Effects of smoking cues in movies on immediate smoking behavior


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Method: Using an experimental design, 60 daily smokers were assigned randomly to one of two movie conditions (smoking vs. non–smoking characters). Participants were exposed to a 72-min movie clip and were allowed to smoke while watching the movie. Transportation and smoking habits were assessed with a questionnaire afterward.

Results: The results showed a significant interaction effect between movie condition and transportation on immediate smoking behavior, indicating that smokers who were less transported smoked significantly more cigarettes when they were exposed to smoking characters compared with non–smoking characters.

Discussion: These results call for (a) increasing the awareness among people about the effect smoking cues in movies might have and (b) stricter control over smoking cues in movies.

Abstract

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Introduction

Media, such as soap operas, television series, and contemporary movies, often depict portrayals of tobacco use. Despite regulations of the U.S. government concerning the sponsoring of movies by the tobacco industry, the depiction of smoking portrayals in contemporary movies remains prevalent (Sargent & Heatherton, 2009; Titus, Polansky, & Glantz, 2009). While most studies on the effects of smoking exposure focus on initiation (Dalton et al., 2003; Sargent et al., 2001), hardly any research has been directed at the effects smoking portrayals in movies might have on the continuation of smoking in established smokers (Harakeh, Engels, Vohs, & van Baaren, 2010; Shmueli, Prochaska, & Glantz, 2010). Different processes underlie the influence of smoking cues in movies on smoking initiation among adolescents and the continuation of smoking among established smokers. Whereas smoking-related cognitions such as attitudes, norms, and prototypes might constitute explanatory mechanisms in the stage of smoking initiation (Tickle, Hull, Sargent, Dalton, & Heatherton, 2006; Wills, Sargent, Stoolmiller, & Gibbons, 2007), processes of cue reactivity and imitation could possibly explain the effects of smoking cues in movies on smokers’ immediate smoking behavior while watching a movie.

In their incentive sensitization theory, Robinson and Berridge (1993) suggest that through classical conditioning, substance-related cues acquire incentive motivational properties. As a result of the repeated pairing of a drug-induced dopamine release with environmental drug-related cues, these cues can eventually produce a conditioned increase in dopamine release. This response becomes more sensitized with the administration of each new substance, and the drug-paired cue zebras one’s attention and strong subjective cravings for the substance might develop. Craving, in turn, also leads to increased attention to substance cues (Franken, 2003). This mutual activation continues until the substance is finally sought out and administered. Thus, smoking cues in movies might lead to direct responses, particularly when smokers associate a specific cue with a specific behavior. This would imply that smoking characters grab smokers’ attention, which might lead to craving and the subsequent lighting of a cigarette. Studies that have been testing this theory in relation to smoking cues in movies show mixed results. In an experimental study, smokers were exposed to a 40-min movie clip (either with or without smoking cues) and afterward asked to indicate their craving (Lochbuehler, Engels, & Scholte, 2009). No difference in craving between conditions was found. Another experimental study examined the effect of viewing smoking in movies on craving by showing short video clips of six different movies (Hines, Saris, & Throckmorton-Belzer, 2000). The study showed that male, but not female smokers, had higher craving levels if the characters they had viewed smoked. In both studies, craving was assessed after watching the movie clips and not during or shortly after cue exposure. Assessing craving throughout the duration of the clip might lead to different results.

In addition to incentive sensitization theory, imitation is another possible mechanism that could explain the link between the exposure to smoking characters in movies and immediate
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smoking behavior. Research demonstrates that people mimic each other's behavior in social interactions. If people perceive a certain behavior, they will be more inclined to perform that specific behavior themselves due to a strong “perception–behavior link.” Perceiving someone performing a certain action activates the same regions of the brain that become active when the action is performed by the person himself (for an overview, see Chartrand & van Baaren, 2009). With regard to smoking behavior, experimental research has revealed that smokers imitate smoking behavior in social interactions and adapt their smoking behavior to that of other smokers (Harakeh, Engels, Van Baaren, & Scholte, 2007). So far, it is not clear whether smokers also imitate the smoking behavior of smoking characters in movies. Imitation might occur regardless of whether the other person is present or depicted on screen (Chartrand & van Baaren).

Although there are a few experimental studies concentrating on the influence of smoking cues in movies on attitudes toward smoking (Pechmann & Shih, 1999), the association between smoking and the self (Dal Cin, Gibson, Zanna, Shumate, & Fong, 2007), and craving (Hines et al., 2000; Lochbuehler et al., 2009), even fewer experimental studies have focused on behavioral outcomes. Of those, Shmueli et al. (2010) examined the effect of viewing smoking in movies on smoking behavior by showing an 8-min movie montage of five different movies. They found that smokers who were exposed to the movie clip with smoking cues were more likely to smoke after watching the clip than those exposed to the clip without smoking cues. However, exposure to a longer segment, compared with a short movie clip, would represent a more realistic and naturalistic context. Moreover, measuring smoking behavior at the moment of cue exposure and not afterward might be a promising way to assess the influence of smoking cues in movies on immediate smoking behavior. In their study, Harakeh et al. (2010) did expose smokers to a longer clip, showing them a 60-min James Bond movie with or without James Bond smoking and allowed the participants to smoke while watching the movie. In their experiment, however, movie condition did not affect the total number of cigarettes smoked. The lack of effect might be explained by the fact that the authors did not use a montage of the same movie in both conditions. By using different movies, even if the movies are comparable with regard to the main character and movie genre, other factors, such as emotions and enjoyment of the movie, might cause different responses in smokers. With regard to investigating the effect of smoking cues in movies, it is therefore essential to use a representative segment of a movie and to use a montage of the same movie in both conditions.

People watch movies for any number of reasons: to relax, to become distracted from everyday life, or to be entertained by being absorbed in a narrative (Green & Brock, 2000). Narratives are able to transport people into a state of involvement and absorption. Green and Brock have defined this process of transportation as “a convergent process, where all mental systems and capacities become focused on events in the narrative” (p. 701). This complete immersion into the world of the story may involve losing track of time and failing to observe events around the viewer by his or her consciously or unconsciously pushing real world facts aside. Therefore, the real world and real world facts may become inaccessible (Green, Brock, & Kaufman, 2004; Green et al., 2008). This could indicate that viewers who are highly transported might perform fewer actions in the real world.

By investigating the effect of movies, it is therefore essential to consider individual differences in the magnitude of transportation.

Assessing the effects of smoking cues in movies on immediate smoking and their underlying mechanisms is not only important for the development and implementation of effective intervention programs but also in terms of policy regulations controlling tobacco portrayals in movies. If smoking cues in movies lead to an increase in smokers' immediate smoking behavior, smokers may find it more difficult to quit smoking, and moreover, watching movies with smoking scenes would increase the chance of relapse. The aim of the present study is therefore to investigate the influence of smoking cues in movies on smokers' actual smoking behavior while watching a movie. Using an experimental design, we exposed smokers either to a movie with or without smoking portrayal during which they had the opportunity to smoke. We predicted that smokers who were exposed to smoking characters in movies would smoke more cigarettes compared with those who were exposed to non-smoking characters. Furthermore, we tested the moderation effect of transportation on the relationship between smoking exposure and smoking behavior. We hypothesized that smokers who show little evidence of transportation in comparison with smokers, who experience higher levels of transportation, will be influenced by smoking cues in movies and thus smoke more.

Method

Sample and procedure

The sample consisted of 60 daily smokers (35% males) between the ages 16 and 51 years, with a mean age of 20.87 years (SD = 3.22). The sample consisted of 60 daily smokers (35% males) between the ages 16 and 51 years, with a mean age of 20.87 years (SD = 3.22). If participants did not meet the <13 ppm cutoff, they were excluded from the study (e.g., Sayette, Loewenstein, Griffin, & Black, 2008). Additionally, to conceal the real aim of the study, they were also asked to refrain from smoking 6 hr prior to the experiment, which is a commonly used approach in cue-reactivity research (e.g., Sayette, Loewenstein, Griffin, & Black, 2008). Additionally, to conceal the real aim of the study, they were also asked to refrain from drugs and alcohol. A laboratory at the Radboud University Nijmegen was equipped with a comfortable leather chair and a big-screen television to create a setting in which the participants would feel comfortable and relaxed. In order to check whether the participants had fulfilled the requirement of 6-hr abstinence from smoking, they were given a carbon monoxide (CO) breath test using a smokerlyzer (Bedfont Scientific Ltd, Bedford, UK). Participants showed CO levels ranging between 0 and 13 parts per million (ppm; M = 5.42; SD = 3.22). If participants did not meet the <13 ppm cutoff, they were excluded from the study (e.g., Conklin, Robin, Perkins, Salkeld, & McClernon, 2008). Before watching the movie, the participants were requested to complete...
a questionnaire assessing, among distracter items, sociodemographic information and their current craving. After completing the questionnaire and providing a breath sample, the edited version of the movie Married Life (2007) was shown. Participants were told that we were interested in how people watch movies at home and that they would be allowed to smoke and consume drinks and nuts that were provided. During the movie, the behavior of the participants was observed and recorded with a hidden camera. After the movie, the participants answered questions about their craving, their transportation, and their smoking habits. Afterward, participants were asked about the real aim of the study (none of whom guessed correctly). They were debriefed, thanked, and given €45 for their participation. The protocols for the study were approved by the Ethical Committee of the Faculty of Social Sciences, Radboud University Nijmegen.

Movie adaption

The contemporary movie, Married Life (2007), was edited to obtain two similar versions of the movie, one with smoking scenes and one without any portrayal of smoking. This particular movie was chosen because of the high number of smoking cues portrayed: All four main female and male characters smoke at least once during the movie. The version shown in the experimental condition contained 16 smoking scenes (= 7.04 min). Both versions were nearly identical in regard to story line and scenes; this controls for the fact that any effect (or lack thereof) cannot be explained by differences in the story and/or affective responses caused by the movie. First, the version used in the control condition was edited. All smoking cues were removed from the movie. About 15 min were cut from the movie, resulting in a length of 72 min. Next, the movie used in the experimental condition was edited. Fifteen minutes of movie material that did not contain any smoking cues were removed, mainly by removing material from those scenes that were also edited in the control condition. Both versions were the same length and did not differ with regard to the story line.

Measures

Smoking behavior

During observation, we counted the number of cigarettes the participants smoked.

Smoking habits

Participants completed a questionnaire assessing their smoking history and current smoking patterns (e.g., age of initiation, number of cigarettes smoked per week).

Craving

We used a visual analog scale (VAS; Smolka et al., 2006) and the four-item Questionnaire on Smoking Urges (QSU-4; Carter & Tiffany, 2001) to measure craving. Using the VAS, participants were asked to indicate their desire to smoke at the moment of completing the questionnaire, ranging from 0 to 100. The QSU-4 measured craving using the following four items: (a) nothing would be better than smoking a cigarette right now, (b) I have an urge for a cigarette, (c) all I want right now is a cigarette, and (d) I crave a cigarette. Cronbach’s α is .84.

Transportation

To measure transportation, participants had to complete an adapted version of the Transportability Scale (Dal Cin, Zanna, & Fong, 2004). As we intended to measure transportation at a specific time in response to a specific narrative, participants were asked to indicate their level of agreement with regard to the movie they had been exposed to. Answers were measured on a 9-point scale ranging from “totally not agree” to “totally agree” for items, such as “I got mentally involved in the story” and “I could easily lose myself in the story.” Cronbach’s α is .84.

Results

All participants were daily smokers, smoking on an average 74.14 cigarettes per week (SD = 39.48). Of the participants, 20% smoked 1–5 cigarettes/day, 33.3% smoked 6–10 cigarettes/day, 43.3% smoked 11–20 cigarettes/day, and 3.3% smoked 21–30 cigarettes/day. They had, on average, initiated smoking at the age of 14.18 years (SD = 2.49). Participants’ craving level prior to the experiment was on average 52.90 (SD = 22.89, QSU-4) and 76.88 (SD = 11.94, VAS). On average, participants smoked 2.69 cigarettes (SD = 1.1, range 0–6; experimental condition: M = 2.83, SD = 1.15 and control condition: M = 2.55, SD = 1.06) while watching the movie. Only one participant did not smoke at all during the experiment. The two groups did not differ with regard to the time the first cigarette was lit (p = .34). The scores for transportation ranged from 1.21 to 6.37 (experimental condition: M = 4.52, SD = .91 and control condition: M = 4.30, SD = 1.26).

Randomization and manipulation check

Randomization over the two conditions was successful. The two groups did not differ in terms of gender (p = .79), age (p = .07), baseline craving level (QSU: p = .11 and VAS: p = .71), the last time participants had smoked (p = .26), the CO level (p = .97), and the average number of cigarettes smoked per day (p = .00) and week (p = .87). The data indicated that the experimental manipulations were successful. In the experimental condition, 80% of the participants accurately recalled having seen at least three of the four main characters smoking. In the control condition, only one (3.3%) of the participants mistakenly recalled having seen one of the four characters smoking.

Tests of hypotheses

An analysis of covariance (ANCOVA) was conducted in order to test the effect of smoking cues in movies on immediate smoking behavior. The independent variable was the experimental condition (movie with smoking scenes vs. movie without any smoking scenes), and the dependent variable was the number of cigarettes smoked while watching the movie. Participants’ transportation scores were used as covariate. The results showed a significant interaction effect between transportation and condition on the number of cigarettes smoked, F(1, 59) = 7.15, p = .01, η² = .113, indicating that smokers who are low in transportation smoke more cigarettes in the experimental condition than in the control condition, while there is no difference found for smokers high in transportation. The average number of cigarettes smoked per condition and transportation scores is shown in Figure 1.

In a second ANCOVA, participants’ scores on baseline craving, gender, age, CO level, and smoking frequency per day and week were also introduced as covariates in the model. After adjusting for these variables, the interaction effect between transportation and condition remained significant, F(1, 48) = 7.45,
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Figure 1. Average number of cigarettes smoked per condition by transportation.

Discussion

The present study examined the effect of smoking cues in movies on immediate smoking behavior among daily smokers and tested whether these cues have the same effects in smokers who differ in their level of transportation. Using an experimental design in which we exposed smokers to the same movie either with or without smoking cues and allowed the participants to smoke while watching the movie, an interaction effect between condition and transportation on smoking behavior was found. Smokers who were less transported smoked significantly more cigarettes when they were exposed to smoking characters compared with non-smoking characters.

Based on cue-reactivity and imitation theories, we expected that smokers who are exposed to smoking cues in a movie would smoke more cigarettes while watching the movie compared with those exposed to non-smoking characters.

Previous studies on the influence of smoking cues in movies on smoking behavior among smokers have revealed mixed results. Shmueli et al. (2010) found that smokers were more likely to smoke after a short movie clip (i.e., 8 min) when they were exposed to smoking characters compared with non-smoking characters. The setup of the exposure to a short movie clip is not comparable with that of the present study in which we used a 72-min movie clip. The exposure to a short movie clip containing scenes from different movies is similar to the setup of cue-reactivity studies (Carter & Tiffany, 1999), and therefore, a confirmation of these results is expected and not surprising. However, exposure to a longer movie clip may demonstrate additional and/or other factors that might influence the smoking behavior causing different results. Harakeh et al. (2010) exposed smokers to a 60-min movie with or without smoking scenes and found no direct effects on the number of cigarettes smoked while watching. As was previously mentioned, the lack of effect might be explained by factors other than smoking cues, as two different movies were used in the experimental and control condition in that study.

Cue-reactivity and imitation processes are not necessarily distinct processes but might function parallel or complement each other. In general, the lighting of the first cigarette while watching a movie could be explained by cue-reactivity as well as by imitation. Once smoked—and when craving levels might be low and need time to develop again—imitation might be more appropriate to explain the continuation of smoking. In the present study smokers, increased craving levels due to deprivation might explain the lighting of the first cigarette. Because smokers continue smoking irrespective of being exposed to a movie with or without smoking cues, imitation might not play an important role in this context. Imitation might primarily occur on a micro level, and for example, people might match their puffing to that of the actors. Experiments with a larger sample size provide the opportunity to examine these underlying mechanisms.

Furthermore, a moderating factor, transportation, has been tested in our experiment. We found that smokers who were less transported smoked significantly more cigarettes when they were exposed to smoking characters compared with non-smoking characters. Being highly transported means having full attention for the events in the narrative and therefore focusing less on the real world and real world facts (Green & Brock, 2000; Green et al., 2004, 2008). High transportation might therefore perform less behavior in the real world. It might also be the case that they do not want to interrupt their immersion by performing a certain behavior, such as smoking. The performance of behavior in the real world might be less interrupting for smokers who are less transported. Another explanation might be that smokers who are less transported are bored and therefore search for distraction. As they participated in an experiment and were asked to watch the movie, smoking was a possible distraction while watching the movie. While being highly transported seems to have a temporary effect on smoking during the movie, this study was not designed to measure whether high transportation also affects smoking behavior after the movie has ended. In fact, given that previous research on transportation shows that transportation increases story-consistent beliefs (Dal Cin et al., 2004), it could be the case that highly transported smokers actually smoke more after the movie. Due to participants’ involvement in the film, the influence of smoking cues in movies might not emerge during cue exposure but might lead to a delay in the expression of the effect. Thus, it is possible that transportation does not necessarily prevent smokers from smoking more or weaken the effect of smoking cues in movies but that the effect of the cues emerges (only) after cue exposure. This needs to be clarified in future research, as the current study aimed at investigating the effects of smoking cues in movies while watching.

The study strengths include the exposure of smokers to a representative movie clip and the assessment of smoking while watching the movie instead of afterward. Although the present study extends previous research by investigating the effect of transportation, it has some limitations. First, our sample was relatively small, and replication with larger samples is needed.
Still, it should be stressed that we had substantial variation in the outcome measurement enough to find significant effects. Also our sample size is not smaller than those employed in other observational behavioral experiments (Harakeh et al., 2010; Shmueli et al., 2010). Second, although our sample consisted of daily smokers only, the sample was still diverse in respect of smoking habits. Five of the 60 participants had a CO level less than two after a 6-hr period of smoking deprivation. However, after controlling for smoking habits in the analysis, the interaction effect between transportation and condition remained significant. If we were to focus only on occasional smokers, different and probably smaller effects might be found (Field, Munafo, & Franken, 2009). Future studies are needed to reveal whether different types of smokers and smokers with different smoking history are affected in the same way. Third, it seems that individuals differ in their susceptibility to smoking cues in movies, so that smoking cues in movies affect smokers differently. We tested a moderation effect of transportation but did not examine other factors that might also influence this association. Certain individual differences such as genetic disposition or personality characteristics (e.g., transportability) and characteristics of the movie should therefore be considered in future studies with larger samples.

The present study found that images of smoking in movies influence the smoking behavior of smokers when they are less transported into the narrative. This finding provides suggestions for interventions on smoking cessation. Interventions for quitters should take into account that smoking cues in movies, in line with other environmental smoking cues, might stimulate smokers to smoke. Our results also emphasize the need of making smokers aware of the effect smoking cues in movies can have and suggest changes in the regulation of the movie rating system. Regarding the Netherlands, we suggest extending the Dutch movie rating system by integrating a warning label for smoking. In addition, to enhance the awareness of "violence" and "alcohol and drugs" but does not include a separate label for smoking. So far, the rating of movies is based on several content labels like "violence" and "alcohol and drugs" but does not include a separate label for smoking. In addition, to enhance the awareness of the effect of smoking cues in movies, the depiction of antismoking advertisements before and during movies could counteract the effect of smoking cues in movies on smokers (Harakeh et al., 2010). Given that smoking in movies influences smoking behavior among smokers and considering the health risks associated with smoking, this study provides further arguments for an adaption of the regulations controlling smoking in movies.

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**Declaration of Interests**

None declared.

**References**


