Cue-reactivity in light and intermittent smokers: Smoking cues in smoking and antismoking stimuli

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Abstract

While overall smoking rates are decreasing, light and intermittent smoking rates are increasing. Traditional models of addiction have failed to explain this increase in low level smoking. Cue-reactivity models posit that environmental stimuli (i.e., cues) related to smoking may be associated with the elicitation of cravings leading to continued smoking. Nevertheless, some antismoking media campaigns use such cues to motivate people to consider smoking cessation. The purposes of this study were to assess traditional cue reactivity in light and intermittent smokers (LITS) and the extent to which smoking cues in antismoking images elicit cravings.

Participants were 155 college student LITS (53% female; 86% Hispanic) living along the U.S./Mexico border. Measures assessed sociodemographic information, tobacco use and history, and smoking cravings via the Questionnaire of Smoking Urges-Brief (QSU-Brief). Participants were randomly assigned to one of three conditions: smoking, antismoking, or neutral pictures. All participants rated baseline craving levels with the QSU. Afterward, participants were exposed to four pictures on a computer for six seconds, with 45 seconds in between each picture for participants to rate cravings on the QSU.

ANOVA results indicated that smoking pictures elicited significantly higher cravings relative to antismoking pictures (p = .007) and neutral stimuli (p = .019), while cravings resulting from antismoking and neutral stimuli did not significantly differ from each other (p = .793).

Results suggest that smoking pictures elicit cravings even in LITS and that antismoking pictures did not elicit similar levels of cravings or more cravings relative to neutral pictures. Thus, continued and heightened regulation of smoking advertisements and extending research on the impact of smoking cues in antismoking advertisements in other ethnic and smoking groups seem warranted.

Introduction

Light and Intermittent Smokers

- Limited research exists on light and intermittent smokers (LITS; Shiffman, 2009).
  - Light smokers: smoking daily less than 10 cigarettes per day.
  - Intermittent smokers: smoking weekly, but not daily.
- Withdrawal models of addiction have not been able to explain low levels of smoking (Zhu, Pulvers, Zhuang, & Báezconde-Garbanati, 2007).
- Light and intermittent smoking rates are increasing (Pierce, White, & Messer, 2009).
- LITS' reasons to smoke have been related to environmental cue exposure (Shiffman, Kassel, Paty, Gnys, & Zettler-Segal, 1994).

Cue reactivity

- Cue-reactivity is the experience of cravings after being exposed to appetitive stimuli (e.g., cigarettes, paraphernalia) (Rohsenow et al., 1990).
- Cue-reactivity models predict that smoking cues will elicit cravings and possibly promote smoking behavior.
- In vivo (Carpenter et al., 2009) video exposure (Upadhyaya, Drobes, & Thomas, 2004) and pictorial stimuli can effectively elicit smoking cravings (Warthen & Tiffanny, 2009).

Smoking and the Media

- Exposure to smoking advertisements is associated with smoking behavior (Choi, Ahluwalia, Harris, & Okuyemi, 2002; López et al., 2004).
- Antismoking campaigns' effectiveness in reducing smoking is inconclusive (Leshner & Cheng, 2009) perhaps due to unintentional depiction of smoking cues.
- Antismoking videos that depict smoking cues can elicit cravings in smokers (Kang, Cappella, Strasser, & Lerman, 2009).

Study Aims and Hypotheses

Aim

- Explore if smoking pictorial cues promote cue-reactivity in LITS.

Hypotheses

- There will be no differences in post-exposure cravings for smoking and antismoking pictorial stimuli.
- Neutral stimuli will produce fewer post-exposure cravings than both smoking and antismoking stimuli.

Methods

Participants

- Data were collected from 155 LITS at a University on the U.S.-Mexico border who participated for course credit.

Measures

- Demographic questionnaire: assesses information about age, gender, level of education, marital status, ethnicity, and history of past mental health services.
- Tobacco use behavior and attitude survey: gathers information about current smoking and tobacco use history (Rodríguez-Esquivel et al., 2009).
- The Fagerström Test of Nicotine Dependence (FTND): assesses the degree of dependence to nicotine (FTND; Heatherton, Lynn, Frecker, & Fagerström, 1991). Scores range from 0 to 10 with higher scores indicating higher nicotine dependence. This instrument has demonstrated acceptable internal consistency (Cronbach's α = .61) (Heatherton et al., 1991).
- Questionnaire of Smoking Urges-Brief (QSU-Brief): measures cravings to smoke (Toll, Katulak, & McKee, 2006). Scores range from 10 to 70 (i.e., higher cravings). The measure has high internal consistency (Cronbach's α = .92 to .97) (Cox, Tiffany, & Christen, 2001).

Apparatus

- Pictorial stimuli were presented on a Dell Optiplex 760 computer through a Dell VGA Ultrasharp 17" model 1708FP monitor with a 1280 x 1024 resolution at 60Hz image refreshing rate and 800:1 contrast ratio.

Stimuli

- Three different stimuli were presented (i.e., smoking, antismoking, and neutral) on the computer screen with four pictures randomly presented in each set of stimuli on Microsoft Power Point.
  - Smoking stimuli pictures with strong internal consistency in eliciting cravings were selected (Carter et al., 2006).
  - Antismoking stimuli pictures that showed smoking cues used in antismoking campaigns were extracted from the internet.
  - Pictures used for neutral stimuli were extracted from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2008).

Procedure

- The present study was approved by the IRB at the University of Texas at El Paso
- Informed consent was obtained from each participant.
- Then, participants were randomly assigned to one of the three stimuli conditions.
- Next, participants rated their cravings before (i.e., baseline cravings) and after exposure to pictures (i.e., post-exposure cravings).
  - Participants were exposed for 6 seconds to each picture and were given 45 seconds to answer the QSU-Brief before the next picture appeared automatically on the screen (replicated from Stritzke et al., 2004).
- Afterward, participants completed the questionnaire packet.
- After completion of the questionnaire, participants were debriefed and thanked for their participation.

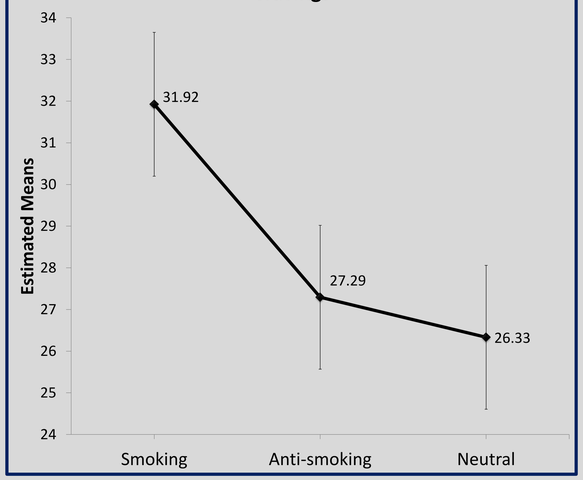
Approach to Analyses

- Descriptive analyses were used to assess participant characteristics.
- A one-way analysis of variance (ANOVA) was conducted, with smoking cravings as the dependent variable and stimuli condition (i.e., smoking stimuli, quit smoking stimuli, and neutral stimuli) as the independent variable.

Table 1. Participant Characteristics

Variable	%	Mean	SD
Gender			
Females	52		
Ethnicity			
Hispanics	88.3		
White	6.5		
Other	5.2		
Smoking Status			
Intermittent	57.0		
Light	43.0		
Age		20.96	4.14
Cigarettes per day		2.39	2.18
Days smoking		18.47	9.91
Scale Scores			
FTND		1.06	1.20
QSU (baseline)		27.83	12.26
QSU (post-exposure)		28.27	12.75

Figure 1. Estimated Means of Post Exposure Cravings



Results

Differences in Cravings across Stimuli

- Smoking stimuli produced the highest post-exposure craving scores (M = 31.92, SD = 15.35), followed by antismoking stimuli (M = 27.29, SD = 10.14), and neutral stimuli (M = 26.33, SD = 12.81) (see Figure 1).
- Post-exposure cravings were significantly different among the three stimuli conditions when controlling for baseline craving scores, with a moderate effect size observed (F (2, 151) = 4.23, p = .016, η^2 = .05).
- Smoking stimuli produced significantly higher post-exposure craving scores relative to antismoking stimuli (p = .007) and neutral stimuli (p = .019).
- No differences in cravings between antismoking stimuli and neutral stimuli (p = .793) were observed.

Discussion

Conclusions

- These results suggest that smoking cues promote cravings, but may not promote cravings when presented negatively in antismoking advertisements.
- Kang et al. (2009) observed that antismoking messages with a weak argument, rather than a strong argument against smoking, elicited cravings.
- Hence, antismoking advertisements with smoking cues may effectively suppress cue-reactivity if the antismoking message is strong.
- Future studies could pre-test stimuli more rigorously and compare different types of antismoking messages (e.g., weak vs. strong, presence vs. absence of cues) to further understand antismoking cue-reactivity in light and intermittent smokers.

Limitations

- First, results may not be generalizable to all smokers, but implications apply to Hispanic college student LITS.
- Second, self-report of cravings was used without physiological measures of cue-reactivity but is still noted as a valid measure of cravings (Carpenter et al., 2009).
- Third, demand characteristics were not addressed in the present study.

Future Directions

- Further regulation of smoking advertisements is warranted.
- Explore smoking changes in the context of cue-reactivity with self-monitoring diary studies (e.g., Taylor & Cooper, 2010) to assess the effect of stimuli exposure on participants' smoking.
- Design studies to reduce craving responses to cues that could assess and promote the efficacy of novel interventions.
- Select antismoking stimuli with pictures that are readily identifiable as antismoking advertisements enhancing external validity of stimuli.

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