

# Influence of Smoking Cues in Movies on Children's Beliefs About Smoking

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## KEY WORDS

children, smoking beliefs, implicit associations toward smoking, movie, smoking

## ABBREVIATIONS

MANOVA—multivariate analyses of variance  
stIAT—single target implicit association task

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**WHAT'S KNOWN ON THIS SUBJECT:** This research presents the first 2 experimental studies on the short-term effects of smoking portrayal in movies on children's beliefs about smoking.



**WHAT THIS STUDY ADDS:** Exposure to movie smoking from cartoon and family-oriented movies had no effect on implicit associations toward smoking. For smoking beliefs, effects were again small and only statistically significant for social norms regarding smoking.

## abstract

FREE

**OBJECTIVE:** Experimental research has revealed that short exposure to movie smoking affects beliefs about smoking in adolescents. In this study, we tested that association in children.

**METHODS:** In 2 experiments, participants were exposed to either a cartoon or family-oriented movie and randomly assigned to 20-minute segments with or without smoking characters. Data collection took place at elementary schools. A total of 101 children (8–10 years; 47.5% boys) were exposed to a cartoon, and in a second experiment, 105 children (8–11 years; 56.2% boys) were exposed to a family-oriented movie. Beliefs about smoking (assessed by questionnaire) and implicit associations toward smoking (single target implicit association task) were assessed after watching the movie.

**RESULTS:** The majority of both samples of children viewed smoking unfavorably. Exposure to movie smoking had no effect on implicit associations toward smoking when experiments were analyzed separately or if the results were combined. For smoking beliefs, effects were again small and only statistically significant for social norms regarding smoking.

**CONCLUSIONS:** Short-term exposure to smoking in cartoon and family-oriented movies had little immediate impact on beliefs about smoking in preadolescent children, but a significant cumulative impact on norms cannot be ruled out. *Pediatrics* 2012;130:221–227

The US National Cancer Institute has stated in its 19th Tobacco Control Monograph that 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.<sup>1</sup> However, few authors have investigated how movie smoking exposure affects smoking behavior. Many theories on the experimentation and initiation of tobacco use emphasize the role of beliefs about smoking. Effects on beliefs about smoking might provide a mechanism to explain the association between cumulative exposure to smoking cues in movies and smoking initiation. Smoking initiation contains different developmental stages of progression, starting with a stage of forming and modifying beliefs and attitudes regarding smoking.<sup>2</sup> Research has revealed that young children have strong antismoking attitudes<sup>3</sup>; however, in early adolescence, these attitudes soften as preadolescents develop more favorable beliefs and some become willing to try tobacco.<sup>2,4</sup> Because movie smoking exposure begins well before adolescents start to smoke, it is important to clarify whether and how depictions of smoking in movies affect children who have not yet experimented with smoking and are in the process of developing more favorable beliefs about smoking.<sup>5</sup>

Could brief exposures to movie smoking affect beliefs about smoking in randomized experiments? Pechmann and Shih<sup>6</sup> conducted the 1 experimental study revealing that exposure to two 8-minute movie previews in which the characters smoke, compared with the exposure to 2 comparable 8-minute movie previews with the smoking edited out, affected adolescents' beliefs about how smokers perceived themselves. Adolescents who were exposed to movie smoking attributed a higher social status to smokers.<sup>6</sup> This study applied

to adolescents,<sup>5</sup> who presumably are well along the way toward developing more favorable smoking beliefs,<sup>7</sup> because this is the age associated with smoking experimentation. Moreover, the movies used in this study were adult-oriented; reaction to smoking in films rated for general audiences has experimentally not been examined. Yet, many critiques of movie smoking focus on the frequent depiction of smoking in family-oriented films and cartoons.<sup>8,9</sup> Given that children spend lots of time watching such films,<sup>10,11</sup> it is important to examine whether seeing smoking in them influences beliefs about smoking in children.

In this current study, we aim to extend previous experimental work by investigating how short-term exposure to general audiences movie smoking affects beliefs about smoking among preadolescents. We expanded the scope of the beliefs assessed in previous research by including explicit and implicit measures. In an experimental design, participants were exposed to a movie clip with or without smoking scenes. In 1 experiment, the clips were derived from a popular cartoon, in another they were from a family-oriented movie. We expected that children who were exposed to smoking characters in movies would have more favorable beliefs about smoking than children exposed to the same characters in nonsmoking situations.

## METHOD

### Sample

A total of 206 8- to 11-year-old children participated in 2 separate studies. Study 1 comprised 101 children aged 8 to 10 years (mean = 8.41; SD = 0.57) who were exposed to the movie *Lucky Luke – De Daltons op pad* (2005). This sample consisted of 48 boys (47.5%) and 53 girls (52.5%), 96% of whom had never tried smoking. Study 2 included 105

children (8–11 years, mean = 9.31, SD = 0.56) and had a similar experimental design but with the movie *Alles is Liefde (Love Is All)* (2007). In the second sample, 56.2% were boys and 43.8% were girls, and 90.5% of the children had never tried smoking.

### Stimulus Material

In each study, the participants were assigned randomly to 1 of 2 different movie conditions. In the experimental condition, children were requested to watch a segment of 1 of the 2 movies with smoking scenes, and in the control condition they were exposed to a similar segment of the same movie without any portrayal of smoking. The movies were chosen because they are suitable for all ages and displayed smoking behavior by lead characters. Both movies were edited to obtain 2 similar versions of the movie, 1 with smoking scenes and 1 without any portrayal of smoking. For the movie displayed in the experimental condition, several smoking scenes were selected from each original movie and integrated into an edited version that lasted ~20 minutes. A comparable version was edited for the control condition without smoking scenes. The movie was shortened so that the storyline was preserved. The storyline and the length of the edited movies were similar in the experimental and control conditions. *Lucky Luke* is based on a Belgian comic book; the story is set in the Old West and portrays an American cowboy who is known to “shoot faster than his shadow.” *Lucky Luke* smoked in 17 scenes (4.36 minutes) in the experimental condition. The other movie, *Love Is All*, is a popular Dutch romantic comedy that portrays a number of characters coming together in events around the Dutch Christmas holiday Sinterklaas (Appendix). Smoking was portrayed by several lead characters in 10 scenes (1.31 minutes).

## Procedure

The studies were conducted in 5 elementary schools in different regions of the Netherlands. Before the study, the parents provided active written consent for the participation of their children. The studies took place in a separate classroom at each school between November 2009 and February 2010. The children were equally allocated by random assignment to each condition. They were taken out of their classroom for ~45 minutes in groups of 5 to 15. First, the researcher explained to the children that they were participating in a study in which they would watch a 20-minute movie and then complete a short questionnaire. They were not informed about the aim of the study. Before the start of the movie, the children were told not to talk to each other, and the researcher remained in the room to maintain order. After watching the movie, the children were asked to complete a questionnaire. The researcher read the questions and response options to the group and explained them if necessary. Each participant then filled in his/her answer individually on a separate sheet. After that, several children performed a single target implicit association task (stIAT). Resources were not available to run stIAT on all children, so lots were drawn to randomly select participants to complete the stIAT. Thirty-seven children in study 1 and 57 children in study 2 performed the stIAT. After the study, all children were debriefed and received a small token for their participation. The study protocols were approved by the Ethical Committee of the Faculty of Social Sciences, Radboud University Nijmegen.

## Measures

### Child Smoking

Children were asked whether they had tried smoking before. Response category was on a 4-point scale: “never,”

“yes, I have taken one puff once,” “yes, I have taken a puff a couple of times,” and “yes, I try smoking once in a while.”

### Parental Smoking

Parental smoking was assessed with the 2 questions, “Does your mother smoke?” and “Does your father smoke?”, postcoded to “both parents do not smoke” (0) or “at least one parent smokes” (1).

### Film Appreciation

Film appreciation was measured with 8 items (eg, “I thought the film was interesting”) on a 4-point scale ranging from “definitely yes” to “definitely not” ( $\alpha = 0.69$  in study 1 and 0.80 in study 2).<sup>12</sup>

### Beliefs About Smoking

The questionnaire assessed the general attitude toward smoking, personal smoking-related expectancies, the perceived social norm regarding smoking, the prototypes of daily smoking, and nonsmoking peers and children’s susceptibility to smoke; all measures have been shown to predict smoking onset in previous work.<sup>13–16</sup>

### Attitude Toward Smoking

The general attitude toward smoking reflects the extent to which the participant approves or has a positive regard for smoking.<sup>17</sup> Attitudes were assessed with 7 items (eg, “I think smoking is unhealthy”) measured on a 7-point-scale (unhealthy [1] to healthy [7] or unpleasant [1] to pleasant [7]). The  $\alpha$  was 0.78 in study 1 and 0.77 in study 2.

### Smoking-Related Expectancies

Personal smoking-related expectancies were measured with 10 items on a 7-point scale ranging from “definitely

yes” to “definitely no.”<sup>18</sup> Pros of smoking refer to items assessing positive personal outcomes of smoking (5 items; eg, “If I were to smoke, it would make me feel very relaxed”), whereas cons of smoking refer to items assessing negative personal outcomes (5 items; “If I were to smoke, it would be bad for my health”). The  $\alpha$  was 0.64 and 0.78 (study 1) and 0.73 and 0.86 (study 2) for pros and cons of smoking, respectively.

### Perceived Social Norm Regarding Smoking

We assessed the perceived social norm regarding smoking by asking the participants’ perception of the approval of friends and parents to smoke (4 items: “Do you think your best friend would approve when you smoke,” “Do you think your friends would approve when you smoke,” “Do you think your father would approve when you smoke,” and “Do you think your mother would approve when you smoke”) on a 5-point scale, “definitely not” to “definitely yes”).<sup>19</sup> The  $\alpha$  was 0.66 (study 1) and 0.67 (study 2).

### Prototypes

The scale for measuring prototypes of daily smoking peers contained 22 items.<sup>20</sup> The participants were asked to indicate to what extent the presented characteristics would describe/reflect the typical peer who smokes on a daily basis. Items were answered on a 5-point scale ranging from 1 “not at all” to 5 “very much.” The same items were used to measure participant’s prototypes of nonsmoking peers by assessing to what extent the characteristics would fit the typical nonsmoking peer. Example characteristics for the scales are as follows: “being cool, looking tough, and enjoying life.” The  $\alpha$  was 0.79 and 0.83 for the smoker prototype scale and 0.90 and 0.88 for the nonsmoker prototype scale in studies 1 and 2, respectively.

## Susceptibility to Smoke

Susceptibility to smoke assesses intentions to smoke and resistance to peer offers by using 5 items<sup>16</sup> that were answered on a 4-point scale (definitely not, probably not, probably yes, and definitely yes): “If one of your friends offered you a cigarette, would you try it?”; “Do you think you will smoke a cigarette some time in the next year?”; “Would you smoke a cigarette if someone gave you one?”; “Do you think you will smoke cigarettes when you are in high school?”; and “Do you think you will ever smoke cigarettes?” The  $\alpha$  was 0.70 (study 1) and 0.75 (study 2).

## Implicit Associations Toward Smoking

In both studies, we used a child-friendly version of the stIAT to assess children's implicit associations toward smoking.<sup>21</sup> Participants sorted target pictures of smoking-related scenes<sup>21</sup> and stimulus words<sup>22</sup> as fast as possible into 2 attribute categories, “good” and “bad,” and 1 target-related category, “smoking.” The D2SD and D600 penalty measures were used as stIAT scores.<sup>23,24</sup>

## Statistical Analysis

First, the results were analyzed for the 2 studies separately, and null results were found for both experiments and for all outcomes. To enhance statistical power, the data for both studies were then combined, and these results are presented below. A multivariate analysis of variance (MANOVA) was used to examine whether children who were exposed to a movie with smoking scenes and children who were exposed to a movie without any portrayal of smoking differ in their beliefs about smoking. A MANOVA was also conducted to examine the influence of smoking cues in movies on implicit associations toward smoking.

## RESULTS

### Randomization and Manipulation Checks

Randomization over the 2 conditions was successful. The participants in the 2 conditions did not differ with regard to gender (study 1:  $P = .63$ ; study 2:  $P = .28$ ), parental smoking (study 1:  $P = .87$ ; study 2:  $P = .62$ ), whether participants had tried smoking before (study 1:  $P = .16$ ; study 2:  $P = .87$ ), and whether they had already seen the movie (study 1:  $P = .56$ ; study 2:  $P = .43$ ). The data indicated that the experimental manipulations were successful. In the experimental condition, 91.7% (study 1) and 80% (study 2) of the participants accurately recalled having seen the character(s) smoking. In the control condition, 24% (study 1) and 18% (study 2) of the participants mistakenly recalled having seen a character smoking.

### Descriptives

With regard to the appreciation of the movie, children who were exposed to the smoking movie had higher scores (mean = 3.12; SD = 0.50) than children who were exposed to the nonsmoking version (mean = 2.84; SD = 0.67) of the movie *Love Is All*,  $t = -2.42$ ,  $P = .02$ . There were no differences in film appreciation between conditions for the movie *Lucky Luke*,  $t = -3.23$ ,  $P = .75$ . Average scores with SDs for all outcome measures are shown in Table 1. The distributions of all explicit outcome measures revealed that the children

had on average unfavorable beliefs about smoking, with distributions skewed toward an antismoking stance.

### The Influence of Exposure to Smoking in Movies on Beliefs About Smoking and Implicit Associations

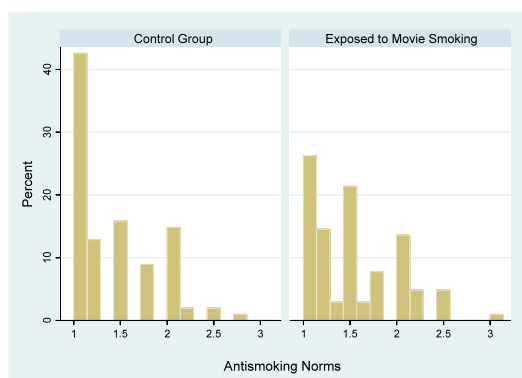
The differences in groups for each of the measures are also shown in Table 1. The results revealed no differences between groups for the general attitude toward smoking, personal smoking-related expectancies, smoker and nonsmoker prototypes, or susceptibility to smoke (Wilks'  $\Lambda = 0.96$ ,  $F_{7, 192} = 1.18$ ,  $P = .32$ ). A significant difference between groups was found only for the perceived social norm regarding smoking. Figure 1 shows the distributions for response to the norm questions by group. A score of 1.0 would represent the most antismoking norms stance. Figure 1 illustrates that exposure to movie smoking was associated with a shift away from the most antismoking stance. Although 42% of the control group was in the most antismoking category, only 27% were in that category for the group exposed to movie smoking. A MANOVA was conducted to examine the influence of smoking cues in movies on implicit associations toward smoking. No significant results were found (D600 penalty:  $F_{1, 92} = 0.00$ ,  $P = .996$ ; D2SD penalty:  $F_{1, 92} = 0.05$ ,  $P = .82$ ). The results on beliefs about smoking and implicit associations toward smoking were not affected when including film appreciation as a covariate.

**TABLE 1** Multivariate Analysis of Variance of the Influence of Movie Smoking on Beliefs About Smoking

	Smoking Movie		Nonsmoking Movie		F	P
	Mean	SD	Mean	SD		
Prosmoking attitudes	1.56	0.80	1.49	0.75	0.33	.57
Pros of smoking	1.66	0.90	1.78	0.99	0.75	.39
Cons of smoking	2.69	1.84	2.72	1.71	0.007	.94
Antismoking norms	1.52	0.46	1.39	0.44	4.25	.04
Smoker prototypes	1.92	0.48	1.94	0.52	0.05	.83
Nonsmoker prototypes	3.36	0.62	3.41	0.60	0.29	.59
Susceptibility to smoke	1.35	0.44	1.27	0.33	2.34	.13

A higher score indicates more favorable smoking beliefs.





**FIGURE 1**  
Side-by-side display of the distribution for antismoking norms across groups.

## DISCUSSION

This study revealed that a 20-minute segment of smoking from family-rated entertainment had no effect on implicit associations toward smoking and only a small effect on 1 smoking-related cognition, antismoking norms, that became apparent only when the results from 2 studies were combined. Notably, this is 1 statistically significant test out of 21 attempted (7 for each of 2 studies and another 7 for the studies combined), so the finding could have occurred by chance. There are several plausible explanations for the weak impact of movie smoking on smoking beliefs and attitudes in the present studies.

First, epidemiologic studies, which reveal an effect of smoking portrayal in movies on smoking initiation, assess cumulative doses of exposure that measure in the thousands. In the present 2 studies, children's smoking beliefs were measured after exposure to a single 20-minute movie segment with smoking scenes. It is possible that it takes more than a 20-minute exposure to affect beliefs about smoking, such that an experiment in children would have to employ a design that delivered repeated exposures over time to reveal a result. These results on short-term effects would seem reassuring for parents who wish to restrict exposure

but worry about the fact that their children also watch movies with friends outside the home environment. However, as it has been shown that cumulative smoking movie exposure affects smoking initiation, the question arises as to where the threshold lies. A single movie may not affect beliefs about smoking, but this study begs the question of just how many depictions of smoking in movies constitute the turning point.

Second, it might be the case that the influence of smoking cues in movies increases with age as children enter adolescence. Longitudinal research on smoking beliefs has revealed that favorable beliefs about smoking increase with age.<sup>4,25</sup> Thus, children between the ages of 8 and 10 years are more cognitively resistant to social influence prompts from movies than adolescents, as evidenced by beliefs about smoking of children in this study, which were substantially skewed toward an antismoking stance. A media influence prompt was unable to change strongly held negative beliefs about smoking, in contrast to adolescents, who are cognitively more susceptible to a variety of social influence prompts. One problem with this explanation is that longitudinal survey research indicates an influence of smoking in movies that starts before experimentation of smoking during the preadolescent period.<sup>26</sup>

Another possibility is that, although smoking portrayal is present in all movies, smoking movie prompts from cartoons and family-oriented movies might be less salient than smoking depictions in movies rated for older adolescents and adults, because characters who smoke in family-rated movies deliver a different message than smoking characters in movies rated for older audiences. For example, a smoking Lucky Luke might not represent the prototype of a cool, sexy, glamorous smoker (the prototype adolescents tend to emulate) and might therefore not have a large impact on children's beliefs about smoking. Also, in the movies used in this study, smoking was portrayed by "good guys," which has been found to be less influential than exposure to "bad guy" smoking.<sup>27</sup> Instead, smoking presented in the context of other adult situations, as portrayed in PG-13\* and R-rated movies, would have more impact.† This hypothesis is supported by another study revealing that exposure to smoking in G and PG-rated movies has little prospective association with smoking behavior in adolescents.<sup>28</sup>

The study strengths include the unique paradigm, being the first experimental study on the influence of movie smoking exposure in such a young age group. Although the current study extends previous research by assessing several explicit and implicit measures, some limitations should be acknowledged. Because previous research suggests that eliminating the portrayal of smoking in movies would reduce smoking

\*Motion Picture Association of America rating categories: G, general audiences; PG, parental guidance suggested, some material may not be suitable for children; PG-13, parents strongly cautioned, some material may be inappropriate for children under 13; R, restricted, under 17 requires accompanying parent or adult guardian.

†To conduct experimental studies on the effects of adult-rated movies in children is ethically challenging, although many children watch these movies regularly.

onset by one-third to one-half,<sup>26,29,30</sup> we expected to find medium to large effects in the current study. Based on these expectations, power calculations (based on power = 0.80 and  $P = .05$ ) indicated that a sample of 98 was necessary for detecting large effects ( $f^2 = 0.16$ ), and a sample of 248 was needed to detect medium effects ( $f^2 = 0.06$ ). However, effects of this size were not found in this study. As a result, the observed power of the current study was 0.50. Thus, our sample size was not powered to detect a small population effect, which can therefore not be ruled out. Another limitation is the order of the assessment of the cognitive tasks. In the current study, explicit cognitions were examined before implicit cognitions. Some scholars argue for carry-over effects when implicit cognitions are assessed after explicit measures.<sup>31</sup> However, research has also indicated that assessing explicit cognitions (ie, questions about alcohol and drug use) before implicit memory associations not only increased the amount of alcohol associations produced but also concurrently and prospectively predicted alcohol use.<sup>32</sup>

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## CONCLUSIONS

These studies examined the impact of family-oriented movie smoking on children's beliefs about smoking and implicit associations toward smoking. A significant effect was only found for antismoking norms. However, as previous studies have revealed that cumulative exposure to movies with smoking cues influences smoking experimentation among adolescents, future research needs to examine whether and how these portrayals affect adolescents' beliefs about smoking. Understanding the underlying mechanism of this association is not only necessary to tailor prevention programs but is also significant in respect of policy implications for the movie rating system. The current study suggests that prevention and policy initiatives should rather focus on the effect of smoking in family-oriented movies. Thus, tobacco control initiatives in the United States should pay attention to adjusting the rating system to address smoking in PG-13 movies. However, this should not be taken to mean that enriching G- and PG-rated movies with smoking is justified or desirable.

## APPENDIX

### Description of the Movie *Lucky Luke*

Based on a Belgian comic, this story is set in the Old West and portrays an American cowboy who is known to "shoot faster than his shadow" and who helps the sheriffs and cavalry in catching villains. Both the comic and the movie are suitable for and popular amongst children in the Netherlands, Belgium, and France. In the present clip, Lucky Luke fights crime and injustice against the Dalton brothers. Lucky Luke smokes cigarettes in earlier film versions, but the cigarette was replaced with a blade of straw in later versions due to public pressure.

### Description of the Movie *Love Is All*

This popular Dutch romantic comedy, featuring many known Dutch actors, contains different storylines that come together during the movie. The movie portrays events around the Dutch holiday Sinterklaas (Santa Claus—December 5th). Several of the main characters smoke cigarettes. All characters who smoked in this movie were good (positively valenced) characters.

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**GELATO:** *It was midnight of the last night of our vacation in Florence, Italy. My wife and I had just finished a lovely dinner and we were now heading to a specific gelaterie we had seen earlier in the evening. While gelaterie can be found on almost innumerable street corners of large cities in Italy, this one looked particularly appealing because I saw that they had passion fruit gelato. Gelato is the Italian equivalent of American ice cream but to me, so much better. Both are made with milk, cream, sugars, and various fruits and nut purees. However, according to the Los Angeles Times (Food: September 23, 2010), gelato has less butterfat compared to ice cream (3–9% vs. 10–16%), more sugar (16–24% vs. 12–16%), much less air (35–40% vs. 90%), and is served at a higher temperature. The end product is a creamy, not hard, intensely-flavored frozen dessert that melts in the mouth. Much of the gelato made in Italy is produced locally in very small batches without chemicals and with fresh ingredients. Gelato should be eaten immediately after being made and certainly within a few days. The flavors reflect the interest of the gelato maker. Although we have quite good ice cream in Vermont, chocolate ice creams available in Vermont taste similar regardless of the maker. In one Italian gelaterie, however, six chocolate selections may be available reflecting different levels of intensity or combinations with other flavors. Over the course of our one week vacation, my wife and I had sampled many wonderful flavors: from subtle variations of hazelnut to intense fruits (we eventually had to agree to limit ourselves to two gelatos a day). For our last night, however, I had to have passion fruit so we bypassed a close-by gelaterie and made our way to the one that had looked so promising. Of course, there was still a line - always a good sign. In most gelaterie not in the center of tourist attractions, the medium-size cone or cup for two Euro comes with two flavors, so we asked the server what would pair well with passion fruit. After a fun discussion, we eventually settled on dark chocolate with orange. Heavenly. What a fantastic way to finish our trip.*

*Noted by WVR, MD*

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