

Smokers' Preferences for Medicinal Nicotine vs Smokeless Tobacco

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Objective: To assess and compare smokers' interest in medicinal nicotine (MN) and smokeless tobacco (SLT) and preference between them. **Methods:** Two studies presented US smokers verbally with MN and SLT concepts and assessed their appeal as smoking substitutes. Both studies evaluated interest and preference between products, with attention to the hypothesis that SLT is preferred over MN. **Results:** Study 1 described well-known MN and SLT

products. Fifty-nine percent preferred MN and 22% SLT. Study 2 presented less familiar MN and SLT products. Forty-four percent preferred MN and 35% SLT. **Conclusions:** The data show that MN products, as presented to smokers in this study, are perceived to be more appealing to smokers.

Key words: smoking, nicotine replacement therapy, medicinal nicotine, smokeless tobacco, harm reduction

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Traditionally, public health measures to reduce tobacco-caused death and disease have focused on complete cessation of both tobacco and nicotine. As many smokers will be unwilling or unable to quit, tobacco control experts have been examining actions that could reduce the risk of continued use of tobacco.¹ One challenge to helping smokers simply reduce their smoking is that attempts to

reduce are often countered by unintended increases in smoking intensity (eg, more or deeper puffs), as smokers unconsciously strive to maintain accustomed levels of nicotine intake, thus defeating any expected benefit of reduced smoking.² Accordingly, one strategy for smoking reduction is to encourage switching to pure nicotine, which carries little risk. Medicinal nicotine (MN) products have been marketed as medications for over 2 decades in the United States³ and have been demonstrated to be safe even for long-term use.^{4,5} Studies have shown that providing people with MN products (eg, nicotine gum or inhaler) can help smokers reduce their smoking and minimize compensation.^{6,7} Accordingly, the use of MN as partial substitute for smoking has been proposed as a harm-reduction strategy.⁸

Another approach has been to advocate for promotion of smokeless tobacco (SLT) use as a way of potentially satisfying smokers' need for nicotine without the toxins in tobacco smoke.⁹⁻¹¹ Smoking is the most hazardous form of tobacco use,

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because burning produces many toxins, and absorption via the lungs increases adverse health effects.^{12,13} Thus, SLT is safer than smoking.¹³ However, SLT products on the market still expose users to chemical toxins that contribute to health risks, including cancer.^{14,15}

Health-oriented advocates of SLT have suggested that the potential of SLT to reduce the harm of tobacco use is great enough to advocate for the reversal of the European Union's ban on the importation and sale of SLT,¹⁰ on the basis that SLT would make a satisfactory and less risky alternative to smoking. SLT advocates acknowledge the safer profile of MN,^{16,17} but argue that SLT is a preferred approach because it is likely to be more appealing to smokers, therefore more likely to be used instead of cigarettes.¹⁸ However, there is no study that we are aware of that has explored differential preference of smokers for switching to MN or SLT as a substitute for cigarettes.

In the United States, there is a small and declining population of SLT users (6.7% of adult males¹⁹) who use SLT for long periods, despite the fact that SLT has been formulated to create and sustain addiction²⁰ and that SLT is widely available and heavily promoted. SLT use is much less common among women than men¹⁹ suggesting differential appeal by gender.

In contrast to SLT products, MN products have been promoted (and formulated) specifically for smoking cessation and are currently used in approximately 15-20% of quit efforts.²¹ Approximately 6% of smokers who use nicotine gum for quitting persist in using it for at least 6 months,²² primarily to maintain abstinence,²³ suggesting that it has enough appeal to sustain continuing use among some users.

The purpose of this study was to assess and compare smokers' interest in MN and SLT and their preference between the 2 product types. In 2 survey studies, we assessed smoker reactions to concepts describing MN and SLT. Study 1 presented smokers with concepts that described MN and SLT and mentioned current "prototypical" forms of each (nicotine gum and smokeless tobacco, respectively). Smokers' responses in Study 1 seemed in part to be based on reactions to these familiar forms. To minimize this carry-over in Study 2, smokers were ex-

posed to concepts that did not mention these familiar forms, but described a relatively novel form – a lozenge – for both MN and SLT. In both studies, we evaluated smoker interest in MN and SLT and preference between the 2, with particular attention to the implicit hypothesis that SLT would be preferred over MN.

METHODS

Overview

A total of 521 smokers were surveyed across the 2 studies (n1=283, n2=238) using random-digit-dialed telephone interviews. Study 1 was conducted from December 13, 2004 - January 9, 2005. Study 2 was conducted January 17-26, 2005. With the exception of the concepts being evaluated, the 2 studies used identical methods of sampling and assessment. Respondents did not differ on demographic characteristics across studies. Results are presented separately for each study.

Subjects

Study 1. A total of 427 respondents were reached. Sixty-six percent (n1=283) completed the survey, 138 of whom were randomly assigned to hear the SLT concept first. An initial group of 67 subjects was interviewed prior to a minor change in one rating scale. The original version of the question asked, "For this first concept, would you say it is...(Read List.?)" with response options very positive, somewhat positive, neither positive nor negative, somewhat negative, very negative. The revised version asked, "For this first product concept, we would like to know what you think. That is, are you...(Read List.?)" with response options very positive about it, somewhat positive, neither positive nor negative, somewhat negative, very negative about <product>. Analysis showed no difference between these 67 and the other respondents on ratings, nor any change in the outcomes when these subjects were excluded. Accordingly, we have included them in the analysis. Subject demographics and smoking history of the completers sample are shown in Table 1. The 144 respondents who terminated the interview midstream (80% before rating the first concept) did not differ from those who completed the interview on age or smoking characteristics. There was no significant difference in the probability of termination based on

Table 1
Sample Characteristics of
Each Study

Characteristic	Study 1	Study 2
	(N=283) %	(N=238) %
Female	46%	46%
Race		
White, Non-Hispanic	76%	76%
Black, Non-Hispanic	12%	11%
Other, Non-Hispanic	2%	3%
Hispanic	9%	10%
Age		
25-39	39%	37%
40-49	29%	30%
50+	32%	33%
Education		
High School Diploma or Less	46%	47%
Income		
< \$50,000	69%	63%
Employed	57%	64%
Married/Living Together	49%	43%
Daily Smokers	92%	93%
Cigarettes Per Day		
≤10	33%	25%
11-20	48%	52%
21+	20%	23%
Years Smoked		
<5	4%	3%
5-10	15%	12%
11+	81%	85%
Time to First Cigarette		
≤ 30 Minutes	69%	69%

whether MN or SLT was presented first. Including partial data from subjects who terminated after providing ratings made no difference in the findings; accordingly, for simplicity, we present data from subjects who completed the interview.

Study 2. A total of 359 respondents were contacted for Study 2 with 238 (66%) completing surveys, 126 of whom were randomly assigned to hear the SLT concept first. Subject demographics and smoking history of the completers' sample are shown in Table 1.

Sampling

Respondents were contacted using a random-digit-dial telephone interviewing system using a random sample of phone numbers for the contiguous United States acquired from Scientific Telephone

Sample.²⁴ A smoker was sampled by first trying to qualify the person answering the phone. If not qualified, the interviewer asked to speak to a smoker in the household who was at least 25 years old, and that person was screened. A total of 244,164 phone numbers were dialed resulting in 12,226 households reached. Seven hundred eighty-one individuals were qualified for the survey for a cooperation rate of 6.4%. This rate is low but consistent with previous reports that RRD cooperation rates are declining.²⁵ Furthermore, most refusals were made prior to the topic of the survey being discussed; thus, nonrespondents were not avoiding questions about tobacco. A total of 521 qualified respondents completed the survey for a completion rate of 67%. This rate is lower than expected, due in part to the focus on product interest and the playing of an audiotaped "product pitch," which respondents may have interpreted as a sales pitch, leading them to hang up.

Weighting

Compared to estimates from the 2003 National Health Interview Survey (NHIS) the original sample was comprised of a larger proportion of females (62% vs 47% from NHIS), older respondents (44% 50 years older or older vs 33%), and whites (87% vs 76%). than the general population of smokers 25 years old or older. Thus, the sample was weighted to be representative of US population of smokers 25 years old or older based on age, gender, and race using estimates from the 2003 NHIS.

Procedure

Potential subjects were contacted by telephone using random-digit dialing. Qualified smokers who agreed to be interviewed were asked a few introductory questions and then presented with 2 concepts (MN and SLT), in random order. Each concept was presented by playing a standard 1-minute audiotape reading of concept text, both of which were read by the same person and recorded in the same session, which is shown in Table 2. After hearing each concept, subjects were asked to rate their response to the concept and to explain how they might use the described product. After hearing and rating both concepts, subjects were asked to choose which one they preferred. Finally, demographic data were collected,

Table 2
MN and SLT Verbal Concepts

Study 1**Tobacco-free Nicotine**

As a smoker, you find there are times when smoking is not permitted, and there may be other times when you choose to smoke less, even when you are not quitting. You know less is better for you, but find it hard.

Now there is a way to relieve the discomfort when you can't or don't want to smoke. R6 lozenges and gum provide pure nicotine in a pleasant-tasting form. The nicotine reduces cravings and discomfort without the smoke and other harmful elements of tobacco. Almost all the harm smoking does is caused by the smoke and other chemicals in tobacco, not the nicotine. It would be great to get relief and satisfaction without smoking. R6 is better and safer than using tobacco, and it works, because it is real nicotine.

Remember, when you want relief and satisfaction without harmful smoke or other chemicals in tobacco, use R6.

Smoke-Free Tobacco

As a smoker, you find there are times when smoking is not permitted, and there may be other times when you choose to smoke less, even when you are not quitting. You know less is better for you, but find it hard.

Now there is a way to relieve the discomfort when you can't or don't want to smoke. L2 tobacco pouches and lozenges provide tobacco in a pleasant-tasting form. The smokeless tobacco, which is like chewing tobacco or snuff, is absorbed through your mouth, and reduces cravings and discomfort without the smoke of cigarettes. Almost all the harm smoking does is caused by the smoke, not the tobacco itself. It would be great to get tobacco satisfaction without smoking. L2 is better and safer than smoking, and it works, because it contains tobacco.

Remember, when you want tobacco satisfaction without harmful smoke, use L2.

Study 2**Tobacco-free Nicotine**

As a smoker, you find there are times when smoking is not permitted, and there may be other times when you choose to smoke less, even when you are not quitting. You know less is better for you, but find it hard.

Now there is a way to relieve the discomfort when you can't or don't want to smoke. R6 lozenges provide pure nicotine in a pleasant-tasting form. R6 lozenges dissolve in your mouth and reduce cravings and discomfort without the smoke and other harmful elements of tobacco. Almost all the harm smoking does is caused by the smoke and other chemicals in tobacco, not the nicotine. It would be great to get relief and satisfaction without smoking. R6 is better and safer than tobacco, and it works, because it is real nicotine.

Remember, when you want relief and satisfaction without harmful smoke and tobacco, use R6.

Smoke-free Tobacco

As a smoker, you find there are times when smoking is not permitted, and there may be other times when you choose to smoke less, even when you are not quitting. You know less is better for you, but find it hard.

Now there is a way to relieve the discomfort when you can't or don't want to smoke. L2 lozenges provide tobacco in a pleasant-tasting form. L2 lozenges dissolve in your mouth and reduce cravings and discomfort without the smoke of cigarettes. Almost all the harm smoking does is caused by the smoke, not the tobacco itself. It would be great to get tobacco satisfaction without smoking. L2 is better and safer than smoking, and it works, because it contains tobacco.

Remember, when you want tobacco satisfaction without harmful smoke, use L2.

and the interview was terminated.

Assessment

After hearing each concept, respondents were asked whether they thought the concept was positive or negative and how likely they were to use the product, each rated on a 5-point Likert scale. After hearing and rating both concepts, respondents were asked using standard market research questions to choose which product they preferred (responses indicating “neither” or “equal” were coded as no preference) and the reason for choosing the preferred product (open ended). Open-ended responses were coded into categories by 2 independent raters, with interrater reliabilities (Cohen’s kappa²⁶) of at least 0.70. Responses were grouped further into the following categories: sensory appeal, nonsensory appeal, efficacy, nicotine content related, tobacco content related, and usage. Individual categories for “contains/provides nicotine” and “contains/provides tobacco” were also maintained. Demographic and smoking history data were collected (Table 1) using standard questions from the literature.

Concepts

The concepts (Table 2) were developed to capture smokers’ current thinking about use of MN and SLT products. The ultimate purpose for using each product was unspecified in both concepts, though both indicated that they could be used even when not quitting and emphasized satisfaction and relief of symptoms rather than cessation as outcomes or benefits. Both concepts shared the following core content: a focus on smoking less or managing times when smoking is restricted; a suggestion that the product could provide benefits in those situations; a positive and empathic tone; health information and a rationale for distinguishing the concept product as safer than smoking; a summary title (emphasizing the unique concept feature) for reference in later items. Concepts were pretested and refined in qualitative research with 10 smokers.

Analysis

We present descriptive statistics on preference, reported likelihood of using product described in each concept, and qualitative reasons for choosing the preferred concept. Ratings of the concepts as

positive or negative produced results similar to likelihood of use and are not discussed further. We examined within-subject differences in ratings of MN and SLT using one-sample t-tests. To eliminate any order effects, we also tested between-subject differences between MN and SLT in ratings made when each was presented first. These results mirrored those of the within-subject analyses, indicating that the results were not affected by order of presentation. Accordingly, we focus on reporting the within-subject comparisons. Differences in qualitative results comparing concept preference groups were compared using Pearson χ^2 statistics.

We examined ratings and preference by gender, because there are vast gender differences in the use of SLT.¹⁹ We also examined whether previous experience with SLT or with nicotine gum affected ratings or preference, because attitudes of past users would be based partly on actual experience with the products, whereas nonusers would presumably be reacting based on their preexisting attitudes and on what was presented in the concepts. We also tested whether smokers at different stages of quitting (preparers—ready to quit in 30 days; contemplators—thinking about quitting within 6 months; and precontemplators—no stated interest in quitting)²⁷ responded differently to the 2 concepts.

RESULTS

Study 1

Overall analysis. Tables 3 and 4 summarize subjects’ responses to MN and SLT. Both concepts were rated as moderately appealing (based on means). However, on average, smokers expressed significantly more interest in using MN compared to SLT (mean rating of MN=3.0 vs SLT=2.3, $P<0.0001$ – Table 3). When asked to choose between the concepts, significantly more smokers preferred MN over SLT (Table 4). Twenty-two percent of smokers expressed a preference for SLT; the preference for MN was 59%—more than twice as great ($P<.0001$); the remaining 19% expressed no preference.

Gender effects. Men and women were similar in their reported intention to use MN or SLT (no significant interaction with gender): both showed significantly higher intent to use MN. Both males and females also preferred MN (males 56%; females

Table 3
Likelihood of Using Products for Selected Characteristics by Study

	Study 1					Study 2				
	Concept		P-value			Concept		P-value		
	MN	SLT	Product difference ^a	Group difference ^b	Inter-action ^c	MN	SLT	Product difference ^a	Group difference ^b	Inter-action ^c
Overall	3.0	2.3	<.0001			3.0	2.8	0.040		
Gender			<.0001	N.S.	N.S.			0.04	N.S.	N.S.
Male	2.9	2.3				3.1	2.9			
Female	3.1	2.2				2.9	2.7			
Prior SLT			<.0001	N.S.	N.S.			N.S.	0.04	N.S.
Yes	2.9	2.4				3.4	3.1	0.06		
No	3.0	2.2				2.9	2.7			
NRT Gum			<.0001	N.S.	N.S.			0.003	N.S.	0.04e
Yes	2.8	2.1				3.5	2.9			
No	3.0	2.3				2.9	2.8			
Stage of Change			<.0001	<.0001	0.001 ^d			0.03	<.0001	N.S.
Preparer	3.6	2.4				3.6	3.4			
Contemplator	3.3	2.4				3.4	3.1			
Precontemplator	2.3	2.1				2.5	2.4			

Note.

All analyses control for concept order

a Test for difference in ratings of concepts

b Test for difference in levels of characteristic (i.e., gender, prior SLT use, prior NRT gum use)

c Test for interaction between concept and characteristic

d Due to differences between Precontemplators and Preparers and Contemplators for the MN concept only

e Due to differences between Users and Nonusers for the MN concept only

62%) when asked to choose between products, with no differences by gender.

Prior use of SLT or MN. We also examined ratings and preference among previous users of smokeless tobacco and nicotine gum. The sample contained 69 (24%) smokers who reported ever using SLT regularly. Prior SLT users and nonusers did not differ in intended use of MN and SLT (Table 3): both showed higher intent to use MN. Both SLT users and nonusers preferred MN over SLT (Table 4). However, a significant statistical interaction indicated that MN preference was statistically greater among SLT users than among those who had not used SLT previously.

The sample contained 37 (13%) smokers who reported previously having used nicotine gum (a form of MN). Both NRT gum users and nonusers stated they were more likely to use MN than SLT, and no

significant differential in ratings was noted (Table 3). Both gum users and nonusers preferred MN over SLT, and their preferences did not differ (Table 4).

Stage of change. We also examined the association of product preference with smokers' interest in quitting, comparing preparers, contemplators, and precontemplators. A significant interaction was observed, such that preparers and contemplators were more likely to use MN than SLT whereas precontemplators stated equal likelihood of using each product (Table 3). Stated another way, there were no differences in how the 3 groups rated likelihood of using SLT, but preparers and contemplators rated MN higher than did precontemplators. All 3 groups preferred MN over SLT though preference for MN was significantly greater among preparers

Table 4
Concept Preference for Selected Characteristics by Study

	Study 1					Study 2				
	MN	SLT	No pref	P-values		MN	SLT	No pref	P-values	
				Interaction between concept & characteristic ^a	Group difference in SLT preference ^b				Interaction between concept & characteristic ^a	Group difference in SLT preference ^b
Overall	59%	22%	19%	N/A	N/A	44%	35%	21%	N/A	N/A
Gender				N.S.	N.S.				N.S.	N.S.
Male	56%	23%	20%			39%	36%	25%		
Female	62%	21%	17%			51%	33%	16%		
Prior SLT				0.0003	<.0001				N.S.	N.S.
Yes	44%	39%	17%			38%	41%	21%		
No	64%	17%	20%			46%	33%	21%		
NRT Gum				N.S.	N.S.				0.004	0.003
Yes	67%	19%	14%			67%	13%	19%		
No	58%	23%	20%			40%	39%	21%		
Stage of Change				0.05	N.S.				N.S.	N.S.
Preparer	73%	15%	12%			41%	39%	20%		
Contemplator	60%	22%	18%			54%	27%	20%		
Precontemplator	49%	27%	24%			40%	38%	22%		

Note.

- a χ^2 test of association between concept preference and characteristic (ie, gender, prior SLT use, prior NRT gum use, stage of change)
- b Test for difference in proportion of SLT preference across levels of characteristic (ie, gender, prior SLT use, prior NRT gum use, stage of change)

(P<0.05).

Reasons for choice. The most common reasons for preferring MN were that it was nicotine (not tobacco) based (41%; primarily that it provided nicotine free of tobacco), that it was efficacious (17%; referring to relief of craving and withdrawal), had nonsensory appeal (16%; referring primarily to the concept just sounding better), and offered health advantages (13%; referring to the safety of the product). About 10% of subjects who preferred MN did so because it delivered nicotine; this was rarely mentioned by those who expressed a preference for SLT (<1%; P<0.03).

The most common reasons given for preferring SLT were sensory appeal (22%; primarily referring to the absence of smoke inhalation) and health (19%). In both cases, SLT preferrers were more likely to cite these factors than were MN preferrers. Interestingly, 7% of SLT-preferrers said they preferred SLT because it contained less nicotine or no nicotine; only 1% said this of MN (P<0.05).

Study 2

Overall analysis. Tables 3 and 4 summarize subjects' responses to MN and SLT. Although both concepts were rated

as moderately appealing (based on means), smokers expressed more interest in using MN compared to SLT (mean rating of MN=3.0 vs SLT=2.8, P<0.04). Consistent with Study 1, more smokers preferred MN over SLT (44% vs 35%), though the results were not statistically significant at the P<0.05 level. About one fifth of smokers (21%) expressed no preference for either MN or SLT.

Gender effects. Men and women were similar in their reported intention to use MN or SLT (Table 3): both showed higher intent to use MN. Men and women also did not differ on product preference, with about a third of each preferring SLT (males 36%; females 33%).

Prior use of SLT or MN. The sample contained 61 (26%) smokers who reported ever using SLT regularly. Prior SLT users were more likely to use either product (P<0.04; Table 4) than were nonusers, and both showed higher intent to use MN, though the difference only approached statistical significance (P<0.06). Ratings of MN and SLT did not differ by prior SLT use. Numerically, prior SLT users preferred SLT over MN, whereas nonusers preferred MN over SLT; however, these differences were not statistically significant (Table 4).

The sample contained 37 (15%) smokers who reported previously having used nicotine gum. Both NRT gum users and nonusers were more likely to use MN than SLT. Additionally, NRT gum users demonstrated greater differences in intention to use than nonusers (interaction, $P < 0.04$), favoring MN. Prior NRT gum users also showed greater preference for MN (67% vs 40%, $P < 0.004$; Table 4). Among nonusers, preference was evenly divided between MN and SLT.

Stage of change. No differential interest in using MN and SLT was seen noted based on stage of change. However, precontemplators indicated lower interest in using both MN and SLT compared to preparers and contemplators ($P < 0.02$). All 3 groups showed a slight preference for MN over SLT, though none of the differences were statistically significant at the $P < 0.05$ level.

Reasons for choice. The results of open-ended reasons for preference were similar to those observed in Study 1, though the observed differences between the concepts were smaller. The most common reasons for preferring MN were efficacy (30%; relief of craving and withdrawal), the provision of nicotine (16%), nonsensory appeal (16%), and health (15%). The most common reasons given for preferring SLT were sensory appeal (32%; primarily the absence of smoke inhalation), nonsensory appeal (24%; primarily "just sounded better"), and health (14%). In both cases, SLT preferrers were more likely to cite these factors than were those who indicated a preference for MN. Fourteen percent of SLT-preferrers said they preferred SLT because it contained less nicotine or no nicotine; 2% said this of MN ($P < 0.004$).

DISCUSSION

As Hall (2005) has indicated, consumer acceptance of products proposed for harm reduction is critical to their public health utility.¹⁸ Both MN and SLT have been proposed as harm reduction products, and SLT proponents have argued that SLT would have greater utility, based on the expectation that SLT would be preferred by current smokers. This is the first report we are aware of comparing smokers' preferences for MN vs SLT as a substitute for cigarette smoking. We examined 2 different sets of product descriptions, one focused on familiar products

and one relatively unencumbered with impressions of past products. In both cases subjects expressed a preference for MN over SLT, although the preference differential narrowed when the product descriptions were for new similar product types (eg, lozenges). In most cases, we observed a statistically significant preference for MN. Moreover, these results largely held across many different groups: men (who are the primary users of SLT), women, users of SLT, and users of NRT gum. In no condition or subgroup did a majority of respondents express a preference for SLT. Thus, current smokers show a robust preference for MN products over SLT products, which contradicts the suggestion that SLT would be preferred by smokers.

The advocates of promoting SLT for harm reduction have emphasized that information about the lesser risk of SLT (compared to smoking) is a key to making SLT appealing to smokers.⁹ In this regard, it is important to emphasize that our concepts did communicate how SLT differed from smoking and noted that SLT was less toxic and risky (we similarly noted the safety of nicotine, because many smokers believe incorrectly that nicotine itself causes smoking-related disease).²⁸ Even in this context, smokers clearly preferred MN over SLT, again contradicting the hypothesis that SLT would be preferred. This suggests that lack of information about relative risks is not the only barrier to SLT's appeal.

Although overall there was a strong preference for MN, a substantial minority of smokers did prefer SLT over MN (22% in Study 1 and 35% in Study 2). The preference for SLT was strongest among those who were not contemplating quitting smoking, so SLT may still be an appealing option for a subset of smokers. However, other concerns have been raised about promoting SLT use, including health risks,¹⁴ possible progression to smoking²⁹⁻³¹ (though see^{32,33}), and effects of promoting tobacco use on the overall tobacco control environment.³¹

Looking across the 2 studies and sets of concepts, the rejection of SLT seemed to narrow in Study 2, suggesting that some of the reactions to SLT in Study 1 were influenced by associations with traditional forms (chewing tobacco and nicotine gum) and might be mitigated by evolution into new forms, such as lozenges, which are

in fact available in the US market for both MN and SLT^{34,35} (This was also confirmed by qualitative responses [not reported in detail], which indicated that some rejection of SLT in Study 1 had to do with aesthetic responses to chewing tobacco.) Nevertheless, even when offered the novel SLT lozenge concept, the majority of smokers still preferred a MN product that did not contain tobacco, but just nicotine. As suggested by Hall, these data suggest that, to be more successful at appealing to smokers, both SLT and MN products may need to develop and evolve, leaving behind their heritage or baggage, and appeal to smokers in new ways.¹⁸ Importantly, whereas SLT products have been marketed for long-term use as a consumer tobacco product, current MN products were developed as medications for short-term use for smoking cessation and were not formulated to be appealing for long-term use.³⁶ This suggests that there may be much room and opportunity to formulate MN products with consumer appeal in mind, if they are to be used to reduce smoking in the long term.

Prior use of SLT or MN affected preferences in complex ways. In Study 1, where chewing tobacco was referenced, smokers with prior SLT experience were more likely to prefer SLT (though even this group did not show an absolute preference for SLT). This was not observed in Study 2, where the concepts were more distant from traditional chewing tobacco. Conversely, whereas this was not observed in Study 1, in Study 2, smokers who had previously used MN were more likely to prefer it, perhaps because they had a better appreciation of how nicotine itself could provide benefit.

Respondents' qualitative, open-ended accounts of reasons for their preferences were revealing. Those who preferred SLT were likely to cite sensory appeal as a reason, particularly in Study 2, when chewing tobacco was not mentioned. It was interesting that some smokers said they preferred SLT because it had less or no nicotine (presumably compared to MN), even though this was never asserted in the concept and is, in fact, untrue.^{37,38} There is evidence that smokers falsely believe that nicotine is the toxic agent in tobacco smoke²⁸ and thus have negative associations with it. Because nicotine is prominent in the MN concept, this may cause some smokers to reject MN. Smok-

ers' misconceptions about nicotine represent an important barrier to adoption of MN. Conversely, MN may have the advantage of being seen as an effective medication. Especially in Study 2, with more novel concepts, respondents who preferred MN often cited its expected efficacy as the reason for doing so.

This study is not without limitations. One important issue is that the MN and SLT concepts presented to smokers were not precisely matched. For example, the MN concept emphasized nicotine delivery without tobacco, whereas the SLT concept emphasized tobacco without smoke. These presentations were designed to represent natural positioning of these products in the current market, but consequently they were not identical in all respects. Importantly, participants were reacting only to verbal concepts without seeing marketing materials or actually trying the products being evaluated. Further, assessments were based on the attitudes and intentions, not actual trial or adoption of products. The concepts also focused just on the products, without addressing regulatory or commercial context, such as price, accessibility, etc. More research is needed on evaluating consumer preferences, including testing reactions to actual use with a variety of current and novel products. Finally, like many contemporary telephone surveys, the response rate was low. However, nonrespondents were unaware that this was an interview about tobacco, and the sample was weighted to match US smokers, so there is little reason to think the results are biased in an important way.

In summary we found that smokers generally prefer MN over SLT as a substitute for cigarette smoking. This contradicts the suggestion that SLT would be substantially preferred.¹⁰ An implication is that consideration of alternatives to cigarettes must consider the relative safety of MN compared to SLT, without dismissing MN as an unrealistic, unappealing alternative. As Hall has pointed out, the consumer appeal of products intended for harm reduction is an important element of their public health potential.¹⁸ If it is deemed appropriate policy to promote alternative forms of nicotine delivery (a position we have not addressed here), products that are safest and most appealing to smokers should be the focus of such public

health strategies.

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