Movie smoking and youth initiation: Parsing smoking imagery and other adult content

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ABSTRACT

Objectives: To isolate the independent influence of exposure to smoking and other adult content in the movies on youth smoking uptake.

Methods: We use discrete time survival analysis to quantify the influence of exposure to smoking and other adult content in the movies on transitioning from (1) closed to open to smoking; (2) never to ever trying smoking; and (3) never to ever hitting, slapping, or shoving someone on two or more occasions in the past 30 days. The latter is a comparative outcome, hypothesized to have no correlation with exposure to smoking in the movies.

Results: Exposure to smoking in the movies significantly increased the likelihood of youth having tried smoking (OR = 1.06; 95% CI: 1.00–1.12) and being open to smoking (OR = 1.09; 95% CI: 1.04–1.15). Smoking initiation would have been 21% lower had this cohort never been exposed to smoking in the movies. However, exposure to adult content is also associated with trying smoking (OR = 1.06; 95% CI: 1.00–1.13) and becoming open to smoking (OR = 1.10; 95% CI: 1.04–1.17). The correlation coefficient between the two exposure measures is 0.995 (p<0.000), and both measures are associated with initiating aggressive behavior.

Conclusion: Although exposure to smoking in the movies is correlated with smoking initiation and susceptibility, the high correlation between exposure to smoking in the movies and other adult content suggests that more research is needed to disentangle their independent influence on smoking.

Keywords: smoking, adolescent, movies, exposure, media
INTRODUCTION

Every year, adolescents around the world are repeatedly exposed to positive images of smoking in media, most notably in movies. A survey of 147 top grossing films released in 2008 revealed that 59% of all movies, 18% of movies rated G or PG, 65% of movies rated PG-13, and 76% of R-rated movies contained tobacco imagery.\(^1\) In 1,769 films released in the United States since 1991, 650 billion portrayals of tobacco use were transmitted to audiences.\(^2\) The source of these portrayals is shifting over time. In 1990, R-rated movies were responsible for 60% of all portrayals. In 2008, 65% of the 18.1 billion tobacco portrayals in movies were in films rated PG-13 and an additional 1% of portrayals were in films rated G or PG.\(^2\)

The pervasive use of tobacco in movies has led to an emerging literature documenting and linking repeated exposure to multiple youth smoking behaviors. In one of the first studies to explore the issue, Dalton et al.\(^3\) found that youth with the highest level of exposure to smoking in the movies were 2.7 times more likely than those with the lowest exposure to initiate smoking. The authors concluded that more than 50% of smoking initiation among youth in the cohort was attributable to exposure to smoking in the movies. Subsequent papers by Sargent et al.,\(^4\) Jackson et al.,\(^5\) Dal Cin et al.,\(^6\) and others corroborate this association,\(^7\)\(^-\)\(^14\) while Sargent et al.,\(^15\) Dalton et al.,\(^16\) and Adachi-Mejia et al.\(^17\) extend this even further, suggesting that exposure to smoking in the movies predicted risk of becoming an established smoker. In a complementary study, Dalton et al.\(^18\) examined the influence of parental monitoring of R-rated movies and found that the relative risk of smoking among adolescents was significantly reduced by parental regulation of movie viewing, even after controlling for parental monitoring of nonmedia-related behaviors.

The link between exposure to smoking in the movies and youth smoking initiation is theoretically plausible: seeing actors smoking could positively influence youth’s perceptions of
the social desirability of smoking and the prevalence of smoking—both factors shown to increase smoking initiation. However, it is also possible that youth who seek out or are permitted to watch movies that contain smoking and other adult content, such as nudity, profanity, and violence, are different from youth who do not and that these differences are associated with smoking initiation. All of the existing studies attempt to account for this possibility by controlling for many differences in personal characteristics, such as sensation seeking and external influences like peer or familial smoking and parenting style. Previous studies have not controlled for exposure to adult content separate from exposure to smoking in the movies. Although exposure to nudity, profanity, and violence is unlikely to be a direct cause of youth smoking initiation, it may be correlated with smoking initiation if it serves as a proxy for differences in risk between youth with varying levels of exposure to smoking in the movies not otherwise controlled for by other confounders. Linking exposure to smoking in the movies, independent of other adult content, would strengthen the plausibility of the link between smoking initiation and exposure to smoking in the movies.

In this study, we address this gap by measuring youth’s exposure to smoking in the movies and other adult content in top grossing movies in an attempt to disentangle these separate influences on adolescent smoking initiation in a cohort of youth in New York State. The survey was conducted annually from 2005 to 2008 with youth who were aged 13 to 16 at baseline; it assessed whether youth had seen a number of top grossing movies (G, PG, PG-13, and R) released over the same period. Using discrete-time survival analysis, we examined whether the quantity of youth’s exposure to portrayals of smoking in the movies is associated with smoking initiation and smoking susceptibility. As a test of whether exposure to smoking in the movies is a proxy for youth’s risk more broadly rather than smoking initiation specifically, we also examined
whether exposure to smoking in the movies is correlated with youth exhibiting aggressive behavior. Together, these analyses are intended to clarify the causal relationship between exposure to smoking in the movies and smoking initiation.

METHODS

Data

The primary data for this study come from the New York Longitudinal Youth Tobacco Evaluation Survey (NY-LYTES)—a survey designed to capture youth smoking transitions from never smoking, experimenting, and regular smoking and the factors that influence these transitions, with a special focus on exposure to smoking in the movies. We conducted a random-digit-dial (RDD) telephone survey of 1,511 youth at baseline in the spring and summer of 2005. Subsequent annual follow-up surveys included 1,060, 809, and 632 youth in 2006, 2007, and 2008, respectively. Before conducting the survey, telephone interviewers obtained parental consent and youth assent. Key constructs are described below.

Outcome measures

We examined three outcomes: ever trying smoking, being open to smoking, and ever exhibiting aggressive behavior. An indicator of ever smoking is based on a positive response to the question, “Have you ever tried cigarette smoking, even 1 or 2 puffs?” Openness to smoking is assessed only among those who report having never smoked a cigarette, even one or two puffs, and measured using 3 items on a 5-point Likert scale (definitely yes, probably yes, probably no, definitely no, and no opinion): (1) Do you think you will try a cigarette soon?; (2) Do you think you will smoke a cigarette at any time during the next year?; and (3) If one of your best friends offered you a cigarette, would you smoke it? Youth are considered closed to smoking (0) if they respond “Definitely not” to all three items and open to smoking (1) otherwise. Our final outcome
is based on the question, “During the past 30 days how many times did you hit, slap, or shove someone?,” with responses of never, once, twice, or three or more times. Based on this question, we created an indicator for hitting, slapping, or shoving someone on two or more occasions (1) or less than two (0) occasions.

**Potential influences**

In our analyses, we account for many of the same potential influences used in related literature on smoking in the movies, including sensation seeking, receptivity to tobacco marketing, and parental monitoring of and rules about watching R-rated movies.

*Exposure to smoking in the movies*

To estimate youth’s exposure to smoking in the movies, we combined data on top grossing films from www.boxofficemojo.com, with rating information on the amount of smoking in movies from SceneSmoking.com, and youth self-reports on seeing individual movies. First, we identified the top domestic grossing movies for the year preceding the annual wave of the survey. For the baseline wave of the survey, we selected 10 of the top grossing films with no or some tobacco use and 20 of the top grossing films with high levels of smoking. For subsequent waves of the survey, we selected 15 movies, 2 with little or no smoking and 13 with a lot of smoking. Of the 71 unique movies across all years, 68% (48) are PG-13, 18% (13) are R, 11% (8) are PG, and 3% (2) are G. Movies with no smoking received a score of 1 (N=10); little smoking, 2 (N=4); moderate amount of smoking, 3 (N=15); and a significant amount of smoking, 4 (N=42). Based on these ratings, we created the Smoking in the Movies Exposure (SME) index. This index was calculated by multiplying a movie’s smoking rating by a number that indicates whether an individual has never seen the movie (0), has seen the movie only once.
(1), or has seen it more than once (2) and then summing this score across all movies in each wave. Individuals’ exposure was then summed across all waves as a continuous, cumulative measure of exposure to smoking in the movies. This cumulative measure was scaled down by a factor of 20 to facilitate the interpretation of odds ratios.

Exposure to adult content in the movies

To estimate youth’s exposure to adult content, we used content analysis conducted by Kids-In-Mind.com, a Web site operated by the not-for-profit organization Critics, Inc. Each movie in our sample was rated on a 0 to 10 scale for each of three categories of adult content: sex/nudity, violence/gore, and profanity. We constructed the Adult Content Exposure (ACE) index in a similar manner to the SME index. We multiplied the Kids-In-Mind scale (0 to 30) by the frequency indicator (0, 1, 2) and then summed across all movies in each wave. We also created a cumulative sum over time. The cumulative measure was then scaled down by a factor of 100.

Sensation seeking

We measured sensation seeking, which has been shown to be associated with youth smoking, with the Brief Sensation Seeking Scale items: (1) I would like to explore strange places; (2) I like to do frightening things; (3) I like new and exciting experiences, even if I have to break the rules; and (4) I prefer friends who are exciting and unpredictable. The items use a 5-point Likert scale (1 = strongly agree, 5 = strongly disagree). These responses were then reverse coded such that higher scores indicated stronger agreement. The four items were then summed and a dichotomous indicator was created to indicate whether a respondent was below the median of this scale (0) or above (1). Youth missing data for any of the four items were considered to have missing data for this measure.
Tobacco marketing receptivity

To measure youth’s receptivity to tobacco marketing, we constructed a receptivity score that is 0 if the individual was unable to name the brand of cigarettes most frequently advertised in stores and magazines; 1 if they could name the most frequently advertised brand of cigarettes; 2 if they could name the most frequently advertised brand of cigarettes in addition to the name of the brand in their favorite advertisements; and 3 if the individual named a most frequently advertised brand, named the brand in their favorite advertisement, and own and are willing to use merchandise bearing a cigarette company’s name or logo.

Parental rules for and monitoring of R-rated movie and television watching

We accounted for restrictions imposed by parents on respondents’ viewing of R-rated movies with two measures based on two questions with 4-point Likert scale response options (1 = Never, 4 = All the time): (1) How often do your parents let you watch movies or videos that are rated R?; and (2) When you watch an R-rated movie, how often do you watch it with one or both of your parents? The first dichotomous measure equals 1 if the parent allows viewing R-rated movies “most of the time” or “all of the time” and 0 otherwise. The second measure is 1 if the parent “never” or “sometimes” co-views and is 0 otherwise.

Parental oversight and involvement in respondents’ movie viewing was assessed in a manner detailed by Dalton et al. Four items on a 4-point Likert scale (1 = Never, 4 = All the time) were used: (1) How often do your parents want to know what a movie is rated before you can see it?; (2) How often do you have to check with your parents before watching a movie?; (3) How often do your parents go into the video store with you when you rent a movie?; and (4) When you go to a friend’s house, how often does your parent check to see what movie you might be watching? The final two items (3, 4) allowed for youth to respond that they “do not go
to the movie store” and “do not go to friends’ houses,” respectively. Responses were
dichotomized so that responses other than “All the time” equaled 0.

Parental limits on television viewing were measured by responses to the question, “Do
your parents limit the amount of time you spend watching TV or movies?” Responses were
dichotomous, and respondents were coded with a 1 for “yes” responses and 0 for “no” responses.

Other variables

Other measures used for analysis include age, race/ethnicity, gender, residence in New
York City, attendance of a public school, a dichotomized indicator for above average academic
achievement, church attendance, the presence of an adult at home after school, employment,
income (scaled down by a factor of 100), having a friend who smokes, having a friend who
smokes marijuana, presence of a smoking ban in respondent’s household, exposure to
secondhand smoke, and exposure to tobacco use prevention lessons in school.

Analysis

We estimated the relationship between exposure to smoking in the movies and youth
transitions using discrete-time survival analysis. This approach begins with all sample members
who have not experienced the event but are at risk of the event occurring (e.g., never smoked in
the model of the transition to ever smoking) and then estimates the risk of the event occurring
(transition to smoking) as the sample of youth ages. We used a logistic regression model to
estimate the probability of event occurrence given that the event has not yet occurred.\textsuperscript{23,24} In
these models, once the event in question occurs, the sample member is dropped from subsequent
time periods because he or she is no longer at risk. This process allowed the calculation of the
odds that an individual will initiate smoking for each age represented in the sample, given that
they had not previously begun smoking. Although there is attrition from the cohort over time, the
sample size used in these analyses depends on whether the event occurred during any of the surveys in which the youth participated (i.e., we used a person-year data set in which each individual contributes to the estimation as long as he or she is at risk of the event occurring). The key covariates of interest are the SME and ACE indexes. For each outcome, we estimated separate models using either the SME or ACE index. For all regressions, we present two model specifications: (1) a crude, bivariate model and (2) an adjusted model including the covariates described above. In addition to these models, we examined the degree of correlation between the SME and ACE indexes.

RESULTS

Table 1 presents descriptive statistics for the baseline sample of youth. At baseline, observed SME scores ranged from 0 to 174, with a mean score of 70.6 out of a total possible score of 180. ACE scores ranged from 0 to 724, with a mean score of 304.1 out of a total possible score of 760. Table 2 illustrates the number of person-years of data available for each outcome, the number who experience the event of interest (i.e., “fail”), and the number of youth who are right censored (i.e., lost to follow-up before experiencing the event/outcome of interest).

(Insert Table 1 here.)

(Insert Table 2 here.)

Exposure to smoking in the movies is significantly associated with an increased odds of initiating smoking and becoming open to smoking among never smokers (Table 3). We find that as the SME index increases, youth are more likely to have tried smoking (adjusted OR = 1.06, 95% CI = 1.00–1.12) and to be open to smoking (adjusted OR = 1.09, 95% CI = 1.04–1.15). Because the SME index is a continuous variable, another method for understanding the magnitude of the effect is to compare observed smoking initiation with predicted smoking
initiation assuming the SME index is zero. This comparison indicates that smoking initiation would have been 21% lower if this cohort was never exposed to smoking in the movies for the fully adjusted model—66% lower for the simple bivariate model. In addition, increases in the SME index are associated with increases in the likelihood of engaging in aggressive behavior (adjusted OR = 1.09, 95% CI = 1.04–1.14).

(Insert Table 3 here.)

Next, we replaced the SME index with the ACE index and find similar results (see Table 3). As this index increases, youth are more likely to have tried smoking (adjusted OR = 1.06, 95% CI = 1.00–1.13) and to be open to smoking (adjusted OR = 1.10, 95% CI = 1.04–1.17). Additionally, increases in the ACE index are associated with increases in the likelihood of engaging in aggressive behavior (adjusted OR = 1.09, 95% CI = 1.04–1.15).

Given the similarity of the results for the SME and ACE indexes, we examined the correlation between the two indexes and found that it is 0.995 (p<0.001). The similarity between the two measures is illustrated in Figure 1. For this figure, each sample member is categorized into quartiles of exposure to smoking in the movies and adult content. We then display the percentage of the sample that is in the highest quartile of adult content for each of the quartiles of exposure to smoking in the movies. This shows that nearly all the youth who are in the highest quartile for exposure to adult content are also in the highest quartile for exposure to smoking in the movies. Additionally, we estimated the correlation between modified versions of the indexes at baseline by recalculating SME and ACE indexes using a dichotomous, as opposed to a three-level, frequency of exposure indicator. At baseline the correlation between the recalculated indexes is 0.992 (p<0.001).

(Insert Figure 1 here.)
DISCUSSION

The current study surveyed a cohort of adolescents annually in New York State by telephone from 2005 to 2008 and created a proxy measure of youth’s exposure to smoking in the movies based on self-reported viewing of top grossing films. Consistent with the burgeoning literature on smoking in the movies, we find that exposure to smoking in the movies is correlated with youth initiating smoking and becoming susceptible to smoking. Although the magnitude of these relationships diminished after controlling for an extensive set of potential confounders, the results were robust and suggest that smoking initiation would have been roughly 20% lower if this cohort had no exposure to smoking in the movies. Although this is less than the 52% of smoking initiation attributed to exposure to smoking in the movies by Dalton et al.,³ the current cohort was older (aged 13 to 16) than the 10 to 14-year-old cohort in Dalton et al.,³ which may explain some of this difference. To extend previous analyses that examined the relationship between watching R-rated movies and youth smoking,¹⁸ we attempted to disentangle the influence of exposure to smoking in the movies from other adult content (i.e., nudity, profanity, and violence) by creating separate exposure measures for each. The intent of this analysis was to illustrate that exposure to smoking in the movies was correlated with smoking initiation above and beyond any potential influence of other adult content on risk behaviors such as smoking. However, based on the sample of 71 top grossing films over a 4-year period, the correlation between exposure to smoking in the movies and other adult content was so high that it was impossible to disentangle their separate influence. This key finding suggests that the true relationship between smoking in the movies and smoking remains to be determined. In light of this high correlation between smoking in the movies and other adult content, it is not surprising
that both measures are separately associated not only with smoking initiation and susceptibility, but also with aggressive behavior.

Although the link between exposure to smoking in the movies and smoking initiation is theoretically plausible and is illustrated in many studies in multiple countries, the current study calls into question the current evidence supporting such a relationship. Our results suggest that it is very difficult to disentangle a measure of smoking in the movies from a measure of other adult content. That is, we find the two measures are almost perfectly correlated—when you have smoking in the movies, you also have other measures of adult content; very few movies have one but not the other. If nothing else, the current study should prompt other researchers (possibly those with more extensive studies with larger selections of movies) to attempt to disentangle exposure to smoking in the movies and other adult content to better quantify the independent influence of smoking in the movies.

The current study has several limitations. This study relied on a smaller set of movies compared to the seminal work by Sargent, Dalton, and colleagues. In addition, the current study examined youth who were older at baseline (aged 13 to 16) than in previous studies, potentially missing earlier initiation. The telephone surveys used in this study likely underestimate the true level of smoking compared to other modes of data collection (e.g., school, household). Finally, each year some of the sample was lost to follow-up, effectively censoring some of the observations.

Despite these limitations, our results are qualitatively similar to other similar studies, although we draw different conclusions. While youth are exposed to a significant quantity of smoking in the movies and it is quite plausible that this exposure influences youth smoking, more careful investigation is necessary to understand the magnitude of this influence. Because of
the high correlation between smoking in the movies and other adult content, it is not possible to disentangle the independent contribution of each.
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WHAT THIS PAPER ADDS

The relationship between adolescent smoking and exposure to smoking in the movies has been assessed in a number of studies. However, these studies have not examined the relationship between adult content in the movies and adolescent risk behaviors. This paper addresses this gap by examining the correlation between exposure to movies with smoking and other adult content. Our findings underscore the importance of further studying how smoking in the movies influences youth smoking, above and beyond other adult content contained in movies viewed by youth.
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Table 1. Baseline Demographics and Summary Statistics

| Measure                                              | n = 1511 |
|------------------------------------------------------|----------|
| Age (Years)                                          |          |
| 13                                                    | 21.1%    |
| 14                                                    | 26.3%    |
| 15                                                    | 28.5%    |
| 16                                                    | 24.1%    |
| Race                                                 |          |
| Non-Hispanic White                                   | 85.4%    |
| Non-Hispanic African American                        | 4.6%     |
| Hispanic                                             | 3.3%     |
| Other Race                                           | 6.3%     |
| Gender                                               |          |
| Male                                                  | 53.4%    |
| Female                                                | 46.6%    |
| New York City resident                                | 11.3%    |
| Sensation seeker (above median)                      | 48.6%    |
| Attend public school                                 | 84.5%    |
| Above average student                                | 55.4%    |
| Attend church frequently                             | 53.6%    |
| Adult at home after school                           | 77.8%    |
| Employed                                             | 22.4%    |
| Monthly income/allowance (scaled)                    | $31.39 ($0.31) |
| One or more friends smoke cigarettes                 | 31.6%    |
| Measure                                                   | n = 1511 |
|-----------------------------------------------------------|----------|
| One or more friends smoke marijuana                       | 28.0%    |
| Smoking ban in household                                  | 76.7%    |
| Number of days exposed to secondhand smoke in the past 7 days | 1.42     |
| Smoker in household                                       | 26.3%    |
| Tobacco use prevention education in school                | 41.6%    |
| Parents limit TV viewing                                  | 37.4%    |
| Parents permit R-rated movie viewing most of the time/always | 45.9%    |
| Parents co-view R-rated movies never/sometimes            | 74.4%    |
| Parents want to know movie rating before viewing          | 31.6%    |
| Must check with parents before watching a movie           | 16.6%    |
| Parents go to the video store when renting movie          | 29.3%    |
| Parents check on which movies might be seen at friend’s home | 4.6%     |
| Tobacco marketing receptivity                              |          |
| None                                                      | 33.2%    |
| Low                                                       | 23.1%    |
| Medium                                                    | 21.1%    |
| High                                                      | 22.6%    |
| Ever smoked                                               | 18.1%    |
| Open to smoking                                           | 30.3%    |
| Exhibited aggressive behavior                              | 26.1%    |
| SME index (not scaled)                                    | 3.5 (70.6)|
| ACE index (not scaled)                                    | 3.1 (304.5)|
Table 2. Life Tables

| Age | Never to Ever Smoking | Closed to Open to Smoking | No Aggressive Behavior to 2 or More Instances |
|-----|-----------------------|---------------------------|---------------------------------------------|
|     | Beginning Sample | Fail | Right-Censored | Beginning Sample | Fail | Right-Censored | Beginning Sample | Fail | Right-Censored |
| 13  | 1,394 | 0 | 83 | 1,286 | 0 | 64 | 1,404 | 1 | 67 |
| 14  | 1,311 | 21 | 122 | 1,222 | 56 | 94 | 1,336 | 70 | 102 |
| 15  | 1,168 | 58 | 156 | 1,072 | 81 | 118 | 1,164 | 111 | 149 |
| 16  | 954 | 113 | 246 | 873 | 81 | 204 | 904 | 119 | 241 |
| 17  | 595 | 115 | 219 | 588 | 72 | 236 | 544 | 99 | 199 |
| 18  | 261 | 37 | 148 | 280 | 18 | 171 | 246 | 17 | 141 |
| 19  | 76 | 9 | 59 | 91 | 4 | 80 | 88 | 5 | 77 |
| 20  | 8 | 3 | 5 | 7 | 0 | 7 | 6 | 1 | 5 |
Table 3. Influence of Exposure to Smoking in the Movies and Adult Content on Initiation to Smoking, Becoming Open to Smoking, and Exhibiting Aggressive Behavior

| Transition                        | Cumulative Exposure to Smoking in Movies | Cumulative Exposure to Adult Content in Movies |
|-----------------------------------|-----------------------------------------|-----------------------------------------------|
|                                   | Crude | Adjusted | Crude | Adjusted |
|-----------------------------------|-------|----------|-------|----------|
| Never to Ever Smoked (95% CI)     | 1.23*** | 1.06** | 1.27*** | 1.06* |
| Person-year observations          | 3,456 | 3,307    | 3,456 | 3,307    |
| Closed to Open to Smoking         | 1.15*** | 1.09*** | 1.17*** | 1.10*** |
|                                   | (1.11–1.20) | (1.04–1.15) | (1.12–1.22) | (1.04–1.17) |
|                                   | 2,589 | 2,474    | 2,589 | 2,474    |
| No Aggressive Behavior to 2 or More Instances | 1.15*** | 1.09*** | 1.17*** | 1.09*** |
|                                   | (1.12–1.19) | (1.04–1.14) | (1.13–1.21) | (1.04–1.15) |
|                                   | 3,407 | 3,261    | 3,407 | 3,261    |

*** p<0.01, ** p<0.05, * p<0.1
Figure 1. Proportion of Cohort in Highest Quartile of Cumulative Adult Content Exposure by Cumulative Smoking in the Movies Exposure Quartiles