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Original Investigation

Reducing Misperceptions About Very Low Nicotine Content Cigarettes: Insights From Adults Who Smoke

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Abstract

Introduction: Many people incorrectly think that very low nicotine content (VLNC) cigarettes are less carcinogenic than current cigarettes. This risk misperception by people who smoke could reduce motivation to quit under a nicotine reduction policy. We qualitatively examined perspectives on campaign messages designed to reduce misperceptions.

Aims and Methods: Adults who smoke from North Carolina participated in online interviews. After being introduced to the idea of a VLNC policy, participants were shown VLNC messages and asked about their perceptions on the clarity, understandability, persuasiveness, and meaning of the messages. We conducted a thematic content analysis of the transcripts.

Results: Thirty adults who smoke cigarettes participated (15 females, 13 males, 2 nonbinary) with a mean age of 43 years. Central themes that emerged were: (1) Confusion about the proposed VLNC cigarette policy affected how messages were interpreted; (2) Messages that promote self-efficacy for quitting rather than guilt or fear were better received; and (3) Direct and succinct messages were seen as more able to grab attention and inform people who smoke. Some participant concerns focused on whether VLNC cigarettes would relieve their nicotine cravings and whether they would need to smoke more VLNC cigarettes to feel satisfied.

Conclusion: Campaign messages to educate the public about the harmful effects of smoking VLNC cigarettes may be more effective if people who smoke are informed about the policy's rationale to understand why nicotine is removed rather than the other harmful chemicals. Messages should also acknowledge the difficulty of quitting and be short and direct to capture attention.

Implications: Adults who smoke have some confusion about nicotine reduction in cigarettes and this affects how they perceive potential communication campaign messages about the risk of smoking VLNC cigarettes. In our qualitative research, we found that adults who smoke prefer messages about VLNC cigarettes that acknowledge the challenge of quitting and that are direct and succinct. With further development, campaign messages may be able to reduce misperceptions about VLNC cigarettes and maximize the public health benefit of a nicotine reduction policy.

Introduction

As part of a new comprehensive plan for tobacco and nicotine regulation, the US Food and Drug Administration (FDA) is considering a policy to reduce the nicotine content in cigarettes to minimally addictive or nonaddictive levels.[1–3] New Zealand is also exploring a similar policy.[4] A nicotine reduction policy could have considerable public health benefit, saving millions of lives by making it easier for people who smoke to quit.[5] Clinical trials of very low nicotine content (VLNC) cigarettes have shown promising results,[6–9] and a nicotine reduction policy has popular support.[10]

Reducing the nicotine in cigarettes is an unusual approach to product safety regulation. Typically, toxic chemicals are removed from a product, or a harmful product is entirely removed from the marketplace. With a nicotine reduction policy, cigarettes would retain their toxicity but people who smoke would decrease their number of puffs, smoke fewer cigarettes per day, have lower nicotine intake, and be less addicted.[8,11] Thus, the purpose of a nicotine reduction policy may not be intuitive to the public, especially since there is a widespread belief that nicotine is the primary carcinogen in cigarettes. Nearly half (47%) of adults who smoke incorrectly think that smoking VLNC cigarettes long term is less likely to lead to lung cancer compared to smoking current cigarettes.[12] Other studies have similarly found "VLNC misperception" where people who smoke thought reduced nicotine cigarettes were as addictive as regular cigarettes.[13,14] Although the net benefits of a nicotine reduction policy are likely considerable, the VLNC cigarette policy misperception has the potential to impact smoking initiation among youth, decrease motivation to quit among people who smoke, or lead to relapse among people who formerly smoked.[1,13] To maximize the potential public health benefit of a VLNC policy, a need exists for an effective communication campaign to correct the VLNC misperception, conveying that while VLNC cigarettes will

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likely be easier to quit, they are still as carcinogenic as current cigarettes.

To date, only a few studies have examined how to communicate about nicotine reduction. One study, focused on how to describe VLNC cigarettes, suggested that saying these cigarettes have "95% less nicotine" results in the most accurate understanding of their reduced addictiveness. However, as the accuracy of perceptions of addictiveness increased, perceptions of risk decreased.[15] Another study found that framing VLNC cigarettes as no longer being able to relieve cravings resulted in a high percentage of people who smoke intending to quit.[16] While VLNC cigarettes have been shown to suppress craving, they do not suppress cravings to the same extent as conventional cigarettes.[17] A recent focus group study that included three risk messages among eight VLNC messages suggested that people who smoke cigarettes may respond best to messages focused on efficacy or risk.[18] The present study is the first to gather perspectives of adults who smoke about messages specifically focused on reducing the VLNC misperception. Using cognitive science principles, we developed 18 campaign messages to counter the VLNC misperception. We conducted in-depth interviews with adults who smoke to determine the extent to which the messages were clear, credible, persuasive, and free of unintended interpretations and to determine whether changes to the messages could make them clearer or more persuasive. Specifically, we addressed these research questions: "How are VLNC misperception correction messages interpreted by adults who smoke and how can they be made most effective?"

Methods

Participants

From December 2019 through May 2020, we recruited a convenience sample of participants. We recruited using ads on Craigslist, our university's study listing platform, and a database of people who had previously indicated interest in our tobacco studies. Eligible participants were adults aged 18–65 years who were current cigarette smokers (had smoked more than 100 cigarettes in their lifetime, and now smoke every day or some days). Additional inclusion criteria were being comfortable participating in English, no participation in a tobacco-related research study in the past 3 months, and no participation in a research study about low or reduced nicotine content cigarettes. Previous research indicates that the misperception about VLNC cigarettes may be more prevalent in participants aged ≥55.[12] To ensure substantial representation of this age group, interview participants were stratified by age. Eligible people who had completed the screener survey were purposively invited to participate in an effort to have an even number of participants across three age ranges (18–34, 35–54, and ≥55 years old), and to have diversity of gender, ethnicity, race, and educational attainment.

Message Design

We began with draft campaign messages (Table 1) designed to reduce the VLNC misperception (the incorrect belief that VLNC cigarettes are less harmful to smoke than current cigarettes). The messages incorporated best practices in communication and tobacco control and were developed using plain language to meet low literacy guidelines.[19–21] The messages use techniques from the cognitive science of

Table 1. Message Development Categories Based on Correcting Misperception

Category	Message
Truth only	Cigarettes with less nicotine are just as harmful as regular cigarettes. It's the cigarette smoke that causes cancer.
	Cigarettes with less nicotine are just as harmful as regular cigarettes. The smoke chemicals cause the cancer.
	Cigarettes with less nicotine are just as harmful as regular cigarettes. Cancer is caused by the other chemicals in cigarette smoke.
Truth and negate myth	Cigarettes with less nicotine are just as harmful as regular cigarettes. Cancer is caused by the other chemicals in cigarette smoke, not the nicotine.
	Cigarettes with less nicotine are just as harmful as regular cigarettes. It's the cigarette smoke that causes cancer, not the nicotine.
	Cigarettes with less nicotine are just as harmful as regular cigarettes. The smoke chemicals cause the cancer. Nicotine does not.
Emotion	Cigarettes with less nicotine are just as harmful as regular cigarettes. Smoking will still cause cancer. Imagine telling a loved one you have cancer.
	Cigarettes with less nicotine are just as harmful as regular cigarettes. Smoking will still cause cancer. If you get lung cancer, you have an 80% chance of dying within 5 years.
	Cigarettes with less nicotine are just as harmful as regular cigarettes. Smoking will still cause cancer. Your loved ones will miss you if you die from cancer.
Alternative account	Cigarettes with less nicotine are just as harmful as regular cigarettes. But they will be less addictive and may make it easier to quit.
	Cigarettes with less nicotine are just as harmful as regular cigarettes. But they won't relieve your nicotine cravings as much so it will be easier to quit.
	Cigarettes with less nicotine are just as harmful as regular cigarettes. But less nicotine will prevent kids from taking up smoking.
Value affirmation	Cigarettes with less nicotine are just as harmful as regular cigarettes. But less nicotine will make it easier for you to quit when you're ready.
	Cigarettes with less nicotine are just as harmful as regular cigarettes. Knowing the nicotine is lower can help you be in control and quit smoking.
	Cigarettes with less nicotine are just as harmful as regular cigarettes. The tobacco industry will no longer be able to control you with nicotine. Now you will be in control.

Table 1. Continued

Category	Message
Explaining fallacy	Cigarettes with less nicotine are just as harmful as regular cigarettes. Nicotine is often talked about because it's in cigarettes. But it doesn't cause cancer
	Cigarettes with less nicotine are just as harmful as regular cigarettes. Nicotine does n't cause cancer. Just because nicotine was in the cigarettes doesn't mean it was the chemical that caused cancer.
	Cigarettes with less nicotine are just as harmful as regular cigarettes. Having negative feelings about nicotine does not mean it causes cancer. Nicotine doesn't cause cancer.

correcting misperceptions,[22,23] specifically (1) providing the truthful information only,[22] (2) providing the truthful information followed by negating the misinformation,[22] (3) including an emotive component,[23,24] (4) providing an alternative account,[25] (5) affirming popular values,[26] and (6) explaining the logical fallacy in the misperception.[27] To avoid case-category confounding and to provide a diversity of messages, we developed three messages for each of these six categories, resulting in 18 messages in all. A panel of communication experts iteratively reviewed and helped revise the messages.

Procedures

The research team, which included members with expertise in public health education and communication, developed the interview guide (Appendix A) using an iterative process, creating questions in accordance with the study aim. The interview guide focused on whether the messages were clear, credible, persuasive, and did not have unintended interpretations. The guide also asked participants for any suggestions they had for improving the messages. Because of Coronavirus Disease 2019 (COVID-19) social distancing restrictions, interviews were conducted online using Zoom teleconferencing software rather than in-person.

Three members of the research team experienced in qualitative research (LMR, KLJ, MJB) conducted the 60–90 min interviews from April to June 2020. Interviewers followed the interview guide and used probes to elicit deeper discussion. Interviews began with the participant reading a brief mocked-up news story about the possibility of a nicotine reduction policy (Figure 1). The rationale for participants reading the mock news story prior to viewing the misperception messages was to give all participants a similar baseline of knowledge about the potential policy, and because information about new policies is generally provided to the public through news media prior to the policy implementation. The interviews began by capturing participants' initial reactions to the news story.

Next, the interviewers collected participant perspectives about potential campaign messages by presenting participants with six messages on the screen for discussion and comparison (one from each message category in Table 1). Messages were presented in high contrast colors[28] (yellow text with black background) on a shared video conference computer screen. The first sentence of each message was the same: "Cigarettes with less nicotine are just as harmful as regular cigarettes." The second sentence varied, using the cognitive science principles to reinforce the first sentence in addressing the VLNC misperception. To stimulate participant engagement and feedback regarding the messages, we asked participants which messages they thought were the two "best" and two "worst" in terms of making the case that these cigarettes with less nicotine are as harmful as current cigarettes. After discussing the initial six messages, we also solicited perspectives on one additional message from each category, so each participant viewed a total of 12 messages (two messages from each category). We also asked participants which message was clearer or more persuasive. Participants were randomized and materials were evenly presented such that the order that messages were presented was approximately equal within and across categories. The interviews were digitally recorded. Participants received a $50 Amazon gift card for their participation. This study was approved by the Institutional Review Board at the University of North Carolina at Chapel Hill.

Most of the nicotine may be removed from cigarettes

Tobacco companies may soon be required to remove 95% of the nicotine from cigarettes. All cigarettes will then have much, much less nicotine in them. The only cigarettes available in the US would be these changed cigarettes. Smokers would no longer be able to buy cigarettes with normal amounts of nicotine.

Figure 1. Policy news story.

Analysis

The interviews were professionally transcribed and imported into Dedoose qualitative data analysis software version 9 [9.0.17] (Manhattan Beach, CA). A codebook of initial codes was developed based on the research questions. In a three-step process, four researchers (LMR, GB, KLJ, SC) gained familiarity with the codebook and established consistency among coders. First, coders independently coded one initial transcript and identified additional codes that needed to be included in the codebook. Second, inter-rater reliability tests were created through Dedoose's Training Center feature, which reports a pooled Cohen's kappa statistic to summarize inter-rater agreement across coded excerpts to reach consensus on coding.[29] Third, following each reliability test, all coders met to review and discuss coding discrepancies. We performed the reliability test on three coded transcripts, and on each occasion, coding differences were resolved and definitions were revised in the codebook. For each of the three coded transcripts, the pooled Cohen's kappa fell within Dedoose's "fair" to "good" agreement range indicating consensus among coding.[30]

The 30 transcripts were divided among the four coders, and each transcript was independently coded. After all coding was complete, the research team discussed the findings and identified major themes from ideas and concepts that emerged

using a thematic data analysis approach. Inductive coding techniques as described by Strauss and Corbin[31] were used along with the constant comparison method,[32] which involves comparing elements that are present in one data source (eg, transcript 1) with elements in another source (eg, transcripts 2, 3, 4) to identify commonalities.[33]

Results

Demographics for the 30 participants included a median age of 42.5 years and diversity in gender (15 females 13 males, 2 nonbinaries) and race/ethnicity (16 Whites}, 10 Black/African American, 2 Asian, 2 other races; 4 Hispanic/Latino) (Table 2).

Three central themes emerged from the qualitative interviews that revealed how people who smoke cigarettes may receive the VLNC policy health risk messages: (1) Confusion about the proposed VLNC cigarette policy affected how messages were interpreted; (2) Messages that promote self-efficacy for quitting rather than guilt or fear were better received; and (3) Direct and succinct messages were seen as more able to grab attention and inform people who smoke. Interview participants discussed whether the messages developed from the six cognitive science categories were clear, credible, persuasive, and free of unintended interpretations and we describe the themes that surfaced in detail and provide illustrative quotes from the participants.

Theme 1: Confusion About the Proposed VLNC Cigarette Policy Affected How Messages Were Interpreted

The majority of participants understood the general idea of the mock news story that the amount of nicotine in cigarettes would be reduced. However, participants wanted additional information about the purpose of the policy and what impact it would have on their smoking experience and the risks of smoking. Participants did not initially understand that the misperception correction messages were to inform people who smoke that the reduction in nicotine would not reduce the health risks associated with VLNC cigarettes. Participants readily confused the reduced addictiveness of low nicotine cigarettes with a reduced harm of the cigarettes. As one participant remarked about a message that referred to VLNC cigarettes' reduced addictiveness, " . . . *if what I'm looking for is an explanation about why they are not safer, it's not effective, because it is, in fact...saying that it is safer and that you'll be able to quit sooner*" (male, age 30). While most participants understood the content of the messages, some participants were generally confused as to whether the messages were encouraging or discouraging VLNC cigarette use. "*I actually think those...messages are suggesting the less nicotine cigarettes are somehow a better option or a safer option" (male, age 49)*. Almost all participants were confused about whether the intent of the VLNC cigarette messages was to promote smoking VLNC cigarettes or to encourage quitting: "*Like I didn't [understand] what message is coming across from this, like how come a lower-nicotine cigarette is being promoted through this message*" (male, age 32), and "*Yeah. I mean I think there are a whole lot of smokers who wanna quit, probably most smokers would quit, if there was a way to do it without being in absolute hell. So, to be offered an opportunity to still have all the good of a cigarette with less of the addictive properties, it would probably encourage people . . . "* (female, age 62). Numerous participants were puzzled as to why the toxic chemicals, as mentioned in the Truth and Negate Myth cognitive messages, were going to be retained and only the nicotine removed. As one said: "*Why is it the nicotine such a big deal when you can buy nicotine gum, and you can buy nicotine replacements of all sorts. Why take it outta your cigarettes and not the, you know, formaldehyde and urine and whatever else they put in it"* (female, age 62).

Participants' quit intentions appeared to affect whether they perceived a nicotine reduction policy positively or negatively. Most participants agreed that less nicotine may help them quit and all messages clearly state that VLNC cigarettes have less nicotine. "*If anything, it tells me to buy them so I can quit–so that's like a good marketing ad for maybe a line of cigarettes that are being created to quit"* (male, age 19). However, several participants were concerned about whether the VLNC cigarettes would relieve their tobacco cravings, which was mentioned in the Alternative Account cognitive messages: "*I mean, as a smoker, I'm like, wait, it won't relieve my cravings? But I want my cravings to be relieved. So, that makes me think like, wait, I don't like these lower nicotine cigarettes"* (female; age 34). Other participants who foresaw themselves continuing to smoke, believed the VLNC cigarettes might increase the number of cigarettes they need to smoke to satisfy their nicotine cravings. "*If the purpose is to try to get people to quit or cut down on smoking, this would do the exact opposite. You're just limiting how much I get out of each cigarette, so I'm gonna wanna smoke more of them.*" (male, age 49). Overall, while the misperception correction messages themselves were clear and understandable from a readability standpoint, participants were perplexed as to how to interpret the messages because the intent of the policy was not obvious.

Table 2. Characteristics of Interview Participants (*N* = 30)

Demographics	Count (N)
Age (years)	
Mean Age (SD)	42.5 (13.4)
18–34	10
35–54	11
≥55	9
Sex	
Female	15
Male	13
Nonbinary	2
Race	
White	16
Black/African American	10
Asian	2
American Indian	1
Other	1
Hispanic Ethnicity	
Non-Hispanic	26
Hispanic	4
Educational Attainment	
High school graduate or less	5
Associates degree or some college	14
Bachelor's degree	7
Graduate degree	4

Theme 2: Messages That Promote Self-Efficacy for Quitting Rather Than Guilt or Fear Were Better Received

Some of the messages, such as the Value Affirmation and Alternative Account messages, had the common theme of explaining that VLNC cigarettes may help people who smoke quit. One of the Value Affirmation messages explains that by being less addictive, participants will no longer be controlled by the industry. Several participants were reactant and upset by this message, for example, "*Here's this laughable conspiracy being proposed to me and . . . somehow, I'm not in control?" It's like telling you that somehow Big Tobacco is controlling you and it just seems silly . . . information is laughably false." I don't think the tobacco industry wants to control anyone. I think they wanna make money.*" (male, age 30) and "*It doesn't make sense, 'cause you're in control of yourself . . . The tobacco industry isn't in control of you*" *(female, age 56)*. Additionally, several participants reacted strongly to messages that said that removing nicotine would make it easier to quit: "*Because there's no human way to make quitting easier, period.... 'easy' is not a word that should even be associated with cessation" (female, age 62)*. In general, participants were inclined to favor supportive quit messages over messages that mentioned quitting is easy or the tobacco industry controls them.

Participants were also sensitive to messages they perceived as evoking too much emotion or manipulating them through emotion, for instance, the Emotion cognitive messages. "*It's an attack, it's depressing, when I think about someone telling me to quit, I like to think more positive. I don't like to think that what I'm doing is killing me, I like to think that I'm making a good life choice and that I'm going to be supported through making this choice*" (male, age 19). Furthermore, messages about telling one's family that they have cancer prompted a strong negative reaction from some participants, for example, "*I don't like [message] because it pulls guilt into it. Like, I, I've actually lost a family member to cancer from smoking, and that like, that guilt resides in me*" (female, age 27).

A few participants were also bothered by the idea of messages presuming they want to quit. "*I understand the properties of nicotine, . . . But, at the same time, I'm an adult and I don't really want the FDA determining when I quit smoking or if I quit smoking*" (*female, age 62*). Most participants gravitated towards messages that they thought were informative and empowering: "*it's informative, and if I have information, I feel empowered to make decisions" (female, age 34)*. Participants recommended using messages that convey agency (ie, increasing one's self-efficacy to quit) rather than evoking emotions such as fear or guilt, which they saw as counterproductive. Thus, while the messages designed to evoke negative emotions succeeded in doing so, they were not favored by participants because many found the messages offensive.

Theme 3: Direct and Succinct Messages Were Seen as More Able to Grab Attention and Inform People Who Smoke.

Messages that were short, direct, and clear resonated more with participants. The majority reported that such messages drew their attention and were more believable. *The shorter, more concise it is, the more likely it is somebody would read it." (male; age 65),* and "*I like [message] because again, it's short and to the point, and it just seems more accurate" (female; age 32)*. While we aimed to keep all messages comparable in length, some messages tended to be longer and encountered more resistance: "*Yeah, it's just a little harder to kind of get to the point of it. That whole second sentence is kind of filler. 'Nicotine is often talked about because it's in cigarettes', By the end of that sentence, it doesn't tell me none of the fact that nicotine is involved with cigarettes . . . .I think messages that have a lot of words with no . . . content just make people's eyes glaze over" (male, age 49),* and "*If there's a lot more wording, people are less likely to read the full thing, so I believe that less words, you know, it can hold their attention a lot faster" (female, age 32)*.

Participants' reactions were mixed in their responses to some message characteristics. A few participants thought messages that had cancer in the sentence were more attention-grabbing: "*I think [message] is slightly more effective because cancer is the subject of the sentence, and nothing will focus attention faster than the discussion of cancer*" *(male, 49)*. While some thought health statistics were attention-grabbing (ie, Emotion), others did not: "*I'm just judging by if I was the general public, okay? I think [message] got worse because it started putting that, "80% [chance of dying from lung cancer] in five years*" *(male; age 48)*.

Discussion

As implementation of nicotine reduction in cigarettes remains a research priority for the US Food and Drug Administration (FDA,)[34] research on ways to successfully address misperceptions about VLNC cigarettes is critical. Our findings indicate that clarifying the intent of the policy (ie, nicotine is being reduced to support smoking cessation) may help the people who smoke correctly interpret the information contained in the VLNC cigarette message. Messages encouraging people to quit smoking should acknowledge the difficulty in quitting. Additionally, messages that were short and direct were better received than longer messages. While our research findings indicate adults who smoke cigarettes can quickly understand that a VLNC cigarette policy will reduce nicotine and make cigarettes less addictive, they had varying understanding about the remaining toxicity and the intent and effects of the policy. Importantly, our findings indicate that people may need more context regarding the purpose of a nicotine reduction policy to reduce confusion about why nicotine was removed, and other toxic chemicals remain in the cigarette.

Two previous VLNC studies concur that implementing a communication campaign to clearly convey the health risk of smoking VLNC would be beneficial.[12,15] Yet, these studies found that people who smoke cigarettes have difficulty understanding VLNC policies, and often come to the incorrect conclusion that VLNC cigarettes are less likely to cause cancer. Moreover, participants in our study were concerned about the ability of VLNC cigarettes to satisfy their nicotine cravings and thought they might end up smoking more cigarettes if the nicotine is reduced. Expectations about VLNC cigarettes tasting different and the need to smoke more to achieve satisfaction, were alleviated in a study where participants experienced smoking VLNC for 72 h.[35] Studies that have examined reduced nicotine cigarettes reported participants did not have sustained compensatory behaviors, had only mild withdrawal symptoms, and felt less dependent of cigarettes.[35,36] Furthermore, experimental trials show that people who

smoke do not actually smoke more VLNC cigarettes—essentially the nicotine reduction is so great (often ~95% less nicotine) that smoking more is futile.[37] However, the public's concern that VLNC would lead to smoking more is intuitively logical and should be explored in future research and likely addressed in VLNC communications campaigns. Highlighting that VLNC cigarettes may no longer relieve cravings has been found to increase intentions to quit for people who smoke.[16] Understanding that nicotine cravings are a common concern among people who smoke, misperception correction messages may need to explicitly address and alleviate this concern.

While our research shows that correcting VLNC misperceptions is not a simple task, this study offers several ideas for further study. It may be useful for the messages to explain the purpose of a nicotine reduction policy, and possibly why nicotine is being removed rather than other substances. The Truth only and Truth and Negate Myth cognitive messages mentioned other chemicals in VLNC cigarettes but only stated removing the nicotine. This prompted participants to ask why only the nicotine was removed. One of the challenges suggested by our research is that there is a tension between the need for short, clear messages that get attention, and the need to provide enough information for people who smoke to sufficiently understand the policy. One solution may be to deliver the information in pieces, for example, develop messages focusing on introducing the policy and providing the rationale for the policy followed by messages that are designed to correct misperceptions.

Participants in our study overwhelmingly preferred supportive quit messaging. Unfortunately, many of our study participants did not perceive the messages developed from cognitive science as supportive VLNC cigarette quit messages. In fact, many participants balked at the reference that quitting is easy as stated in the Alternative Account cognitive massages. Tobacco cessation research that suggests gain-framed messages increase self-efficacy and promote tobacco cessation and VLNC cigarette misperception messages may get more traction with this approach.[38] Furthermore, emotions are powerful drivers in determining human perception and health decisions[39] and tobacco control studies have found communication topics of social support, stress reduction, and nicotine replacement therapy are selected as most helpful.[40] Messages about the VLNC cigarette misperception may be made even more supportive by adding a link to a quitline or other quit-smoking resource.

Notably, the possibility of a reduced nicotine policy and one Value Affirmation cognitive message stating: "*The tobacco industry will no longer be able to control you with nicotine,*" elicited emotions of anger and resentment from a subset of participants. Adults who smoke in our study wanted to believe they had the freedom to smoke or quit on their own terms. They did not acknowledge that the tobacco industry's use of nicotine was already limiting their freedom. While the original truth campaign was able to reduce smoking initiation and changed attitudes towards smoking using antitobacco messages about the tobacco industry controlling people who smoke, the campaign targeted at-risk youth aged 12–17 years.[41–43] It is possible that messages about the tobacco industry controlling people who smoke work well for prevention messages, but produces negative reactions among adults who are established smokers. Future studies can examine whether this reactance makes the messages less effective, or if, in fact, the heightened emotion makes the messages more effective. Research on cigarette health warning labels report that graphic warnings are more effective than text-only warnings specifically because they evoke strong negative emotions and avoidant responses.[44,45] Therefore, the negative emotions such as fear and guilt that our participants experienced with the misperception correction messages may be an indication of deeper processing.[45]

Some limitations exist with this study. As with most qualitative research, we used a convenience sample. However, we worked to ensure diversity by gender, race, ethnicity, age, and education. Also, because of COVID-19, the interviews were conducted using teleconferencing software rather than in-person. This may have reduced rapport, although alternatively, participants may have felt more comfortable talking within the privacy of their own home rather than an unfamiliar office meeting room. Since the study participants were required to conduct the interview on a computer with internet access, we may have limited the ability to reach people who smoke with the lowest-income, although we may have also expanded access to others who could not easily get to the study site. While we aimed to keep the repetitive portion of the messages as concise as possible in order to focus participants on the parts that changed, it is possible that using the wording "cigarettes with 95% less nicotine" might have aided comprehension. Finally, interviewers' techniques and styles may have varied, but we aimed to adhere to a detailed interview guide and protocol in order to promote consistency.

Our semi-structured interviews of adults who smoke revealed the challenge in correcting misperceptions about a nicotine reduction regulatory policy. Adults who smoke in our study were more receptive to misperception correction messages that are supportive and empowering, and direct and succinct messages were ideal to grab the attention of people who smoke. Clearly and concisely stating the VLNC cigarette policy rationale may yield more understanding and receptivity to the correction messages. Future research can continue to refine messages that address the VLNC cigarette misperception and quantitatively test their effectiveness in changing beliefs and intention to quit under a nicotine reduction policy. With further development, communication campaign messages may be able to reduce misperceptions about VLNC cigarettes and maximize the public health benefit of a nicotine reduction policy.

Supplementary Material

A Contributorship Form detailing each author's specific involvement with this content, as well as any supplementary data, are available online at https://academic.oup.com/ntr.

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Declaration of Interest

The authors have no conflicts of interests.

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