

Acute perceptions of preferred cigarettes when blinded to brand

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ABSTRACT

Background Marketing claims often have promoted specific perceptions that users should expect from acutely smoking that cigarette brand. Yet, little controlled study has determined the degree to which actual perceptions are based on the cigarette's tobacco constituents in the absence of knowledge about the brand's identity.

Methods 194 adult dependent smokers rated their perceptions on 'liking', 'satisfying', 'strong' and perceived amount of 'nicotine' after smoking ad lib one of their preferred brands of cigarettes. All did so either when blinded (n=118) or unblinded (n=76) to the brand they were given, with the blinding conditions from separate studies. These between-groups secondary analyses determined differences in perceptions based on blinding to brand, controlling for age and cigarettes/day.

Results All perceptions were lower for those smoking own brand under blinded versus unblinded conditions, as hypothesised. Consistent with lowered perceptions for smoking one's own brand obtained from the 118 blinded to brand, their 'somewhat' ratings for a 'how similar to own brand' item indicated uncertainty, just mid-way between 'not at all' and 'very much' on the 0–100 visual analogue scale. (The 76 unblinded were already informed it was their own brand.)

Conclusions Acute perceptions of one's own cigarette are substantially lower when smokers are simply unaware of brand, relative to those aware it is their preferred brand. Results support the notion that perceptions of smoking own brand are enhanced by marketing efforts to associate brands with expectations of pleasurable subjective effects, beyond the impact due solely to the cigarette's manufactured product constituents.

INTRODUCTION

Throughout the last century, tobacco companies have often marketed their cigarette brands by claiming, in part, clearly identifiable sensory perceptions from smoking those brands.¹ These strategies have had clear implications for policies on the regulation of tobacco products. Examples of written marketing efforts restricted in some countries, but still allowed in the USA and others,^{2,3} are appeals that the brands are 'smooth' and 'mild', or include descriptors related to 'taste', 'satisfaction', 'pleasure' or 'full flavor', as well as those emphasising relative reductions in adverse perceptions, such as 'less harsh' and 'less bitter'.^{1,4–8} These characteristics attributed to the brand are in addition to other product design features intended to suggest what the smoker will experience after using those brands, including products that improve

mouth sensation, throat scratch, among many other marketing approaches.^{1,5,8–11} Implied is the uniqueness of these effects promoted in that named brand, and descriptors of perceptions users of these brands should expect have been strongly linked to the brand's labelled packaging content, sometimes even included in the brand name (eg, 'Milds', 'Fresh'^{1,6,12}). Such efforts aim to encourage users to associate specific brands with the anticipated perceptions being promoted so they acquire a brand 'identity' and engender user 'loyalty'.^{5,13–16} For these reasons, tobacco regulation policies in Australia and an increasing number of countries outside the USA now require standardised or 'plain' packaging that eliminates most such marketing efforts aiming to increase cigarette use.^{3,17}

Yet, because branding labels on packaging and cigarette paper are still allowed in the USA and most countries, uncertain is how dependent cigarette smokers evaluate, and the degree to which they actually *can* identify, their own cigarette when they are blinded to brand. In other words, if smokers are kept blind to the brand label (unable to see the brand name or logo on the cigarette paper, pack, carton, and so on), are their acute perceptions of smoking a cigarette of their own preferred brand the same as when smoking that cigarette unblinded, as they usually do? If so, they may perceive a cigarette as being one of their own brands based on the specific identifiable acute sensory perceptions they experience when smoking it, as industry marketing efforts suggest should be common.^{7,9} However, if acute perceptions differ significantly between blinded versus unblinded access to one's own cigarette, information about the brand identification would clearly influence evaluative perceptions of smoking that cigarette. Regulatory efforts to limit brand identification markings on cigarette packaging (eg, 'plain packaging'¹⁸) and on the cigarette paper could correspondingly limit positive perceptions from smoking that cigarette, which would then have to be based solely on its tobacco constituents (a very active, separate area of regulatory research¹⁹).

We examined ratings of a smoker's own preferred brand on acute perceptions after smoking one cigarette of that brand, comparing those who were kept blind versus not blind to the identity of that brand. We assessed these ratings after ad lib smoking of one cigarette when not abstinent beforehand, to capture 'typical' perceptions of freely smoking that brand. Along with comparing blinded versus unblinded smoking conditions, individual difference factors of age, sex, dependence severity, own brand's nicotine yield and menthol brand preference were explored as potential influences on the



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magnitude of these ratings of own brand, depending on whether blinded or unblinded to brand. We hypothesised that perception ratings would be significantly lower under the blinded versus unblinded conditions, despite the exact same preferred cigarette being smoked in both. If confirmed, such differences would further support the critical importance of knowledge about the labelled brand being consumed on a smoker's rated perceptions of smoking a specific cigarette.^{11 15 18 20–22} Indeed, a very recent within-session study found significantly greater 'taste' and less 'stale' ratings (but not 'harsh', 'dry', 'strength', and so on) after four puffs on a 'premium' brand when smokers were unblinded, compared with when they were blinded to the cigarette's brand name.²² The current study assessed effects of blinding conditions on ratings of one's own preferred brand, using a between-groups design. Finally, under the blind conditions, we also paid particular attention to their rating of 'how similar to own brand' they perceived that cigarette, and factors related to that rating. The lower the certainty of 'similar to own brand' when blinded, the greater the support for the influence of brand label markings in identifying one's own preferred brand.

METHODS

Participants

Eligible were adults aged 18 or older with a smoking history of ≥ 10 cigarettes/day for > 1 year, a mid-day expired-air Carbon Monoxide reading of ≥ 10 ppm to index regular smoking and presence of Diagnostic and Statistical Manual-IV nicotine dependence criteria.²³ All had to be fluent in English and not currently diagnosed with serious medical or psychological problems (eg, cancer, heart disease, psychosis, major depression). The 194 participants (108 men, 86 women) smoked a mean (\pm SD) of 17.2 ± 5.9 cigarettes/day, with 1.0 ± 0.3 mg nicotine yield of preferred brand ($n=87$ for menthol, 107 for non-menthol), and mean score of 4.6 ± 1.9 on the Fagerstrom Test of Nicotine Dependence (FTND).²⁴ Age was 30.8 ± 11.4 years old, and men and women did not differ on these characteristics. They self-identified mostly as Caucasian (83.0%), with 12.4% African American, 3.1% Asian and 1.5% more than one ethnicity.

All were those from several past studies participating in an ad lib smoking baseline period (ie, instructed to smoke 'as usual') before this session on standardised assessment of rating perceptions from smoking a single cigarette, which occurred prior to engaging in later sessions involving other research. In this secondary analysis of data, the 76 (48 male, 28 female) smoking their own brand under unblinded conditions were those not interested in quitting soon and later underwent acute negative mood induction to determine effects on subjective and smoking behaviour responses during lab sessions conducted between February 2006 and August 2009.²⁵ The 118 (60 male, 58 female) smoking their own brand under blinded conditions were explicitly those interested in quitting in the next few months who later participated in studies evaluating a short-term method to test for efficacy of smoking cessation medications, conducted between November 2009 and May 2017.^{26–28} As described in the papers from those latter studies, all were instructed to smoke ad lib on most weeks of the study period (as well as prior to this session) and, at the time of this session, all knew they would not be making a short-term (less than 1 week) quit attempt for a few weeks, or a permanent quit attempt for a few months, after their study participation had ended.

Thus, because the blinded versus unblinded conditions during these standardised assessments were not randomised but specific to each sample recruited for the later research, both samples

Table 1 Demographic and smoking characteristics of participants smoking their own brand while blinded ($n=118$) versus unblinded ($n=76$) to the brand identification

	Blinded	Unblinded	Total
Gender			
Number of women	58 (49.2%)	28 (36.8%)	86 (44.3%)
Number of men	60 (50.8%)	48 (63.2%)	108 (55.7%)
Age*	34.1 (12.1)	25.6 (7.8)	30.8 (11.4)
Number of menthol smokers	55 (46.6%)	32 (42.1%)	87 (44.8%)
Cigarettes per day*	15.9 (5.5)	19.3 (5.9)	17.2 (5.9)
FTND	4.7 (2.0)	4.5 (1.9)	4.6 (1.9)
Nicotine yield of own brand	1.0 (0.3)	1.0 (0.2)	1.0 (0.3)
Ethnicity			
Caucasian	95 (80.5%)	66 (86.8%)	161 (83.0%)
African American	15 (12.7%)	9 (11.8%)	24 (12.4%)
Asian	6 (5.1%)	0 (0%)	6 (3.1%)
More than one	2 (0.8%)	1 (1.3%)	3 (1.5%)

Values in parentheses are either percentages or SD.

* $P < 0.001$ for difference between blinded and unblinded conditions.

FTND, Fagerstrom Test of Nicotine Dependence.

were compared on demographics and smoking characteristics. As shown in table 1, these samples did not differ on most characteristics, except those in the blinded versus unblinded conditions differed in mean age and cigarettes/day. Data analyses were adjusted for these differences in age and cigarettes/day where relevant, as described below in the Analysis section. Finally, we saw no difference in baseline CO on arrival to this session between samples, with means (SEM) for blinded versus unblinded of 22.79 (1.10) vs 20.87 (1.04) ppm, respectively, $t(192)=1.19$, $p=0.21$, indicating no differential smoking exposure prior to engaging in this smoking assessment.

Procedure

Participants' preferred brand was identified along with all smoking and demographic information during their initial screening session to determine eligibility and provide informed consent. Unbeknown to all participants, that brand of cigarettes was purchased by research staff for use in the subsequent standardised session 1–2 weeks later on assessing acute perceptions from smoking one cigarette. We used this approach to minimise any expectations participants may have had that this brand might be used during the testing session. All were instructed to simply smoke as usual prior to the session.

On arrival after assessing CO, participants were first told the purpose for the brief session was to evaluate the characteristics of smoking a commercial brand cigarette. As previously explained in more detail for a prior study,²⁹ they were then given one cigarette of their own brand, either under blinded or unblinded conditions in which all markings were covered or uncovered, respectively, and told, 'You will now be able to smoke as much or as little as you like' before lighting it and smoking it as they wished. That instruction continued with '... of your own brand of cigarettes' for those in the unblinded condition, who were then given one cigarette of their own brand and viewed it before inserting it into a portable topography assessment device from the Clinical Research Support System (CReSS; Borgwaldt KC, Richmond, VA), prior to smoking it. For the blinded condition, the cigarette was prepared before giving it to the participant. We used white Fisherbrand Labeling Tape (Fisher Scientific, Pittsburgh, PA), 13 mm wide, to cover brand markings along the top

of the filter, being careful not to cover any vent holes. If there was branding on the tobacco rod, we covered it with top brand cigarette papers. That cigarette was inserted into the CRess, with most of the filter inside the CRess mouthpiece, which was then brought in to the blinded participant for lighting and smoking.

The CRess assessed smoking exposure via total puff volume. Total volume between conditions was compared because it is the most straightforward measure of smoking exposure, as total volume has been significantly related to rise in plasma nicotine (exposure), while puff number often is not (eg, ref³⁰). Volume was assessed to interpret any differences in ratings due to the blinding conditions (ie, attribute differences in responding to variable reactions to the same amount of total exposure vs to variability in amount of total exposure). Also, use of the CRess allows naturalistic smoke consumption and ratings of that consumption,³¹ and invasive measures of exposure (eg, plasma levels) might influence subjective ratings, limiting the generalisability of those responses to smoking.

All were shown the rating form to be used to report their perceptions of the cigarette, and then instructed to smoke at least one puff. They were told to rate the cigarette using the items on the form, but only after they had finished smoking as much as they wanted and extinguished it. The subjective perceptions of the cigarette's effects were assessed with four self-report items, found sharply sensitive to cigarette nicotine content as well as predictive of subsequent acute reinforcement from smoking a research cigarette with moderate nicotine content.³² These four ask how much 'nicotine' and 'liking' was perceived, and how 'satisfying' and 'strong' the cigarette was. Those 118 smoking while blinded were also asked 'how similar to your own brand' was the cigarette; this item was not asked for those smoking while unblinded as, by definition, they already knew the cigarette was in fact one from their own brands. Each of these items was rated on a 0–100 visual analogue scale (VAS), anchored by 'not at all' at 0 to 'very much' at 100, with 'somewhat' at 50.³³

Analyses

All analyses were completed using SPSS V.24.0. Demographic characteristics were compared between blinded and unblinded conditions using independent samples t-tests and X^2 analyses (for continuous or dichotomous characteristics, respectively). The samples were found to vary between conditions on mean age and mean cigarettes smoked per day, so these characteristics were used as covariates in subsequent analyses. Preliminary analyses compared total puff volume between conditions using between-subjects analysis of covariance (ANCOVA). Primary between-subjects analyses compared mean perception ratings for 'own brand' between blinded versus unblinded conditions using multivariate analysis of covariance (MANCOVA), with follow-up univariate ANCOVAs and paired contrasts. Exploratory between-subjects analyses related these ratings to individual differences, using MANCOVA for dichotomous characteristics (eg, sex and menthol preference) and regression for continuous characteristics (nicotine yield of own brand, FTND dependence score). Also provided are partial eta-squared (η_p^2) values to indicate effect sizes of differences in analyses.

RESULTS

In preliminary comparisons, cigarette topography was not different between those smoking it ad lib under the blinded versus unblinded conditions, with adjusted mean total volumes (\pm SEM) of 528 ± 24 vs 540 ± 31 mL, respectively, confirming equal exposure to the cigarette. For our primary comparisons,

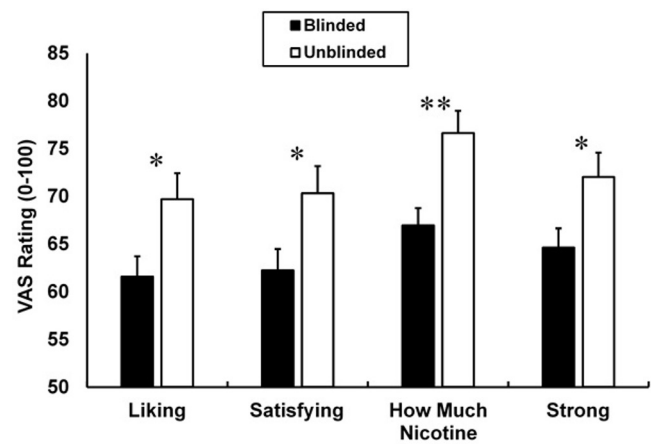


Figure 1 Adjusted mean (SEM) for subjective perception of cigarette effects (controlling for age and cigarettes smoked per day). Bars are shown separately for blinded ($n=118$) and unblinded ($n=76$) conditions. * $P<0.05$, ** $P<0.01$ for main effect of blinding condition. VAS, visual analogue scale.

multivariate analysis (covarying for age and cigarettes per day) indicated a significant main effect of blinding condition across the linear combination of the perception items, $F(4,187)=2.87$, $p=0.02$, $\eta_p^2=0.06$. As shown in figure 1, follow-up univariate analyses indicated that each perception item was significantly lower for those blinded when smoking their own brand, 'liking', $F(1,190)=4.98$, $p=0.03$, $\eta_p^2=0.03$; 'satisfying', $F(1,190)=4.46$, $p=0.04$, $\eta_p^2=0.02$; 'how much nicotine', $F(1,190)=9.75$, $p=0.002$, $\eta_p^2=0.05$; 'how strong', $F(1,190)=4.68$, $p=0.03$, $\eta_p^2=0.02$.

Exploratory analyses of individual differences in these perception ratings, under blinded versus unblinded conditions, also controlled for these differences in age and cigarettes/day. Notably, we found a significant multivariate effect of menthol brand preference on the linear combination of perception ratings, $F(4,185)=2.79$, $p=0.03$, $\eta_p^2=0.06$. Univariate follow-up analyses found that menthol smokers rated their own brand significantly higher than non-menthol smokers on individual perception items of 'how much nicotine', $F(1,188)=4.03$, $p=0.046$, $\eta_p^2=0.02$, and 'how strong', $F(1,188)=4.57$, $p=0.03$, $\eta_p^2=0.02$, but only marginally higher for 'liking', $F(1,188)=3.12$, $p=0.08$, $\eta_p^2=0.02$, and no different for 'satisfied', $F(1,188)=0.81$, $p=0.37$, $\eta_p^2=0.00$ (see figure 2). However, there were no interactions of menthol \times blinded/unblinded conditions, and so no differential influence of menthol content on ratings due to blinding. Moreover, we saw virtually no main or interaction effects of sex on perception ratings, except for lower rating of 'how much nicotine' in men versus women, 69.2 ± 1.8 vs 75.4 ± 2.4 , respectively, $F(1,188)=4.74$, $p=0.03$, $\eta_p^2=0.03$. By and large, then, men and women rated their own brand very similarly, as both rated it lower on these perception items when blinded versus unblinded to the brand identification. Regression analyses found no effects of FTND or nicotine yield of own brand on any perception items, with all standardised betas (β) between -0.10 and 0.13 , all $p>0.10$.

Finally, very consistent with these lower ratings from the 118 participants blinded to brand was their low rating for the additional 'how similar to own brand' item, 53.8 ± 2.7 on the 0–100 VAS. As above, no sex differences were observed on this

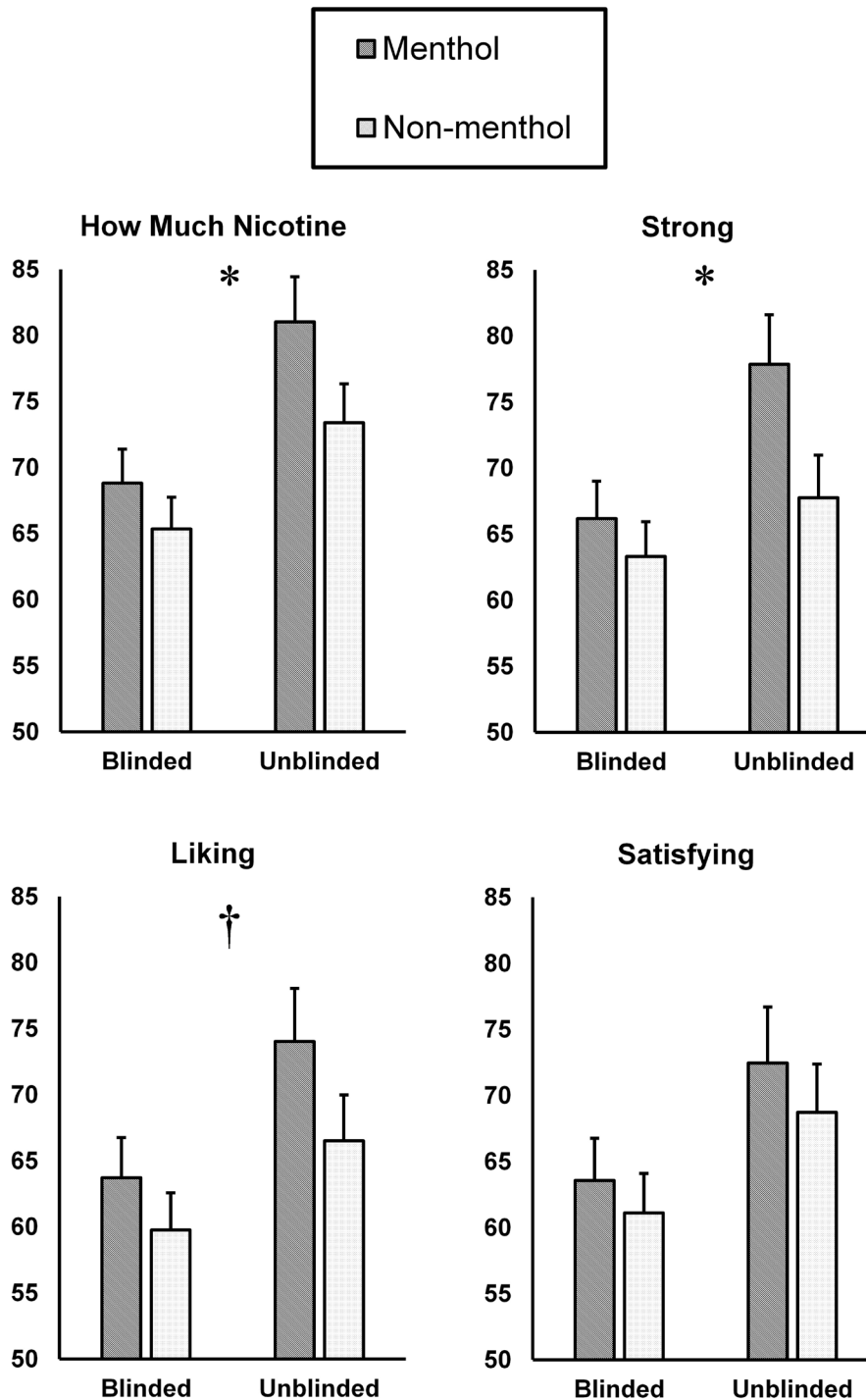


Figure 2 Adjusted mean (SEM) for subjective perception of cigarette effects (controlling for age and cigarettes smoked per day). For each subjective measure, pairs of bars are shown for each blinding condition, with one bar for menthol and the other for non-menthol. †P<0.10, *P<0.05 for main effect of menthol preference.

'how similar' rating under the blinded condition, $t(116)=0.05$, $p=0.96$, 53.9 ± 3.7 vs 53.6 ± 3.9 for the 60 male vs 58 female, respectively. Similarly, there were no differences while blinded to brand between menthol (55.4 ± 4.0) or non-menthol (52.3 ± 3.7) preference, $t(116)=0.56$, $p=0.58$. Therefore, despite these participants ad lib smoking a cigarette of their own brand, their perception of the cigarette's similarity to their brand was only 'somewhat', at the midpoint of a 0–100 scale anchored by 'not at all' and 'very much' and well below that indicating clear identification of the cigarette as being one's own brand (ie, 90–100).

DISCUSSION

As anticipated, acute perception ratings of smoking one's own brand of cigarettes differed significantly when blind to the brand, relative to those aware (ie, unblinded) it was their own brand, in this between-groups comparison. Thus, rated 'liking', 'satisfying', 'strong' and perceived amount of 'nicotine' in one's own cigarette were substantially lower in smokers unaware of what brand they were smoking, relative to those made aware they were smoking their preferred brand. Particularly telling was

that the 118 smokers blinded to brand appeared quite uncertain as to 'how similar' the cigarette they were smoking was to their own brand, rating it mid-way between 'not at all' and 'very much', despite it actually being their cigarette brand. These significant effects of blinding to brand on perceptions did not vary across these smokers as functions of individual differences, including sex, dependence severity, nicotine yield of own brand or menthol preference. We did find a main effect of menthol on higher ratings on 'how much nicotine' and 'how strong' for their own brand, perhaps consistent with other research indicating higher thresholds for discriminating cigarette nicotine content in menthol versus non-menthol smokers.³⁴

Because awareness of brand identity represents the naturalistic smoking condition, our findings add support to the notion that acute perceptions of smoking are enhanced by marketing efforts to foster specific brand preferences, such as by associating brands with expectations of pleasurable effects, beyond the impact due solely to the cigarette's manufactured constituents.^{5 11 14} Repeated exposure to these acute cigarette perceptions while aware of brand identity (through the labelled markings on packaging and cigarette paper) likely helps condition these associations²¹ and contribute to onset of regular smoking and adoption of a clearly 'preferred brand' by young adulthood.^{13 35} By attenuating the link between brand identity and expected perceptions, extinction of such associations may be possible.^{16 20}

Strengths of this study include first, to our knowledge, the standardised assessment of perceptions from smoking one's own cigarette comparing smokers blinded to brand with those unblinded to brand (or how they are typically smoked under naturalistic conditions). This is also one of the first experimental studies testing the influence of brand blinding per se on acute hedonic ratings of smoking a cigarette (but see ref 22). We also allowed ad lib puffing on the cigarette, to ensure exposure was sufficient by which to rate how a full cigarette was perceived, aiding generalisability to naturalistic smoking of own brand. Yet, we carefully assessed smoking topography to confirm equal total exposure between the blinded versus unblinded conditions, ruling out the possibility that the different perception ratings were due to different amounts of smoking exposure. Further, we conducted this assessment in those previously smoking without restrictions, to further capture the typical naturalistic perceptions of own brands. On the other hand, our research is limited by the fact that study samples were not randomised to blinded versus unblinded conditions, owing to the objectives of the subsequent research assessments in each study, which involved smokers differing in their plans to quit soon. Yet, comparisons between samples on smoking or demographic characteristics showed few differences, other than age and cigarettes/day which were controlled in subsequent analyses of effects due to blinding conditions.

Although we found no individual differences in the effects of blinding on perception ratings of own brand, replication of these results may be needed among other subgroups of smokers to verify generalisability of these findings. For example, effects of blinding may differ among those abstinent from recent smoking, those preferring flavourings,³⁶ in adolescent smokers (to gauge the time course for the onset of the association between own brand awareness and heightened acute perceptions), and in non-dependent adults (to determine the importance of tobacco dependence on this association). Similarly, future research should assess these effects as a function of high versus low quit interest among smokers randomised to these blinding conditions, to gauge the potential influence of upcoming plans to quit on ratings of own cigarette when blind versus unblind to brand

identification. Moreover, better control may be possible by using a within-subjects design that directly compares the effects of blinding conditions in the same participants, as in a very recent similar evaluation of 'premium' brands.²² Future research could also compare perceptions of smoking own cigarette under different blinding conditions, such as without identifying brand markings on the paper that is provided in plain versus 'usual' commercial packaging,¹⁷ especially to evaluate duration of the influence of brand identification on smoking perceptions (eg, acceptance) over time.¹⁶ Acute perceptions from one's own brand could be assessed when the paper (or packaging) systematically differs in a variety of ways, to directly assess the influence of variations in text or design markings on perception ratings, rather than just own cigarette brand under true markings versus no markings as in this study (ie, unblinded vs blinded).^{4 11 15} Finally, research should investigate the degree to which these influences of blinding to brand on acute perceptions of use may apply to other smoked and non-smoked products, especially electronic cigarettes.³⁷⁻³⁹ This line of research, similar to other ongoing studies, would be just one component of ongoing systematic examination of the influence of packaging factors, advertising or other marketing efforts on smoked tobacco brand preference and consumption.³⁵

CONCLUSIONS

Our results confirm that brand markings on cigarette paper, and perhaps other packaging, are key to engendering positive sensory responses to smoking one's own brand, illustrating why tobacco industry marketing efforts often focus on associating brands with positive descriptors of perceptions to be expected from brand use, fostering brand acceptance. Despite industry suggestions of specific pleasures to be gained from acute use of particular brands, smokers appear not to readily identify their own brand, based solely on its constituents when smoking it under blind conditions. Therefore, limiting brand markings on all cigarette paper and packaging could lessen acute perceptions from smoking cigarettes when only those constituents in the tobacco are used to form those perceptions. Future studies should evaluate other packaging manipulations over extended durations of access to examine their impact on daily smoking perceptions, acceptance and amount of use, as well as determine generalisability of brand blinding conditions to perceptions of other products, such as electronic cigarettes.

What this paper adds

- ▶ Pleasurable perceptions of one's own preferred cigarette brand are blunted when smokers are blinded to knowledge of what brand they are smoking.
- ▶ Dependent smokers do not clearly identify their own preferred cigarette brand when they are blind to brand markings on cigarette paper.
- ▶ Restrictions on tobacco brand markings may help extinguish associations between seeing those markings and positive perceptions from smoking that brand, perhaps attenuating use.

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