

# Preventing Tobacco Use Among Youth and Young Adults

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## Chapter 4. Social, Environmental, Cognitive, and Genetic Influences on the Use of Tobacco Among Youth

1. Given their developmental stage, adolescents and young adults are uniquely susceptible to social and environmental influences to use tobacco.
2. Socioeconomic factors and educational attainment influence the development of youth smoking behavior. The adolescents most likely to begin to use tobacco and progress to regular use are those who have lower academic achievement.
3. The evidence is sufficient to conclude that there is a causal relationship between peer group social influences and the initiation and maintenance of smoking behaviors during adolescence.
4. Affective processes play an important role in youth smoking behavior, with a strong association between youth smoking and negative affect.
5. The evidence is suggestive that tobacco use is a heritable trait, more so for regular use than for onset. The expression of genetic risk for smoking among young people may be moderated by small-group and larger social-environmental factors.

## Chapter 5. The Tobacco Industry's Influences on the Use of Tobacco Among Youth

1. In 2008, tobacco companies spent \$9.94 billion on the marketing of cigarettes and \$547 million on the marketing of smokeless tobacco. Spending on cigarette marketing is 48% higher than in 1998, the year of the Master Settlement Agreement. Expenditures for marketing smokeless tobacco are 277% higher than in 1998.
2. Tobacco company expenditures have become increasingly concentrated on marketing efforts that reduce the prices of targeted tobacco products. Such expenditures accounted for approximately 84% of cigarette

marketing and more than 77% of the marketing of smokeless tobacco products in 2008.

3. The evidence is sufficient to conclude that there is a causal relationship between advertising and promotional efforts of the tobacco companies and the initiation and progression of tobacco use among young people.
4. The evidence is suggestive but not sufficient to conclude that tobacco companies have changed the packaging and design of their products in ways that have increased these products' appeal to adolescents and young adults.
5. The tobacco companies' activities and programs for the prevention of youth smoking have not demonstrated an impact on the initiation or prevalence of smoking among young people.
6. The evidence is sufficient to conclude that there is a causal relationship between depictions of smoking in the movies and the initiation of smoking among young people.

## Chapter 6. Efforts to Prevent and Reduce Tobacco Use Among Young People

1. The evidence is sufficient to conclude that mass media campaigns, comprehensive community programs, and comprehensive statewide tobacco control programs can prevent the initiation of tobacco use and reduce its prevalence among youth.
2. The evidence is sufficient to conclude that increases in cigarette prices reduce the initiation, prevalence, and intensity of smoking among youth and young adults.
3. The evidence is sufficient to conclude that school-based programs with evidence of effectiveness, containing specific components, can produce at least short-term effects and reduce the prevalence of tobacco use among school-aged youth.

11–17-year-olds annually, with a total of 180,000 teens being surveyed between 1999 and 2007 (Philip Morris USA 2008b). Although tobacco companies assert that there is a “firewall” between the research done for the

department concerned with preventing smoking by youth and their cigarette marketing efforts, Philip Morris has acknowledged that it rotates employees through both departments (Tobacco on Trial 2005).

## Images of Smoking in the Entertainment Media and the Development of Identity

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This section addresses the impact of images of smoking in the entertainment media—primarily movies—which have been the focus of most of the research in this area. Much of that research involves the impact of depictions of smoking in movies on the uptake of tobacco by adolescents. As described below, from the 1920s to 1989 the tobacco industry entered into a variety of financial arrangements to tie smoking to movies (Mekemson and Glantz 2002). Movies receive greater First Amendment protection than commercial speech such as advertising and promotional materials. Indeed, some argue that tobacco control initiatives should not meddle with movie-makers' intentions to depict the realities of life, including smoking (Chapman 2009). Others argue that the movies to which adolescents are drawn often have nothing to do with reality (e.g., *Avatar*) and that movies are not simply art: they are products created by the entertainment industry to be sold to specific audiences. The rating of the film is part of the marketing effort for the film and the desired rating is generally decided before the film is made so overall content, language, sexual content, and violence can be calibrated to secure the desired rating. Nearly one-half (44%) of top-grossing films in the United States between 2005 and 2010 were rated PG-13, making them easily accessible to youth over the age of 13 years (Nash Information Service LLC 2011). The decision to include smoking in movies ultimately rests with the people who create the movies and the studios that pay for their production and distribution; any effort to affect when

smoking is portrayed in movies and other entertainment media is logically focused on the production studios rather than on the tobacco industry.

Images of smoking in the entertainment media are a potentially powerful socializing force among adolescents, in part because they are communicated by people who are identified by youth as media stars (Bandura 1977, 1986). Adolescents actively rely on external information as they seek to shape their own identities, often looking to media stars as models of what to wear and what to do. Adolescents today are highly exposed to entertainment media, which—because they present smoking in the context of a story rather than as a commercial presentation—tend to dispel the skepticism that would attend a commercial presentation. The suspension of disbelief that occurs in viewing entertainment media, and the fact that the message is conveyed by an influential figure, provides a theoretical underpinning for an effect of entertainment media on smoking during adolescence a strong one (Bandura 1977, 1986). More important, because some image advertising has been curtailed by the Master Settlement Agreement, entertainment media are among the few remaining channels for transmission of aspirational images of smoking to large audiences (Kline 2000).

The next section builds on the work of the 2008 NCI monograph, *The Role of the Media in Promoting and Discouraging Tobacco Use* (NCI 2008). Chapter 10 of that work summarizes research (up to 2006) that links depictions of smoking in movies with adolescent smoking.

## Images of Smoking in Movies and Adolescent Smoking

### Historical Links Between the Tobacco Companies and the Movie Industry

It is generally assumed that smoking was common in early movies, but in fact few content analyses exist for that era. One published study assessed 20 silent movies for episodes of tobacco use and found they occurred at a mean rate of 23.3 per hour (St. Romain et al. 2007). Indeed, the movie industry was viewed as an opportunity for advertising as far back as the nickelodeon era, when movies were silent, cost only a nickel, and ad slides played between reels. By the late 1920s, the tobacco industry considered the male market for cigarettes to be mature and began to position cigarettes in advertising as a way for a man to strike up a conversation with a woman and as a method of weight control for women (e.g., the “Reach for a Lucky Instead of a Sweet” campaign); research has correlated the emergence of these ads with the dramatic rise in smoking among women during the 1930s and 1940s (Pierce and Gilpin 1995). Edward L. Bernays, the architect of many of these marketing campaigns, recognized the “power of film to shape consumer expectations” (Brandt 2007, p. 86). In the 1930s and 1940s, movies frequently showed a lead male actor using cigarettes to engage a lead female actress in conversation (Figure 5.7A, a still from *To Have and Have Not*

**Figure 5.7 Actor engaging an actress with a cigarette**

A. Humphrey Bogart lighting a cigarette for Lauren Bacall in *To Have and Have Not*



B. Print advertisement showing Humphrey Bogart and Lauren Bacall engaged over tobacco



Source: Figure 5.7A. mptvimages.com 2011. Reprinted with permission from mptvimages. Figure 5.7B. *Life* September 1951.

*Not*). Note the similarity between the Humphrey Bogart/Lauren Bacall scene and Figure 5.7B, a cigarette ad from that period. Lum and colleagues (2008) found evidence of commercial relationships between the tobacco and movie industries in tobacco documents dating from as early as 1929. FTC investigations in 1930 ended this practice, and the tobacco and motion picture industries turned to cross-promotion arrangements (termed “tie-ins”), in which endorsements of cigarette brands by movie stars were used to advertise those brands and garner publicity for newly released movies. Figure 5.8 shows a tie-in ad in which film star Spencer Tracy endorses Lucky Strikes and pitches the MGM production *Test Pilot*.

Placement of products in movies, including tobacco, became an integral part of film production with the advent

**Figure 5.8** “SHOUT, Mr. Tracy!”: actor enjoying a cigarette



Source: American Tobacco Company 1938.

of product placement agencies in the late 1970s (Mekemson and Glantz 2002; Segrave 2004). For example, a 1987 sales pitch by Liggett & Myers promoted the movie *Eight Men Out* as follows: “... based on its story, cast and subject matter, this film will appeal to young audiences.... Billboard sponsorship provides an opportunity to deliver subtle but powerful institutional and product messages to a young group, still in its stages of forming purchasing habits” (Breidenbach 1987, Bates No. 91753669/3670, p. 1).

Evidence from tobacco company documents has provided confirmation of a commercial relationship between the tobacco industry and film studios that began in the 1920s and lasted until it waned in the 1950s, the era when advertising dollars began flowing away from movies and into television (Lum et al. 2008). There was a resurgence of tobacco product placement in the movies

during the 1970s after cigarette advertising was banned on television (Mekemson and Glantz 2002). Some evidence suggests that some companies sought to provide financial backing to movies as “trademark diversification” but with the demonstrated intent of incentivizing tobacco use in movies (LeGresley et al. 2006).

## Evidence for the Presence of Tobacco Use in Movies: Content Analysis

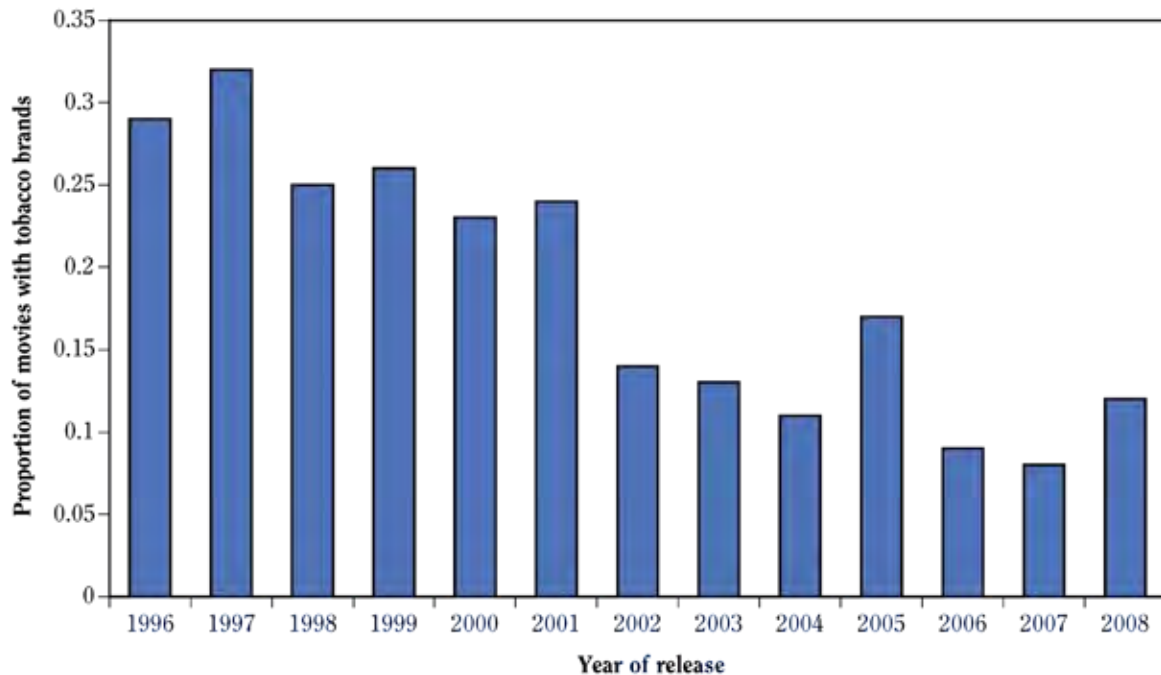
Content analysis is the process by which information about a certain topic is systematically coded by watching or listening to the media source. Typically, the content is determined through a set of rules. The best analyses employ two or more coders and examine inter-rater reliability for an overlapping subset of content to validate the process. Over the years, there have been many content analyses of depictions of smoking in movies. A review conducted by NCI (2008), which summarized the results of 14 content-coding studies, concluded that cigarette and cigar smoking is pervasive in movies but use of smokeless tobacco is not, and it found that identifiable cigarette brands appeared in about one-third of movies released during the 1990s. It also concluded that (1) the prevalence of smoking among contemporary movie characters is approximately 25%, about twice that of movies of the 1970s and 1980s; (2) smokers in movies differ from smokers in the general population, the former being more likely to be affluent and White; (3) the health consequences of smoking are rarely depicted in movies; and (4) smoking in the movies is not related to box office success. Studies of trends in movie content published since 2005 (summarized in Table 5.12) show declines in depictions of movie smoking since the Master Settlement Agreement.

## Tobacco Use in Movies

### Product Placement

In a section titled “Prohibition on Payments Related to Tobacco Products and Media,” the Master Settlement Agreement prohibits payments for branded product placement in motion pictures, television shows, theatrical productions, music performances, and video games (NAAG 1998a). This agreement is binding only on the domestic cigarette companies that signed the agreement, not on their international counterparts or companies outside the United States or nonparticipating domestic tobacco companies.

**Figure 5.9** Proportion of movies containing tobacco brand appearances in the top 100 box office hits released each year, 1996–2008



Source: Adapted from Worth et al. 2007.

Individual state attorneys general are responsible for enforcing these and other provisions of the agreement. The agreement is ambiguous, however, on whether the rules apply only to brand placement or to all product placement, including unbranded placements; the attorneys general have sought to enforce only branded placements. Other summaries (Appendix 10C of Chapter 10, NCI Monograph 19; NCI [2008]) have documented enforcement activity, in the form of letters sent from NAAG attorneys to lawyers representing tobacco corporations, asking them to confirm that no exchange of money occurred in return for a particular brand placement. Corporate attorneys representing the tobacco and movie studios have confirmed that no exchange took place. Recent trend studies suggest that enforcement has had the intended dampening effect on the placing of cigarette brands in movies.

Since the signing of the agreement, studies have reported declines in the placement of tobacco products in films (Adachi-Mejia et al. 2005; Worth et al. 2007; CDC 2010, 2011). Figure 5.9 shows the proportion of the top 100 box office hits containing an appearance of a tobacco brand for each year from 1996 through 2008; brands were present in almost 30% of movies at the beginning of the period (Sargent et al. 2001b) and in less than 10% in

2007, followed by a rise to about 12% in 2008. In 2010, the number of on-screen tobacco incidents in youth-rated (G, PG, or PG-13) movies continued a downward trend (CDC 2011).

## Depictions of Smoking

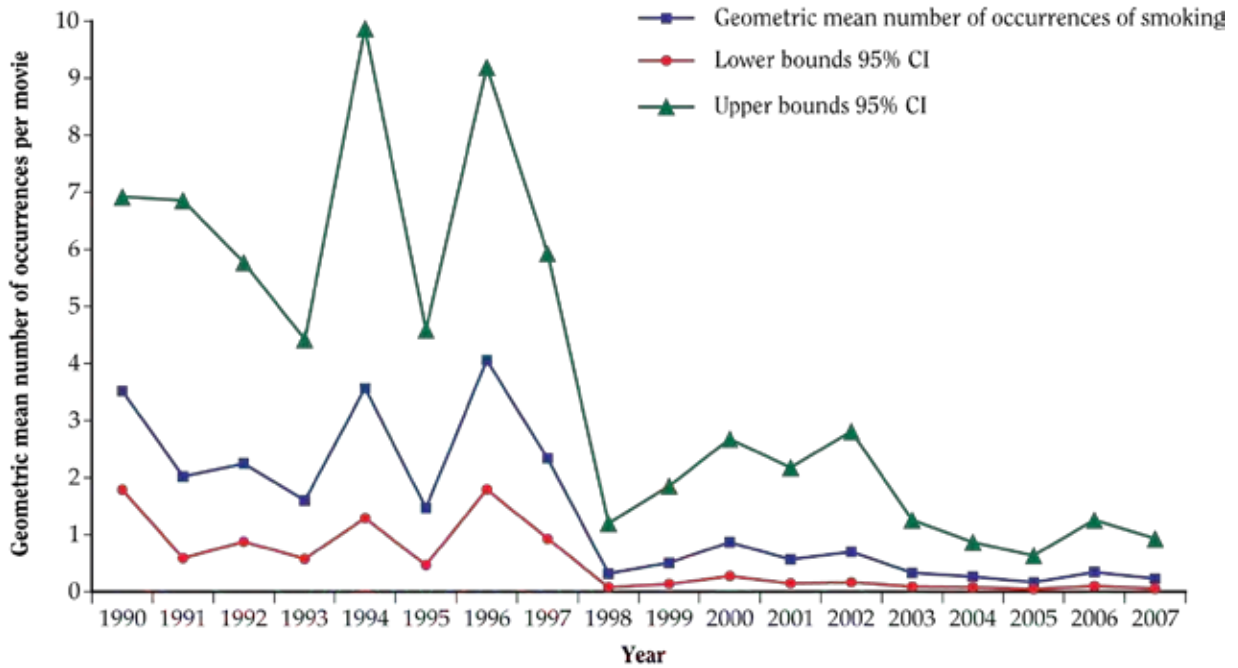
### Short-Term Contemporary Trends

Recent studies have examined trends for the unbranded depiction of smoking in the period surrounding the Master Settlement Agreement; these studies examined smoking grouped by movie and by movie character.

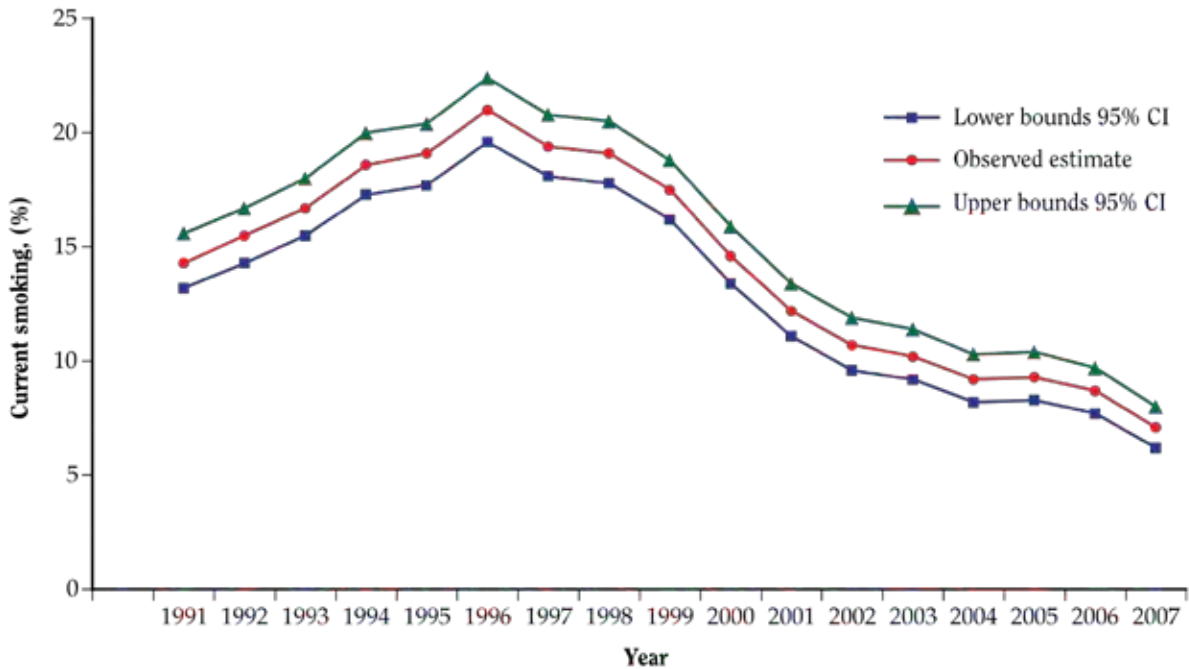
**The prevalence of smoking in movies.** Three recent studies of trends in movie smoking have found overall declines in that activity. Sargent and Heatherton (2009) compared trends for smoking in the top 25 box office hits each year from 1990 to 2007 with trends in youth smoking derived from the MTF survey. Figure 5.10, which is based on their work, illustrates parallel downward trends for movie smoking and adolescent smoking among eighth graders after 1996. The authors stated, “Movie smoking represents only one of several factors that contribute to youth smoking trends.... Nonetheless, the downward

Figure 5.10 (A) Occurrences of smoking in highest-grossing movies, 1990–2007, and (B) smoking among eighth graders, 1991–2007, in the United States

A. Top 25 box office hits per year



B. 99% confidence limits: 30-day prevalence of cigarette use, eighth graders, 1991–2007, MTF



Source: Adapted from Sargent and Heatherton 2009 with permission from the American Medical Association, © 2009.  
 Note: Trends for the geometric mean for the number of smoking occurrences in the 25 movies with the highest U.S. box office gross revenues released each year between 1990 and 2007 (lines below and above the middle line indicate 95% CI) and current (past 30-day) smoking among eighth graders from the MTF for each year between 1991 and 2007 (lines below and above the middle line indicate 95% CI). CI = confidence interval; MTF = Monitoring the Future.

trend in movie smoking is consistent with an influence on downward trends in adolescent smoking” (p. 2212). A second content analysis examined trends by motion picture rating (Worth et al. 2007), which is important because adolescents get more exposure to movies that are rated for youth (Sargent et al. 2007b). Overall, the percentage of the top 100 box office hits that depicted smoking declined from 91% in 1996 to 63% in 2005. Despite this observed decline of almost one-third among the top 100 hits, the number of “tobacco episodes” in youth-rated movies actually increased by 27% over the period because a larger percentage of the movies were youth rated toward the end of the period (due to “ratings creep”). A third analysis looked at trends for smoking in the top 15 United Kingdom box office hits (Lyons et al. 2010) from 1989 through 2008, a sample that contained a greater number of films produced in the United Kingdom than in the United States samples, resulting in an overall downward trend from a mean of six 5-minute intervals per hour that contained smoking images to less than one per hour in 2008.

**The prevalence of smoking at the level of the character.** Using the level of the movie character for content analysis allows for a comparison with the prevalence of smoking in the population. Four studies have found the prevalence of smoking among characters in movies to be similar to population prevalence (Dalton et al. 2002b; McIntosh et al. 2005; Omidvari et al. 2005; Worth et al. 2006). Worth and colleagues (2006) found that the prevalence of smoking declined significantly among adult characters in the top 100 box office hits over a 9-year period, from 1996 through 2004, and that the prevalence of smoking was equivalent to that among U.S. adults over that time period.

The sociodemographics of smokers in movies have been examined by many researchers; studies show that smokers tend to be White, male, and affluent and thus not representative of smokers in society (Hazan et al. 1994; Dalton et al. 2002b; Worth et al. 2007). The result is that the images of smoking in movies are more similar to the images in cigarette advertising—wealth and power—than to the realities of smoking, which is increasingly associated with lower socioeconomic status and powerlessness. This phenomenon is due to the demographics of movie characters overall, not a biased selection of who smokes in movies. The most conspicuous example of this type of bias is in gender: the majority of “character smokers” in movies are male because 70% of movie characters are male.

### **Long-Term Trends**

Several studies regarding trends in the portrayal of tobacco use in U.S. films since 1950 are inconsistent. Two

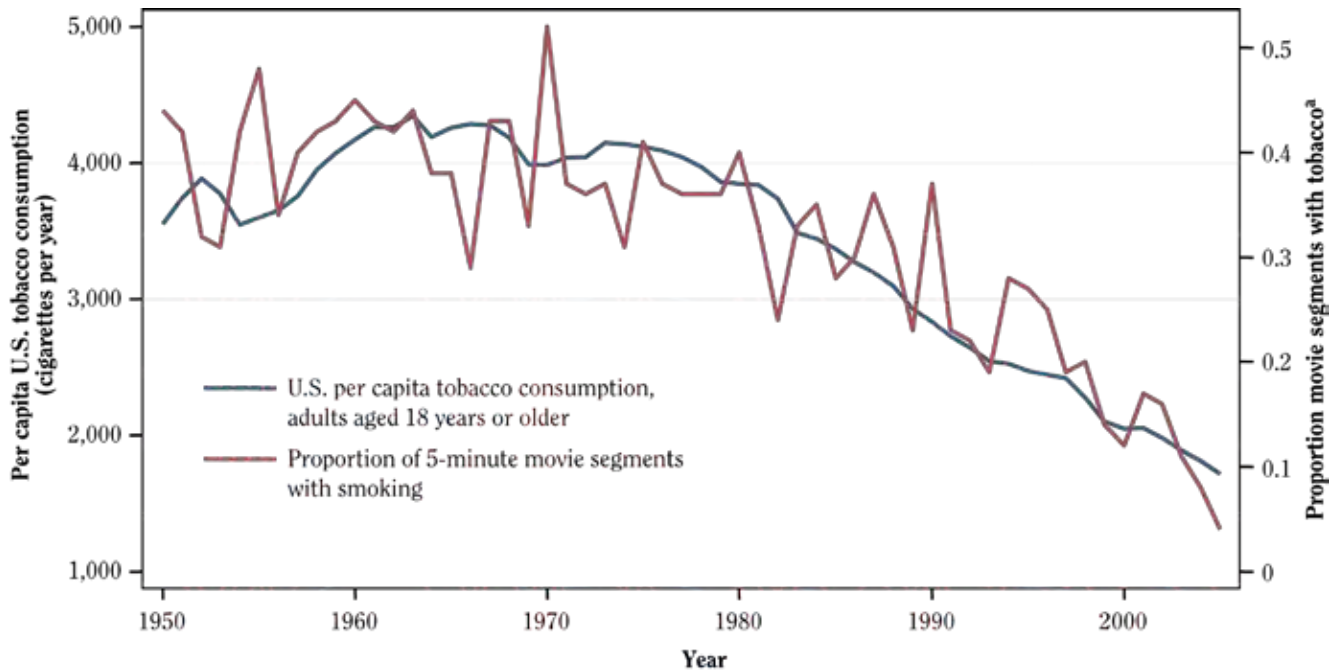
studies (Stockwell and Glantz 1997; Glantz et al. 2004) found that the number of smoking incidents per hour declined from 10.7% in the 1950s to 4.9% in the early 1980s, but increased to a high of 10.9% in 2002. Several other studies found little or no change in the frequency of tobacco movie portrayal in the 1980s and 1990s (Hazan et al. 1994; Everett et al. 1998; Dalton et al. 2002b; Titus et al. 2009). Other studies reported downward trends in the number of smoking incidents in movies during the 1990s (Mekemson et al. 2004; Worth et al. 2006; Sargent and Heatherton 2009). One study (Jamieson and Romer 2010) sought to overcome these inconsistencies by using a common sampling frame and methodology. The authors performed a content analysis of 15 movies randomly selected from the top 30 box office hits each year from 1950 through 2006 ( $n = 855$  movies) and coded each film in 5-minute segments to determine total tobacco-related content and main character tobacco use. The results showed a steady and considerable decline in tobacco content of movies since 1950, with total tobacco-related content peaking around 1961. The study also concluded that the decline in tobacco use by main characters was already under way in 1950 and continued to decline.

CDC published two long-term content analyses of smoking in the movies (CDC 2010, 2011) in which the sampling frame was all motion pictures that were in the top 10 films for box office receipts for at least 1 week. This was done in cooperation with the Thumbs Up! Thumbs Down! (TUTD) Project of Breathe California-Sacramento Emigrant Trails. This sample counted all tobacco incidents among the 10 top-grossing movies in any calendar week. During 2002–2008, U.S. movies that ranked in the top 10 for at least 1 week accounted for 83% of all movies exhibited in the United States and 96% of ticket sales. For this analysis, TUTD defined a tobacco incident as the use or implied use of a tobacco product by an actor. The number of movies without tobacco incidents was divided by the total number of movies to calculate the percentage of movies with no incidents, and the average number of tobacco incidents per movie was calculated for each motion picture company.

Figure 5.11 shows the results of this analysis by film rating. Using this approach, the total number of tobacco incidents in all top-grossing films has been declining since 2005. Despite this decline, there is still a substantial amount of smoking in youth-rated (G, PG, PG-13) movies. Thus, while there are some differences in results among studies using different approaches for measuring the level of onscreen smoking in films, all available studies show a decline in the level of exposure since at least 2005.



**Figure 5.11 Comparison of the trend for proportion of 5-minute movie segments with tobacco (means for 15 of the top 30 box office hits from 1950 to 2005) and per capita cigarette consumption among adults, 1950–2005, in the United States**



Source: Adapted from Jamieson et al. 2008 by permission of Oxford University Press, Fig. 4.4, p. 113 of *The Changing Portrayal of Adolescents in the Media Since 1950*.

Note: Mean for the percentage of film segments containing tobacco use in the top 30 U.S. films (right axis) and U.S. per capita consumption of tobacco for adults aged 18 years or older (left axis).

<sup>a</sup>Mean for the proportion of 5-minute movie segments that contain tobacco.

### Varying Responses by Media Company

Beginning in 2004, three motion picture companies adopted and began to enforce written policies designed to reduce the amount of smoking in their films: Disney in October 2004, Time Warner in July 2005 (updated in July 2007), and Universal (then part of General Electric and since purchased by Comcast) in April 2007. These policies provided for review of scripts, story boards, daily footage, rough cuts, and the final edited film by managers in each studio with the authority to implement the policies. Although these companies have almost entirely eliminated depictions of tobacco use from their G, PG, and PG-13 movies, as of June 2011 none of the three companies had zero depictions of smoking or other tobacco imagery in the youth-rated films that they produced or distributed.

From 2005 to 2010, among these three major motion picture companies (one-half of the six members

of the Motion Picture Association of America [MPAA]), the number of tobacco incidents per youth-rated movie decreased 95.8% from an average of 23.1 incidents per movie to an average of 1.0 incidents (CDC 2010). For independent companies that are not MPAA members and the three MPAA members with no antitobacco policies, tobacco incidents decreased 41.7%, from an average of 17.9 incidents per youth-rated movie in 2005 to 10.4 incidents in 2010. Among the three companies with anti-tobacco policies, 88.2% of their top-grossing youth-rated movies were free of tobacco incidents, compared with 57.4% of youth-rated movies among companies without policies (Viacom, News Corp, Sony, and the independent producers) (CDC 2011).

While the policies voluntarily adopted during 2004–2007 by the three major motion picture companies (Disney, Time Warner, Universal) have excluded nearly all tobacco incidents from their top-grossing youth-rated movies, none of the three company policies completely

banned smoking or other tobacco imagery in the youth-rated films they produced or distributed (CDC 2011). Given the continuing varying performance among motion picture companies in reducing tobacco imagery in youth-rated films, WHO (2009) and numerous public health and health professional organizations have recommended giving movies with tobacco incidents an R rating, with exceptions: those that portray a historical figure who smoked and those that portray the negative effects of tobacco use (CDC 2011).

### **Tobacco Use in Movie Trailers**

Depictions of smoking in movie trailers have important implications for exposure as the trailers are aired on television and may be seen by a wider audience than the movie itself. One study combined a content analysis of trailers with Nielsen data measuring media exposure among 12- to 17-year-olds (Healton et al. 2006); of all 216 movie trailers shown on television in a single year (2001–2002), 14.4% included images of tobacco use. Nielsen data indicated that during that year 95% of all U.S. youth aged 12–17 years saw at least one movie trailer on television depicting the use of tobacco, and 88.8% saw at least one of these trailers three or more times. Over the course of that year, movie trailers showing tobacco use were seen 270 million times by youth aged 12–17 years. One experimental study found that smoking by a character in a film trailer was associated with increased perceptions of that character's attractiveness among adolescent smokers (Hanewinkel 2009).

It has been noted that even if stronger policies were adopted banning smoking or other tobacco imagery in youth-rated movies, such policies would not affect youth exposures to older movies that have already been released and are available as downloads, rentals, and on television (CDC 2011). Also, evidence indicates that youth view some R-rated movies (Sargent 2007b). Therefore, antitobacco ads have been recommended for showing before movies that depict smoking (USDHHS 2010).

## **Summary**

Recent content analyses of tobacco use in movies have documented a general decline in the appearance of tobacco brands and in depictions of tobacco use overall, especially since 2005 (Table 5.12). These trends suggest that the movie industry is responding to research and heightened attention to the issue applied by the public health community and the state attorneys general.

While these declines demonstrate the practicality of enacting policies to reduce tobacco incidents in youth-

rated movies, it has been recommended that expanding the R rating to include movies with smoking could further reduce exposures of young persons to onscreen tobacco incidents (CDC 2011).

## **Exposure to Tobacco Use in Movies**

### **Assessment of Exposure**

Assessment of exposure to components of movies is challenging in ways similar to assessment of exposure to advertising. A recent article (Sargent et al. 2008) contrasts various methods and lists their advantages and disadvantages. The recall method (Goldberg and Baumgartner 2002) involves simply asking subjects how often they watch movies or how much they notice smoking in movies. This method is subject to recall bias; for example, a subject who smokes may pay more attention to smoking scenes. A second method involves assessing the relation between the smoking status of an adolescent's favorite movie star and the youth's own smoking status (Distefan et al. 1999). In this approach, adolescents are asked to name their favorite male and female movie stars. The smoking status of these stars is then assessed within a contemporary sample frame of movies, and this information is compared with the smoking status of the adolescent. This method has the advantage of assessing exposure to movie smoking in a way that is highly relevant to the individual, but it does not take into account that adolescents observe smoking by actors other than their favorites.

A third method determines which movies adolescents have watched and assesses these movies for tobacco exposures. This method requires adolescents to recognize a movie title when it is presented and recall whether they have seen the movie. Positive responses from participants are combined with content analysis to estimate exposure to portrayals of movie smoking. Clearly, it is not possible to ask every respondent about all available movies, and researchers have addressed this limitation in two ways. Some researchers choose a list of 40 or 50 contemporary movies with varying amounts of smoking and survey all respondents about all those specific films (Thrasher et al. 2008). This approach is easy to implement, but the conclusions apply only to the set of movies surveyed. A different approach, using the Beach method (Sargent et al. 2008), analyzes a large sample (500–600) of box office hits and then surveys each respondent about a randomly selected subsample of titles. The random subsample allows researchers to estimate exposure of the population to a relatively large sample of hits rather than limiting estimates to a specific subset of movies.

**Table 5.12 Content analyses of movies in studies published since 2005**

Study	Movie sample frame	Interrater reliability	Unit of analysis	Outcome variable	Results	Comments
Adachi-Mejia et al. 2005	Top 100 box office hits per year 1996–2003	Not reported	Movie	Number with appearances of tobacco brands, by year OR for appearance of a tobacco brand before vs. after Master Settlement Agreement	Brand appearances dropped from 20.8% of movies before Master Settlement Agreement to 10.5% afterward, OR = 0.45 (95% CI = 0.29–0.68)	Interrater reliabilities on this content analysis available through authors
Healton et al. 2006	All movie trailers shown on television August 1, 2001, to July 31, 2002	All smoking verified by two coders and differences resolved	Movie trailer (N = 216)	Percentage of trailers containing smoking Gross impressions for smoking in trailers among youth aged 12–17 years	Tobacco appeared in 14.4% (31) of trailers 270 million gross impressions were delivered to youth by the trailers	
Worth et al. 2006	Top 100 box office hits per year 1996–2004	Agreement = 99.6% for character smoking status	Major character smoking status	Smoking prevalence among adult major smoking characters	Smoking prevalence declined from 25.7% in 1996 to 18.4% in 2004, equivalent to declines in smoking among U.S. adults	
Worth et al. 2007	Top 100 box office hits per year 1996–2005	Mean for coder agreement on whether character tobacco use was occurring in 1-second intervals = 0.86 (SD = 0.17)	Tobacco episodes (handling or use of tobacco by a movie character) analyzed at the level of the movie and at the aggregate level for the top 100 box office hits each year	Percentage of movies with smoking, by movie rating Number of tobacco episodes for top 100 box office hits, by year and rating	Percentage of movies with smoking declined from 91% to 63% over study period Overall, the number of tobacco episodes declined from 650 to 400 There was an increase in tobacco episodes delivered by youth-rated movies (because a larger share of movies received youth ratings)	
Jamieson et al. 2008; Jamieson and Romer 2010	15 of the 30 top box office hits (random selection), each year 1950–2004	Krippendorff's alpha = 0.78 for tobacco	Unit of coding was the 5-minute interval (any tobacco present? yes vs. no) The unit of analysis was the percentage of 5-minute intervals containing any reference to tobacco	The outcome reported was the mean for the percentage of intervals containing any tobacco for all movies in each 5-year window	There was a continuous decline in the proportion of 5-minute intervals that contained smoking over the entire time period	

**Table 5.12 Continued**

Study	Movie sample frame	Interrater reliability	Unit of analysis	Outcome variable	Results	Comments
Sargent and Heatherton 2009	Top 25 box office hits 1990–2007	Interrater correlation = 0.96	A smoking occurrence was counted whenever a movie character handled or used tobacco or when tobacco use was depicted in the background Only tobacco use was coded (>90% was cigarette or cigar smoking)	Geometric mean, number of episodes per movie, by year of release	Geometric mean for movie smoking occurrences was 3.5 (95% CI = 1.8–6.9) in 1990 and 0.23 (95% CI = 0.06–0.93) in 2007 Trend analysis indicated that geometric mean for movie smoking declined by an average of 0.84 smoking occurrences (95% CI = 0.80–0.89) per year between 1990 and 2007	Downward trend in smoking among 8th graders also documented during this period
Lyons et al. 2010	Top 15 most commercially successful films United Kingdom 1989–2008	No interrater reliability reported	Unit of coding was the 5-minute interval (following categories counted separately: consumption of any tobacco product by any character, tobacco paraphernalia, inferred tobacco use, and brand appearances)	Proportion of movies with smoking, by rating Mean number of 5-minute intervals per hour	The mean rate of occurrence of tobacco intervals fell substantially and significantly ( $p < 0.05$ ) for all categories of tobacco use between 1989 and 2008, from 3.5 to 0.6 per hour; similar trends occurred for all categories of tobacco interval	The proportion of U.K. films with brand appearances (0.36) was much higher than the rate overall (0.09) and for U.S. films (0.20)

Note: **CI** = confidence interval; **OR** = odds ratio; **SD** = standard deviation; **U.K.** = United Kingdom; **U.S.** = United States.

## Total Exposures to Smoking in Movies

The exposure studies described in this section document the fact that movies overall deliver billions of smoking impressions to adolescents and conclude that how movies are rated affects these exposures. Three research groups have independently developed estimates for the exposure of adolescents to smoking contained in movies themselves, with convergent results. (Note that all three studies underestimated total exposure because they did not account for multiple DVD viewings of a given film.) Sargent and colleagues (2007b) surveyed 6,522 nationally representative U.S. adolescents aged 10–14 years in 2003; using the Beach method, they analyzed the content of 534 contemporary box office hits for smoking and assigned each movie to a random subsample of adolescents (on average, 613 adolescents per movie) who were asked whether they had seen it. Using survey weights, the authors estimated the total number of U.S. adolescents who had seen each movie and then multiplied that figure by the number of depictions of smoking in each to obtain total smoking exposures seen by adolescents. (“Gross impressions” are the total number of exposures delivered by a media schedule, such as all showings of a given film.) As of the date of the survey in 2003, the 534 movies had delivered 13.9 billion gross smoking impressions, an average of 665 per U.S. adolescent aged 10–14 years. Most of the 534 movies were rated either PG-13 (41%) or R (40%), and 74% contained smoking (3,830 total occurrences of smoking). On average, a movie was seen by 25% of the adolescents surveyed, but viewership was significantly lower for R-rated movies. Although this sample’s youth-rated movies (G, PG, and PG-13) contained only 40% of smoking occurrences, they delivered 61% of smoking impressions to the targeted age group because of that group’s higher viewership of those movies. Most of the gross impressions of smoking delivered by youth-rated movies came from PG-13 movies. The Sargent study also grouped gross smoking impressions by movie and by actor. Some 30 popular movies each delivered more than 100 million gross smoking impressions, and 30 actors each delivered more than 50 million smoking impressions, such that just 1.5% of the 1,961 actors who played characters in these movies delivered one-quarter of all character smoking to the adolescent sample. Some popular actors did not smoke in any of the movies.

In the second study, Polansky and Glantz (2007) examined how many gross smoking impressions were delivered to adolescents from 1,306 movies (1998–2006) that earned \$500,000 or more at the box office. The estimated number of smoking occurrences was based on each movie’s MPAA rating and its tobacco rating (Screenit[2012], where parents rate movie smoking). Overall, the 1,306 movies delivered an estimated 44.5 billion gross

smoking impressions to audiences of all ages from 1999 to 2006, including 2.4 billion to children aged 6–11 years and 8.8 billion to youth aged 12–17 years. The study estimated that about one-half of impressions overall were delivered by youth-rated movies.

In the third study, Anderson and colleagues (2010) used a similar methodology to assess the exposure of British adolescents to smoking from 572 top-grossing films in the United Kingdom. They found higher exposure among British (than U.S.) adolescents resulting from higher exposure to movies with smoking that would have been rated R in the United States, but were rated as appropriate for youth in the United Kingdom. Because of the difference, British youth were exposed to 28% more movie smoking than were U.S. youth. These studies underline the large impact that decisions by ratings boards can make on the exposure of youth to smoking in movies; because fewer youth see adult-rated movies, a mandate by the ratings board to give movies with smoking an adult rating would greatly reduce the exposure of youth to smoking in those movies.

Further, it has been noted that almost all states offer movie producers subsidies in the form of tax credits or cash rebates to attract movie production to their states, totaling approximately \$1 billion annually (CDC 2011). Millet and associates (2011) have reported that the 15 states subsidizing top-grossing movies with tobacco incidents spent more on these productions in 2010 (\$288 million) than they budgeted for their state tobacco control programs in 2011 (\$280 million).

The conclusion of Chapter 5 of the 1994 Surgeon General’s report on smoking in young people emphasized the importance of the advertising of images in making use of cigarettes attractive to youth: “Cigarette advertising uses images rather than information to portray the attractiveness and function of smoking. Human models and cartoon characters in cigarette advertising convey independence, healthfulness, adventure-seeking, and youthful activities—themes correlated with psychosocial factors that appeal to young people” (USDHHS 1994, p. 195). Today, the delivery of billions of glamorized images of smoking by movie and television stars offers a stark contrast to the current landscape for tobacco advertising. Because some image-based tobacco advertising has been eliminated by the Master Settlement Agreement, images of smoking in movies and television may today be some of the more potent media-delivered smoking images seen by U.S. children and adolescents. The effect is compounded by the fact that many U.S. films are eventually released on television, DVD, or online, where they can reach an international audience. Thus, they have the potential to expose adolescents around the world to role models who smoke.

## Population-Based Research Linking Movie Smoking to Adolescent Smoking

### Cross-Sectional Studies Assessing Exposure to Movie Smoking and Smoking Among Young People

A number of cross-sectional studies have examined the association between movie smoking and adolescent smoking using a variety of approaches (Table 5.13) to assess measures of exposure: direct recall (Goldberg and Baumgartner 2002; Goldberg 2003; Henriksen et al. 2004b; McCool et al. 2005; Laugesen et al. 2007; Thompson and Gunther 2007); smoking status of favorite movie star (Distefan et al. 1999; Tickle et al. 2001; Dixon 2003); and cued recall (Sargent et al. 2001a, 2002, 2005; Hanewinkel and Sargent 2007; Thrasher et al. 2008). These cross-sectional studies assessed adolescents in Asia, Europe, Latin America, and the United States.

In these studies, the use of general recall measures resulted in weaker associations than did assessments of smoking by favorite movie star or methods that used cued recall of titles to assess exposure. The studies by Henriksen and colleagues (2004b) and Thompson and Gunther (2007) suggest that recall measures that assess the extent to which participants notice smoking in movies are unlikely to show a multivariate association with smoking. Figure 5.12 illustrates the strength and consistency of the results of cross-sectional studies of smoking onset that (1) employed cued recall of movie titles (results 1–4), (2) found adjusted ORs between 2 and 3 for high versus low exposure to movie smoking, and (3) achieved statistical significance for all estimates after controlling for a variety of potential confounders. Studies that used the participants' favorite movie stars showed significant associations between the star's smoking status and smoking among the youth who named a favorite movie star (Table 5.13). In summary, the results from cross-sectional studies are consistent with an association between exposure to smoking in movies and youth smoking.

### Longitudinal Studies Assessing Exposure to Movies

A literature search identified eight published longitudinal samples, six involving U.S. adolescents, one from Germany, and one from Mexico, that were used to assess exposure to smoking in movies (Table 5.13).

The first published study was a follow-up of a sample of northern New England adolescents in which Dalton and colleagues (2003) contacted 2,603 baseline never smokers by telephone and determined that exposure to smoking in

movies at baseline had a significant multivariate relationship with trying smoking over the 1- to 2-year follow-up period. When this sample was resurveyed as young adults, exposure to movie smoking during middle school was statistically associated with established smoking (>100 cigarettes lifetime). Another analysis of the same sample (Adachi-Mejia et al. 2009) found that the effect of movie smoking on established smoking was significantly stronger among those adolescents who were generally at lower risk for smoking because of their participation in team sports.

A 1-year follow-up study of never smokers in California (Distefan et al. 2004) found that adolescent girls choosing as a favorite movie star someone who had smoked in more than one movie in the 3 years preceding the survey were significantly more likely to try smoking in the follow-up period. In North Carolina, a school-based longitudinal study of a racially mixed sample of youth (Jackson et al. 2007) found that exposure to R-rated movies was associated with significantly elevated risk for trying smoking during the follow-up period for White but not Black adolescents. Having a television in the adolescent's bedroom was also a significant predictor, over and above the association with R-rated movies.

Sargent and colleagues (2007a) followed a nationally representative sample of 10- to 14-year-old adolescents at 8-month intervals for 24 months (four survey waves) and found that exposure to movie smoking at baseline predicted time to onset of established (>100 cigarettes lifetime) smoking in this cohort. In the same cohort, Tanski and colleagues (2009) found that exposure to movie smoking predicted onset of smoking among those who were never smokers at baseline and that smoking by movie characters predicted the onset of youth smoking regardless of whether the character was positively or negatively portrayed in the film.

Hanewinkel and Sargent (2008) followed 2,711 adolescents in Germany who had never smoked; after 1 year there was a significant association between exposure to movie smoking at baseline and onset of smoking. In addition, the authors reported a dose-response curve for the relation between a continuous measure of exposure to movie smoking and onset of smoking that was similar in shape to the dose-response curve for the Dalton cohort (Figure 5.13; Dalton et al. 2003). Both dose-response curves were curvilinear, with a flattening of the curves above the 75th percentile of exposure, indicating that the largest marginal effects occur at low, rather than high, levels of exposure.

Titus-Ernstoff and coworkers (2008) studied 2,627 New England fourth- and fifth-grade students and followed them up annually for 2 years; the authors assessed exposure to smoking in movies at baseline and in movies

**Table 5.13 Population-based studies assessing the relation between exposure to movie smoking and smoking among young people**

Study	Design	Measure of exposure	Categories of covariates used in adjustment <sup>a</sup>	Outcome (prevalence)	Exposure comparison categories	Measure of association, association (95% CI) <sup>b</sup>	Comments
Distefan et al. 1999	Multiethnic Aged 12–17 years Cross-sectional random-digit-dialing survey N = 6,252 (analysis performed on 3,510 never smokers) United States (California) 1996	Identified favorite movie stars of ever smokers (vs. never smokers)	S, P, SCH, SI, M	Susceptibility to smoking among never smokers (42%)	Adolescent never smokers choosing a favorite star typical of ever smokers vs. choosing a favorite star typical of other never smokers	AOR 1.35 (1.12–1.62)	Favorite actors and actresses were defined by the nominations of the subjects; study examined common only chosen actors/actresses; 52% of adolescents were excluded because they nominated a star chosen by fewer than 5 respondents

Table 5.13 Continued

Study	Design	Measure of exposure	Categories of covariates used in adjustment <sup>a</sup>	Outcome (prevalence)	Exposure comparison categories	Measure of association, association (95% CI) <sup>b</sup>	Comments
Sargent et al. 2001a, 2002, 2009a; Tickle et al. 2006	White Aged 10–15 years Cross-sectional school-based survey N = 4,919 (3,766 never smokers) United States (Northeast) 1999	Movie title recognition— Beach method 50 titles/survey 601 U.S. box office releases, 1989–1999	S, P, SCH, PS, SI, M	Tried smoking (17%)	Quartile of exposure to movie smoking: 1 2 3 4	AOR Reference 1.9 (1.3–2.7) 2.6 (1.8–3.7) 2.5 (1.7–3.5)  No association between exposure to movie smoking and higher levels of lifetime smoking	A cross-sectional structural equation model (Tickle et al. 2006) identified indirect paths from exposure to movie smoking to intentions to smoke through positive expectancies and identification as a smoker, but not through normative beliefs
				Lifetime smoking level among triers (n = 794): puffers (57%), 1–19 cigarettes (19%), 20–100 cigarettes (9.7%), > 100 cigarettes (13.8%)	Quartile of exposure to movie smoking: 1 2 3 4	AOR Reference 1.2 (0.9–1.5) 1.5 (1.1–1.9) 1.6 (1.2–2.1)	
				Among never smokers: susceptibility to smoking (20%)	Quartile of exposure to movie smoking: 1 2 3 4	APOR Reference 1.2 (1.0–1.5) 1.3 (1.1–1.6) 1.4 (1.1–1.7)	
				Positive expectancies (61% endorsed no positive expectancies)	Quartile of exposure to movie smoking: 1 2 3 4	APOR Reference 1.2 (1.0–1.5) 1.3 (1.1–1.6) 1.4 (1.1–1.7)	
				Views adult smoking as normative (55%)	Quartile of exposure to movie smoking: 1 2 3 4	AOR Reference 1.2 (0.9–1.4) 1.3 (1.1–1.6) 1.4 (1.1–1.7)	



Table 5.13 Continued

Study	Design	Measure of exposure	Categories of covariates used in adjustment <sup>a</sup>	Outcome (prevalence)	Exposure comparison categories	Measure of association, (95% CI) <sup>b</sup>	Comments
Tickle et al. 2001	White, low-income communities Aged 10–19 years Cross-sectional school-based survey N = 632 (281 never smokers) United States (New Hampshire, Vermont)	Movie character smoking status of favorite star averaged for films released up to 3 years before survey	S, SCH, SI, M	Smoking index: 0 = nonsusceptible never smoker (37%), 1 = susceptible never smoker (7%), 2 = 1–99 lifetime cigarettes smoked, but not a current (30 days) smoker (26%), 3 = 1–99 lifetime cigarettes smoked and a current smoker (9%), 4 = ≥100 cigarettes lifetime (20%) Susceptibility among never smokers (17%)	Character smoking by favorite star averaged over 3 years: None 1 2 ≥3	APOR Reference 0.78 (NS) 1.53 (1.01–2.32) 3.09 (1.34–7.12)  AOR Reference 2.16 (0.86–5.45) 4.78 (1.60–14.2) 16.2 (2.33–112)	Study examined comm only chosen actors/actresses; 51% of adolescents were excluded because they nominated a star chosen by fewer than 5 respondents
Goldberg and Baumgartner 2002	Asian Aged 14–17 years Cross-sectional school-based N = 1,338 Thailand 1998	Recall measure—how many American movies have you seen in the past 2 months in theater or on video (0–1 vs. 2–3 vs. ≥4)?	None	Intent to smoke in the future  Tried smoking  Smoked at least 1 cigarette	0–1 movies (15%), 2–3 (14%), ≥4 (15%)  0–1 movies (24%), 2–3 (29%), ≥4 (32%)  0–1 movies (19%), 2–3 (24%), ≥4 (27%)	NS  p < 0.05  p < 0.05	Results shown for exposure to American movies on video; results similar for exposure to American movies in theater
Dixon 2003	White Aged 12–18 years Cross-sectional school-based N = 2,610 participants, 1,858 experimental smokers Australia 1999	Movie character smoking status of favorite male and female star (mean smoking scenes per movie)	S, SCH, SI	Smoking uptake index: 0 nonsmokers (67%), 1 occasional smoker (12%), 2 light smokers (8%), 3 heavy smokers (5%), 4 chain smokers (1%) Null findings for negative health effects of smoking, endorsement of smokers as more popular, intent to smoke in future	APOR male actors: 1.16, p = 0.04 APOR female actors: NS	Stronger evidence for association among girls than in boys; study examined comm only chosen actors/actresses; 31% of adolescents were excluded because they nominated a star chosen by fewer than 5 respondents	

Table 5.13 Continued

Study	Design	Measure of exposure	Categories of covariates used in adjustment <sup>a</sup>	Outcome (prevalence)	Exposure comparison categories	Measure of association, association (95% CI) <sup>b</sup>	Comments
Goldberg 2003	Asian Aged 14–17 years Cross-sectional school-based N = 1,762 Hong Kong 1998	Recall measure—how many American movies have you seen in the past 2 months (0–1 vs. 2–3 vs. ≥4)?	No covariate adjustment	Intent to smoke in the future (27%) Tried smoking (40%) Current (7 days) smoking (30%)	0–1 movies (21%), 2–3 (26%), ≥4 (30%) 0–1 movies (34%), 2–3 (41%), ≥4 (47%) 0–1 movies (18%), 2–3 (21%), ≥4 (22%)	p < 0.01 p < 0.01 NS	
Henriksen et al. 2004b	Multiethnic 6th–8th grades Cross-sectional school-based N = 2,125 California 2003	Recall measure—how often have you seen smoking in the movies or on television in the past week (never vs. sometimes/often)?	M, P, PS, S, SI, SCH	Tried smoking (prevalence not described, current [30 days] smoking 2.6–7.6%, depending on grade in school)	Past-week viewing of smoking in movies or television: Never vs. sometimes/often	AOR Reference NS (OR estimate did not survive stepwise regression)	Unadjusted OR was statistically significant = 2.2 (95% CI = 1.7–2.8)
McCool et al. 2005	Multiethnic Aged 12 or 16 years Cross-sectional school-based survey N = 3,041 New Zealand	Recall measure—3 items (How often do you see a film at the cinema?), $\alpha = 0.65$ Positive smoker stereotypes (smokers in films are stylish, smart, sexy, healthy, intelligent), $\alpha = 0.79$	S	Intent to smoke in the future Mediators Imagery pervasiveness (“smoking in films is common”), 3 items, $\alpha = 0.61$ Nonchalance (“smoking in films is not important to me”), 3 items, $\alpha = 0.67$	Continuous structural equation model; the relation between exposure to smoking in movies mediated through image pervasiveness and nonchalance Positive smoker stereotypes had a direct relation with intent to smoke in the future but were not predicted by higher exposure		

Table 5.13 Continued

Study	Design	Measure of exposure	Categories of covariates used in adjustment <sup>a</sup>	Outcome (prevalence)	Exposure comparison categories	Measure of association, association (95% CI) <sup>b</sup>	Comments
Sargent et al. 2005	Multiethnic national sample N = 6,522 Aged 10–14 years Cross-sectional random-digit-dialed survey United States 2003	Movie title recognition—Beach method 50 titles/survey 532 U.S. box office hits released from 1998 to 2003	S, P, SCH, PS, SI, SINC, ACH, EA	Tried smoking (10%)	Quartile of exposure to movie smoking: 1 2 3 4 AAF	AOR Reference 1.7 (1.1–2.6) 1.8 (1.2–2.8) 2.6 (1.7–4.1) 0.38 (0.20–0.56)	
Hanewinkel and Sargent 2007	White Aged 10–17 years Cross-sectional school-based survey N = 5,586 Germany (Schleswig-Holstein) 2005	Movie title recognition—Beach method 50 titles/survey 398 internationally distributed movies that were German box office hits and released from 1994 to 2004	S, P, SCH, PS, SI, M	Tried smoking (41%)	Quartile of exposure to movie smoking: 1 2 3 4	AOR Reference 1.7 (1.4–2.1) 1.8 (1.5–2.3) 2.2 (1.8–2.8)	
Laugesen et al. 2007	Annual school-based surveys 10th graders N = 96,156 New Zealand 2002–2004	How often do you watch R-rated movies? (3 venues: cinema, video, TV) Never < 1/month Once/month 2–3/month ≥ once/week	S (sensitivity analysis adjusted also for SI, SINC, and PS did not change the conclusion)	Tried smoking among not current smokers  Current (30 days) smoking (12%)	Quartile of exposure to movie smoking: 1 2 3 4  ARR Watched R-rated movies: Never 2–3 times/month Once/month Weekly  Watched R-rated movies: Never 2–3 times/month Once/month Weekly	AOR Reference 1.20 (1.12–1.28) 1.67 (1.55–1.80) 2.04 (1.90–2.18) 2.28 (2.12–2.45)  Reference 0.80 (0.73–0.88) 1.15 (1.05–1.26) 1.59 (1.44–1.75) 2.31 (2.10–2.54)	

Table 5.13 Continued

Study	Design	Measure of exposure	Categories of covariates used in adjustment <sup>a</sup>	Outcome (prevalence)	Exposure comparison categories	Measure of association, association (95% CI) <sup>b</sup>	Comments
Song et al. 2007	Multiethnic Aged 18–25 years Cross-sectional Web-based survey N = 1,528 United States	Movie title recognition—Beach method 60 titles/survey 500 top-grossing movies released from 2000 to 2004	S, P, SRA, SI, M, PPS	Current (30 days) smoking (31%)	ACOR with exposure to movie smoking divided into quartiles and entered as a continuous variable	1.21 (1.05–1.38) for each quartile increase in exposure	For the established smoking analysis, a mediational model that showed significant paths from movie smoking to established smoking through friend smoking and positive expectancies
				Established smoking (> 100 cigarettes lifetime) (25%)	ACOR, same analytic approach as above	1.08 (0.93–1.25)	

**Table 5.13 Continued**

Study	Design	Measure of exposure	Categories of covariates used in adjustment <sup>a</sup>	Outcome (prevalence)	Exposure comparison categories	Measure of association, association (95% CI) <sup>b</sup>	Comments		
Thrasher et al. 2008	Hispanic Aged 10–14 years Cross-sectional school-based survey N = 3,874 Mexico (Cuernavaca and Zacatecas) 2005	Movie title recognition—fixed list of 42 box office hits (2002–2006) with >1 minute of smoking, 15 Mexican, 23 U.S., 4 other foreign	S, P, SI, BOF	Current (30 days) smoking (12%)	Quartile of exposure to movie smoking:		AOR Reference 1.4 (0.9–2.4) 1.8 (1.0–3.2) 2.7 (1.5–4.7)	Significant multivariate association not found for perceived prevalence among adults	
					1	2			
					3	4			
					Quartile of exposure to movie smoking:				AOR Reference 1.3 (0.9–1.6) 1.8 (1.4–2.4) 2.3 (1.5–3.6)
					1	2			
					3	4			
					Quartile of exposure to movie smoking:				
					1	2			
					3	4			
					Among never smokers susceptible to smoking (40%)				UAB Reference 0.17 (0.03–0.31) 0.18 (0.02–0.34) 0.41 (0.23–0.57)
Attitudes toward smoking (good or bad; pleasant or unpleasant; safe or dangerous)									
Perceived prevalence among adults and youth									
Quartile of exposure to movie smoking:		UAB Reference 0.21 (0.03–0.39) 0.30 (0.16–0.44) 0.34 (0.18–0.50)							
1	2								
3	4								

Table 5.13 Continued

Study	Design	Measure of exposure	Categories of covariates used in adjustment <sup>a</sup>	Outcome (prevalence)	Exposure comparison categories	Measure of association, association (95% CI) <sup>b</sup>	Comments
Hunt et al. 2009	White Aged 19 years Cross-sectional N = 948 Scotland (Glasgow) 2002–2004	Movie title recognition— Beach method 50 titles/survey 532 U.S. box office hits released from 1998 to 2003	S, P, SCH, SI	Ever smoked (63%)  Current smoker (33%)  Occasional social smoker + regular smoker vs. never smoker + trier + former smoker	No bivariate or multivariate association with movie smoking  No bivariate or multivariate association with movie smoking	AOR Not significant	None of the associations between exposure categories was significant

Table 5.13 Continued

Study	Design	Measure of exposure	Categories of covariates used in adjustment <sup>a</sup>	Outcome (prevalence)	Exposure comparison categories	Measure of association, association (95% CI) <sup>b</sup>	Comments
Dalton et al. 2003, 2009;	Longitudinal school-based survey with telephone follow-up, baseline = 1,999	Movie title recognition—Beach method	S, P, SCH, PS, SI, M	18-month endpoint Incidence of tried smoking (10%)	Quartile of exposure to movie smoking: 1 2 3 4	ARR Reference 2.02 (1.27–3.20) 2.16 (1.38–3.40) 2.71 (1.73–4.25)	Dalton et al. (2003) also found a significant moderation effect on parental smoking (higher movie effects among adolescents whose parents did not smoke); Tickle et al. (2006) found significant indirect paths to intentions to smoke through positive expectancies and identification as a smoker; there was also a pathway to smoking behavior at 18 months through smoking status of favorite star; Wills et al. (2007) found that change in friend smoking status from time 1 to time 2 partially mediated the effect of movie exposure on smoking at 18 months; Adachi-Mejia et al. (2009) found a moderation effect for the 7-year endpoint, with stronger effect for adolescent team sports participants
2006; Wills et al. 2007;	N = 2,603 baseline never smokers followed up at 18 months, 1,791 at 7 years	601 U.S. box office releases, 1989–1999		7-year endpoint		AAF 0.52 (0.30–0.67)	
Adachi-Mejia et al. 2009;	United States (New Hampshire, Vermont)		S, P, SCH, PS, SI, M	Established smoking incidence (≥100 cigarettes lifetime at survey point) (27.8%)	Quartile of exposure to movie smoking: 1 2 3 4	ARR Reference 1.36 (0.95–1.94) 1.68 (1.15–2.44) 1.98 (1.35–2.90)	
Sargent et al. 2009a	Follow-up at 18 months, 5 years White Aged 10–14 years at baseline Baseline smoking status: never smoker						

Table 5.13 Continued

Study	Design	Measure of exposure	Categories of covariates used in adjustment <sup>a</sup>	Outcome (prevalence)	Exposure comparison categories	Measure of association, association (95% CI) <sup>b</sup>	Comments
Distefan et al. 2004	Longitudinal random-digit-dial survey N = 2,084 never smokers at baseline Follow-up 3 years Multiethnic Aged 12–15 years Baseline smoking status: never smoker United States (California)	Movie character smoking status of favorite star Nonsmoker star smoked in <2 movies in preceding 3 years Smoker star smoked in ≥2 movies in the preceding 3 years	S, SCH, PS, SI, M	Tried smoking (not given, approximately 30%)  Among females	Nonsmoker star Smoker star  Nonsmoker star Smoker star	Reference 1.36 (1.02–1.82)  Reference 1.86 (1.26–2.73)	Significantly stronger effect was found for females, with no effect for males
Jackson et al. 2007	Longitudinal school-based survey, 2001–2002 N = 735 Follow-up at 2 years White and Black Mean age 13.6 years Baseline smoking status: never smoker United States (North Carolina)	Title recognition measure—93 film titles released 2001–2002 7 (G-rated), 14 (PG-rated), 49 (PG-13 rated), 23 (R-rated)	S, SI, PS, SCH, P	Tried smoking (30%)	No movie effect for Black adolescents  Among White adolescents, tercile of exposure to R-rated movies: 1 2 3	AOR Reference 1.57 (0.73–3.35) 2.67 (1.07–6.55)	Television in the bedroom also found to be related to smoking; after controlling for this variable, the AOR for tercile 3 among White adolescents = 2.69 (1.25–5.77)



Table 5.13 Continued

Study	Design	Measure of exposure	Categories of covariates used in adjustment <sup>a</sup>	Outcome (prevalence)	Exposure comparison categories	Measure of association, association (95% CI) <sup>b</sup>	Comments
Sargent et al. 2007a; Wills et al. 2008; Tanski et al. 2009	Longitudinal random-digit-dial survey N = 6,522 baseline (5,829 never smokers)	Movie title recognition—Beach method 50 titles/survey Baseline pool: 532 U.S. box office hits released from 1998 to 2003	S, SI, P, PS, EA, SCH	Tried smoking (15.9% by 24 months)	Continuous measure windsorized and scaled so 0 = 5th percentile and 1 = 95th percentile, assessed by character type:	AHR = 1.39 (1.04–1.85) 1.46 (1.07–1.98) 1.39 (0.99–1.96)	Interaction effect for negative character smoking: AHR = 2.55 (1.50–4.32) for adolescents low in sensation seeking; Wills et al. (2008) found that the relation of movie exposure and onset of smoking was partially mediated through positive expectancies and change in the smoking status of friends; interaction effect for established smoking: AHR = 12.7 (2.0–80.6) for adolescents low in sensation seeking
National sample Follow-up at 8 months (5,503), 16 months (5,019), 24 months (4,574)	Multiethnic Aged 10–14 years at baseline	or DVD during interim periods (approximately 150 titles for each follow-up survey wave)	S, SI, P, PS, EA, SCH	Established smoking (≥100 cigarettes lifetime)	Continuous measure windsorized and scaled so 0 = 5th percentile and 1 = 95th percentile	AHR = 2.04 (1.01–4.12)	
Baseline smoking status: never smoker for outcome of tried smoking; not established smoker for outcome of established smoking	United States 2003						

Table 5.13 Continued

Study	Design	Measure of exposure	Categories of covariates used in adjustment <sup>a</sup>	Outcome (prevalence)	Exposure comparison categories	Measure of association, association (95% CI) <sup>b</sup>	Comments
Hanewinkel and Sargent 2008;	Longitudinal school-based survey N = 2,711	Movie title recognition—Beach method	S, P, SCH, PS, SI, M	Tried smoking (19%)	Quartile of exposure to movie smoking: 1 2 3 4	ARR Reference 1.37 (1.09–1.68) 1.78 (1.39–2.29) 1.96 (1.55–2.47)	Hanewinkel and Sargent (2008) also found a significant moderation effect on parental smoking (higher movie effects among adolescents whose parents did not smoke); this and the dose-response curve were similar to Dalton et al. (2003)
Sargent and Hanewinkel 2009	Follow-up at 1 year White Aged 10–16 years at baseline Baseline smoking status: never smoker Germany (Schleswig-Holstein) 2005	50 titles/survey 398 internationally distributed movies that were German box office hits and released from 1994 to 2004		Smoking index (composed of lifetime smoking and current smoking items, $\alpha = 0.87$ )	Continuous measure windsorized and scaled so 0 = 5th percentile and 1 = 95th percentile, assessed by character type	APOR among baseline never smokers: 2.85 (1.90–4.26)	

Table 5.13 Continued

Study	Design	Measure of exposure	Categories of covariates used in adjustment <sup>a</sup>	Outcome (prevalence)	Exposure comparison categories	Measure of association, association (95% CI) <sup>b</sup>	Comments
Titus-Ermstoff et al. 2008	Longitudinal, school-based, elementary schools, telephone N = 2,627 (2,499 baseline never smokers) United States (New Hampshire, Vermont) 2002–2003 Follow-up at 1 year (2,354) and 2 years (2,255) White Aged 9–12 years at baseline Baseline smoking status: never smoker	Movie title recognition—Beach method 50 titles/survey 550 popular contemporary movies, top 100 releases for each of the 5.5 years preceding baseline survey Follow-up movie pools selected on rolling basis from top 100 box office hits plus top 100 video rentals for the 12 months preceding survey	Tried smoking (9.6% by 24 months)	Exposure entered as continuous measure, with each 1-point increase equivalent to a 1-decile increase in exposure: Baseline (B) 12-month exposure 24-month exposure B + 12-month exposure B + 12-month + 24-month exposure	AAF = 0.35 (0.16–0.53); majority of movie smoking exposure was from youth-rated movies ARR for trying smoking at 24 months 1.09 (1.03–1.15) 1.09 (1.03–1.16) 1.07 (1.00–1.14) 1.11 (1.04–1.17) 1.09 (1.02–1.16)	AAF 0.35 (0.16–0.53) AAF 0.46 (0.11–0.70)	
Thrasher et al. 2009	Longitudinal school-based survey N = 3,874 baseline (2,093 never smokers) Mexico (Cuernavaca and Zacatecas) 2005 Follow-up at 1 year (1,741) Hispanic Aged 10–14 years Baseline smoking status: never smoker	Movie title recognition—fixed list of 42 box office hits (2002–2006) with >1 minute of smoking, 15 Mexican, 23 U.S., 4 other foreign	Tried smoking (36%) Current (30 days) smoking (8%)	Quartile of exposure to movie smoking: 1 2 3 4 Quartile of exposure to movie smoking: 1 2 3 4	ARR Reference 1.01 (0.64–1.60) 1.54 (1.01–2.64) 1.41 (0.95–2.10) ARR Reference 1.22 (0.59–2.51) 2.44 (1.31–4.55) 2.23 (1.19–4.17)		

Table 5.13 Continued

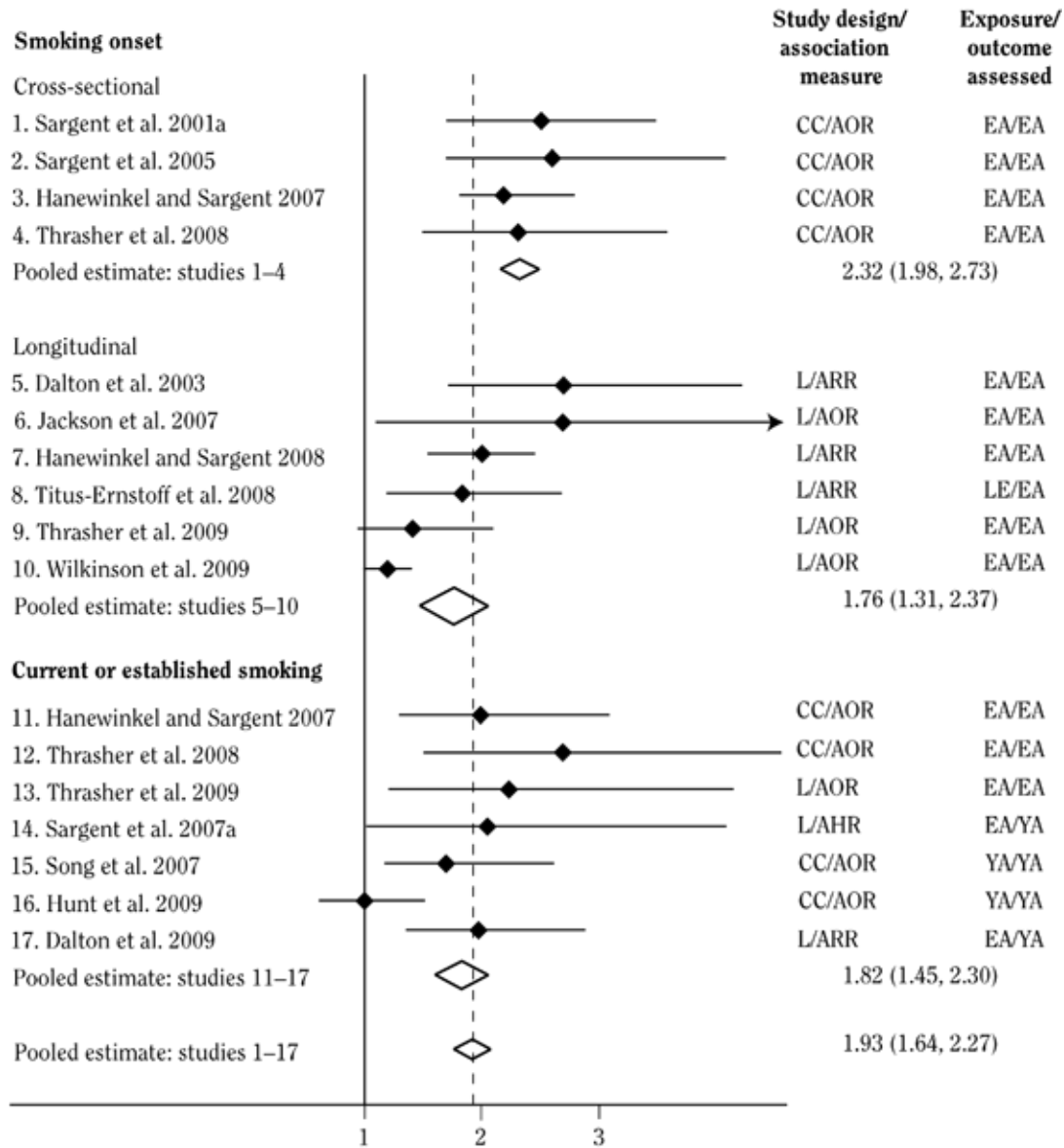
Study	Design	Measure of exposure	Categories of covariates used in adjustment <sup>a</sup>	Outcome (prevalence)	Exposure comparison categories	Measure of association, association (95% CI) <sup>b</sup>	Comments
Wilkinson et al. 2009	Longitudinal household survey N = 1,328 Follow-up at 6, 12, 18, and 24 months (1,286) Hispanic Aged 11–13 years Baseline smoking status: never smoker for new experimentation United States (Texas)	Movie title recognition— Beach method 50 titles/survey 250 popular contemporary movies, top 50 releases each year 1999–2004	P, S, SCH, SI	Ever tried cigarettes (n = 1,286)  New experimentation with cigarettes (n = 1,129)	Continuous measure winsorized and scaled so 0 = 5th percentile and 1 = 95th percentile  Continuous measure winsorized and scaled so 0 = 5th percentile and 1 = 95th percentile	AOR 1.27 (1.10–1.39)  AOR 1.19 (1.01–1.40)	Interaction effect found for country of birth, with Mexican-born adolescents having a stronger response to smoking in movies, AOR = 1.52 (1.14–2.05), than did U.S. born, AOR = 1.04 (0.86–1.27)

Note: Multiple citations within one cell are for multiple reports on the same sample. U.S. = United States.

<sup>a</sup>Covariates: **ACH** = access to cigarettes in household; **BOF** = reported seeing bogus title; **EA** = extracurricular activities; **M** = other media/advertising influences; **P** = personality characteristics; **PPS** = perceived prevalence of smoking; **PS** = parenting style/parental oversight of smoking behavior; **S** = socioeconomic status; **SCH** = school attachment and function; **SI** = other social influences (friend and family smoking); **SINC** = weekly spendable income; **SRA** = smoking-related attitudes/cognitions.

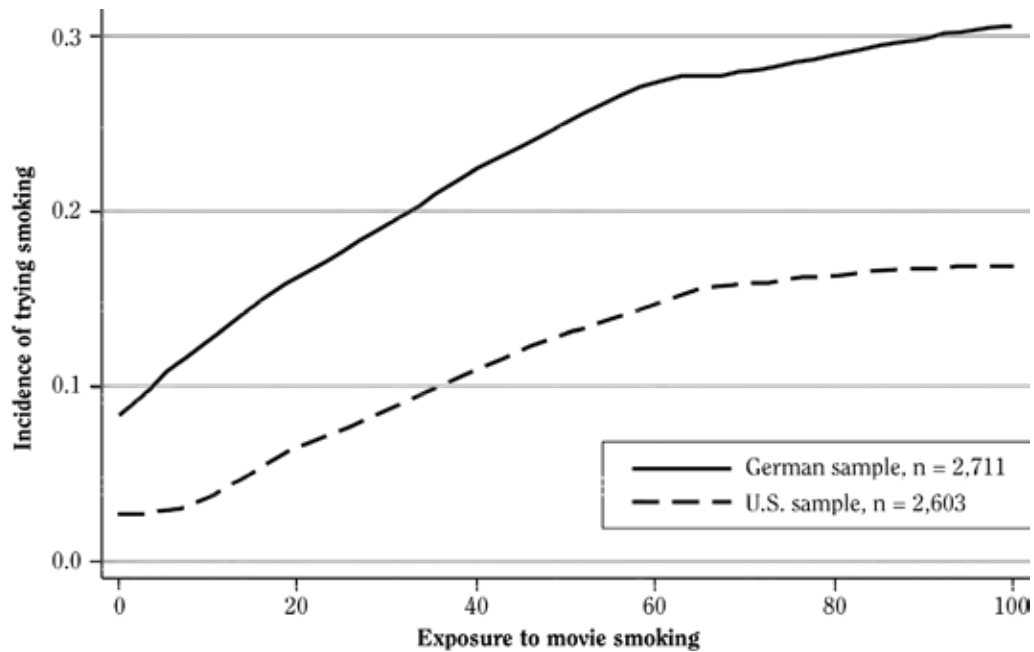
<sup>b</sup>Measures of association: **AAF** = adjusted attributable fraction; **AHR** = adjusted hazard ratio; **AOR** = adjusted odds ratio; **APOR** = adjusted proportional odds ratio; **ARR** = adjusted relative risk; **CI** = confidence interval; **NS** = not significant; **OR** = odds ratio; **UAβ** = unstandardized beta coefficient.

**Figure 5.12 Summary and meta-analysis of studies on the association between exposure to movie smoking and smoking among adolescents and young adults**



Note: Only studies that used some form of a movie title recognition method of assessing exposure are summarized; in most cases, the high category was highest quartile of exposure compared with lowest quartile. For each study, the point estimate and 95% confidence intervals are illustrated. Pooled estimates were obtained through random effects meta-analysis using Stata 10 (College Station, Texas). **AHR** = adjusted hazard ratio; **AOR** = adjusted odds ratio; **ARR** = adjusted relative risk; **CC** = cross-sectional; **EA** = early adolescents (aged 11–15 years); **L** = longitudinal; **LE** = late elementary school (aged 7–10 years); **YA** = young adults (aged 18–25 years).

**Figure 5.13** Shape of the crude dose-response relation between exposure to movie smoking and smoking onset for German and U.S. samples of adolescents



Source: Hanewinkel and Sargent 2008. Reprinted with permission from the American Academy of Pediatrics, © 2008.

Note: For the German sample, exposure was to 398 internationally distributed box office hits in the German market; for the U.S. sample, exposure was to 601 box office hits in the North American market. Because the sample of movies for the U.S. study was larger, those individuals had higher average levels of exposure to movie smoking. To compare the dose-response curves, exposure was standardized for the two studies so the lowest value was 0 and the highest was 100, with both distributions trimmed at the 95th percentile. For the German sample, the median (interquartile range) was 23 (7–48), and for the U.S. sample it was 32 (18–56).

that had been released after each previous survey. Most of the exposure (79%) in this age group came from youth-rated movies, and almost one-half of the onset of smoking in this cohort was explained by exposure to smoking in movies consistent with the results of Dalton and colleagues (2003).

Two longitudinal studies have addressed the relation between exposure to movie smoking and adolescent smoking among Latino adolescents. A study of Mexican adolescents 1 year after they were exposed to movie smoking (Thrasher et al. 2009) reported no association with trying smoking among never smokers at baseline, but significant associations with current (past 30 days) smoking among this group. The second study (Wilkinson et al. 2009) followed up a Texas-based sample of 1,328 Mexican American adolescents and reported that those who had been born in Mexico were more strongly affected by the exposure to movie smoking than were U.S.-born youths.

Figure 5.12 summarizes the results for longitudinal studies of the onset of smoking among adoles-

cents that used cued-recall measures of movie exposure (results 5–10). Four studies of White adolescents (Dalton et al. 2003; Jackson et al. 2007; Hanewinkel and Sargent 2008; Titus-Ernstoff et al. 2008) from the United States and Germany yielded consistent results with multivariate estimates of relative risk (RR) in the 2–3 range. Smaller measures of risk were found among U.S. Latinos (Wilkinson et al. 2009), and findings were null for Mexican adolescents (Thrasher et al. 2009). Noting that marketing restrictions were strongest at the time of their study in the United States, intermediate in Germany, and weakest in Mexico, Thrasher and colleagues (2009) suggested that the strength of the association between movie smoking and adolescent smoking may depend on marketing regulations, with larger effects in countries with stronger tobacco control programs.

One study of Black adolescents using exposure to R-rated movies did not find a relationship between exposure and smoking behavior (Jackson et al. 2007). Another study found that there was a dose-response between the

number of episodes of smoking by Black actors and smoking initiation among Black adolescents (Tanski et al. 2011). However, Black adolescents did not appear to be affected by smoking by White actors, unlike White adolescents who were susceptible to both Black and non-Black movie characters. Further research is needed to better understand the relation between movie exposures and smoking among minority adolescents.

Figure 5.12 also summarizes results of cross-sectional and longitudinal studies of adolescents and young adults regarding an association with current or established smoking (results 11–17). All but one study of adolescents found multivariate RRs/ORs in the 2–3 range. A cross-sectional study of young adults in experimental phases of smoking by Song and colleagues (2007) showed a significant association, but the study by Hunt and colleagues (2009) (involving young established regular smokers) did not.

In summary, longitudinal studies have found consistent associations between exposure to movie smoking and the onset of smoking among adolescents (early vs. late smoking outcomes are addressed below). The evidence base is not large enough at this time to determine whether these general results apply specifically to young adults or to racial and ethnic subgroups.

### **Replicated Moderation Effects**

Moderation, or effect modification, is found when the association is significantly stronger or weaker in a certain subgroup. Moderation effects are often reported but rarely replicated; replication of a moderation effect would make one more certain of an underlying causal relation responsible for both the association and the moderation effect.

#### **Early Versus Late Outcomes**

It has been common to model the uptake of smoking as one continuous variable, but recent publications have raised the possibility that different risk factors could play different roles for early outcomes (e.g., the onset of smoking) versus intermediate outcomes (progression of early experimentation) versus late outcomes (daily smoking) (Robinson et al. 2006). In one study, Sargent and coworkers (2009a) found that the association between exposure to movie smoking and adolescent smoking was confined to trying smoking; the authors found no significant association between exposure to movie smoking and higher levels of lifetime smoking among the experimental smokers. A study by DiFranza and colleagues (2002) found that some adolescents move quickly from the onset of smoking to symptoms of dependence and established smoking (>100 cigarettes lifetime) and that movies have

more important effects on the early phases of this process (Pomerleau 1995; DiFranza et al. 2007).

### **Smoking by Parents**

Dalton and colleagues (2003) reported that parental smoking status modified the relationship between exposure to movie smoking and smoking among adolescents; the effect was significantly stronger among adolescents in nonsmoking households. This moderation effect was replicated in the longitudinal study of German adolescents by Hanewinkel and Sargent (2008). Thus, the stimulus for smoking behavior that smoking in movies provides appears stronger for youth in nonsmoking homes, where parents do not provide smoking role models.

### **Sensation Seeking**

Sargent and colleagues (2007a) reported a moderation effect for sensation seeking in their study of established smoking, with adolescents who were low in sensation seeking more strongly influenced by exposure to movie smoking. This type of moderation effect was also present for trying smoking, with adolescents low in sensation seeking being more strongly affected by negative-balanced smoking (smoking by bad guys) in movies (Tanski et al. 2009).

In conclusion, the moderation effects reported to date suggest that the effects of movies are stronger for adolescents at lower risk for taking up smoking (parents do not smoke, the youth are low-sensation seekers).

### **Mediation Through Hypothesized Endogenous Variables**

Analyses of mediation are important in behavioral science because they test whether hypothesized attitudes, cognitions, and intentions lie along the causal pathway from an exposure to a behavior. These variables are considered endogenous, part of the mental mechanism through which the exposure to media exerts its influence. Demonstrating such a mediational pathway is an important part of empirically testing the plausibility of the theory underlying the causal association.

For example, using cross-sectional and longitudinal structural models, both Tickle and colleagues (2006) and Wills and colleagues (2007) assessed whether exposure to movies affected the onset of smoking indirectly through changes in some variable for peers regarding smoking. The Wills study found that change in friends' smoking status between baseline and follow-up partially mediated the effect of exposure to movies on the adolescent's own uptake of smoking. The Tickle study found that the pathway from exposure to movie smoking to young people's

intentions to smoke was mediated by positive expectancies about smoking and identification as a smoker. Finally, in a cross-sectional study of young adults, Song and colleagues (2007) found pathways from exposure to movie smoking to current smoking through friend smoking and positive expectancies about smoking. In summary, mediational analyses conducted on three samples suggest that exposure to smoking in movies affects adolescent smoking both directly and indirectly through peers and positive expectancies.

### Parental Control Over Media Exposure

Although policies to reduce smoking in youth-rated movies might limit adolescents' exposure to movie smoking, about 40% of the exposure to this risk factor comes through adolescents watching movies rated for adults. Thus, an additional approach to limiting risk would be to encourage parents to control the exposure of their children to adult-rated movies. Observational studies, summarized in Table 5.14, suggest that this strategy could be complementary to policies aimed at eliminating smoking from youth-rated movies (Dalton et al. 2002a, 2006; Sargent et al. 2004; Thompson and Gunther 2007; Hanewinkel et al. 2008). Most of these studies used a form of the question "How often do your parents allow you to watch R-rated movies? (*never, once in a while, sometimes, all the time*)." Typically, only a minority of young adolescents reported complete restriction from viewing R-rated movies, and yet parental restrictions were associated with seeing fewer R-rated movies (Dalton et al. 2002a; Sargent et al. 2004; Hanewinkel et al. 2008). Most of the studies controlled for a variety of confounding influences, including some measure of authoritative parenting style. As illustrated in Figure 5.14, all the studies found that fewer parental restrictions on movie viewing were associated with higher risk of trying smoking.

The evidence that parental restrictions on the viewing of R-rated movies translates into lower risk for the onset of their children's smoking has two important implications for policy. First, it is evidence that active intervention to lower the level of exposure to on-screen smoking (the "dose") leads to lower risk of smoking (the "response"), and that intervention to move down the dose-response relationship between exposure to smoking in movies and youth smoking is possible. Second, because youth still receive a substantial amount of their exposure to on-screen smoking from youth-rated (mostly PG-13) films (Figure 5.11), even children of parents who vigorously enforce the R rating will receive substantial exposure to on-screen smoking. This remaining exposure is very important in view of the evidence that the marginal effect of exposure at lower levels is greater than at higher

levels (Figures 5.12 and 5.13) and the effects of exposure to on-screen smoking are greater in youth at lower risk of smoking.

### Summary of Population-Based Studies

A random effects meta-analysis of the four cross-sectional studies of smoking onset among early adolescents summarized in Figure 5.12 produced a pooled OR of 2.32 (95% CI; 1.98–2.73) for adolescent smoking in the top quartile of exposure to movie smoking compared with the bottom quartile of exposure. Similarly, a random effects meta-analysis of the six longitudinal studies in Figure 5.12 produced a pooled RR of 1.76 (95% CI; 1.31–2.37) for the same comparison. A random effects meta-analysis of the seven studies that addressed later stages of smoking yielded a pooled OR of 1.82 (95% CI; 1.45–2.30). Considering the OR to be an approximation of the RR, a random effects meta-analysis of all 17 studies provided an overall estimate of the risk of smoking as a function of high exposure to movie smoking to be 1.93 (95% CI; 1.64–2.27). In addition, the population-attributable risks for the four studies that provided such estimates (Dalton et al. 2003, 2009; Sargent et al. 2005; Titus-Ernstoff et al. 2008) yielded an overall population-attributable risk fraction of 0.44 for adolescent smoking due to exposure to smoking in movies (Millett and Glantz 2010). Because of the very widespread exposure to smoking in movies, and because movie exposures are not viewed with the same skepticism as marketing messages, some authors suggest that movie smoking may account for a larger fraction of the onset of youth smoking than does traditional cigarette advertising (Glantz 2003; Sargent and Hanewinkel 2009; Sargent et al. 2009a).

### Studies Published Since the Meta-Analysis Was Completed

Since the meta-analysis discussed above was prepared, several additional epidemiological studies on the links between on-screen smoking and adolescent smoking have been completed that reinforce the conclusions of earlier work. Cross-sectional surveys with extensive controls for confounding have been published from Europe (Hunt et al. 2011; Morgenstern et al. 2011; Waylen et al. 2011). In one, approximately 16,000 adolescents were surveyed from six European Union nations, and in each country there was an association between seeing smoking in movies and youth smoking, net confounding (Hunt et al. 2011). One survey of adolescents in the U.S. Midwest



**Table 5.14 Population-based studies assessing the relation between parental restrictions on viewing R-rated movies and smoking among adolescents**

Study	Design	Measure of exposure	Categories of covariates used in adjustment <sup>a</sup>	Outcome	Exposure comparison categories	Measure of association (95% CI) <sup>b</sup>	Comments
Dalton et al. 2002a	Cross-sectional school-based survey N = 4,544 White Aged 10–15 years United States (Northeast) 1999	“How often do your parents let you watch movies or videos that are rated R?” (p. 3) (Never, once in a while, sometimes, all the time)	M, P, PS, S, SCH, SI	Prevalence of tried smoking (18%)	Allowed to watch R-rated movies: Never (16%) Once in a while/sometimes (53%) All the time (31%)	ARR 0.29 (0.19–0.45) 0.74 (0.65–0.85) Reference	Parental restrictions associated with lower viewership of R and PG-13 movies and lower rates of drinking alcohol
Dalton et al. 2006	School-based survey N = 2,606 Aged 9–12 years United States (Northeast)	Parental restrictions on R-rated movie viewing combined with whether they co-viewed the movies	PS, S, SI	Susceptibility to smoking (12.5%)	Permits watching, no parent Permits watching, co-views Prohibits child from watching	ARR Reference 0.72 (0.54–0.96) 0.54 (0.41–0.70)	When assessing other movie-monitoring habits (requiring child to ask before seeing, going into video store, overseeing movie viewing at friends), it appeared that these behaviors partially ameliorated the effects of seeing R-rated movies
Thompson and Gunther 2007	School-based survey of 1,687 6th–8th graders N = 1,687 United States (Wisconsin)	“How often do your parents let you watch movies or videos that are rated R?” ([1] never to [5] all the time)	PS, S, SI	Smoking susceptibility among never smokers (24%)  Tried smoking prevalence (29%)	R-rated movie restriction: Full Partial None  R-rated movie restriction: Full Partial None	AOR Reference 2.1 (1.5–2.8) 3.3 (2.3–4.6)  Reference 1.5 (1.0–2.8) 2.5 (1.7–3.7)	

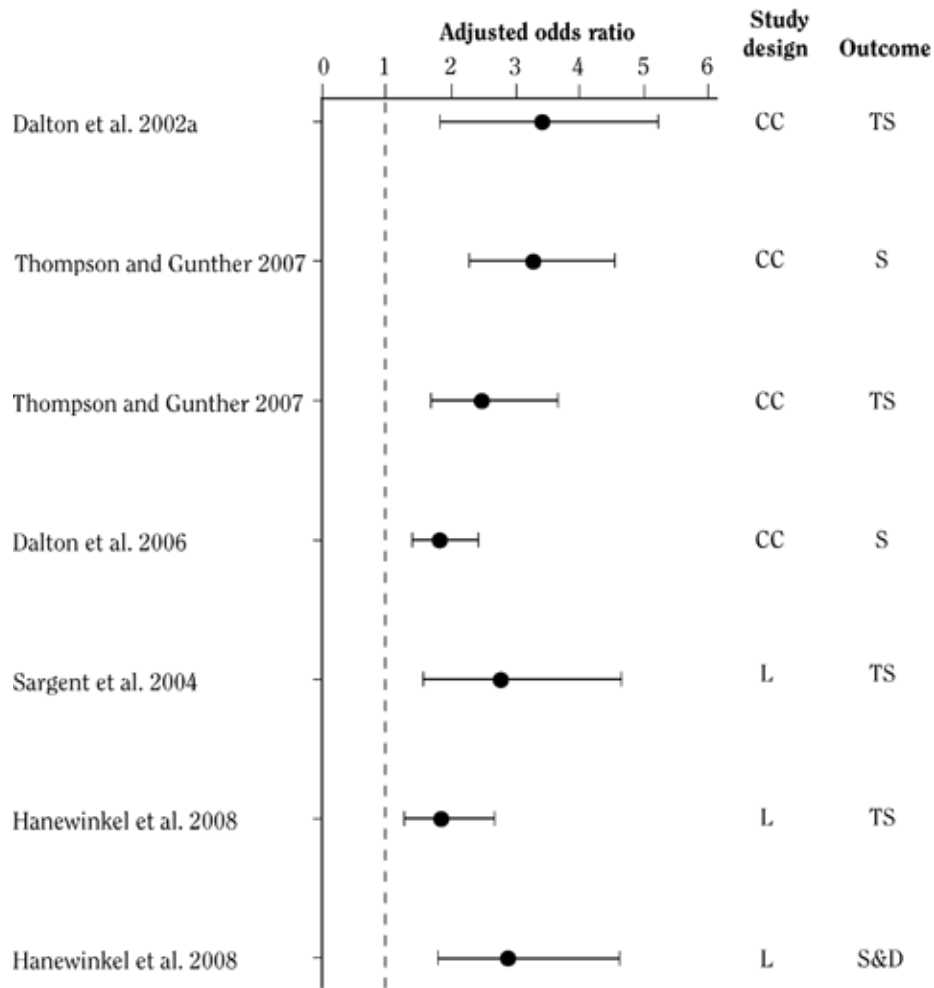
Table 5.14 Continued

Study	Design	Measure of exposure	Categories of covariates used in adjustment <sup>a</sup>	Outcome	Exposure comparison categories	Measure of association, association (95% CI) <sup>b</sup>	Comments
Sargent et al. 2004	Longitudinal school-based survey with telephone follow-up, baseline survey N = 2,596 baseline never smokers Follow-up at 18 months White Aged 10–14 years at baseline Baseline smoking status: never smoker United States (New Hampshire, Vermont) 1999	“How often do your parents allow you to watch movies or videos that are rated R?” (Never, once in a while, sometimes, all the time)	EA, P, PS, S, SCH, SI	Incidence of tried smoking (15.9% by 18 months)	Allowed to watch R-rated movies: Never (19%) Once in a while (29%) Sometimes/all the time (52%)	ARR Reference 1.8 (1.1–3.1)  2.8 (1.6–4.7)	Statistically significant interaction with stronger results for adolescents living in nonsmoking households; relaxation of R-rated restrictions over time resulted in greater risk of smoking; strengthening of restrictions over time resulted in lower risk
Hanewinkel et al. 2008	Longitudinal, school-based survey N = 2,110 Follow-up at 1 year White Aged 10–15 years at baseline Baseline smoking status: never smoker Germany (Schleswig-Holstein) 2005	“How often do your parents allow you to watch movies that are rated for 16-year-olds?” (Never, once in a while, sometimes, all the time)	P, PS, S, SCH, SI	Tried smoking incidence (16%)  Smoking and binge drinking (5%)	Never (41%) Once in a while (28%) Sometimes (22%) All the time (9%)  Never Once in a while Sometimes All the time	Reference 1.19 (0.85–1.67) 1.71 (1.33–2.20) 1.85 (1.27–2.69)  Reference 1.64 (1.05–2.58) 2.30 (1.53–3.45) 2.92 (1.83–4.67)	German rating categories refer to the age below which the restriction applies; they are FSK-0 (family), FSK-6, FSK-12, FSK-16, FSK-18; lower exposure to movies in all rating categories for adolescents reporting restrictions; mediational analysis shows indirect pathway from FSK restriction through lower movie substance-use exposure to behavior

<sup>a</sup>Covariates: EA = extracurricular activities; M = other media/advertising influences; P = personality characteristics; PS = parenting style/parental oversight of smoking behavior; S = sociodemographics; SCH = school attachment and function; SI = other social influences (friend and family smoking).

<sup>b</sup>Measures of association: AOR = adjusted odds ratio; ARR = adjusted relative risk.

**Figure 5.14 Summary of results for studies on the association between parental movie restrictions and smoking among early adolescents**



*Note:* The point estimate is for the comparison between being allowed to watch R-rated movies “all the time” vs. “never”; for each study, the point estimate and 95% confidence intervals are illustrated. **CC** = cross-sectional; **L** = longitudinal; **S** = susceptibility to smoking among never smokers; **S&D** = tried smoking and binge drinking; **TS** = tried smoking.

found an association between repeated measures of adolescents’ own assessment of smoking in movies they saw and changes in their smoking behavior (Choi et al. 2011, in press). In that study, there was no reciprocal relationship; that is, there was no prospective association between higher levels of smoking and larger increases in perception of smoking in movies. A survey of Indian adolescents assessed their exposure to smoking in 60 Bollywood movies and found a relationship with smoking that was the same order of magnitude found in studies of youths in Western countries (Arora et al., in press). de Leeuw and colleagues (2011) found that parental restrictions on

viewing R-rated movies affected smoking by decreasing growth in sensation seeking over time. Finally, a study by Wills and colleagues (2010) found that higher levels of self-control were associated with a blunted response to smoking in movies.

## Experimental Research

Experimental studies have used either quasi-experimental or randomized designs to better control for risk factors and influences that could confound the

effect of movie images on behavior. A recent review (NCI 2008) summarized the results from eight experimental studies that explored the effects of movie smoking on viewers' beliefs about smoking or their reactions to movies. According to that review, the results suggest that (1) viewing smoking in movies enhances viewers' perceptions of how socially acceptable smoking is (Pechmann and Shih 1999; Gibson and Maurer 2000), (2) adolescents who view adult characters smoking on screen perceive the real-world prevalence of smoking among adults to be higher than do adolescents viewing nonsmoking movie characters, and (3) exposure to smoking by characters affects personal intentions to smoke among adolescents (Pechmann and Shih 1999), but not among young adults (Gibson and Maurer 2000). The results also suggest that showing youth an antismoking advertisement before viewing a movie depicting smoking blunts the favorable attitudinal response among adolescents (Pechmann and Shih 1999). Finally, one study reported no relationship between the presence of smoking in a movie and box office success (Dalton et al. 2002b).

### **Recent Experimental Studies**

Nine relevant experimental studies have been published since the NCI (2008) review. In one, Dal Cin and colleagues (2007) found that greater self-identification with the smoking protagonist may make smokers more likely to continue smoking and make nonsmokers more favorably disposed toward smoking.

Lochbuehler and colleagues (2009) studied reactivity to cues in movie smoking among young adults in The Netherlands and found that, although individual pictures of movie smoking prompted craving in a traditional pictorial study of reactivity to cues, a 30-minute movie segment with multiple cues to smoke did not have an effect on urge to smoke after the movie.

Golmier and colleagues (2007) evaluated the capacity of a graphic warning label to decrease the effect of movie smoking and found a significant main effect for warning labels on susceptibility to smoking. Harakeh and associates (2010) found that among young adult Dutch smokers, viewing an antismoking ad resulted in a moderate decline in all measures of smoking used, with a dose-response effect (more antismoking ads led to less smoking).

Shmueli and associates (2010) randomly assigned young adult smokers to watch an 8-minute film montage comprised of clips that either did or did not contain smoking. After watching, participants were asked to leave the room for 10 minutes while the experimenter prepared the next phase of the study. Smokers who watched the montage with smoking scenes were more likely to smoke during the break than those who watched the smoke-free

montage. In addition, participants who saw the smoking films were more likely to smoke a cigarette within 30 minutes after completion of the experiment than were those who watched the smoke-free montage.

An interaction analysis suggested an enhanced effect on smoking of smoking in movies when the film included horror scenes (Sargent et al. 2009b). Another interaction effect was reported by Hanewinkel and colleagues (2010b) who replicated the findings that showing an antismoking ad before some films was associated with higher awareness of smoking in the movies and with lower levels of approval of smoking in the movie and smoking in general. These effects occurred at all ages but were stronger in youth than among adults.

Wagner and colleagues (2011) compared functional magnetic resonance imaging responses to smoking scenes in movies in a group of smokers and nonsmokers who were naive to the focus on smoking. The study assessed brain responses to movie smoking segments and compared them with responses to segments that contained no smoking. The smokers had larger responses in reward circuits and also larger responses in motor planning areas for the right hand, suggesting that the smoking scenes prompted planning for smoking. Lochbuehler and colleagues (2011) found that smokers preferentially looked at the cigarette when viewing on-screen smoking images and, in another study, that smokers smoked more when viewing movie smoking but only if they were not transported into the story (Lochbuehler et al. 2010). Finally, Shadel and colleagues (2010) showed middle-school adolescents movie clips that depicted smoking in the context of rebelliousness, relaxation, and no motive and found greater desire to smoke after adolescents viewed clips in which smoking conveyed relaxation.

### **Summary of Experimental Research**

Experimental studies to date offer further evidence for an effect of movie images on behavior. In addition, there is a strong concordance of results for the beneficial effect of an antismoking advertisement shown before movies with smoking: more conscious awareness of movie smoking, higher disapproval of movie smoking, less intent to smoke among nonsmoking adolescents, and less actual smoking among young adult smokers. With respect to the effect of smoking in movies on urge to smoke, the results are mixed, with one quasi-experimental study showing an effect size similar to other cue reactivity studies and randomized experiments showing little or no effect. For observed smoking behavior—not urges alone—however, there is some evidence that exposure to smoking scenes increases smoking intensity. The differences in findings among some of the experimental studies may be due to

differences in the type of movie. The strongest design was used by Shmueli and colleagues (2010) who randomly assigned subjects to cues from five different movies. If subjects react more strongly to smoking presented in certain contexts than others, the null results for some experiments may be explained by the choice of the particular movie or movie segment used for the prompt; this is an important area for further research.

## Summary

A 2008 NCI monograph that reviewed influences of the media on tobacco use offered a summary of research on the portrayal of tobacco use in media channels, including movies, television, music, magazines, and the Internet (NCI 2008). Chapter 10 of that report concluded that exposure to smoking in movies causes tobacco use among adolescents, stating: "The total weight of evidence from cross-sectional, longitudinal, and experimental studies indicates a causal relationship between exposure to movie smoking depictions and youth smoking initiation" (p. 357). This statement was also incorporated into that report's six major conclusions (p. 12). Since this statement was issued, population-based cross-sectional studies have shown that movies deliver billions of images of smoking to young audiences. Furthermore, cross-sectional and longitudinal population studies have demonstrated an association between seeing smoking in movies and smoking among youth in samples of U.S. White and Mexican American adolescents and among adolescents in Germany. Other studies have linked higher exposure to R-rated movies with smoking among adolescents in Wisconsin and New Zealand. In no case was the estimate of risk either zero or in the negative direction. Popula-

tion-based studies support a mechanism whereby movie effects are mediated through cognitions, and experimental studies demonstrate a short-term effect of movies on the attitudes and behavior of adolescents who watch them. Population studies also provide support for an association between exposure to movie smoking and later stages of adolescent smoking; it is unclear whether this effect results from movies prompting adolescents to start smoking, promoting the continuation of experimentation, or both. An MPAA policy to give films with smoking an R (adult) rating, as recommended by WHO (2009), CDC (2011), and other authorities, could eliminate youth-rated films as sources of exposure to on-screen smoking imagery and reduce the exposure of youth to smoking in movies. The adoption of such policies would contribute to a reduction in adolescent smoking behavior. Some U.S. film studios have begun to respond to public pressure through the development of internal mechanisms to limit the depiction of smoking in movies.

Experimental studies provide strong and consistent support for the idea that an antismoking advertisement shown before a movie that contains smoking scenes influences how moviegoers view smoking and react to it; several studios have already adopted this practice.

Finally, population-based studies provide evidence to support the idea that parental restrictions on viewing R-rated movies reduces exposure to such movies and the risk of early onset of smoking when restrictions are applied during late childhood and early adolescence. Moreover, practices of restricting and monitoring media appear to work independently of more traditional types of parenting factors, such as authoritative parenting. However, parental restrictions would not address the substantial exposure of youth to smoking imagery in movies rated G, PG, and PG-13.

## Evidence Summary

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There is strong empirical evidence, along with the tobacco industry's own internal documents and trial testimony, as well as widely accepted principles of advertising and marketing that support the conclusion that tobacco manufacturers' advertising, marketing, and promotions recruit new users as youth and continue to reinforce use among young adults. Hence, despite claims from cigarette manufacturers that marketing and promotion of their products are intended to increase market share and promote brand loyalty among adult consumers, the evidence presented in this chapter is sufficient to conclude that

marketing efforts and promotion by tobacco companies show a consistent dose-response relationship in the initiation and progression of tobacco use among young people. As has been true for many decades, today, the majority of smokers begin to use tobacco products as adolescents. Among adults who become daily smokers, nearly all (88%) first use of cigarettes occurs by 18 years of age, with 99% of first use by the age of 26 years (see Chapter 3 of this report; SAMHSA 2009). Constraints on tobacco product marketing, including the ban on broadcast advertising, have had little impact on overall industry expenditures in

this area (FTC 2011a,b). Although spending for advertising and promotion of cigarettes has declined every year since 2004, the industry spent \$9.94 billion on these activities in 2008 and \$574 million to market smokeless tobacco products in 2008, the latest year for which data are available (FTC 2011a,b). Approximately 84% of these expenditures were for discounts, price promotions, coupons, and other activities that resulted in lower retail prices of cigarettes. Tobacco companies have several options for altering the prices of their products, ranging from changing wholesale prices to launching and promoting discount brands to engaging in a variety of price-reducing promotions. Evidence in this chapter also outlines industry actions to attract price-sensitive populations such as youth to their products, as well as to soften the price impact on consumers of increases in federal and state tobacco excise taxes (Chaloupka et al. 2002). Because there is strong evidence that as the price of tobacco products increases, tobacco use decreases, especially among young people, then any actions that mitigate the impact of increased price and thus reduce the purchase price of tobacco can increase the initiation and level of use of tobacco products among young people.

In addition to pricing policies, tobacco manufacturers have employed a wide range of advertising, marketing, and promotional initiatives that evidence shows have been key factors in the initiation and progression of tobacco use among youth and young adults (Perry 1999; King and Siegel 2001; Siegel 2001; NCI 2008). Existing theories of health behavior, including TTI, explain the processes by which tobacco marketing affects tobacco use among youth. TTI, which is consistent with other health behavior frameworks such as the Theory of Planned Behavior and the Social Cognitive Theory, organizes factors that promote or deter health behaviors such as smoking into three interacting streams: intrapersonal, social-contextual, and cultural-environmental (Flay et al. 2009). Variables that might influence smoking can be found at ultimate, distal, and proximate distances from actual smoking behaviors, and much industry marketing acts at multiple levels and points within this triadic framework, through moderated mediation pathways. Behavioral intentions are immediate precursors to behavior and are strong predictors of future behavior. Research demonstrates that tobacco marketing affects intentions toward smoking in a way that leads to increased susceptibility to smoking among adolescents exposed to the marketing. Many econometric studies analyzed in this chapter offer additional evidence that the marketing of tobacco promotes its use by adolescents.

There is strong evidence that tobacco advertising and promotion, particularly those initiatives containing imagery that associates positive qualities with tobacco

use, are successful at affecting awareness of smoking, recognition of specific brands, attitudes about smoking, intentions to smoke, and actual smoking behavior among youth (Armstrong et al. 1990; Aitken et al. 1991; Evans et al. 1995; Schooler et al. 1996; Gilpin et al. 1997). Such imagery has also been proven to be effective at reducing perception of risk among young people (Pollay 2001; Wakefield et al. 2002a). Tobacco advertising has consistently contained images that evoke characteristics such as independence, adventurousness, sophistication, athleticism, social acceptability, sexual attractiveness, thinness, popularity, and rebelliousness—common aspirational themes among youth and young adults (see Chapter 3 of this report; SAMHSA 2009). Studies cited in this chapter demonstrate that young people who are more familiar with tobacco advertising can identify specific advertisements, have a favorite tobacco advertisement, or possess cigarette promotional items are more likely to begin smoking than their peers who do not have these characteristics (Arnett and Terhanian 1998; Feighery et al. 1998). Additional longitudinal studies have found increased odds of progression from initiation of smoking to established smoking among adolescents who both owned cigarette promotional items and had a favorite cigarette advertisement (Pierce et al. 1998). Although tobacco companies reported spending relatively small proportions of their marketing and advertising dollars on their Web sites in 2008, Web sites that promoted specific brands of tobacco products and engaged in electronic mail marketing were found to include features such as music, cartoons, and moving images.

A number of studies have examined the relationship between tobacco marketing, peer relationships, and adolescent smoking behavior. Adolescents who believe smoking to be prevalent are more likely to smoke, and peers who smoke increase perceptions of the prevalence of smoking (Kobus 2003). Significant research has supported the idea that adolescents choose their peer group on the basis of their attitudes about smoking and their smoking behavior (Ennett and Bauman 1994; Engels et al. 1997; Kobus 2003; de Vries et al. 2006; Mercken et al. 2007). Industry documents cited in this chapter illustrate how tobacco companies employ peer appeal in marketing campaigns and emphasize the popularity of specific brands to encourage brand loyalty as an extension of a sense of belonging (Tindall 1984; RJR 1986a; Philip Morris USA 2004a). Other research concluded that tobacco companies market their products to young adult trendsetters through promotions in bars and nightclubs because these young adults were highly likely to influence the behaviors of their peers (Hendlin et al. 2010).

In addition to advertising and promotions, the tobacco industry has invested heavily in packaging design

to establish brand identity and promote brand appeal (Pollay 2001; Wakefield et al. 2002a). Research conducted by the tobacco industry and cited in this chapter has consistently demonstrated that brand imagery on packages is especially influential during adolescence and young adulthood, when smoking behavior and brand preferences are being developed (DiFranza et al. 1994; Pollay 2000, 2001). Color, words, and images on cigarette packs, as well as container shape and packaging material of smokeless tobacco products, have all been found to suggest specific product characteristics and reduce the perception of risk (Pollay 2001; Pollay and Dewhirst 2001; Wakefield et al. 2002a; Kropp and Halpern-Felsher 2004; Hammond 2009a; Hammond and Parkinson 2009; Bansal-Travers and Hammond 2010). Recent research suggests that even when terms such as “light” and “mild” are prohibited in tobacco packaging and advertising, a significant proportion of adult and youth smokers continue to report false beliefs about the relative risk of cigarette brands (Hammond et al. 2009). Studies suggest that the use of lighter colors on cigarette packs to imply lightness, as well as replacement words such as “smooth,” have the same misleading effect as “light” and “mild” labels (Pollay 2001; Wakefield et al. 2002a; Hammond 2009a). The efficacy of package design as an element of tobacco marketing has been supported by research into plain packaging, which removes color and brand imagery from packaging. In addition to enhancing the effectiveness of health warnings by increasing their noticeability, plain packaging has been shown to make smoking less appealing and has the potential to reduce the level of false beliefs about the risks of different brands (Freeman et al. 2008). Plain packaging, then, has the potential to reduce youth smoking.

The evidence reviewed in this chapter strongly suggests that tobacco companies have changed the packaging and design of their products to increase their appeal to adolescents and young adults. Further, as a complementary tactic to support the effects of packaging design on brand identity, tobacco manufacturers have used product design features to appeal to specific market segments. Reviews of internal industry documents show that cigarette length, chemical additives to improve the flavor of the smoke and reduce harshness, ventilated filters, and other product modifications were all used by cigarette companies to attract beginning smokers (Burrows 1984; Tindall 1984; Stevenson and Proctor 2008). Menthol and other flavor additives including fruit and candy flavoring were used as marketing tools to attract young smokers, and national survey findings confirm that menthol cigarette use is disproportionately common among younger and newer adolescent smokers. Flavoring agents other than menthol have been banned in cigarettes but are still

used in some cigars, smokeless tobacco products, and new tobacco products such as orbs, sticks, and strips. The evidence also shows that tobacco companies have used menthol and other flavor additives to increase the appeal of smokeless tobacco products to young people. Evidence presented in this chapter indicates that smokeless products have been designed on the basis of a “graduation strategy” to encourage new users to start with particular products and progress to others with higher levels of free nicotine (Figure 5.5; U.S. Smokeless Tobacco 1984). This integration of product design with marketing helped to reverse the decline in smokeless tobacco use among adolescents and young adults (Slade 1995; Tomar et al. 1995; USDHHS 1986). More recent evidence suggests that similar integration of product design with marketing to increase appeal to adolescents and young adults has continued in cigarettes and new smokeless tobacco products such as orbs, sticks, and strips (Mejia and Ling 2010).

Although some tobacco advertising and promotion activities are prohibited by the Master Settlement Agreement and the *Family Smoking Prevention and Tobacco Control Act*, consumers, regardless of age, are exposed to prosmoking messages in stores, and tobacco companies have offered retailers price promotions, volume discounts, in-store branded displays, and payment for prime shelf space. Research confirms that tobacco companies have sought to make their products easily visible and readily accessible to customers to stimulate impulse purchases and have entered into contractual agreements with retailers to secure placement of their products in highly visible locations around sales counters (Pollay 2007). Studies of stores that sell tobacco have confirmed that there is more in-store tobacco advertising in predominantly ethnic and low-income neighborhoods and that tobacco industry point-of-sale marketing differentially appeals to people with lower income and education levels (Willey et al. 1992; Barbeau et al. 2005; John et al. 2009). Further, more cigarettes are sold in convenience stores than in any other type of store, and 70% of adolescents shop in convenience stores at least weekly. Studies have shown that tobacco advertising is more prevalent in stores located near schools and where adolescents are more likely to shop. The presence of heavy cigarette advertising in these stores has been shown to increase the likelihood of exposing youth to prosmoking messages, which can increase initiation rates among those exposed, particularly if stores are near schools. Several cross-sectional studies have identified relationships between exposure to tobacco marketing in a retail environment and experimentation with smoking; a multiyear cross-sectional study of 8th-, 10th-, and 12th-grade students found that higher levels of advertising, lower cigarette prices, and greater availability of

cigarette promotions at point of sale all predicted smoking uptake among youth (Slater et al. 2007). Finally, research on the location of retail outlets selling cigarettes indicated that experimental smoking among youth was related to the density of tobacco outlets both in high school neighborhoods and in neighborhoods where youth live.

In addition to traditional advertising and point-of-sale marketing, tobacco companies have engaged in a variety of public relations strategies to position themselves as responsible corporations and to enhance their public image. Tobacco industry documents demonstrate that these strategies were undertaken in response to public concern about the industry's marketing practices and with the goal of forestalling legislation on regulation that would restrict industry activities. These strategies have included sponsorship of school-based youth smoking prevention programs, retailer education programs on enforcement of legal restrictions on youth access to tobacco products, antismoking campaigns in the mass media, and sponsorship of community-based programs aimed at youth such as the national 4-H program (SCARC Action Alert 1996; Landman et al. 2002; Mandel et al. 2006). Studies cited in this chapter show that the tobacco industry's youth smoking prevention activities have not provided evidence that they are effective at reducing youth smoking. Some studies, as well as industry documents, indicate that these programs can lead to a greater likelihood of uptake among youth by positioning smoking as an "adult only" activity, a concept that may appeal to youth. Further evidence has shown that the messages in these programs divert attention from industry marketing efforts, as well as from messages on the addictiveness of the product. At the same time, advertisements about tobacco company charitable works were shown to improve perceptions of the company's corporate image among 18–25-year-old undergraduates.

An NCI monograph that reviewed influences of the media on tobacco use by youth concluded that exposure to depictions of smoking in movies causes tobacco use among

adolescents (NCI 2008). Since that report was issued, multiple population-based cross-sectional studies have provided consistent evidence supporting a causal relationship between exposure to smoking images in movies and smoking among youth in the United States. Although the incidence of on-screen smoking in movies has declined steadily since 2005 and one-half of MPAA member movie studios have adopted policies designed to reduce smoking images in their films, movies overall continue to deliver billions of these images to adolescents. Cross-sectional and longitudinal population studies have demonstrated an association between exposure to smoking in movies and smoking among youth in samples of U.S. White and Mexican American adolescents. Research cited in this chapter has shown that the association between exposure to smoking images in movies and youth smoking has a more important effect on the early phases of smoking initiation than on the transition to addiction. Experimental studies have suggested that an antismoking advertisement shown before a movie that contains smoking scenes can influence how moviegoers view smoking. Evidence indicates that parental restrictions on viewing R-rated movies reduces exposure to such movies and the risk of early onset of smoking when restrictions are applied during late childhood and early adolescence. Finally, recent evidence supports expanding the R rating to include movies with smoking in order to further reduce exposures of young persons to onscreen tobacco incidents, making smoking initiation less likely.

In summary, the tobacco industry's own internal documents and trial testimony indicate that the industry needs to recruit new smokers from among youth. The evidence provided in this chapter shows multiple strategies by which the tobacco industry continues to pursue this objective to increase the rate of initiation and use of tobacco products among young people. Cumulative research indicates that cigarette advertising and promotional activities and depictions of smoking in movies have caused young people to smoke (Lovato et al. 2011).

## Conclusions

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1. In 2008, tobacco companies spent \$9.94 billion on the marketing of cigarettes and \$547 million on the marketing of smokeless tobacco. Spending on cigarette marketing is 48% higher than in 1998, the year of the Master Settlement Agreement. Expenditures for marketing smokeless tobacco are 277% higher than in 1998.
2. Tobacco company expenditures have become increasingly concentrated on marketing efforts that reduce the prices of targeted tobacco products. Such expenditures accounted for approximately 84% of cigarette marketing and more than 77% of the marketing of smokeless tobacco products in 2008.



3. The evidence is sufficient to conclude that there is a causal relationship between advertising and promotional efforts of the tobacco companies and the initiation and progression of tobacco use among young people.
4. The evidence is suggestive but not sufficient to conclude that tobacco companies have changed the packaging and design of their products in ways that have increased these products' appeal to adolescents and young adults.
5. The tobacco companies' activities and programs for the prevention of youth smoking have not demonstrated an impact on the initiation or prevalence of smoking among young people.
6. The evidence is sufficient to conclude that there is a causal relationship between depictions of smoking in the movies and the initiation of smoking among young people.