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# Media exposure and smoking intention in adolescents: A moderated mediation analysis from a cultivation perspective

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## Abstract

The study tested a moderated mediation model to examine the mechanisms underlying the link between media exposure and adolescent smoking intention by utilizing a modification of cultivation theory. A total of 12,586 non-current smoker adolescents in California were included in the analysis. Results showed that media exposure was positively related to smoking intention via perceived prevalence of peer smoking when friend disapproval of cigarette use was low. This study contributes to a better understanding of the mechanisms regarding the media effects on smoking intention, but the findings should be interpreted with caution due to the small effect size.

## Keywords

adolescents, cultivation, friend disapproval, media exposure, smoking

## Introduction

### *Media exposure and cigarette smoking*

Cigarette smoking in adolescents is a “pediatric epidemic” (Elders et al., 1994). Although great efforts have been made to reduce adolescent cigarette use, statistics show that the decline has leveled off since 2003 (US Centers for Disease Control and Prevention, 2010). The prevalence of adolescent smoking might be due to media exposure to smoking in this population. Research shows that media could greatly influence adolescent behaviors (Lyons and Dalton, 2006; Slater and Tiggemann, 2006). Villani’s (2001) review of media exposure among adolescents found that media exposure has pervasive

impact on a variety of behaviors, such as increased aggressive behavior and alcohol and tobacco use, although the majority of studies focused on television exposure. In a more recent review, Strasburger et al. (2010) found that

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media affects adolescent health and well-being, particularly for outcomes such as aggression and substance use. Similarly, Nunez-Smith et al. (2010) reviewed evidence for the idea that media exposure consistently influences substance use, and the evidence was stronger for the link between media exposure and tobacco use compared to links between media exposure and illicit drug consumption or alcohol use. These recent reviews highlight that exposure to older forms of media (e.g. television) as well as new media (e.g. video games) is a major public health concern that merits more research.

In the case of smoking, literature shows that media exposure is associated with increased smoking behavior, such as experimentation with cigarettes or age of smoking initiation (e.g. Gidwani et al., 2002; Villanti et al., 2011). Behavioral intention is a widely used concept in behavioral theories and is a strong predictor of actual behavior. Smoking intention often precedes smoking initiation but has not been systematically studied (Moodie et al., 2008). Hence, this study aims to investigate how media exposure affects adolescent smoking intention.

### *Mechanisms underlying the link between media exposure and smoking intention*

With an increase in health education programs or product advertising in the media, a review of literature reveals a trend toward examining the effects of message framing and individual difference on substance-related perceptions and behaviors (e.g. Cornacchione and Smith, 2012; Glock et al., 2013; Van't Riet et al., 2012a, 2012b). For instance, Van't Riet et al. (2012b) found that loss-framed message was more persuasive than gain-framed messages for low-relevance participants when provided with skin self-examination information. Additionally, participants with low avoidance orientation were more likely to be persuaded by low-threat message on the consequences of drinking too much alcohol, but those with high avoidance

orientation were likely to be persuaded by high-threat one (Van't Riet et al., 2012a). Still other research has found that the impact of media health messages depends on the content of prior beliefs of the target audience. For instance, Myers (in press) reported that antismoking media messages had the opposite effect on viewers and increased their comparative optimism for smoking-related illness.

Despite such a trend, less is known about the cognitive mechanisms underlying the link between degree of media exposure and adolescents' substance use. Social learning theory has been used to explain such link (Gutschoven and Van den Bulck, 2004). The theory states that people can learn new behaviors by observing other people (Bandura, 1977). In particular, a media persona who smokes acts as a symbolic model and motivates adolescents to adopt smoking behavior. In addition to the direct effect of symbolic modeling, cultivation theory (Gerbner, 1969; Gerbner et al., 2002) provides an alternative explanation. As suggested by cultivation theory, heavy television viewers tend to perceive the world according to what they perceive in television programs. They tend to have unrealistic beliefs about the real world, such as an overestimated prevalence level of violence and crime, biased beliefs about aging, and stereotypical attitudes toward minorities (see Morgan and Shanahan, 2010, for a review). This pattern has been known as the "mean world syndrome." Although the theory originated from research on television, cultivation theory has recently been expanded to study a more diverse set of media outlets such as video games, films, and social media (Morgan and Shanahan, 2010). In the present study, we utilized a modified cultivation theory to examine the effects of media exposure in general (i.e. television and video games) on adolescent smoking intention.

Media exposure could increase adolescents' access to smoking-related information, from either television programs or video games. In support of this view, a content analysis by Heaton et al. (2006) showed that 14.4 percent

movie trailers shown on television during 2001–2002 included images of tobacco use. They found that 95 percent of the youth saw at least one movie trailer depicting tobacco use and 88.8 percent saw at least one of these trailers three or more times on television. Additionally, Cullen et al. (2011) found that 40 percent of TV programs popular among US youth in 2007 contained at least one depiction of tobacco, which doubled the rate found in a similar study 10 years earlier. Christenson et al. (2000) found tobacco reference in 22 percent and tobacco use in 19 percent of the top-rated, prime-time shows of the fall 1998–1999 season, with one or more major characters using tobacco in 11 percent of top-teen programs. Video games, representing a major source of youth entertainment, with 87 percent of 8- to 18-year-olds having a video game console, and playing an average of 1 hour and 13 minutes per day (Rideout et al., 2010), are also a resource of smoking images. For instance, Barrientos-Gutierrez et al. (2012) found that tobacco reference or use accounted for about 8 percent of the time in *Starcraft*, a popular PC military game. Haninger and Thompson (2004) found that 15 percent of a random sample of 81 teen-rated video games portrayed substances, including tobacco. In addition to the tobacco depiction on television shows or in video games, smoking was often portrayed in a positive way (Stockwell and Glantz, 1997), or at least, without reference to any concomitant negative health or social consequences (Shogren, 1997). However, antitobacco campaigns portraying the negative consequence of cigarette smoking are more commonly seen in the media (Emery et al., 2005). High exposure to such smoking depiction in the media would cause adolescents to have unrealistic perceptions of smoking (e.g. “real-world prevalence of smoking is quite high”) or positive attitudes toward cigarettes (e.g. “smoking is cool”). For instance, Shanahan et al. (2004) found that TV exposure was related to higher prevalence estimates of smoking. Nan (2011) found that adolescents who watched a lot of television tended to overestimate

real-world smoking prevalence and also to hold more favorable attitudes toward smokers. Although adolescents may encounter both pro-smoking and antismoking information from the media, antismoking messages may not be able to counteract the effect of pro-smoking imagery (Straub et al., 2003). The pro-smoking portrayals lacking the negative consequence of smoking may make adolescents less likely to realize the hazard of cigarettes.

The perceived prevalence of peer cigarette smoking and perceived harm of cigarettes could in turn influence smoking intention. According to social norms theory (Perkins and Berkowitz, 1986), people’s behavior is greatly influenced by their perceptions of how other members in their social group behave. Furthermore, people have the tendency to misperceive health-compromising behaviors of their peers. If people think unhealthy behavior is typical, they tend to engage in that behavior and use these misperceptions to justify their behavior. Likewise, as perceptions of smoking prevalence increase, adolescents are more likely to see smoking as normative, which in turn leads to higher intention to smoke (Olds et al., 2005). Attitudes also play a crucial role in behavioral intention. Those who attributed less harm to cigarettes had higher smoking intention (O’Callaghan et al., 1999) and were more than twice more likely to initiate smoking (Song et al., 2009). Based on the aforementioned arguments, we developed the following hypotheses:

*Hypothesis 1.* Perceived prevalence of peer cigarette smoking mediates the relationship between media exposure and smoking intention.

*Hypothesis 2.* Perceived harm of cigarettes mediates the relationship between media exposure and smoking intention.

### *The role of friend disapproval of cigarette use*

Given that friends/peers shape adolescents’ behaviors, it is important to examine the role of



**Figure 1.** Moderated mediation model of the effects of media exposure on smoking intention.

social context—specifically how peer influence moderates media effects. During the process of pursuing independence and negotiating their sense of identity, adolescents spend less time with parents and more time with their peers. Numerous studies have consistently demonstrated significant effects of peer influence on adolescents' smoking behavior (e.g. Mullen, 2000; Villanti et al., 2011). However, most studies have focused on negative side of peer influence, whereas less is known about positive perspective of peer influence, such as peer disapproval of deviant behaviors. Friend disapproval of deviance has been consistently found to be a protective factor from a variety of delinquent and deviant behaviors, like cigarette smoking (Sawyer and Stevenson, 2008).

In light of the buffering effect of friend disapproval of cigarette use, we hypothesized that friend disapproval of cigarette use moderates the relationship between perceived harm of cigarettes/perceived prevalence of peer cigarette smoking and smoking intention. Specifically, the correlation between perceived harm of cigarettes/perceived smoking prevalence and smoking intention is stronger when friend disapproval of cigarette use is lower than that when friend disapproval of cigarette use is higher, as higher friend disapproval may attenuate the effects of smoking-related perceptions on smoking intention. Even when adolescents perceive high smoking prevalence and low perceived harm of cigarettes, it is possible that their smoking intention is reduced when their friends strongly

disapprove of their cigarette smoking. Together, the above mediational model may vary as a function of friend disapproval of cigarette use (see Figure 1 for the conceptual model). Thus, we hypothesize as follows:

*Hypothesis 3.* Friend disapproval of cigarette use moderates the mediation model of media exposure and smoking intention via perceived harm of cigarettes and perceived prevalence of peer cigarette smoking. The mediational role of the two perceptions is more robust when friend disapproval of cigarette use is lower than when friend disapproval of cigarette use is higher.

### *The present study*

Despite the sensible link between media exposure and adolescent smoking behavior, few studies have attempted to examine the mechanisms underlying how media exposure exerts its influence on smoking intention while simultaneously considering the social context of adolescents. The current study aims to address these gaps by considering the roles of smoking-related perceptions and a social-contextual variable; we examine whether perceived prevalence beliefs and attitudes toward cigarettes could explain the linkage between media exposure and smoking intention and whether the mediating role of perceived prevalence belief and attitudes toward cigarettes is moderated by friend disapproval of cigarette use.

## Methods

### Participants

The analyses used data from the 2006–2007 High School Questionnaire of the California Healthy Kids Survey (CHKS) in order to understand the effects of media exposure on smoking intention in the next year. The CHKS was developed by WestEd’s Human Development Program for the California Department of Education. More details pertaining to CHKS are available from WestEd (2013). Data analyses are based on a sample of 12,586 high school students (Median<sub>age</sub> = 16 years, 52.4% females), including 4258 Asian Americans, 999 Pacific Islanders, and 7329 White Americans, who self-identified as non-current smokers.

### Measures

Detailed psychometric properties on the CHKS were published by the WestEd Organization (Austin et al., 2010a, 2010b). Research has demonstrated the effects of socioeconomic status (SES) on adolescents’ cigarette smoking (Hanson and Chen, 2007). Although the CHKS did not provide individual information regarding SES, the corresponding school-level subsidized meal program data were used as a proxy for SES, with higher percentages of students in subsidized meal programs indicating lower SES (Yang et al., 2013). The percentages of students in subsidized meal programs were drawn from 2006–2007 California Basic Educational Data System files (California Department of Education). In addition to SES, other variables which may influence smoking intention, including age, gender, ethnicity, previous cigarette use, internal-, friend-, family-, school-, and community-connectedness, depressiveness, truancy, academic performance (Yang et al., 2013), and adult smoking, were also controlled for in the analysis.

**Media exposure.** Media exposure was measured by the item “On an average school day, how many hours do you watch TV or play video

games?” The options for this item included A (*I do not watch TV on an average school day*), B (*less than 1 hour*), C (*1 hour*), D (*2 hours*), E (*3 hours*), F (*4 hours*), and G (*5 hours or more*).

**Smoking intention.** Smoking intention was measured by the item “How likely do you think it is that you will smoke one or more cigarettes in the next year?” The item was rated on a 5-point Likert scale ranging from A (*I am sure it will not happen*) through E (*It will happen for sure*). Higher scores indicate higher intention to smoke cigarettes in the next year.

**Perceived prevalence of peer cigarette smoking.** Perceived prevalence of peer cigarette smoking was measured by the item “About how many students (a group of 100 students in your grade) have smoked cigarette at least once a month?” The item was rated on an 11-point scale ranging from A (*none*) through K (*all*) with higher scores denoting higher prevalence.

**Perceived harm of cigarettes.** Perceived harm of cigarettes was assessed by the item “How harmful do you think it is to use the cigarette frequently?” The item was rated on a 5-point scale ranging from A (*extremely harmful*) through E (*harmless*). This item was recoded so that high scores indicate higher level of perceived harm of cigarettes.

**Friend disapproval of cigarette use.** Friend disapproval of cigarette use was measured by the item “How much would your friends disapprove of you for using cigarettes?” The item was rated on a 4-point scale ranging from A (*a lot*) through D (*not at all*). This item was recoded so that higher scores denote higher friend disapproval.

### Method of analysis

Bivariate correlation analysis was used to test the correlations between media exposure, perceived prevalence of peer cigarette smoking, perceived harm of cigarettes, friend disapproval

**Table 1.** Intercorrelations between main variables.

Variables	1	2	3	4	5
1. Media exposure	1				
2. Perceived harm of cigarettes	-.08*	1			
3. Perceived prevalence of peer cigarette smoking	.01	-.05*	1		
4. Friend disapproval of cigarette use	-.08*	.22*	-.13*	1	
5. Smoking intention	.07*	-.16*	.11*	-.26*	1
Mean	3.71	4.46	3.80	3.32	1.36
SD	1.76	0.81	2.15	0.99	0.80

SD: standard deviation.

\* $p < .001$ .

of cigarette use, and smoking intention while controlling for the above covariates.

Next, we examined the mediational role of perceived prevalence of peer cigarette smoking and perceived harm of cigarettes, in order to see whether the two variables mediated the relationship between media exposure and smoking intention. We further examined whether the mediation process was moderated by friend disapproval of cigarette use. Moderated mediation is often used to examine whether a mediation process differs in terms of strength and/or direction on different levels of a moderator variable (Muller et al., 2005). The analysis was performed using Hayes' (2013) PROCESS macro.

## Results

Adolescents in the study watched television or played video games for a median of 2 hours on an average school day. The majority of adolescents had never smoked before. Bivariate correlation analysis was shown in Table 1.

Results using bootstrap approach showed that the total and direct effects of media exposure on smoking intention were not significant, but the indirect effect of media exposure on smoking intention via perceived prevalence of peer cigarette smoking was significant [ $a$  path:  $B = .05$ , standard error ( $SE$ ) = .01,  $p < .001$ ;  $b$  path:  $B = .01$ ,  $SE = .003$ ,  $p = .011$ ; 95% confidence interval (CI) = (.0001, .0011), excluding zero], whereas the indirect effect via perceived

harm of cigarettes was not significant. Overall, the multiple mediator model was significant,  $R^2 = .23$ ,  $p < .001$ .

Moderated mediation analysis showed that the indirect effect of media exposure on smoking intention via perceived harm of cigarettes was not significant regardless of the level of friend disapproval of cigarette use. However, the indirect effect of media exposure on smoking intention via perceived prevalence of peer cigarette use was significant only when friend disapproval of cigarette use was low (95% CI = (.0003, .0020), excluding zero). In other words, when friend disapproval of cigarette use was low, media exposure could increase smoking intention via perceived prevalence of peer cigarette smoking. Overall the moderated mediation model was significant,  $R^2 = .48$ ,  $p < .001$ .

## Discussion

The present study demonstrated that perceived prevalence of peer cigarette smoking mediated the relationship between media exposure and smoking intention, and friend disapproval of cigarette use further moderated the relationship between perceived smoking prevalence and smoking intention. Media exposure was positively correlated with perceived smoking prevalence, which in turn was positively related to smoking intention when friend disapproval of cigarette use was low. The moderated mediation model highlights that media could shape adolescent cognitions, which in turn affect

behavioral intention to smoke, especially under certain social conditions.

Cultivation theory states that media exposure has two types of effects, first-order and second-order (Shrum, 1995). First-order effects examine quantitative estimates of frequency or probability of events in the real world, for example, smoking prevalence. Second-order effects test value judgment or general attitudes toward social reality, like the perceived harm of cigarettes. Our findings suggest the mediation role of first-order effects, but not second-order, underlying the link between media exposure and smoking intention. The common images of smoking increase adolescents' perception of smoking prevalence. If adolescents perceive cigarette smoking as a normative behavior, they might see the behavior as permissible and intend to adopt the behavior. However, the imagery depiction of cool smokers, rather than explicit portrayals of the harm or negative consequence of cigarette smoking in the media, may diminish the mediational effect of perceived harm of cigarettes. Moreover adolescents may encounter antitobacco campaign information through other ways, like school education programs, which could counterbalance the media's cultivation effect in terms of the harm of cigarettes on smoking intention.

The moderated mediation model further elucidated the role of friend disapproval of cigarette use. The two dominant perspectives of media-related research, social learning theory and cultivation theory, often view the media effects in isolation from the social context, such as peers or friends (Chia, 2006). Actually, the social context does play an important role in modifying adolescents' views and behaviors. Our study suggests that friend disapproval of cigarette use could buffer the effect of perceived prevalence beliefs on smoking intention. Lower friend disapproval of cigarette use accentuated the mediational role of perceived prevalence of peer cigarette smoking, while higher friend disapproval of cigarette use attenuated the of perceived prevalence belief. This implies that friend disapproval of cigarette use

serves as a protective factor that reduces the effects of perceived smoking prevalence, a risk factor on smoking intention. Thus, peer influence may not always be a risk factor for adolescent unhealthy behaviors (Maxwell, 2000). Instead, we need to specify the nature of peer influence and perhaps educate adolescents that their disapproval of their friends' cigarette use may help decrease subsequent smoking intention.

One point that deserves mention is the small effect size of the findings. A review of the literature shows that media effects on adolescents' behaviors are generally small or minimal. Some research shows little or no evidence for the media effects on a variety of health behaviors. For instance, Steinberg and Monahan (2010) found no evidence that exposure to sexy media initiated sexual intercourse when controlling for differential selection variables. Likewise, Ferguson's (2013) meta-analysis found little evidence for media effects on body dissatisfaction in males and minimal media effect in females, concluding no substantive links between media use and body dissatisfaction. Additionally, the meta-analysis of Savage and Yancey (2008) revealed that exposure to media violence was not associated with criminal aggression. Moreover, the meta-analysis of cultivation research by Shanahan and Morgan (1999) and Dossche and Van den Bulck (2010) found that the average cultivation effect was only .079 and .09, respectively. It resonates with their statement that cultivation effect is small, but cumulative and significant. Our findings with small effects may be the logical standard rather than the exception. Greater caution is required when claiming the relationship between media and smoking, especially from the practical perspective.

It is important to note several limitations of this study. First, when examining the media effects, both social learning theory and cultivation theory suffer some limitations, such as lack of control for covariates and the examination of causality relationship. Our study tried to address these flaws by controlling for variables that

could possibly affect smoking intention. However, the present study cannot evaluate the causality of the media exposure–perceptions–smoking intention linkage due to the cross-sectional nature of the survey. Longitudinal studies are needed to examine the causal relationship in order to remedy the flaws. Second, the analyses were based on self-report data, which may be subjected to adolescents' social desirable tendencies in reporting less media exposure and lower smoking intention. Experimental studies are needed to resolve such issue. Third, this study did not distinguish between the effects of television programs and video games on perceptions of cigarette smoking and smoking intention. However, given much of cultivation research has been limited to television viewing, our study on general media exposure by including video games represents a potential useful contribution to the literature. Finally, although the moderated mediation model was significant, the effects are small. It suggests that the findings may be insufficient at the practical level, although they are important at the theoretical level.

Despite these limitations, the study tested a moderated mediation model to extend our understanding of the relationship between media exposure and smoking intention by utilizing the cultivation theory and considering the role of the social context. Significant on theoretical level, the findings should be cautiously interpreted due to the small effect size.

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