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ORIGINAL INVESTIGATION

Do People Serve as Cues to Smoke?

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ABSTRACT

Introduction: Recent research has identified that the environments in which smoking has previously occurred can alone, in the absence of any explicit smoking stimuli (e.g., cigarettes, lighters), serve as cues that induce robust craving to smoke. The goal of the present study was to determine if people can similarly function as smoking and nonsmoking cues capable of directly affecting smokers' cue-induced craving.

Methods: Smokers (N = 72) borrowed cameras to take photos of the people in their lives around whom they do and do not smoke ("personal" smoking and nonsmoking people, PS and PN, respectively). Self-report and physiological cue reactivity to those photos were compared with smokers' reactivity to photos of people unknown to them ("standard" smoking and nonsmoking people, SS and SN, respectively).

Results: Results suggest that the people around whom smokers regularly smoke (PS) can alone function as cues capable of eliciting patterns of reactivity similar to that evoked by proximal and environment smoking cues, namely, increased craving to smoke, negative affect, and excitement. In contrast, the people around whom smokers do not smoke become associated with not smoking (PN) and serve a potential protective function by reducing craving and increasing calm.

Conclusions: This novel investigation and its results have implications for promoting smoking cessation by developing strategies to manage a smoker's social environment.

Cue-reactivity studies have established that drug-dependent individuals respond with significant changes in subjective (e.g., self-reported craving) and physiological (e.g., heart rate [HR]) indices of responding when exposed to cues most proximal to drug administration (e.g., heroin needles, lit cigarettes, drug use paraphernalia; see Carter & Tiffany, 1999, for review). Specific to smoking, recent cue-reactivity studies have shown that stimuli more distal to actual smoking can also function as salient cues to smoke (Conklin, 2006). Recent work in our laboratory has revealed that exposure to smoking-related environments alone, in the absence of any proximal cues to smoke, elicits robust craving to smoke (Conklin, Robin, Perkins, Salkeld, & McClernon, 2008). Moreover, when such environment stimuli are personalized, by having smokers take pictures of the actual places in which they most often smoke and using those pictures within the cue-reactivity paradigm, smokers respond with even greater reactivity, particularly heightened craving (Conklin, Perkins, Robin, McClernon, & Salkeld, 2010).

In addition to environments, there may be other distal cues that, devoid of explicit smoking stimuli, can alone elicit strong craving to smoke, most notably, other people. Clinically, smokers readily report that the majority of their urges and lapses occurs in the presence of family and friends who smoke (Stöffelmayr, Wadland, & Pan, 2003). Among substance-abusing women, research has shown that spending considerably more time with friends and family who encourage abstinence versus those who support drug use is positively associated with favorable treatment outcome (Falkin & Strauss, 2003). By contrast, having smokers in one's social network can negatively affect cessation maintenance and has been shown to differentiate those who maintain abstinence from those who relapse within 1 year after quitting (Mermelstein, Cohen, Lichtenstein, Baer, & Kamarck, 1986). Likewise, having former smokers as close friends (i.e., those likely to discourage smoking) has been associated with increased likelihood of becoming a successful abstainer rather than a recidivist (Eisinger, 1971). On balance, research suggests that having people in one's life who encourage quitting can have a positive impact on cessation efforts, while the reverse is true of those who, directly or indirectly, support smoking. However, the specific mechanisms underlying those social effects remain largely unknown.

Classical conditioning is one possible mechanism through which an individual's social contacts might affect the likelihood of engaging or refraining from drug use. Through repeated drug administration in the presence of certain people,

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those individuals might themselves gain associative properties, such that they alone signal drug availability. Likewise, repeated refraining from drug use in front of specific people might create an association whereby they signal restraint from drug use. From a conditioning perspective, over time the link between specific people and drug use or abstinence could allow exposure to those individuals to evoke responses consistent with drug seeking (e.g., increased craving) or drug avoidance (e.g., reduced craving), respectively.

To determine if people can, like proximal and environment cues, function as discrete cues for smoking, we designed a method for having smokers take pictures, using borrowed digital cameras, of the actual people in their lives around whom they do and do not smoke. All photographs of people were edited to show them from the shoulders up, with neutral facial expressions, standing in front of a white background that was absent of any other stimuli (e.g., background, smoking paraphernalia, etc.). The elimination of facial and smoking-related cues allowed for a clean assessment of the ability of people alone to function as cues for smoking or not smoking. These pictures were presented in a cue-reactivity paradigm along with control pictures of strangers matched on age, sex, and race. This allowed for assessment of smokers' reactivity to the people in their lives in comparison with demographically similar people who were strangers (i.e., examine and control for the effect of exposure to people in general).

Based on our past research with both proximal and distal cues, if the people around whom an individual typically smokes function as smoking cues, we should see greater craving, negative affect, and excitement, as well as lower positive affect and calmness as a function of exposure to smoking-related people compared with both personal nonsmoking (PN) people and matched control people (i.e., strangers). Additionally, if nonsmoking-related people are truly associated with not smoking, we should see attenuated craving to nonsmoking people compared with matched controls. Our past psychophysiology work also suggests that exposure to personal smoking (PS) people should increase HR and skin conductance (SC) compared with both nonsmoking people and matched controls.

METHODS

Participants

Seventy-two smokers (36 men and 36 women) were recruited for the study through newspaper advertisements and flyers inviting, "healthy men and women smokers, ages 20–65 [to participate in] a research study investigating smoking cues." For the purpose of guarding against a primarily undergraduate student sample of nondependent or mildly dependent smokers, the age range was restricted to 20–65 and the number of cigarettes per day to greater than 10. Participants were daily smokers between the ages of 20–65 (M = 34.39; SD = 12.33; range = 20–61), smoked 10 or more cigarettes per day for at least a year (M = 20.15; SD = 5.60; range = 10–40), and had a carbon monoxide (CO) concentration greater than 8 ppm (M = 22.76; SD = 12.10). Participants had an average Fagerström Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker & Fagerström, 1991) score of 5.3 (SD = 1.9; range = 2–10) and received $125 for completing the study.

Design

Each participant attended three individual sessions. Session 1: Structured interview to determine the "smoking" and "nonsmoking" people to photograph; Session 2: Camera return with taken photographs; Session 3: Cue reactivity to people cues. Ethical approval was obtained from the Institutional Review Board of the University of Pittsburgh for all research presented here.

Stimulus Materials

Session 3 cues were presented in a 2 cue (smoking people, nonsmoking people) × 2 source (personal, standard) within-subjects design. Cues consisted of eight photos of individuals. The four "personal people" photos were of two people around whom the subject smokes (PS), and two people around whom the smoker does not smoke (PN). The four "standard people" photos were of individuals unknown to the subject but matched on age, sex, and race to the people in the participants' PS and PN pictures (two standard smoking [SS] and two standard nonsmoking [SN], respectively). Of note, smoking and nonsmoking people were based on the participant's experience of smoking or not smoking in front of those individuals, regardless of the pictured individual's own smoking status. For example, a participant's grandmother might smoke, but if the participant would never smoke in front of her, she could be a nonsmoking cue.

The four experimenter-generated standard people pictures were chosen from a large set of 128 headshots of people gathered from the Internet. These people were divided equally across four age groups (18–30, 31–45, 46–55, 56–older), men and women, Black, and Caucasian. The addition of matched controls allowed for assessment of the impact of exposure to people in general on subjective and physiological indices of reactivity in smokers. The standard set of pictures was rated by 10 independent raters. There was a 96% interrater reliability for age group and a 100% interrater reliability for both sex and race. In addition, all standard and personal pictures were of equal resolution, 72 pixels per inch (ppi).

To control for order effects, the eight pictures (two PS and two PN, and four standard matched pictures, two SS and two SN) were counterbalanced such that no cue type appeared more than twice in a row and an equal number of cue types occurred in the first and second half of the session. Four orders following these rules were created and repeated an equal number of times (i.e., 18 times) across the 72 participants.

Self-Report Measures

Initial questionnaires included: The Smoking History Form, 36 items of basic demographic information and smoking patterns (Conklin & Perkins, 2005; Conklin, Tiffany, & Vrana 2000); the FTND (Heatherton et al., 1991), a six-item multiple-choice questionnaire that yields a score (0–10) for level of nicotine dependence; the Balanced Inventory of Desired Responding-Impression Management (BIDR-IM; Paulhus, 1991), 20 items that allow for assessment of associations between impression management and self-report measures. Following each cue-exposure picture trial, participants completed brief posttrial ratings including: a four-item craving measure (QSU-4; Carter & Tiffany, 2001), a four-item relevance measure (assessing the extent to which the participant could envision actually interacting with each

person viewed), and single-item ratings of vividness, positive and negative affect (Diener & Emmons, 1984), and arousal (excited and calm). For each posttrial rating, participants were instructed to answer based on how they felt while focusing on actually being with the person just pictured. All ratings were done on a 100-point scale.

Physiological Measures

HR and SC measures were collected during the third session cue-reactivity procedure. HR and SC were measured using BioPac physiological recording equipment (BioPac Systems). Pulse was recorded from a BIOPAC photoelectric pulse plethysmograph transducer attached to the nondominant index finger. SC was recorded from two BIOPAC Ag/AgCl electrodes filled with isotonic gel and attached to the middle and ring fingers of the nondominant hand.

Procedure

Session 1

The first session lasted approximately 90 min. The participant signed consent forms, reported time since last cigarette, and gave a CO expired-air breath sample (Vitalograph). After completing initial questionnaires, the participant listed and rank ordered 10 people around whom he/she most often smokes and 10 people around whom he/she does not smoke. The experimenter then conducted a semistructured interview to determine the three smoking and three nonsmoking people of whom the participant would take pictures. The people could be anyone from the smoker's life, but had to meet specific criteria. Smoking people had to be individuals the participant was with at least once a week (mean = 4.08 days), smoked in front of at least 7 out of 10 times (mean = 9.14 out of 10 times), and was rated as someone it would be difficult to not smoke around of at least a 5 on a scale of 0–10 (mean = 8.15). Nonsmoking people had to be individuals whom the participant was with at least once a week (mean = 3.78), did not smoke around more than 2 out of 10 times (mean = 0.086), and rated the difficulty of not being able to smoke around him/her at 5 or less on a scale of 0–10 (mean = 1.64). Note: Participants took pictures of three people in each category, but only two of each type were used in the Session 3 cue-reactivity trial. This was done to create a buffer if someone refused to let the participant take his/her picture or the pictures taken were not clear. Lastly, participants received written instructions on how to take pictures and practiced using the camera in the lab. They then borrowed an Olympus Camedia D-390 digital camera (Olympus Optical Co., Ltd.).

Session 2

One week later, the participant dropped off the camera and supplied a CO breath sample in order to capture typical midday smoking exposure (mean = 21.43 ppm). The experimenter reviewed the people pictures and scheduled a third session for approximately one week later (to allow sufficient time for picture editing). The participant was told to abstain from smoking for at least 6 hr prior to the third session.

Session 3

The third session lasted approximately 2 hr. The participant first provided a CO breath sample (mean = 9.10 ppm) to verify 6-hr abstinence from smoking. CO level had to be no more than 50% of his/her highest CO level from the previous two sessions. If a participant failed to meet the CO criteria, he/she could reschedule once. No subjects failed to meet the abstinence criteria. Next, physiological monitors were attached to three fingers on the participant's nondominant hand. A HR pulse plethysmograph monitor was attached to the index finger and two galvanic skin response monitors were attached to the middle and third fingers.

The experimenter then explained the automated cue reactivity. The participant was told that he/she would be prompted to sit back comfortably in the chair and clear his/her mind. Pictures of people would then appear on the screen and he/she was to focus on actually being with each person regardless of whether or not the individual was familiar. After the picture trial, the participant would fill out subjective ratings and complete another relaxation period (20 s) before the next picture trial would begin.

Following a neutral practice trial to ensure that the participant could correctly follow the trial instructions, the experimenter left the room. The participant completed eight automated cue-exposure trials, which followed a standard format: 20-s relaxation, 20-s baseline, 30-s cue-exposure, and self-report ratings. The presentation of the pictorial stimuli was controlled by Microsoft PowerPoint (Microsoft Corporation) software on a Compaq Evo computer (Hewlett Packard Company) and displayed on a 22″ monitor (ViewSonic Corporation). After the final trial, the experimenter returned to the room, removed the monitors, debriefed, and paid the participant.

Data Reduction and Analyses

An interactive editing program was used to eliminate artifacts from the HR data and convert it to beat-per-minute HR. The SC signal was amplified at 10 Amho/V (0–100 Amho range) and bandpass filtered online (1.0–0.05 Hz). All signals were digitized at 250 Hz, passed to a PC-based BIOPAC MP100 data acquisition workstation, and saved to the hard drive. For each measure, deviation scores were computed for each trial by subtracting combined data from the stimuli presentation periods from the average of seconds 6–14 of the baseline for each trial.

The overall data analytic strategy focused on the impact of photo Source (personal, standard) and Cue (smoking person, nonsmoking person) on self-report and physiological indices of reactivity using a 2 (source) × 2 (cue) within-subjects repeated measures of analysis of variance (ANOVA). Although we anticipated no difference between the two matched control stimulus groups (SS and SN), we made an a priori decision to kept them separate in the analyses. No research to date has examined discrete people cues within a cue-reactivity paradigm. Thus, it could be the case that matching the control people so closely to the personal people (i.e., on age, race, and gender) could give them some associative effects comparable with the PS or PN people to which they were matched. This analysis design would allow us to determine that. Significant interactions were investigated with pairwise comparisons ($p = .05$). Additionally, correlational analyses were conducted to examine possible associations between self-report measures and trait scales of impression management (BIDR-IM) and nicotine dependence (FTND).

RESULTS

Self-Report Measures

Average posttrial ratings for all self-report measures can be seen in Table 1. Significant source (personal, standard) and cue (smoking, nonsmoking) main effects and significant source × cue interactions are presented for each measure.

Craving
Craving data revealed a significant source × cue interaction, $F(1, 71) = 78.84$, $p < .001$. Post-hoc evaluation via pairwise comparisons revealed that, as expected, the smoking–nonsmoking difference was greater for personal people cues (mean difference = 26.42; 95% *CI*: 20.3–32.5), compared with standard people cues (mean difference = –3.26; 95% *CI*: –6.6 to 0.045), $t(71) = 8.879$, $p < .001$. The latter difference was not significant, given that the standard people pictures were matched to personal people, but contained images of strangers who participants should not associate with either smoking or not smoking. By contrast, the smoking–nonsmoking difference for participants' personal people cues led to an effect size that would be considered large, $d = 1.12$ (Cohen, 1988). Post-hoc pairwise comparisons also revealed that craving to PS people cues was significantly greater than to standard people cues (for which smoking and nonsmoking were collapsed due to a lack of difference), $t(71) = 7.13$, $p < .001$. Likewise, craving to PN people cues was significantly *less* than to standard people cues, $t(71) = 4.01$, $p < .001$. These craving effects are depicted in Figure 1.

Vividness
There was a significant main effect of source, $F(1, 71) = 103.70$, $p < .001$. Participants rated their personal people as significantly more vivid than the standard people.

Negative Mood
The ANOVA on negative mood ratings revealed a significant source × cue interaction, $F(1, 71) = 7.98$, $p = .006$. Post-hoc tests revealed that this effect was driven by the difference between smoking and nonsmoking people cues under the personal condition, as the negative affect cue difference under standard people cues was not significant.

Positive Mood
A significant source effect for positive mood was found, $F(1, 71) = 70.96$, $p < .001$. Participants reported a greater positive mood after viewing their own personal cues compared with standard cues.

Excited
There was a significant source effect for self-reported excitement, $F(1, 71) = 53.80$, $p < .001$. Participants reported greater excitement when viewing personal cues compared with standard cues. There was also a significant cue effect, $F(1, 71) = 7.41$, $p = .008$. Smoking cues led to greater excitement compared with nonsmoking cues.

Calm
There was a significant source effect for self-reported calmness, $F(1, 71) = 5.20$, $p = .026$, as well as a significant cue effect, $F(1, 71) = 8.16$, $p = .004$. These effects appear to have been driven by a significant source × cue interaction, $F(1, 71) = 6.04$, $p = .016$, suggesting that smokers reported feeling significantly calmer when exposed to PN cues compared with all other cues, despite participants rating enhanced excitement to personal cues and to smoking cues (as noted above).

Relevance
The ANOVA for relevance ratings revealed a significant source effect $F(1, 71) = 101.15$, $p < .001$, such that participants rated personal cues as more personally relevant compared with standard cues.

Physiological Analyses

No difference in HR as a function of the cue or source manipulations was found. However, there was a significant source effect on SC, $F(1, 71) = 6.65$, $p = .01$. Increase in SC was greater as a function of exposure to personal people cues compared with standard people cues. This SC difference suggests a familiarity effect in which individuals commonly demonstrate greater increases in SC while viewing pictures of familiar faces compared with unfamiliar faces (Ellis, Quayle, & Young, 1999). No difference as a function of the cue manipulation (smoking vs. nonsmoking) was revealed. SC means can be seen in Table 1.

Correlational Analyses

Correlational analyses were conducted between self-report measures and the BIDR-IM (impression management scale) to determine if tendency to engage in impression management, which could bias subjective reporting, was

Table 1. Self-Report Measures as a Function of Source (Personal, Standard) and Cue (Smoking, Nonsmoking)

Source	Personal		Standard		Significant effects		
Cue	Smoking	Nonsmoking	Smoking	Nonsmoking	S = Source	C = Cue	I = Interaction
Craving	64.7 (24.4)	38.3 (23.0)	44.8 (24.4)	48.1 (24.2)	S = $p < .001$	C = $p < .001$	I = $p < .001$
Vividness	89.0 (19.4)	88.3 (18.0)	54.5 (25.2)	54.9 (23.7)	S = $p < .001$		
Negative affect	24.4 (23.8)	15.6 (19.1)	21.8 (21.8)	21.7 (21.7)		C = $p < .05$	I = $p < .05$
Positive affect	55.8 (23.3)	55.1 (22.7)	33.8 (23.0)	33.3 (22.7)	S = $p < .001$		
Excited	49.7 (23.5)	42.6 (24.1)	30.3 (21.6)	29.6 (21.3)	S = $p < .001$	C = $p < .05$	
Calm	45.6 (21.0)	54.4 (21.0)	45.1 (20.2)	46.1 (21.5)	S = $p < .05$	C = $p < .05$	I = $p < .05$
Relevance	91.6 (16.6)	91.0 (16.3)	58.4 (21.5)	59.0 (20.0)	S = $p < .001$		
Skin conductance	.025 (.058)	.026 (.082)	.011 (.088)	.010 (.039)	S = $p < .01$		

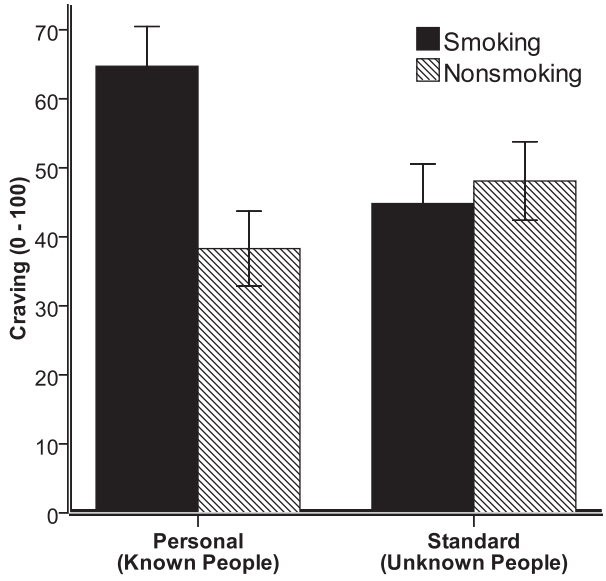

Figure 1. Mean craving for personal smoking, personal nonsmoking, standard smoking, and standard nonsmoking people cues.

associated with self-reported reactivity. Unlike past studies we have conducted, in which BIDR-IM was associated with a tendency to underreport level of craving (Conklin et al., 2008) or negative affect (Conklin et al., 2010), we found no significant correlations between impression management and any of the self-report measures in the present study. Yet, also unlike our past studies, we *did* find an association between FTND scores and craving. Having a higher FTND score was positively associated with craving during PN people cues. This finding suggests that more dependent smokers may experience less attenuation of craving in the face of cues to not smoke compared with their less dependent counterparts. No other significant correlations emerged.

DISCUSSION

It has long been assumed that avoiding people one associates with past drug use and interacting with those who discourage it may aid addiction recovery. Some correlational support for this notion has been reported (Eisinger, 1971). The present study offers more direct empirical support for a causal link between the people in one's life and craving to smoke, and suggests that conditioning is one possible mechanism underlying that relationship. Our results demonstrate that exposure to the people around whom one has typically smoked can, like other smoking-related stimuli (e.g., proximal drug cues, environments), bring about robust increases in craving, negative affect, and excitement. In contrast, exposure to the people a smoker chooses not to smoke in front of can have an attenuating effect on craving. We know of no prior research that so clearly demonstrates these effects of people as smoking cues.

The results of this study suggest that managing one's social relationships can influence the frequency and severity of acute craving to smoke, potentially affecting quitting success. Compared with other static cues like environments or explicit smoking stimuli, people associated with smoking may be a good target of intervention during behavioral therapy because they are not only influential but much more dynamic as well. Likewise, unlike other distal smoking cues (e.g., environments, Conklin et al., 2010), people cues may be targeted in treatment in highly interactive ways. For example, quitting smokers can begin to refrain in front of individuals strongly associated with smoking in an effort to begin a sort of real-world extinction of cue-induced craving. Additionally, quitting smokers might ask these same people to discourage smoking through statements supporting nonuse of cigarettes and/or by themselves refraining from use around the quitting smoker. Regardless of an acquaintance's smoking status, he/she can positively affect another's quit success. For example, parents who strongly discourage smoking are more likely to have nonsmoking kids, even if they themselves are current smokers (Jackson & Henriksen, 1997). Different coping strategies specific to preparing for interactions with smoking individuals who cannot be avoided may need to be addressed in therapy.

Perhaps of even greater clinical importance is what the present study reveals about exposure to the people around whom one typically refrains from smoking (e.g., pastors, parents, bosses, friends who hate smoking). Craving to smoke was significantly lower during exposure to those people—not just lower than that experienced with smoking-related people, but lower than the level of craving experienced when exposed to matched strangers. People associated with not smoking therefore appear to serve a protective function against an individuals' urge to smoke. We believe this finding is highly novel, as we have not previously identified cues that function in this inhibitory-type manner; and, we know of no past controlled human research identifying specific cues that function to actually reduce craving. As other researchers have noted, smoking in social networks is difficult to modify and presents a constant source of smoking cues with which individuals must contend (Lichtenstein, Glasgow, & Abrams, 1986). If the presence of a friend or individual associated with not smoking attenuates the urge to smoke in such situations, increasing time and social engagement with those individuals may be an important component of cessation therapy. Future research is needed to determine if nonsmoking people cues reduce urges even in the face of other proximal and distal cues to smoke (e.g., lit cigarettes, permissive environments like a bar). If so, associating with such people could serve a more explicit protective function by reducing the adverse impact of environmental smoking stimuli on craving.

The findings of the present study may also shed light on past studies examining relapse scenarios. Shiffman and colleagues have consistently reported that the presence of other smokers is a particularly dangerous situation for quitting smokers (Shiffman, 1986; Shiffman, Paty, Gnys, Kassel, & Hickcox, 1996). In one study, the authors note that if no behavioral coping is engaged by a quitting smoker, 94% of ex-smokers will smoke when confronted with others smoking in a social situation. Interestingly, that social effect appears to be largely specific to smoking by one's acquaintances, not by strangers (Shiffman et al., 1996). The results of the present study are in line with those findings, as enhanced craving occurred only as a function of exposure to people the smoker knew and associated with smoking, not to unfamiliar people matched on demographic characteristics. This is not to say that viewing strangers smoking might not increase urge to smoke or smoking behavior, only that cue-induced craving during such exposures

is likely driven more by proximal smoking cues (a lit cigarette being smoked) than by the presence of the stranger per se.

Like many naturalistic cue-reactivity studies, the present study is not devoid of interpretational challenges. Perhaps most importantly, the present study requires an assumption of conditioning. That is, smokers' reactivity to pictures of familiar people is assumed to be due to prior learning in the real world, during which those individuals became associated with smoking or with refraining from smoking, over the course of repeated interactions. As some researchers have suggested, to be certain that conditioning is the mechanism at work, strangers would have to be brought to the lab and specifically paired with smoking or nonsmoking through repeated acquisition trials (Robbins & Ehrman, 1992). Thus, although the present results suggest that the actual individuals from a smoker's life are capable of increasing or quelling urges to smoke, which was not the case with strangers, attributing this effect to prior real-world learning or conditioning is an assumption. Future work examining in-lab conditioning of people may be useful in further understanding people as cues to smoke. Likewise, although we assessed impression management and found no correlation with magnitude of craving self-report in the present study, future work may benefit from more directly determining the extent to which alternative mechanisms, such as the study demand characteristics or expectancies for how one should react to various people, might be at play.

It is also important to note that the present study was not a clinical trial and the participants were daily smokers not interested in quitting, perhaps limiting the generalizability of results to smokers attempting to quit. Although we found clear effects of people cues on craving, our study does not offer information about how these cues affect actual smoking behavior (Perkins, 2009). Thus, it remains to be determined if exposure to people personally associated with smoking has a causal effect on actual smoking behavior or, in an abstinent sample, on lapse and/or relapse. The same is true with regard to the protective function found in the present study with exposure to people associated with not smoking. Smokers' self-report and associative evidence (McBride & Pirie, 1990; Shiffman, 1986) suggest that a causal link may be likely, but future research examining actual smoking as a function of people cue exposure in experimental and/or clinical samples is needed.

In conclusion, our study demonstrates that people can serve as cues for increased craving to smoke or, perhaps more uniquely, as cues to decrease craving to smoke. We know of no prior research that has clearly demonstrated these functions of people cues on craving. Because only familiar people served these cue functions, not strangers matched on demographics, our results suggest that higher or lower craving in response to these people stems from conditioned associations. Findings provide directions for clinical research on developing strategies for quitting smokers to manage their social environments, such as fostering greater contact with people who promote low craving and identifying those people who promote high craving with whom greater coping efforts may be needed.

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DECLARATION OF INTERESTS

None declared.

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