The association of point-of-sale cigarette marketing with cravings to smoke: results from a cross-sectional population-based study

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ABSTRACT

Objective To examine the association between recalled exposure to point-of-sale (POS) cigarette marketing (ie, pack displays, advertisements and promotions such as discounts) and reported cravings to smoke while visiting a store.

Methods Data were collected using a telephone survey of a cross-sectional sample of 999 adult smokers in Omaha, Nebraska. Recalled exposure to POS cigarette marketing was measured by asking respondents about noticing (a) pack displays, (b) advertisements and (c) promotions in store in their neighbourhood. A 3-item scale indicating the frequency of experiencing cravings to smoke in locations where cigarettes are sold was created by asking respondents: (1) "feel a craving for a cigarette?" (2) "feel like nothing would be better than smoking a cigarette?" and (3) "feel like all you want is a cigarette?" The association between recalled exposure to POS cigarette marketing and cravings was estimated using ordinary least squares linear regression models, controlling for nicotine dependence, gender, age, race/ethnicity, income, education, frequency of visiting stores in one's neighbourhood and method of recruitment into the study.

Results Recalled exposure to POS cigarette displays ($p<0.001$) and advertisements ($p=0.002$), but not promotions ($p=0.06$), was associated with more frequent cravings to smoke.

Conclusions Recalled exposure to POS cigarette marketing is associated with cravings to smoke as predicted by laboratory studies on the effects of smoking cues on cigarette craving. Policies that reduce or eliminate POS cigarette marketing could reduce cigarette cravings and might attenuate impulse buying of cigarettes.

INTRODUCTION

Tobacco products are one of the most heavily marketed products in the USA.[1] In the wake of the 1998 Master Settlement Agreement (MSA), which imposed significant prohibitions on tobacco marketing such as banning outdoor advertising, the tobacco industry has increasingly focused its marketing activities at the point-of-sale (POS).[2–4] In 2011, the tobacco industry spent $8.4 billion on cigarette marketing and 89% of this expenditure was made at the POS[5] in three marketing areas of (a) product displays, (b) advertisements and (c) promotional and price incentives to consumers.[3 6]

Cigarette marketing may act as a cue to smoke and prompt a craving to smoke. According to the 'withdrawal model' of craving and addiction, individuals consume drugs to relieve withdrawal-related discomforts and craving occurs to escape such aversive states.[7–10] Initially, the lack of drugs provokes a withdrawal symptom. Later, cues (such as cigarette pack displays or images used in POS marketing) become conditioned stimuli to the withdrawal-related discomforts and as such can create cravings for the drug, which in turn can lead to drug use.

The effect of POS cigarette marketing on a craving to smoke has received scant attention. Kim *et al* used a sample of 1216 current smokers and recent quitters to conduct a laboratory experiment to examine the effect of having an open display versus an enclosed display of cigarette packs on cravings to smoke in a virtual store. The results of the study indicated that exposure to an enclosed display resulted in a lower level of self-rated cravings.[11] In a different laboratory experimental study, Carter *et al*[12] examined the effect of smoking imagery on cravings to smoke. They used a sample of 63 smokers and measured self-reported cravings following exposure to various smoking-related photos, including a photo of eight cigarette packs. This photo elicited a higher craving response than a neutral photo with no cigarette imagery. In this study, the stimuli did not include a full POS cigarette display in a retail store, which may have a greater impact on craving than a photo of a small number of packs as an isolated group.[13] To the best of our knowledge, the only other study on the effect of POS cigarette displays on cravings is a qualitative study by Hoek *et al*[14] who conducted semistructured in-depth interviews with 20 participants. The participants had attempted to quit smoking in the previous 6 months and at the time of the interview, 12 were still smoke-free. The analysis of interview data suggested that seeing cigarette displays reminds quitters of smoking and its perceived benefits, and as such promotes cravings. For example, one respondent said: "It (tobacco displays) did make me long for a smoke when I saw them. … It made me think, gosh, look what I'm missing out on." Another respondent said: "There's a connection made … between seeing the packet, and knowing what the packet feels like, and then you can start by getting warmed up about opening the packet and smelling the cigarettes and lighting one up …"

These studies have two shortcomings. First, they only examine one type of cigarette POS marketing,

namely cigarette pack displays. The effects of cigarette advertisements and promotions on cravings have never been addressed. Second, except the small qualitative study by Hoek *et al*,[14] there are no observational studies about POS cigarette marketing and cravings to smoke. To address these shortcomings, our aim was to assess the association of cravings to smoke with recalled exposure to POS cigarette pack displays, advertisements and promotions using a cross-sectional population-based sample of current smokers in Omaha, Nebraska, USA.

METHODS

Sample

A total of 999 adult respondents were recruited in Omaha, Nebraska, USA using random digit dialling (45.5%) and placement of local advertisements (54.5%) in places such as the major daily newspaper and Craigslist to recruit volunteers, in 2014. The response rate for random digit dialling was 22.4%. All data were collected using telephone interviews that took an average of 20 min. Those included in the study spoke English, were 18 years of age or older, had smoked more than 100 cigarettes in their life, and smoked five or more cigarettes a day at the time of the recruitment. Those who responded 'never' (0.0058%) to the following question were excluded from the study: "How often do you visit the stores in the neighbourhood where you live? By stores, we mean such places as convenience stores, gas stations, grocery stores, supermarkets, drug stores, liquor stores and tobacco stores. (never/sometimes/frequently/always)". Ethics approval for the project was obtained from the University of Nebraska Medical Center Institutional Review Board.

While the study sample was not a probability sample and its representativeness is suspect, its sociodemographic distribution was similar to the subsample of smokers in the centre city of Nebraska Metropolitan Statistical Area in the Behavioural Risk Factor Surveillance System (BRFSS).[15] For example, the gender distribution in our sample and BRFSS was identical. The mean age was 47.8 years in our sample and 53 years in BRFSS. The percentage of respondents with a high school diploma or a lower level of education was 49.9 in our sample and 46.3 in BRFSS.

Measurement

Outcome

To measure the craving to smoke, we asked respondents the following three questions: "When you are in a store in your neighbourhood that sells tobacco products, how often do you (1) feel a craving for a cigarette? (2) feel like nothing would be better than smoking a cigarette? (3) feel like all you want is a cigarette? (1=never, 2=rarely, 3=sometimes, 4=often, 5=always)".[16–19] We summed the responses to these questions to create a scale with a range of scores from 3 to 15, with higher scores representing a higher level of craving to smoke (Cronbach's α=0.77).

Main covariate—recalled exposure to POS cigarette marketing

Respondents who reported visiting stores that sold tobacco were asked three questions about the types of POS marketing they recalled seeing: "When you are in a store in your neighbourhood, how often do you notice tobacco ads?"; "When you are in a store in your neighbourhood, how often do you notice tobacco promotions such as special prices, multipack discounts, or free gifts with purchase of cigarettes?"; and "When you are in a store in your neighbourhood, how often do you notice cigarette pack displays?" Possible responses to each question were: 1=never, 2=rarely, 3=sometimes, 4=often, 5=always. These questions were adapted from our previous studies on POS tobacco product marketing.[20 21]

Covariates

Other covariates that were included in the analyses were nicotine dependence, gender, age, race/ethnicity, household income, education, frequency of visiting stores and method of recruitment (random digit dialling vs other). Nicotine dependence was measured using the Heaviness of Smoking Index (HSI).[22 23] HSI scores range from 0 to 6 and were calculated by summing the points for time to first cigarette after waking and number of cigarettes smoked per day. Time to first cigarette is scored as follows: <5 min=3 points; 6–30 min=2 points; 31–60 min=1 point; and >60 min=0 point. Number of cigarettes smoked per day is scored as follows: 1–10=0 points; 11–20=1 point; 21–30=2 points; and >31=3 points. Higher HSI scores indicate higher nicotine dependence. Age was categorised into four groups: 18–24, 25–39, 40–54, and 55 and older. Race was categorised as non-Hispanic White, non-Hispanic Black, Hispanic and other. Education was categorised on the basis of highest grade or year of school completed as follows: less than high school, high school graduate, some college and college graduate and higher. Method of recruitment was dichotomised into random digit dialling versus other.

Statistical analysis

In all analyses, we omitted observations that had a missing value for any of the analysis variables. This constituted 5% of the total sample; only 0.6% of responses for the outcome variable, that is, craving to smoke, were missing. The analysis sample size was 947. We used ordinary least squares (OLS) regressions to model the effect of POS marketing and other covariates on cravings to smoke. We checked for the normality of residuals, linearity, multicollinearity and heteroscedasticity and found no violation of OLS assumptions.

RESULTS

Table 1 shows the characteristics of the sample. The scale of cravings to smoke had a mean of 8.5 (range: 3–15). The mean of exposure to POS marketing was 3.1 for displays (range: 1–5), 2.8 for advertisements (range: 1–5) and 3.1 for promotions (range: 1–5). The mean level of HSI was 3.3. The percentage of men was 57.4. The percentages of respondents who were 18–24, 25–39, 40–45 and over 55 years old were 7.9, 21, 36.8 and 34.3, respectively. Respondents who were non-Hispanic White comprised 66.1% of the sample. Mean income was about $31 000 and 50% of the sample had finished high school or had a lower level of education. The percentage of respondents who visited the stores in their neighbourhoods sometimes, frequently or always was 11.7, 36.6 and 51.6, respectively.

Table 2 shows the unadjusted and adjusted effects of recalled exposure to POS cigarette marketing on cravings to smoke. Unadjusted results indicated overwhelming evidence that POS displays ($p<0.001$), advertisements ($p<0.001$) and promotions ($p<0.001$) had an effect on cravings to smoke. After adjusting for all covariates, while there was very little evidence of an effect of POS promotions ($p=0.06$), the data provided strong evidence for an effect of POS displays ($p<0.001$) and advertisements ($p=0.002$). A 1 unit increase in exposure to POS displays and advertisements was associated with an increase of 0.33 and 0.22 unit in the scale of cravings to smoke, respectively. Higher HSI, lower age, lower income, lower level of education and higher frequency of visiting stores in one's neighbourhood were associated with a higher frequency of experiencing cravings to smoke. Males compared to females and respondents who were recruited through random digit dialling compared to others reported a lower frequency of experiencing cravings to smoke.

Table 1 Sample characteristics of current smokers 18 years and older in Omaha, Nebraska USA (n=947)

Variables	% or Mean (range)
Craving	8.5 (3–15)
POS marketing	
Displays	3.1 (1–5)
Ads	2.8 (1–5)
Promotions	3.1 (1–5)
HSI	3.3 (1–6)
Sex	
Male	57.4
Female	42.6
Age	
18–24	7.9
25–39	21
40–54	36.8
55+	34.3
Race/ethnicity	
Non-Hispanic White	66.1
Non-Hispanic Black	24
Hispanic	3.1
Other	6.9
Income ($1000)	31 (5–75)
Education	
Less than high school	10.2
High school graduate	39.8
Some college	36.8
College graduate	13.2
Frequency of visits to stores	
Sometimes	11.7
Frequently	36.6
Always	51.6
Method of recruitment	
Random digit dialling	45.5
Other	54.5

HSI, Heaviness of Smoking Index; POS, the point-of-sale.

Table 2 Regression of craving to smoke on cigarette POS marketing (displays, advertisements and promotions) and other covariates (n=947)

	Unadjusted $\hat{\beta}$	p Value	Adjusted* $\hat{\beta}$	p Value
POS				
Displays	0.60	<0.001	0.33	<0.001
POS				
Ads	0.63	<0.001	0.22	0.002
POS				
Promotions	0.49	<0.001	0.14	0.06
HSI	0.38	<0.001	0.44	<0.001
Sex		<0.001		0.011
Male	−0.50		−0.47	
Female	0		0	
Age		<0.001		<0.001
18–24	0		0	
25–39	−0.76		−0.58	
40–54	−1.18		−0.68	
55+	−2.48		−1.36	
Race/ethnicity		<0.001		0.219
Non-Hispanic White	0		0	
Non-Hispanic Black	0.89		0.02	
Hispanic	1.87		0.75	
Other	0.92		0.59	
Income ($1000)	−0.03	<0.001	−0.01	0.005
Education		<0.001		0.003
Less than high school	0		0	
High school graduate	−0.9		−0.54	
Some college	−1.54		−0.98	
College graduate	−2.7		−1.28	
Frequency of visits to store		<0.001		<0.001
Sometimes	0		0	
Frequently	1.5		0.81	
Always	1.91		0.91	
Method of recruitment		<0.001		<0.001
Random digit dialling	−1.66		−0.56	
Other	0		0	
$\bar{R}^2$			0.22	

*Adjusted for the effect of all covariates.
HSI, Heaviness of Smoking Index; POS, the point-of-sale.

DISCUSSION

In this population-based cross-sectional study of adult smokers, we examined the association between recalled exposure to POS and reported frequency of cravings to smoke. We found that POS displays and advertisements were associated with cravings to smoke. Our results are consistent with laboratory studies that have demonstrated in controlled settings that exposure to smoking cues, such as cigarette pack displays or images of cigarette packs, increases cravings to smoke.[11 12 24–26] Noticing POS promotions alone was not associated with cravings to smoke. This might be due to the fact that most POS promotions are telling consumers about the price of a brand, rather than emphasising the imagery of smoking. This might also be because the measurement of POS promotions was less precise as compared to POS displays and advertisement. It may be that many respondents did not understand what was meant by 'special prices' or did not provide a reliable answer to the question about noticing "free gifts with purchase of cigarettes" because such gifts are currently rare in stores.

We note six weaknesses of the study. First, owing to its cross-sectional nature, the results cannot be used to establish causality. While it is plausible that noticing POS cigarette marketing can promote cravings to smoke, it is also possible that a person who is experiencing nicotine withdrawal symptoms and thus has cravings for a cigarette would be more likely to also notice the presence of cigarette marketing. This possibility is supported by the finding in our study that those with high nicotine dependence, that is, high HSI, and higher frequency of visits to the stores reported higher exposure to POS marketing and higher cravings. Furthermore, it may be the case that smokers who experience cravings to smoke are more likely to overstate exposure to POS marketing. Second, the study relied on recalled exposure to POS marketing instead of the 'actual' amount of POS marketing in stores in a smoker's neighbourhood. Examining the actual marketing amount is important because conscious recognition of marketing is not the only influence on consumer choices and purchasing behaviours; environmental influences that are not consciously perceived by the consumer can lead to decision processes that take place entirely outside of awareness.[27–30] A further issue regarding recall bias in this study is that we assumed that respondents were capable of recalling specific types of marketing (ie, advertising, product displays and promotion) with which they may not have been familiar. Additionally, since we did not give respondents a time frame of

reference for answering questions about exposure to POS marketing, they might have reported their cumulative exposure over a long period of time. Third, self-representational concerns might have motivated respondents to adjust their reported cravings so that they correspond with their reported POS marketing exposure. This is especially important if respondents had guessed during the interview that we were hypothesising an association between POS marketing and cravings to smoke. Fourth, the extent to which survey questions about POS marketing exposure could have acted as a cue and elicited cravings to smoke would affect the validity of the findings of this research. Fifth, since the sample was from a Midwestern city in the USA, the results may not be generalisable to other regions. Sixth, while in our multivariable analysis we controlled for several important predictors of cravings to smoke, there may be residual confounding due to factors such as the primary purpose of visiting the neighbourhood stores or triggers of cravings such as observing someone else smoke before entering a store.

Despite these limitations, the findings from this study support the conclusion that POS marketing can stimulate cravings to smoke.[11 12 24–26] To the extent that craving to smoke while visiting a store can lead to unplanned purchase of cigarettes, increased consumption of cigarettes and/or relapse among former smokers,[14] these findings lend support to efforts to limit POS marketing of tobacco products as some countries such as Australia, Canada, Norway and Ireland have done.

What this paper adds

Previous studies suggest that exposure to point-of-sale (POS) tobacco marketing may stimulate cravings to smoke. These studies have two shortcomings. First, they only examine one type of cigarette POS marketing, namely cigarette pack displays. The effect of cigarette advertisements and promotions has never been addressed. Second, except a small qualitative study, there are no observational studies about POS cigarette marketing and cravings to smoke. To address these shortcomings, our aim was to assess the association of cravings to smoke with recalled exposure to POS cigarette pack displays, advertisements and promotions using a cross-sectional population-based sample of current smokers in Omaha, Nebraska USA. We found that POS displays and advertisements, but not promotions, have an association with cravings to smoke.

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Competing interests All authors have completed the Unified Competing Interests form (available on request from the corresponding author) and declare that there was no financial relationships with any organisations that might have an interest in the submitted work in the previous 3 years; neither did we have other relationships or activities that could appear to have influenced the submitted work.

Ethics approval Ethics approval for this study was obtained from the University of Nebraska Medical Centers' Institutional Review Board.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement The additional unpublished data from the study are available to the principal investigator and co-investigators only. The data are made available through a password protected shared drive only accessible to authorised personnel.

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