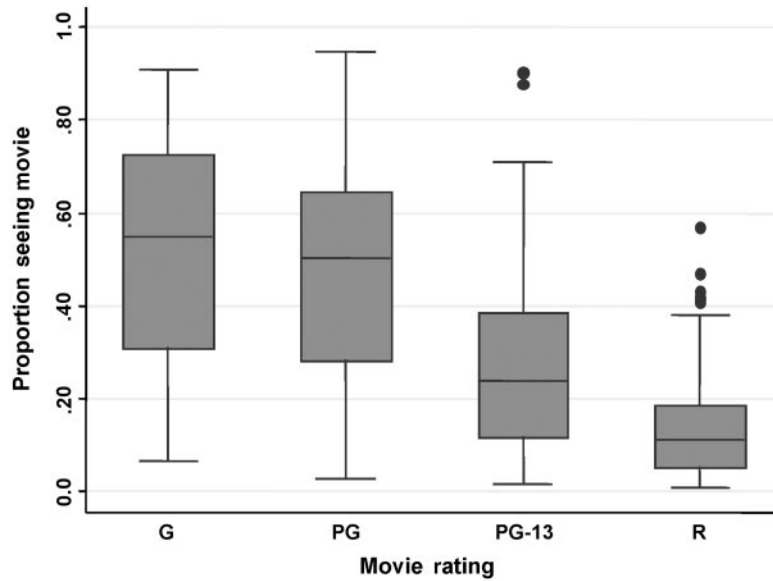


FIGURE 1

Adolescent viewership for 534 popular contemporary movies according to MPAA rating. For the box plot, the box represents the interquartile range (25th–75th percentiles), and the line in the middle of the box represents the median value. The brackets extending from the box represent the lower and upper adjacent values, roughly corresponding to the 3rd and 97th percentiles, respectively.

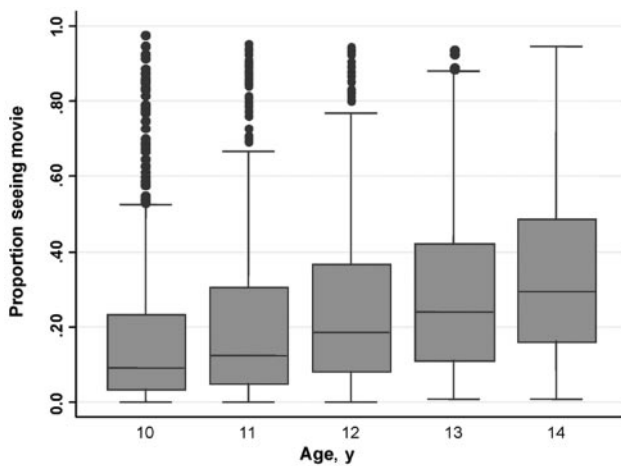


FIGURE 2

Viewership rates for 534 movies according to age of respondent.

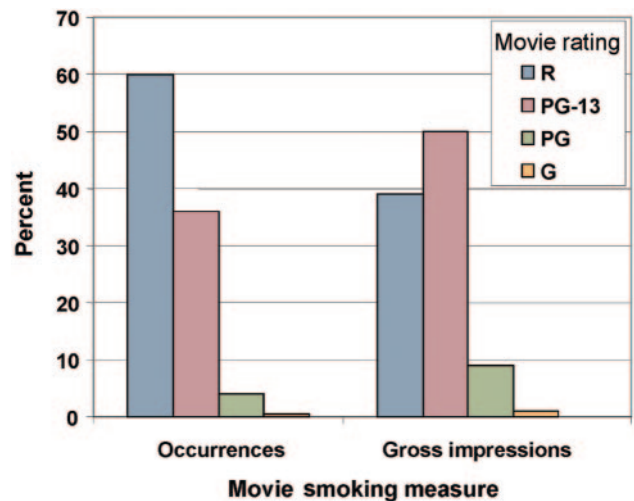


FIGURE 3

Percentage of movie tobacco occurrences and movie tobacco gross smoking impressions according to motion picture rating.

### Gross Smoking Impressions According to Major and Minor Characters

In this movie sample, we identified 7720 major or minor movie characters (Table 3). The smoking rate among minor characters was much lower than for major characters. Among the 3813 major characters, 71% were male (we did not code gender for minor characters), and the smoking rate was slightly higher among males. Movie characters accounted for 2760 (72.1%) of the 3830 smoking occurrences in the movies, delivering 9.88 billion gross impressions of character smoking to US adolescents. The majority of the character gross smoking impressions (65.2%) were delivered by male major characters.

Of the 1961 actors who played character roles in these films, 499 (25.4%) smoked in  $\geq 1$  role. Table 4 shows the number of smoking characters, total smoking episodes, and gross smoking impressions for 30 actors who delivered  $\geq 50$  million gross impressions of character smoking to US adolescents (see Appendix 2 for details on movies and names of smoking characters). These 30 actors accounted for 2.4 billion gross smoking impressions, or 24.6% of all of the gross smoking impressions delivered by characters in these movies. Of the 30 actors shown, only 3 were women, in keeping with the observation that most actor smoking is done by males. Generally,

**TABLE 2** Movies That Delivered  $\geq 100$  Million Gross Impressions of Smoking

Movie Title	Movie Characteristics			Exposure Estimates for US Adolescents Aged 10–14 y		
	Year of Release	MPAA Rating	No. of Smoking Occurrences	Proportion Having Seen the Movie	Estimated Adolescent Viewership <sup>a</sup>	Gross Impressions <sup>a</sup>
<i>The Perfect Storm</i>	2000	PG-13	43	0.42	8.76	376.9
<i>Lord of the Rings: The Fellowship of the Ring</i>	2001	PG-13	24	0.60	12.50	300.0
<i>Wild Wild West</i>	1999	PG-13	22	0.63	13.17	289.7
<i>Saving Private Ryan</i>	1998	R	44	0.27	5.54	243.6
<i>Catch Me If You Can</i>	2002	PG-13	28	0.33	6.96	194.8
<i>Mr Deeds</i>	2002	PG-13	14	0.65	13.66	191.2
<i>Atlantis: The Lost Empire</i>	2001	PG	15	0.59	12.22	183.3
<i>Hardball</i>	2001	PG-13	20	0.41	8.47	169.5
<i>8 Mile</i>	2002	R	20	0.38	7.99	159.8
<i>Charlie's Angels</i>	2000	PG-13	12	0.64	13.26	159.2
<i>Pearl Harbor</i>	2001	PG-13	16	0.48	9.93	158.9
<i>Men of Honor</i>	2000	R	33	0.23	4.73	156.2
<i>Die Another Day</i>	2002	PG-13	18	0.39	8.17	147.1
<i>Men in Black II</i>	2002	PG-13	9	0.73	15.19	136.7
<i>Fight Club</i>	1999	R	65	0.10	2.02	131.4
<i>The Master of Disguise</i>	2002	PG	12	0.52	10.86	130.3
<i>Black Hawk Down</i>	2001	R	21	0.29	6.06	127.2
<i>A Beautiful Mind</i>	2001	PG-13	26	0.22	4.63	120.4
<i>Hannibal</i>	2001	R	25	0.23	4.79	119.8
<i>Small Soldiers</i>	1998	PG-13	12	0.48	9.98	119.7
<i>Training Day</i>	2001	R	21	0.27	5.69	119.6
<i>Thirteen Days</i>	2000	PG-13	40	0.14	2.94	117.6
<i>Behind Enemy Lines</i>	2001	PG-13	19	0.30	6.19	117.6
<i>Gangs of New York</i>	2002	R	44	0.12	2.55	112.4
<i>Girl Interrupted</i>	1999	R	51	0.10	2.14	109.0
<i>My Dog Skip</i>	2000	PG	8	0.64	13.37	106.9
<i>Frequency</i>	2000	PG-13	49	0.10	2.17	106.1
<i>Ocean's Eleven</i>	2001	PG-13	16	0.31	6.38	102.1
<i>Blade</i>	1998	R	13	0.37	7.81	101.5
<i>The Adventures of Rocky Bullwinkle</i>	2000	PG	10	0.48	9.95	99.5

<sup>a</sup> Data are shown in millions.**TABLE 3** Character Smoking in 534 Popular Contemporary Movies: Its Reach Among US Adolescents Aged 10 to 14 Years

Variable	Characters, n (%)	Smokers, %	Smoking Episodes, n (%)	Gross Smoking Impressions, n (%) <sup>a</sup>	Per Capita
Major characters					
Male	2695 (34.9)	22.9	1808 (65.5)	6440 (65.2)	309
Female	1118 (14.5)	18.5	577 (20.9)	1870 (18.9)	90
Minor characters	3907 (50.5)	6.3	375 (13.6)	1570 (15.9)	75
Total No.	7720	13.8	2760	9880	473

<sup>a</sup> Data are shown in millions.

high impact actors played smoking characters in several movies released over the study period; but some actors, such as Keanu Reeves, delivered all of their smoking in a single popular movie (*Hardball*). Some of the characters delivering the high numbers of smoking impressions were not human: Florence Stanley delivered the highest number of smoking impressions of any actor by playing the voice for Mrs Packard, the chain-smoking communications officer on the submarine in the animated movie *Atlantis: The Lost Empire*, and Ian McKellan played Gandolf, a pipe-smoking wizard in *The Lord of the Rings*.

As mentioned above, the majority of actors did not smoke in films. Moreover, a number of actors starred in multiple films in this sample and did not smoke in any of

them. Table 5 lists all of the actors who starred in  $\geq 5$  films during the study period and portrayed no smoking characters. Table 5 includes the names of many notable actors, some of whom (eg, Tom Cruise) have rarely, if ever, smoked in movies, and others (eg, Bruce Willis), who were known previously for playing smoking characters in highly popular movies (eg, *Die Hard*).

## DISCUSSION

This is the first study to assess the delivery of movie smoking impressions to US adolescents using survey techniques that allow for a direct estimate of the exposure. The results indicate that this sample of popular contemporary movies delivered billions of smoking im-

**TABLE 4 Character Smoking for Actors Who Delivered  $\geq 50$  Million Gross Smoking Impressions to US Adolescents Aged 10 to 14 Years**

Actor Name	Character Portrayals		No. of Smoking Episodes	Gross Smoking Impressions <sup>a</sup>
	Nonsmoker	Smoker		
Stanley, Florence	0	1	15	183.3
Hawkes, John	1	3	18	156.8
Avari, Erick	2	2	11	147.4
McKellan, Ian	2	1	10	125.0
De Niro, Robert	7	4	28	117.9
Gibson, Mel	4	3	21	90.9
Borgnine, Ernest	0	1	9	89.8
Reeves, Keanu	4	1	10	84.7
Pitt, Brad	3	3	42	83.7
Dahn, Werner	0	1	9	83.5
Close, Glenn	1	1	5	82.0
Branagh, Kenneth	1	2	6	77.7
Gould, Elliott	0	1	12	76.6
Reilly, John C	5	4	12	75.7
Hackman, Gene	5	4	36	73.9
Fichtner, William	5	1	8	70.1
McDonald, Christopher	3	1	5	69.6
Glover, Crispin	2	1	5	66.3
Jackman, Hugh	1	3	11	63.4
Goldberg, Adam	2	3	13	61.9
Ifans, Rhys	1	2	16	61.2
Voight, Jon	4	3	8	59.3
Kline, Kevin	1	3	5	57.4
Mortensen, Viggo	3	2	5	56.7
Carrey, Jim	3	2	9	55.7
McBride, Chi	2	3	8	53.8
Reedus, Norman	0	1	8	53.4
Washington, Denzel	5	3	11	52.9
Hopkins, Anthony	6	3	14	52.7
Cage, Nicolas	2	7	37	50.4

<sup>a</sup> Data are shown in millions.

pressions to American youth and provide a basis, from a communications standpoint, for the large population effect (an adjusted attributable risk of 0.50 in 1 longitudinal study<sup>4</sup>) of movie smoking on adolescent smoking. A single popular movie with smoking can deliver tens of millions of smoking depictions to adolescents on the first run at the box office. Once that film also appears on DVD, video, and movie channels, the movie extends its reach and may ultimately deliver hundreds of millions of gross smoking impressions to youth. These findings represent a conservative estimate of the impact of movies, because we did not assess exposure to all of the films, did not determine how many times adolescents had seen each film, and restricted our survey to a both a narrow age range and date range for the movie sample. Indeed, children begin watching animated movies with smoking as preschoolers, and, with the penetration of VCRs and DVD players, are able to view their favorite films over and over throughout childhood and adolescence. Older movies are also readily available, resulting in the delivery of many more smoking depictions from these films than we were able to document in this study.

**TABLE 5 Characters Who Starred in  $\geq 5$  Films But Did Not Smoke**

Actor Name	Character Portrayals		No. of Smoking Episodes	Gross Smoking Impressions <sup>a</sup>
	Nonsmoker	Smoker		
Anderson, Anthony	12	0	0	0
Affleck, Ben	11	0	0	0
Willis, Bruce	10	0	0	0
Cruise, Tom	7	0	0	0
Cummings, Jim	7	0	0	0
David, Keith	7	0	0	0
Freeman, Morgan	7	0	0	0
Hanks, Tom	7	0	0	0
Isaacs, Jason	7	0	0	0
Lee, Jason	7	0	0	0
Moore, Julianne	7	0	0	0
Shalhoub, Tony	7	0	0	0
Shannon, Molly	7	0	0	0
Spacey, Kevin	7	0	0	0
Baker, Dylan	6	0	0	0
Clooney, George	6	0	0	0
Gooding, Cuba Jr	6	0	0	0
Lawrence, Martin	6	0	0	0
Levy, Eugene	6	0	0	0
Lindo, Delroy	6	0	0	0
Lopez, Jennifer	6	0	0	0
Miller, Larry	6	0	0	0
Nealon, Kevin	6	0	0	0
Prinze, Freddie Jr	6	0	0	0
Soucie, Kath	6	0	0	0
Thomas, Sean Patrick	6	0	0	0
Union, Gabrielle	6	0	0	0
Ward, Fred	6	0	0	0
Williams, Robin	6	0	0	0
Balaban, Bob	5	0	0	0
Bates, Kathy	5	0	0	0
Boorem, Mika	5	0	0	0
Cleese, John	5	0	0	0
Curtis, Cliff	5	0	0	0
Detmer, Amanda	5	0	0	0
Dick, Andy	5	0	0	0
Duvall, Robert	5	0	0	0
Ferrell, Will	5	0	0	0
Kennedy, Jamie	5	0	0	0
Levine, Ted	5	0	0	0
Liotta, Ray	5	0	0	0
Mohr, Jay	5	0	0	0
Morton, Joe	5	0	0	0
Myers, Mike	5	0	0	0
Neeson, Liam	5	0	0	0
Patton, Will	5	0	0	0
Paxton, Bill	5	0	0	0
Piven, Jeremy	5	0	0	0
Rapaport, Michael	5	0	0	0
Suplee, Ethan	5	0	0	0
Sutherland, Donald	5	0	0	0
Woodard, Alfre	5	0	0	0

<sup>a</sup> Data are shown in millions.

When examined according to movie rating, we found that, although R-rated movies accounted for the majority of occurrences of movie smoking, they delivered only ~40% of smoking impressions to adolescents. This assessment corresponds closely with the findings by Po-

lansky and Glantz.<sup>17</sup> Youth-rated movies delivered proportionally more smoking because of higher viewership rates for these movies. One implication of our findings is an assessment of the likely impact of an R-rating for smoking on reach among young adolescents. An R rating for smoking is one of the policy planks of a public health advocacy movement aimed at decreasing the impact of movie smoking.<sup>19</sup> Because movies are financed and produced with a target audience and rating in mind, an R rating for smoking would assure that movies intended for youth audiences would be smoke free. Assuming that new movies had a smoking mix similar to this sample and assuming that adolescent viewership rates for movies according to rating did not change, an R rating for smoking would decrease adolescent exposure to movie smoking in new releases by ~60%, resulting in a substantial reduction in exposure over time. Thus, from a health perspective, if one accepts movie smoking as a causal influence in adolescent smoking, the goal to incorporate smoking into the ratings system has some appeal.

The decision to depict smoking in movies may be subject to forces other than industry rating policy. Our examination of character smoking according to actor shows that just 30 actors delivered one quarter of movie character smoking to young adolescents, representing the work of only 1.5% of the actors playing character roles in these movies and 6% of actors who smoked in movies. These 30 actors were primarily lead males who starred as smoking characters in multiple movies. A decision not to smoke in movies by any one of these characters would have had a substantial impact on current adolescent exposure to smoking. The behavior of these actors contrasts with other notable stars who played lead roles in multiple movies but did not smoke in any of them. For example, Ben Affleck, who has been shown smoking in “real-life” images captured by news magazines and tabloids, appears as 10 different characters within this movie sample, yet none of his characters smoked. This contrast suggests, for lead actors at least, a fair amount of autonomy with regard to the decision to depict smoking on screen, with many having chosen not to smoke. If this is so, another approach to decreasing smoking exposure to youth could be to encourage/pressure a relatively small number of high-profile actors not to smoke in films.

This study is subject to limitations, some of which are described above and relate to the underestimation of movie smoking reach among children and adolescents. Adolescent recollection of whether they had seen a movie title is subject to recall bias. However, adolescents correctly report having seen a movie 90% of the time more than a year after having seen it,<sup>2</sup> so we think that their responses are accurate. Another limitation is that this study treats all movie smoking equally; it does not address any potential relationship between viewing dif-

ferent types of smoking and adolescent smoking. We would expect movie smoking to vary in its influence on adolescent smoking, depending on the individual characteristics of the adolescent and the context of the movie smoking depiction. At the movie level, our counts of movie smoking include character and background depictions of smoking and do not differentiate on the duration of the occurrence. In addition, our character smoking measure did not distinguish between different types of smoking (cigar, pipe, or cigarette) or other contextual elements, such as the type or attractiveness of character who smokes, whether the smoking occurred in an emotional or arousing scene, or the overall level of violence in the movie. One would expect, for example, that cigarette smoking depicted by Rusty Ryan (Brad Pitt) in *Oceans Eleven* might have more impact on adolescent cigarette smoking than pipe smoking by Gandolf (Ian McKellan) in *Lord of the Rings*. In addition, we do not consider differential impact by adolescent gender or race/ethnicity. More research needs to be done on whether these factors impact adolescent smoking behavior differentially.

Despite its limitations, this study offers the first direct assessment of the reach of movie smoking, providing a measure of the magnitude by which this medium delivers potentially powerful social influence impressions to a vulnerable population. The finding that movies deliver smoking depictions by the billions to US adolescents during a period when they are susceptible to social influences to smoke warrants further research to better understand the process by which these depictions might affect behavior. Of additional importance, with more than half of box-office receipts for US movies coming from overseas, US movies deliver smoking impressions to adolescents all over the world. We hope that this research will prompt those in the movie industry who make decisions about movie smoking to think carefully about the role they may be playing in the smoking epidemic both domestically and worldwide. Finally, we encourage pediatric practitioners to support the efforts of the American Academy of Pediatrics and other groups<sup>19</sup> to pressure the movie industry to adopt voluntary incentives and other policies to limit smoking in movies. In addition, pediatricians should counsel parents regarding the media, monitoring steps that they can take to reduce movie smoking exposure to their children. As stated in the conclusion of a recently published article on the topic, “parental rules and monitoring of children’s movie viewing may have a protective influence on children’s risk for smoking and drinking, over and above parental monitoring of nonmedia-related behaviors.”<sup>20</sup>

#### ACKNOWLEDGMENTS

We acknowledge funding from the National Cancer Institute.

We thank our collaborators, Madeline Dalton, Mi-

chael Beach, Jennifer Tickle, and Todd Heatherton, and also the content coders, Daniel Nassau, Balvinder Rakhra, and Elaini Bergamini, for their efforts.

## REFERENCES

- Sargent JD, Beach ML, Adachi-Mejia AM, et al. Exposure to movie smoking: its relation to smoking initiation among US adolescents. *Pediatrics*. 2005;116:1183–1191
- Sargent JD, Beach ML, Dalton MA, et al. Effect of seeing tobacco use in films on trying smoking among adolescents: cross sectional study. *BMJ*. 2001;323:1394–1397
- Sargent JD, Dalton MA, Beach ML, et al. Viewing tobacco use in movies: does it shape attitudes that mediate adolescent smoking? *Am J Prev Med*. 2002;22:137–145
- Dalton MA, Sargent JD, Beach ML, et al. Effect of viewing smoking in movies on adolescent smoking initiation: a cohort study. *Lancet*. 2003;362:281–285
- Distefan JM, Gilpin EA, Sargent JD, et al. Do movie stars encourage adolescents to start smoking? Evidence from California. *Prev Med*. 1999;28:1–11
- Distefan JM, Pierce JP, Gilpin EA. Do favorite movie stars influence adolescent smoking initiation? *Am J Public Health*. 2004;94:1239–1244
- Tickle JJ, Sargent JD, Dalton MA, et al. Favourite movie stars, their tobacco use in contemporary movies, and its association with adolescent smoking. *Tob Control*. 2001;10:16–22
- Dalton MA, Tickle JJ, Sargent JD, et al. The incidence and context of tobacco use in popular movies from 1988 to 1997. *Prev Med*. 2002;34:516–523
- Everett SA, Schnuth RL, Tribble JL. Tobacco and alcohol use in top-grossing American films. *J Community Health*. 1998;23:317–324
- Glantz SA, Kacirk KW, McCulloch C. Back to the future: Smoking in movies in 2002 compared with 1950 levels. *Am J Public Health*. 2004;94:261–263
- Hazan AR, Lipton HL, Glantz SA. Popular films do not reflect current tobacco use. *Am J Public Health*. 1994;84:998–1000
- McIntosh WD, Bazzini DG, Smith SM, et al. Who smokes in Hollywood? Characteristics of smokers in popular films from 1940 to 1989. *Addict Behav*. 1998;23:395–398
- Mekemson C, Glik D, Titus K, et al. Tobacco use in popular movies during the past decade. *Tob Control*. 2004;13:400–402
- Roberts D, Henriksen L, Christenson P. *Substance Use in Popular Movies and Music*. Rockville, MD: Office of National Drug Control Policy and Department of Health and Human Services Substance Abuse and Mental Health Services Administration; 1999.
- Dalton MA, Sargent JD, Beach ML, et al. Positive and negative outcome expectations of smoking: implications for prevention. *Prev Med*. 1999;29:460–465
- Omidvari K, Lessnau K, Kim J, et al. Smoking in contemporary American cinema. *Chest*. 2005;128:746–754
- Polansky J, Glantz S. *First-Run Smoking Presentations in U.S. Movies, 1999–2003*. San Francisco, CA: Center for Tobacco Control Research and Education; 2004
- Healton CG, Watson-Stryker ES, Allen JA, et al. Televised movie trailers: undermining restrictions on advertising tobacco to youth. *Arch Pediatr Adolesc Med*. 2006;160:885–888
- Glantz SA. SmokeFreeMovies homepage. Available at: <http://smokefreemovies.ucsf.edu>. Accessed October 27, 2005
- Dalton MA, Adachi-Mejia AM, Longacre MR, et al. Parental rules and monitoring of children's movie viewing associated with children's risk for smoking and drinking. *Pediatrics*. 2006;118:1932–1942

### APPENDIX 1 Demographic Characteristics for 6522 Adolescents Aged 10 to 14 Years in the Baseline Survey Compared With US 2000 Census

Data	Baseline Sample %		US Census %
	Unweighted	Weighted	
Age, y			
10	18	21	21
11	20	20	20
12	21	20	20
13	21	20	19
14	20	19	20
Gender			
Male	49	49	49
Female	51	51	51
Race			
White	66	65	70
Black	11	15	15
Asia/Pacific Islander	2	2	4
American Indian	1	1	1
Other	20	17	10
Ethnicity			
Hispanic	19	16	15
Non-Hispanic	81	84	85
Census region			
Northeast	18	18	19
Midwest	24	22	23
South	34	36	35
West	24	24	23
Household income, \$1000s			
≤10	8	6	7
10–20	10	10	9
20–30	12	11	10
30–50	21	23	21
50–75	19	22	23
>75	30	28	30

**APPENDIX 2 High-Profile Actors, Their Movies, and Smoking Characters**

Actor Name	Movie	Smoking Character
Stanley, Florence	<i>Atlantis: The Lost Empire</i>	Mrs Packard
Hawkes, John	<i>I Still Know What You Did Last Summer</i> <i>The Perfect Storm</i> <i>Hardball</i>	Dave Michael "Bugsy" Moran Ticky Tobin
Avari, Erick	<i>Mr Deeds</i> <i>Master of Disguise, The</i>	Cecil Anderson Cigar Maker
McKellan, Ian	<i>Lord of the Rings: The Fellowship of the Ring, The</i>	Gandalf
De Niro, Robert	<i>Ronin</i> <i>Adventures of Rocky &amp; Bullwinkle, The</i> <i>Men of Honor</i> <i>15 Minutes</i>	Sam Fearless Leader Billy Sunday Eddie Flemming
Gibson, Mel	<i>What Women Want</i> <i>Payback</i> <i>We Were Soldiers</i>	Nick Marshall Porter Lt Col Hal Moore
Borgnine, Ernest	<i>Small Soldiers</i>	Kip Killagin
Reeves, Keanu	<i>Hardball</i>	Conor O'Neill
Pitt, Brad	<i>Fight Club</i> <i>Snatch</i> <i>Ocean's Eleven</i>	Tyler Durden Mickey O'Neill Rusty Ryan
Dahn, Werner	<i>XXX</i>	Kirill
Close, Glenn	<i>102 Dalmatians</i>	Cruella De Vil
Branagh, Kenneth	<i>Wild Wild West</i> <i>Road to El Dorado, The</i>	Dr Arliss Loveless Miguel
Gould, Elliott	<i>Ocean's Eleven</i>	Reuben Tishkoff
Reilly, John C	<i>Thin Red Line, The</i> <i>Perfect Storm, The</i> <i>Chicago</i> <i>Hours, The</i>	Sgt Storm Dale "Murph" Murphy Amos Hart Dan Brown
Hackman, Gene	<i>Behind Enemy Lines</i> <i>Replacements, The</i> <i>Royal Tenenbaums, The</i> <i>Heartbreakers</i>	Reigart Jimmy McGinty Royal Tenenbaum William B. Tensy
Fichtner, William	<i>Perfect Storm, The</i>	David "Sully" Sullivan
McDonald, Christopher	<i>Iron Giant, The</i>	Kent Mansley
Glover, Crispin	<i>Charlie's Angels</i>	Thin Man
Jackman, Hugh	<i>X-Men</i> <i>Swordfish</i> <i>Someone Like You...</i>	Logan/Wolverine Stanley Eddie Alden
Goldberg, Adam	<i>Saving Private Ryan</i> <i>EDTV</i> <i>Beautiful Mind, A</i>	Pvt Mellish John Sol
Ifans, Rhys	<i>Notting Hill</i>	Spike
Voight, John	<i>Replacements, The</i> <i>Pearl Harbor</i> <i>Ali</i> <i>Holes</i>	Nigel Gruff President Roosevelt Howard Cosell Mr Sir
Kline, Kevin	<i>Wild Wild West</i> <i>Wild Wild West</i> <i>Road to El Dorado, The</i> <i>Orange County</i>	Artemus Gordon President Grant Tulio Marcus Skinner
Mortensen, Viggo	<i>Lord of the Rings: The Fellowship of the Ring, The</i>	Aragorn
Carrey, Jim	<i>Man on the Moon</i> <i>Me, Myself &amp; Irene</i> <i>Me, Myself &amp; Irene</i>	Tony Clifton 1 Charlie Hank
McBride, Chi	<i>Gone in Sixty Seconds</i> <i>Undercover Brother</i> <i>Cradle 2 the Grave</i>	Donny Astricky The Chief Jump Chambers
Reedus, Norman	<i>Blade II</i>	Scut
Washington, Denzel	<i>Fallen</i> <i>Siege, The</i> <i>Training Day</i>	John Hobbes Anthony Hubbard Alonzo

(continued)

**APPENDIX 2 (Continued)**

Actor Name	Movie	Smoking Character
Hopkins, Anthony	<i>Mask of Zorro, The</i>	Zorro/Don Diegode la Vega
	<i>Hannibal</i>	Hannibal Lecter
	<i>Hearts in Atlantis</i>	Ted Brautigam
Cage, Nicolas	<i>Snake Eyes</i>	Rick Santoro
	<i>City of Angels</i>	Seth
	<i>8mm</i>	Tom Welles
	<i>Bringing out the Dead</i>	Frank Pierce
	<i>Windtalkers</i>	Joe Enders
	<i>Family Man, The</i>	Jack Campbell
	<i>Captain Corelli's Mandolin</i>	Captain Antonio Corelli

# Exposure to Movie Smoking Among US Adolescents Aged 10 to 14 Years: A Population Estimate

James D. Sargent, Susanne E. Tanski and Jennifer Gibson

*Pediatrics* 2007;119:e1167-e1176

DOI: 10.1542/peds.2006-2897

<b>Updated Information &amp; Services</b>	including high-resolution figures, can be found at: <a href="http://www.pediatrics.org/cgi/content/full/119/5/e1167">http://www.pediatrics.org/cgi/content/full/119/5/e1167</a>
<b>References</b>	This article cites 17 articles, 9 of which you can access for free at: <a href="http://www.pediatrics.org/cgi/content/full/119/5/e1167#BIBL">http://www.pediatrics.org/cgi/content/full/119/5/e1167#BIBL</a>
<b>Citations</b>	This article has been cited by 2 HighWire-hosted articles: <a href="http://www.pediatrics.org/cgi/content/full/119/5/e1167#otherarticles">http://www.pediatrics.org/cgi/content/full/119/5/e1167#otherarticles</a>
<b>Subspecialty Collections</b>	This article, along with others on similar topics, appears in the following collection(s): <b>Office Practice</b> <a href="http://www.pediatrics.org/cgi/collection/office_practice">http://www.pediatrics.org/cgi/collection/office_practice</a>
<b>Permissions &amp; Licensing</b>	Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at: <a href="http://www.pediatrics.org/misc/Permissions.shtml">http://www.pediatrics.org/misc/Permissions.shtml</a>
<b>Reprints</b>	Information about ordering reprints can be found online: <a href="http://www.pediatrics.org/misc/reprints.shtml">http://www.pediatrics.org/misc/reprints.shtml</a>

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

