

The impact of cigarette package design on perceptions of risk

David Hammond, Carla Parkinson

Department of Health Studies and Gerontology, University of Waterloo, Waterloo, ON, Canada N2L 3G1
Address correspondence to David Hammond, E-mail: dhammond@uwaterloo.ca

ABSTRACT

Background More than 40 countries have laws prohibiting misleading information from tobacco packages, including the words 'light', 'mild' and 'low-tar'. Little is known about the extent to which other words and package designs prove misleading to consumers.

Methods A mall-intercept study was conducted with adult smokers ($n = 312$) and non-smokers ($n = 291$) in Ontario, Canada. Participants viewed pairs of cigarette packages that differed along a single attribute and completed ratings of perceived taste, tar delivery and health risk.

Results Respondents were significantly more likely to rate packages with the terms 'light', 'mild', 'smooth' and 'silver' as having a smoother taste, delivering less tar and lower health risk compared with 'regular' and 'full flavor' brands. Respondents also rated packages with lighter colors and a picture of a filter as significantly more likely to taste smooth, deliver less tar and lower risk. Smokers were significantly more likely than non-smokers to perceive brands as having a lower health risk, while smokers of light and mild cigarettes were significantly more likely than other smokers to perceive brands as smoother and reducing risk. Perceptions of taste were significantly associated with perceptions of tar level and risk.

Conclusion The findings suggest that current regulations have failed to remove misleading information from tobacco packaging.

Keywords beliefs, smoking

Introduction

Tobacco use is responsible for one in ten global deaths and remains the leading cause of preventable death.¹ In 2008, more than 5 million people are projected to die from tobacco, more than tuberculosis, HIV/AIDS and malaria combined.¹ The health burden from tobacco reflects a wide range of smoking-related diseases, including cardiovascular disease, respiratory disease and 10 different forms of cancer.² Remarkably, the list of known health risks continues to grow.

Smokers' awareness of these health risks has an important influence on their behaviour. Health concerns are the most common motivation to quit, and smokers who perceive greater risks are more likely to attempt to quit and to remain abstinent.^{3–6} Awareness of health risks among smokers is also on the rise: although many smokers continue to underestimate the likelihood and severity of smoking-related disease, most acknowledge that smoking is hazardous to health and an increasing number can cite specific health.^{5,7}

Tobacco companies have identified rising levels of health concern as among the primary threats to the industry.⁸

An important function of tobacco marketing has been to reassure consumers about the risks of their products. A central feature of this marketing strategy has been to promote the perception that some cigarettes are less hazardous than others.^{9,10} Health-concerned smokers have been encouraged to switch to so-called 'low tar' cigarettes, rather than quit—cigarettes that generate lower tar and nicotine levels under machine testing, but deliver much higher levels during consumer use.^{11,12} Although these cigarettes are no less harmful than higher tar versions, they have nevertheless provided reassurance and an appealing alternative to quitting for many smokers.¹³

Tobacco packaging has served as a critical medium for shaping perceptions of consumer risk.^{9,11,14–17} Brand 'descriptors'—words and numbers incorporated in the name of a brand—are ostensibly used to denote flavor and taste. However, descriptors such as 'light', 'mild' and 'low tar'

David Hammond, Assistant Professor

Carla Parkinson, Research Assistant

have also been promoted in advertising as 'healthier' products.¹⁰ As a result, considerable proportions of smokers report that light, mild and low tar cigarette brands deliver less tar, lower health risk and are less addictive than 'regular' or 'full flavor' brands.^{18–23} These perceptions of light and mild brands are reinforced by the design of these cigarettes, which typically use filters that dilute the smoke to reduce its harshness during inhalation.^{12,24} Thus, the brand descriptors on packages reinforce the lower tar numbers and sensory perceptions of 'lighter' smoke.

In the USA, a Federal District Court ruled in 2006 that the terms 'low tar', 'light', 'ultra light' and 'mild' are deceptive, and a Court Order has prohibited their use; however, these terms have remained on packages pending an appeal.²⁵ To date, 43 other countries have prohibited the use of words light, mild and low tar on tobacco packaging as part of prohibitions on misleading packaging under the world's first international public health treaty, the WHO Framework Convention on Tobacco Control.²⁶ However, recent research conducted in Canada, the UK and Australia suggests that prohibiting light and mild terms may be insufficient to significantly reduce false beliefs about the risks of different cigarette brands.²⁷ One potential explanation for these findings is the wide range of other descriptors that remain in use, including words such as 'smooth', color descriptors such as 'silver' and 'blue' as well as 'tar' numbers that are incorporated into brand names (e.g. 'Marlboro One').²⁸ However, other than for the descriptors light and mild, there is little evidence with regards to how these terms are perceived by consumers.

Perceptions of consumer risk can also be influenced by 'brand imagery'—colors, symbols and graphics used in package design.^{9,15} Internal tobacco industry documents describe this phenomenon:

'Lower delivery products tend to be featured in blue packs. Indeed, as one moves down the delivery sector, then the closer to white a pack tends to become. This is because white is generally held to convey a clean healthy association'.²⁹

Different shades of the same color and the proportion of white space on the package are commonly used to distinguish between variants of the same brand family. Several internal industry studies have demonstrated that the color and design of the package are effective to the point where they influence sensory perceptions from smoking a cigarette, a process known as 'sensory transfer'.^{30,31} Outside of the tobacco industry, there is growing evidence that the removal of brand imagery from packaging—so-called 'plain' packaging—reduces the appeal of brands and increase the salience

of health warnings.^{32–35} However, there is relatively little independent research that has examined the impact of brand imagery on consumer perceptions risk.

Overall, while there may be consensus among tobacco control advocates that prohibitions on the terms light, mild and low tar are insufficient to remove misleading information from packaging, there is a lack of published evidence on consumer perceptions of other packaging elements to support broader regulations. At present, there is virtually no research on brand descriptors other than light and mild, and almost all the existing evidence on brand imagery has been collected within the tobacco industry.

The current study sought to examine: (i) consumer perceptions of brand descriptors and various elements of brand imagery; (ii) the association between perceptions of taste and perceptions of health risk; and (iii) individual differences in perceptions of packaging, including between non-smokers and smokers as well as among smokers of light or mild brands. Based on previous literature and industry marketing practices, we hypothesized that participants would perceive the following types of brands as having lower health risk, lower tar delivery and smoother taste: brands with lighter coloring, words such as light, mild, smooth and silver; brands with lower numbers incorporated into the brand name; and brands that made reference to filter technology on the package.

Methods

Protocol

Respondents were recruited between January and March 2007 from shopping malls in South-Western Ontario using convenience sampling methods. Eligible participants included smokers and non-smokers of 18 years of age or older. After providing consent, participants were seated at a table in a private area and asked to complete a 5-min survey on their smoking status and socio-demographic variables. Participants were then asked to view a series of cigarette packages presented on a small display. Packages were presented to participants in pairs of two, and the placement of packages on the display (i.e. left or right position) was counter-balanced across participants. Participants were allowed to pick up and look at the packages if they wished, after which participants responded to three questions about each pair of packages (see 'package ratings', below). Upon conclusion of the study, participants were compensated US \$10 and were entered into a draw for a US \$100 gift certificate.

Cigarette packages

Cigarette packages were created specifically for this study. Packages were printed on high-quality cardboard, scored and folded in the same manner as actual cigarette packages. High-density foam was inserted into the packages to mimic the weight and feel of cigarettes. The pairs of cigarette packages presented to participants were identical except for a single element, either a descriptor in the name of the brand or the design of the package. Brand descriptors varied across six pairs of packages: full flavor versus light, light versus ultra light, regular versus mild regular versus smooth, full flavor versus silver and the numbers '10' versus '6'. In addition, three pairs of packages varied with the brand imagery: lighter blue shading versus darker blue shading, a dark gray versus a white symbol, and an image of a cigarette filter, accompanied by the words, 'charcoal filter' (see Table 2 for illustration of each package). All of the descriptors and brand imagery were based on current industry practices; however, the packages carried artificial brand names to avoid 'contamination' from pre-existing perceptions of current Canadian brands. Each package also displayed the same health warning—a pictorial warning covering 50% of the principal display areas, as required under federal regulations.

Measures

Current smokers were defined as individuals who had smoked 100 cigarettes in their lifetime and reported smoking at least one cigarette in the past month. Smokers responded to an additional set of questions, including their usual type of cigarette brands. Smokers were also asked about the association between the taste and the risk of cigarettes using three questions: (i) 'Do cigarettes that taste smoother or milder deliver less tar?'; (ii) 'Do cigarettes that taste smoother or milder deliver less nicotine?'; and (iii) 'Are cigarettes that taste really strong and harsh worse for your health?' Responses options for each of these questions were 'Yes', 'No', or 'No Difference/Don't know'. All of these questions were asked prior to viewing and rating the cigarette packages.

Package ratings

After viewing each pair of packages, participants were asked three questions: (i) 'Which brand would you expect to deliver the most tar if you were to smoke it?'; (ii) 'Which brand would you expect to have the smoothest taste?'; and (iii) 'If you were to choose between these two brands, which one would you buy if you were trying to reduce the risks to your health?' Participants were asked to select one of the

two packages or to indicate 'no difference' in response to each question.

Three scales were created by aggregating responses to these questions from the nine pairs of packages: a 'tar scale', a 'taste scale' and a 'health risk scale'. Prior to the study, one package from each pair was identified as the package most likely to be rated as higher tar, smoother taste and lower health risk, based on *a priori* hypothesis. These packages are listed first for each pair as shown in Table 2: light, mild, smooth, silver, ultra light, 6, lighter shading, white symbol and carbon filter. Each time this package was selected from the pair, participants received a score of '1'. The total score from the nine pairs of packages was summed to yield a score of 0–9 for each scale.

Analysis

All analyses were conducted using SPSS software (Version 16.0). Pearson correlation coefficients were used to test bivariate correlations between individual measures and scales. Chi-square tests were used to test the significance of proportions for packaging ratings and *t*-tests for independent samples were used to test differences in means between smokers and non-smokers as well as smokers of light and mild cigarette brands.

Results

Sample characteristics

Table 1 shows the characteristics of the sample. Among non-smokers, 144 (49.0%) were 'former smokers', who had smoked at least 100 cigarettes lifetime, but reported no smoking in the past month. Among smokers, the mean number of cigarettes per day and intentions to quit were consistent with national averages.³⁶

Perception of brand descriptors and imagery on packages

Table 2 shows ratings for each pair of packages. Perceptions of light and mild brands were very similar: over 90% of participants reported that cigarettes in packages with the words light or mild would deliver less tar, approximately 85% reported they would lower health risks and approximately 75% indicated they would taste smoother compared with full flavor and regular brands. A similar proportion of participants reported that smooth and silver brands would deliver less tar and lower health risks compared with full flavor and regular brands, respectively. Not surprisingly, packages with the word smooth were most likely to be selected as having a smooth taste compared with regular

Table 1 Sample characteristics by smoking status ($n = 603$)

	Smoker ($n = 312$)	Non-smoker ($n = 291$)	Overall
Age, mean (SD)	36.20 (13.14)	41.96 (16.24)	38.98 (14.99)
Gender, % (n)			
Male	63.5 (198)	46.7 (136)	55.4 (334)
Female	36.2 (113)	53.3 (155)	44.4 (268)
Education, % (n)			
Grade school or some high school	34.3 (107)	14.8 (43)	24.9 (150)
Completed high school	35.3 (110)	28.9 (84)	32.2 (194)
Technical/trade or college	20.8 (65)	32.0 (93)	26.2 (158)
Some university (no degree)	3.2 (10)	5.5 (16)	4.3 (26)
Completed university	5.4 (17)	14.4 (42)	9.8 (59)
Post-graduate degree	1.0 (3)	4.5 (13)	2.7 (16)
Cigarettes per day, mean (SD)	16.9 (8.88)	—	—
Intentions to quit, % (n)			
Within the next month	10.9 (34)	—	—
Within the next 6 months	24.4 (76)	—	—
Sometime in the future, beyond 6 months	40.7 (127)	—	—
Not planning to quit	23.7 (74)	—	—

Table 2 Perceptions of brand descriptors and design ($n = 604$). This table appears in colour in the online version of the *Journal of Public Health*.

	"Light" vs. "Full-Flavour"			"Mild" vs. "Regular"			"Smooth" vs. "Regular"		
			No Difference			No Difference			No Difference
Delivers less tar	91%*	5%	4%	93%*	4%	3%	91%*	5%	4%
Smoother taste	74%*	23%	3%	77%*	20%	3%	92%*	6%	2%
Lower health risk	87%*	7%	6%	86%*	9%	5%	80%*	11%	9%
	"Silver" vs. "Full-Flavour"			"Ultra Light" vs. "Light"			"6" vs. "10"		
			No Difference			No Difference			No Difference
Delivers less tar	83%*	12%	5%	89%*	7%	4%	90%*	5%	5%
Smoother taste	65%*	31%	4%	62%*	35%	3%	77%*	16%	7%
Lower health risk	73%*	17%	10%	76%*	17%	7%	84%*	8%	8%
	Lighter vs. Darker Colour			White symbol vs. Grey symbol			"Charcoal Filter with picture"		
			No Difference			No Difference			No Difference
Delivers less tar	83%*	6%	11%	71%*	11%	18%	77%*	20%	3%
Smoother taste	80%*	10%	10%	74%*	12%	14%	69%*	28%	3%
Lower health risk	79%*	8%	13%	73%*	12%	15%	76%*	19%	5%

* $P < 0.001$.

brands. A strong majority of participants also reported that ultra light brands would deliver less tar, taste smoother and lower health risk compared with light brands. Perceptions also differed based upon the numbers appearing on packages: the brand showing 6 was rated as delivering less tar, having a smoother taste and lowering health risk compared with the packages with 10. Each of these differences were significant at the $P < 0.001$ level.

Differences were also observed between packages based on brand design and imagery. Approximately 80% of participants reported the package with lighter blue shading would deliver less tar, smoother taste and lower health risk compared with the package with darker blue shading. Slightly more than 70% of respondents also reported that the package with a white symbol would deliver less tar, have a smoother taste and lower health risk compared with the package with a gray symbol. Finally, the package with the words 'charcoal filter' and a picture of a filter was rated as delivering less tar, having smoother taste and lowering health risks by approximately 70% of participants.

Smokers versus non-smokers

Analyses were conducted to examine the potential differences in package ratings between smokers and non-smokers. Smokers were significantly more likely than non-smokers to report lower tar delivery for two of the nine pairs: for the packages with the white versus gray symbol ($\chi^2 = 3.95$, $P = 0.047$) and the packages with the 'charcoal filter' text and image ($\chi^2 = 10.36$, $P = 0.001$). When responses from each of the nine pairs were aggregated in the tar scale, the difference between smokers and non-smokers failed to reach statistical significance ($t = 1.65$, $P = 0.097$).

Smokers were significantly more likely than non-smokers to report smoother taste for three of the nine pairs: for the smooth versus regular pack ($\chi^2 = 4.94$, $P = 0.026$), the ultra light versus light pack ($\chi^2 = 7.69$, $P = 0.006$) and the white versus gray symbol pack ($\chi^2 = 4.35$; $P = 0.04$). Differences between smokers and non-smokers on the taste scale failed to reach statistical significance ($t = 1.86$, $P = 0.063$).

Finally, six of the nine pairs of packages were more likely to be rated by smokers as having lower health risks: the mild versus regular pack ($\chi^2 = 9.30$, $P = 0.002$), the light versus full flavor pack ($\chi^2 = 9.79$, $P = 0.002$), the ultra light versus light pack ($\chi^2 = 31.78$, $P < 0.001$), the 6 versus 10 pack ($\chi^2 = 9.19$, $P = 0.002$), the gray versus white symbol pack ($\chi^2 = 7.79$, $P = 0.005$) and the charcoal filter text and image pack ($\chi^2 = 15.3$, $P < 0.001$). Overall, smokers were significantly more likely to report lower health risks across

all 9 pairs of packages than non-smokers on the health risk scale ($t = 4.20$, $P < 0.001$).

Light and mild smokers

A total of 124 smokers reported smoking a light or mild cigarette (42.2% of all smokers). Analyses were conducted to examine potential differences in package ratings between smokers of light and mild brands and those smoking all other brands. Light/mild smokers were significantly more likely than others to report smoother taste for one brand, the carbon filter pack ($\chi^2 = 12.8$, $P = 0.012$), as well as across the 9 pairs of packages on aggregate taste scale ($t = 2.07$, $P = 0.04$). Light/mild smokers were also significantly more likely than others to report lower health risk for 5 of the 9 pairs: the light versus full flavor pack ($\chi^2 = 12.0$, $P = 0.017$), the mild versus regular pack ($\chi^2 = 15.1$; $P = 0.005$), the silver versus full flavor pack ($\chi^2 = 12.5$, $P = 0.014$), the 6 versus 10 pack ($\chi^2 = 18.4$, $P < 0.001$) and the lighter versus darker shading pack ($\chi^2 = 11.6$, $P = 0.021$). Overall, light/mild smokers were significantly more likely to report lower health risks than others across all nine pairs of packages on the health risk scale ($t = 3.18$, $P = 0.002$). No significant differences for light/mild smokers were observed for perceived tar delivery, either for the individual pairs of package or for the tar scale.

Association between perceptions of taste and health risk

Package ratings for each of the three ratings—smooth taste, tar delivery and lower health risks—were significantly correlated within each pair of packages ($P < 0.001$ for all pairwise correlations) as well as for each of the three scales: the tar and smooth scales were correlated 0.47 ($P < 0.001$), the tar and health scales were correlated 0.55 ($P < 0.001$) and the smooth and health scales were correlated 0.44 ($P < 0.001$).

Prior to completing the package ratings, participants also responded to three survey questions about the association between taste, tar and nicotine delivery and health. A total of 23.1% of smokers agreed that cigarettes that taste smoother or milder deliver less tar, 39.1% were unsure and 37.8% disagreed. A similar proportion (24.0%) agreed that cigarettes that taste smoother or milder deliver less nicotine, 30.8% were unsure and 45.2% disagreed. Finally, 58.2% agreed that 'cigarettes that taste really strong and harsh are worse for your health', 11.9% were unsure, while 29.9% disagreed.

Discussion

Main findings of this study

All conventional cigarettes present the same health risk to smokers; nevertheless, substantial proportions of adults in the current study associated perceptions of risk and tar delivery with package design. Both smokers and non-smokers were significantly more likely to identify packages using light, mild and ultra light descriptors as delivering less tar and having lower health risk compared with regular and full flavor brands. The findings also suggest that words such as smooth, silver and lower numbers in the name of cigarette brands are perceived in much the same way as light and mild. Indeed, compared with regular and full flavor packages, brands with these descriptors were just as likely to be rated as lower tar and lower health risk as light and mild brands. This is notable given that more than 40 countries have prohibited the use of light and mild on the basis that these terms are misleading, while terms such as smooth, the use of numbers and the names of color descriptors remain in widespread use. Perceptions of risk were also associated with brand imagery. Packages with lighter colors, and packages with white versus gray symbols were rated as lower tar and lower health risk.

Overall, smokers were significantly more likely than non-smokers to perceive differences in taste, tar delivery and health risk. This is not surprising given that smokers have greater incentive to believe that some cigarette brands may be less harmful, perhaps in an attempt to reduce cognitive dissonance and rationalize their smoking behavior. In addition, smokers of light and mild brands were more likely than smokers of other brands to perceive differences in tar delivery and health risk. This is consistent with previous research indicating that false beliefs about the health benefits of light and mild cigarette are higher among those who smoke these brands.^{18,19,35} Despite these differences, the pattern of findings was highly consistent across all smokers and non-smokers. This suggests that the package design does not depend on the personal experience of smoking to shape perceptions of risk.

Finally, perceptions of 'smooth taste' were highly correlated with perceptions of tar delivery and health risks. In addition, approximately one quarter of smokers agreed that cigarettes that taste smooth deliver less tar and nicotine, and more than half agreed that cigarettes that taste 'really strong and harsh' are worse for your health.

What is already known on the topic

The finding that light and mild brands were regarded as lower tar and lower health risk is consistent with previous

research. However, the proportion of smokers who reported that light and mild cigarettes deliver less tar and lower health risks is somewhat higher than previous estimates. For example, a recent national survey found that 43% of Canadian smokers reported that light cigarettes offered a health benefit.³⁷ We attribute the more robust findings in the current study to the use of real packages as stimuli, as well as differences in the wording of the questions and the response format. The implications of the protocol and response format are discussed in more detail below.

The association between pack color and health risk observed in the current study is also consistent with research described in industry documents, in which consumers perceive white and lighter colors as being 'healthier'.^{9,14,15,17} Participants in the current study also rated packs with pictures of a charcoal filter as lower tar and lower health risk. We are unaware of any published research that has examined how consumers perceive pictures and references related to product design, although industry researchers have previously noted that references to filtration provide reassurance to consumers, irrespective of any health benefits (Brandt, 2007). As Myron Johnston and W.L. Dunn of Philip Morris stated in 1966, 'the illusion of filtration is as important as the fact of filtration'.⁴¹

Limitations

Participants in this study were not recruited using random sampling. Therefore, the findings are not necessarily representative of Canadian smokers and some degree of bias is likely. Nevertheless, the sample represents a heterogeneous group of smokers and non-smokers from different age groups and socio-economic levels which are broadly similar to the profile of Canadian smokers. In addition, we would not anticipate significant differences in response patterns among smokers and non-smokers in other geographical areas given that few regional differences exist with respect to tobacco packaging and marketing in Canada. A second potential limitation of the current study is the 'forced choice' nature of the package ratings. Participants were asked to make comparative ratings by choosing one of the two packages. This method may result in higher levels of endorsement than some other methods; however, participants were given the option to select 'no difference' and many participants did so for several of the comparisons. A third potential limitation concerns social desirability response bias. Given the public health messages that all cigarettes are equally harmful, which have included high-profile mass media campaigns on the risk of light and mild cigarettes in Canada, one might expect social desirability bias to

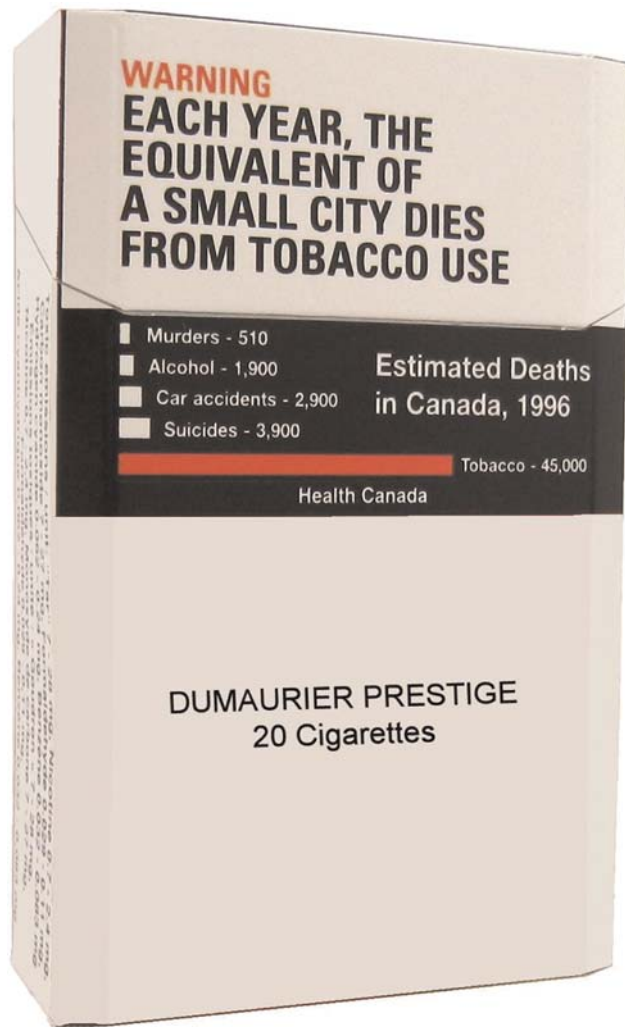


Fig. 1 Example of plain packaging. This figure appears in colour in the online version of the *Journal of Public Health*.

result in greater endorsement of the ‘no difference’ option, rather than identifying one of the two brands as lower tar or health risk.

What this study adds

More than 40 countries currently prohibit the terms light, mild and low tar from appearing on packages on the basis that they are misleading. The current study suggests that other terms and elements of package design may be equally misleading to smokers, and raises doubts about the effectiveness of such limited restrictions.

These findings raise important questions about the distinction between ‘taste’ versus ‘health’ descriptors in cigarette packaging. Legislation in Canada and elsewhere distinguishes between packaging information related to ‘health’ and ‘factual information’: whereas factual

information related to the characteristics of a product is permitted, packaging information that is misleading, deceptive or likely to ‘create an erroneous impression about the characteristics, health effects or health hazards of the tobacco product’ is prohibited.³⁸ Tobacco companies have argued that brand descriptors such as ‘smooth’ are used to communicate flavour and taste to smokers, and not to communicate perceptions of health risk or tar levels;³⁹ however, the current findings suggest that these terms are equivalent in the minds of many smokers when used on packaging. The current findings are also consistent with research from internal industry documents which highlights the potentially reassuring properties of taste perceptions:

‘...All work in this area should be directed towards providing consumer reassurance about cigarettes and the smoking habit. This can be provided in different ways, e.g. by claiming low deliveries, by the perception of low deliveries and by the perception of “mildness”’.⁴⁰

In addition to broadening the list of prohibited words on packs, the removal of color and other design elements—so-called ‘plain packaging’—may also be required to eliminate misleading information from packaging.³⁴ Plain packaging would standardize the appearance of packages by requiring the removal of all brand imagery, including corporate logos and trademarks. Packages would display a standard background color and manufacturers would be permitted to print only the brand name in a mandated size, font and position (Fig. 1). Research to date suggests that plain packages are less attractive and engaging and may reduce brand appeal, particularly among youth.^{9,42–44} Plain packaging may also enhance the effectiveness of health warnings by increasing their noticeability and believability.^{32–35} To date, plain packaging regulations have been considered in several jurisdictions, but have yet to be adopted.

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