Deadly in pink: the impact of cigarette packaging among young women

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ABSTRACT

Background This study sought to examine the impact of cigarette packaging on young women, including the impact of 'plain' packaging.

Methods Participants were randomised to view eight cigarette packs designed according to one of four experimental conditions: fully-branded female brands; the same brands without descriptors (eg, 'slims'); the same brands without brand imagery or descriptors (ie, 'plain' packs); and fully branded non-female brands as a control condition. Participants rated packs on perceived appeal, taste, tar, health risks and smoker 'traits'.

Results Fully-branded female packs were rated as significantly more appealing than 'no descriptor' packs, 'plain' packs and non-female branded packs. Female branded packs were associated with a greater number of positive attributes including glamour, slimness and attractiveness, compared to brands without descriptors and 'plain' packs. Women who viewed plain packs were less likely to believe that smoking helps people control their appetite—an important predictor of smoking among young women—compared to women who viewed branded female packs.

Conclusions 'Plain' packaging—removing colours and design elements—and removing descriptors such as 'slims' from packs may reduce brand appeal and thereby susceptibility to smoking among young women.

INTRODUCTION

At the turn of the 20th century, cigarette smoking was almost exclusively a male behaviour. However, during a period of two decades between the 1940s and 1950s, the prevalence of smoking increased dramatically among women.[1] Today, North American women smoke in nearly equal numbers as men, and tobacco use is the leading cause of preventable death among women.[1,2]

Tobacco marketing played a critical role in the rise of female smoking in North America.[1] The launch of new female brands and advertising campaigns targeting themes of female independence and sophistication helped to shift social norms, and positioned smoking as a modern, progressive behaviour for young women. One of the most common themes in female-oriented tobacco marketing is smoking and weight control.[1] Beliefs about smoking and thinness have an important influence on the smoking behaviour of young women. Women and adolescent girls hold a common belief that smoking is an effective weight control strategy.[3-12] Women are more likely to endorse this belief than men,[6,9] and are also more likely to report using cigarettes as a weight loss method.[9] Research also suggests that smoking initiation is higher among girls who value thinness, engage in dieting behaviours, express concern over body weight, or have negative views of their bodies.[1,4,12,13]

Tobacco packaging has served as an important component in the overall marketing strategy targeting women. The pack provides a direct link between consumers and manufacturers, and is particularly important for consumer products such as cigarettes, which have a high degree of social visibility.[14-18] The importance of cigarette packaging has only increased following restrictions on traditional forms of advertising, such as in Canada, where packaging is the most prominent form of tobacco marketing.

Similar to tobacco advertisements, brand descriptors—words used in the name of brands and on packages—such as 'slims' have targeted concerns about body weight among women.[3] Many female-oriented brands include 'slims', 'super slims', or 'extra slims' variants. The colour and design of packs have also been designed to appeal to young women.[3,17] Colours such as pink, purple, white and yellow convey positive qualities such as freshness, femininity, cleanliness, purity and health.[1,17] Cigarettes packaged in lighter, more feminine colours are also perceived by many consumers as less harmful and 'smoother' than regular or full-flavour brands.[19,20] Beliefs about the harmfulness of cigarettes with respect to so-called 'light', 'mild' and low-tar brands have previously been associated with behavioural outcomes, such as brand switching as an alternative to quitting.[21]

Despite a consensus among public health advocates that packaging helps to promote smoking among young women, there is little empirical research that systematically evaluates the impact of female-oriented tobacco packaging. The current study sought to identify the impact of female-oriented cigarette packaging on women's beliefs and attitudes about smoking. More specifically, the study sought to examine the effects of brand descriptors (such as 'slims'), brand colour and imagery, as well as the impact of removing these elements—so-called 'plain' or 'standardised' packaging—on young women's beliefs about smoking.

METHODS

Participants and recruitment

Participants consisted of 512 women between the ages of 18 and 25 including smokers and non-smokers. Participants were recruited from a consumer panel of over 400 000 Canadians through Global Market Insite, Inc. (GMI, Bellevue, Washington). Invitations to participate in the survey were emailed to select panel members, although the invitation did not indicate the nature

or purpose of the study. Additional information on the GMI panel is available at http://www.gmi-mr.com. Participants were provided with remuneration of approximately $C2, depending upon the duration of the survey. All participants provided consent before completing the survey, in accordance with ethics requirements at the University of Waterloo, Ontario, Canada.

Protocol

Participants in the GMI panel were invited to participate in a 20-min survey by email. To ensure equal numbers of smokers and non-smokers in each of the four experimental conditions, participants were randomised to each condition after ascertaining smoking status. After answering a series of background questions, participants viewed eight cigarette packages, one at a time, designed according to each of the four experimental conditions: condition (1) female-oriented packages; condition (2) female-oriented packages with brand descriptors removed (eg, 'super slims'); condition (3) female-oriented packages without descriptors and with the colour and brand imagery removed

(ie, 'plain' packages); and condition (4) leading Canadian cigarette brands without any overtly feminine characteristics. Figure 1 shows the packs viewed in each experimental condition. Participants were asked to rate each pack on four 'brand ratings' (appeal, taste, health risks, tar levels), followed by eight 'smoker trait' questions. The image of the pack was presented on the screen during all pack ratings and smoker trait questions. After all eight packs were viewed and rated, participants were asked to complete a series of measures to assess outcomes related to their beliefs and attitudes towards smoking.

Selection of packages

The eight 'female-oriented' brands were selected based on previous research and internal industry documents.[3][20] These brands featured the descriptors extra slims, slims, menthol, cherry and vanilla, as well as 'traditional' female colour schemes, such as pink, white and other pastels; see figure 1. The 'non-female' brands selected for condition 4 included popular 'full flavour' or 'regular' variants of Canadian cigarette brands. Packs

Figure 1 Packages viewed in the study within each experimental condition. Note that the order of pack presentation within each experimental condition was counterbalanced across participants.

in this condition were included as a comparison condition to 'control' for the effects of viewing cigarette packs, compared to the female-oriented packs in conditions 1–3. All packages in the study displayed the same pictorial health warning covering 50% of the principal display surface, in accordance with Canadian regulations. Packages were counterbalanced to control for any effects of the order of presentation.

Measures

Sociodemographic variables and moderators
Education level, income and ethnicity were measured using previously validated measures.[22] Education was categorised as 'low' (grade school or some high school), 'medium' (high school, technical school or community college), or 'high' (university). Ethnicity was coded as 'white' versus 'other', and income was coded as 'low' (up to $C29 999), 'medium' ($CC30 000–$C59 999) and 'high' ($C60 000). Self-esteem was measured by taking the sum of five questions commonly used to assess self-esteem in surveys with young people, where higher scores indicate greater self-esteem.[23] Smokers were defined as respondents who reported smoking either daily, weekly, or monthly. Non-smokers were defined as respondents who reported smoking less than monthly or not at all. Weight concerns were measured by summing five questions assessing recent attempts to lose weight, and concerns over body weight and shape, using a five-point response scale.[24]

Brand ratings
Participants were asked to rate each package on four measures: (1) brand appeal ('In your opinion, how appealing would this brand of cigarettes be to young women your age compared to other brands on the market?'); (2) brand taste ('How do you think these cigarettes would taste compared to other brands'); (3) tar delivery ('How much tar do you think these cigarettes would have compared to other brands?'); and (4) health risks ('How would the health risks of these cigarettes compare to other cigarette brands?'). Responses were provided on a five-point Likert scale (eg, 1='a lot more appealing' to 5='a lot less appealing') and subsequently coded as either a 1 ('a little'/'a lot more appealing') or 0 ('a little'/'a lot less appealing' and 'no difference'). An overall index rating was created for each of the four measures, by summing scores across the eight packages to yield a score between 0 and 8.

Smoker trait ratings
For each package, respondents were asked to identify the typical smoker of each pack by answering the question, 'In your opinion, someone who chooses to smoke this brand is more likely to be…' for eight characteristics: female/male, glamorous/not glamorous, cool/not cool, exciting/boring, popular/not popular, attractive/unattractive, slim/overweight, sophisticated/not sophisticated. For each set of traits, respondents could choose either trait, 'don't know' or 'no difference'. The female/male question was recoded so 'female' was scored a '1', and 'male', 'no difference' and 'don't know' were scored a '0'. For the remaining traits, the more desirable trait was scored a '1', and the less desirable trait, 'no difference' and 'don't know' were scored a '0'.

Beliefs about smoking
Smoking and weight control beliefs were assessed using three measures: (1) weight control ('smoking helps people stay slim'), (2) effect of quitting smoking ('quitting smoking causes weight gain') and (3) appetite control ('smoking helps people control their appetites').

Responses were provided on a five-point Likert scale ranging from 'strongly agree' to 'strongly disagree'.

Analysis
All analyses were conducted in SPSS V. 17.0 (SPSS, Chicago, Illinois, USA). Regression models were used to examine the effect of experimental condition for three primary outcomes: brand ratings, smoker trait ratings and beliefs about smoking. For each outcome, regression models were conducted in two steps. In step 1, only the experimental condition variable was included in the model. In step 2, the following variables were entered as covariates: age, education, income, self-esteem, smoking status and weight concerns. Self-esteem was included in models predicting brand ratings and smoker traits. Unless indicated otherwise, results are from the 'adjusted' models in step 2 with all covariates present.

RESULTS

Sample characteristics
Table 1 shows the sample characteristics. There were no statistically significant differences between the four conditions on any of the sociodemographic variables shown in table 1.

Perceptions of brand appeal
Table 2 shows brand ratings for individual packs across the three female experimental conditions. As table 2 shows, 'plain', packages were rated as significantly less appealing than 'standard' female packs for all brands with the exception of the *Camel*, *XS* and *Silk Cut* variants. A linear regression was conducted using an index score for brand appeal across all eight packs to examine overall differences between experimental conditions, as well as sociodemographic predictors of brand appeal. A significant main effect of condition was found (F=10.55, p<0.001), such that packs in the standard condition (mean=4.2) were rated significantly more appealing than packs in the no descriptors condition (mean=3.7, β=−0.58, p=0.02), plain condition (mean=2.0, β=−2.29, p<0.001) and male condition (mean=2.4, β=−1.78, p<0.001). The no descriptors packs were also given higher appeal ratings than packs in the plain condition (β=−1.71, p<0.001) and male condition (β=−1.2, p<0.001), and packs in the plain condition were given lower appeal ratings than packs in the male condition (β=−0.51, p=0.04). Smokers and participants with higher incomes rated packs as more appealing compared to non-smokers and individuals who either reported low income or did not state their income, as shown in table 3.

Perceptions of taste
Table 2 shows taste ratings for each individual pack in the female conditions. Compared to standard female packs, significant reductions in perceived taste were observed in the plain pack condition for the three packs with flavour descriptors: *Benson & Hedges Menthol*, *Capri Vanilla* and *Capri Cherry*. A linear regression model was conducted using the taste index variable to examine differences across all eight packs. A significant main effect of condition was found (F=6.04, p=0.001), such that the standard packs (mean=2.4) were given higher taste ratings than the no descriptors (mean=1.9; β=−0.54, p=0.01), plain (mean=1.1; β=−1.32, p<0.001) and male packs (mean=1.9; β=−0.43, p=0.004). In addition, packs in the male condition and packs in no descriptors condition were given higher taste ratings than the plain condition (β=−0.9, p=0.01; β=−0.79, p<0.001, respectively). As table 3 shows, smokers, respondents with higher education, higher income and respondents who were non-white were more likely to rate packs as 'better taste'.

Table 1 Sample characteristics (n=512)

Condition	Standard	No descriptors	Plain	Non-female	Total
Sample size:	n=141	n=125	n=122	n=124	n=512
Age, mean (SD)	22.1 (2.1)	21.8 (2.2)	22.0 (2.2)	22.0 (2.2)	22 (2.2)
Ethnicity:					
White	70.2% (99)	73.6% (92)	72.1% (88)	74.2% (92)	72.5 (371)
Other	29.8% (42)	26.4% (33)	27.9% (34)	25.8% (32)	27.5 (141)
Income:					
Under $C10 000 to $C29 999	31.2% (44)	27.2% (34)	25.4% (31)	27.4% (34)	27.9% (143)
$C30 000 to $C59 999	29.8% (42)	32% (40)	33.6% (41)	26.6% (33)	30.5% (156)
$C60 000 and upwards	27.7% (39)	32% (40)	32.8% (40)	32.3% (40)	31.1% (159)
Not stated	11.3% (16)	8.8% (11)	8.2% (10)	13.7% (17)	10.5% (54)
Education level:					
Low	22.7% (32)	24% (30)	30.3% (37)	28.2% (35)	26.2% (134)
Medium	22.7% (32)	17.6% (22)	18% (22)	21% (26)	19.9% (102)
High	54.6% (77)	58.4% (73)	51.6% (63)	50.8% (63)	53.9% (276)
Smoking status:					
Current smokers	40.4% (57)	39.2% (49)	42.6% (52)	43.6% (54)	41.4% (212)
Former smokers	7.1% (10)	8.8% (11)	8.2% (10)	6.4% (8)	7.6% (39)
Never smokers	52.5% (74)	52.0% (65)	49.2% (60)	50.0% (62)	51.0% (261)
Cigarette smoking:*					
No. per day, mean (SD)	11.2 (8.5)	10.4 (9.2)	9.4 (6.7)	8.3 (7.0)	9.8 (8.0)
Plans to quit smoking:*					
In next month	17.7% (11)	15.4% (8)	10.4% (5)	11.1% (6)	13.9% (30)
In next 6 months	22.6% (14)	32.7% (17)	33.3% (16)	27.8% (15)	28.7% (62)
Beyond 6 months	40.3% (25)	40.4% (21)	47.9% (23)	44.4% (24)	43.1% (93)
Not planning to quit	19.4% (12)	11.5% (6)	8.3% (4)	16.7% (9)	14.4% (31)

Number in parentheses refer to sample sizes, except for age and cigarettes smoked.
*Among current smokers only.

Perceptions of tar level

As shown in table 2, few differences were observed across the female experimental conditions in the perceived tar level for individual packs. In a linear regression analysis using the index variable across all eight packs, a significant main effect of condition was found (F=2.81, p=0.001), such that the no descriptors (mean=1.1) packs were rated as having significantly less tar than packs in the male condition (mean=0.6; β=−0.44, p=0.009). Respondents with a 'medium' education level were more likely to rate packs as having less tar compared to low education respondents, as were smokers and respondents with low, medium and high income compared to those who did not state their income.

Perceptions of health risks

Table 2 shows health risk ratings for individual packs in the female conditions. As with perceived tar levels, few differences across conditions were observed. In a linear regression model using the index score across all eight packs, a significant main effect of condition was found (F=2.24, p=0.01), such that packs in the no descriptors (mean=0.74) condition were more likely to be rated as lower health risk than packs in the standard condition (mean=0.4; β=0.31, p=0.03). Packs in the no descriptors condition were also rated as lower risk compared to packs in the male condition (mean=0.35; β=−0.36, p=0.02). As table 3 shows, education and income levels were also associated with beliefs about health risk.

Effect of cigarette packages on smoker trait ratings

Participants were asked to rate each package along eight smoker 'traits'. Table 4 shows the number of packs endorsed for each smoker trait across the eight packs viewed by each participant. As table 4 shows, plain packages received significantly fewer positive ratings for every smoker trait except 'exciting', for
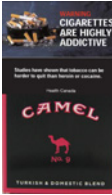
which no significant differences were observed across experimental conditions. A linear regression model was conducted in which seven of the smoker traits (all traits except 'female') were combined in a single index score, where higher scores indicated more positive smoker traits. A main effect of condition was significant (F=5.08, p<0.001), such that the packs in the standard condition (mean=13.2) were given higher positive trait scores than packs in the plain (mean=8.7; β=−4.9, p<0.001) and male (mean=7.5; β=−5.68, p<0.001) conditions. In addition, packs in the no descriptors condition (mean=12.1) were give higher positive ratings than packs in the male (β=−4.15, p<0.001) and plain pack (β=−3.33, p=0.009) conditions. As shown in table 3, smokers were more likely to endorse positive pack traits than non-smokers, as were younger respondents, non-white respondents, and those with higher education and income levels.

Effect of cigarette packages on beliefs about smoking and weight control

After viewing and rating each of the eight packages, participants were asked to report their beliefs about smoking and weight control. In a linear regression predicting agreement with the statement, 'Smoking helps people stay slim', there was an overall effect of condition (F=5.77, p<0.001), such that respondents in the plain pack condition were significantly less likely to believe that smoking helps people stay slim compared to participants in the no descriptors condition (β=−0.31, p=0.03). Smoking status, income, education and weight concerns were associated with the belief that smoking helps people stay slim (table 3).

In a linear regression predicting belief in the statement 'Smoking helps people control their appetites', there was a main effect of condition (F=6.0, p≤0.001), such that respondents in the plain pack condition were significantly less likely to believe

Table 2 Pack ratings of appeal, taste, tar level and health risk for individual packs (n=512)

	Capri	Capri	Vogue	PINK	Superslims	Silk Cut	XS	Camel
'A little' or 'a lot' more appealing than other brands (percentage agreement)								
Standard	66.7%[a]	66.0%[a]	60.3%[a]	60.3%[a]	55.3%[a]	47.5%	38.3%	27.7%
No descriptors	64.0%[b]	52.0%[a]	56.8%	49.6%[a]	46.0%[b]	35.2%	31.5%	29.6%
Plain	16.5%[ab]	14.8%[a]	44.3%[a]	14.8%[a]	19.7%[ab]	36.9%	31.7%	21.3%
'A little' or 'a lot' better taste than other brands (percentage agreement)								
Standard	58.2%[a]	58.9%[a]	22.7%	17.0%	31.9%[a]	24.8%	9.9%	10.0%
No descriptors	26.4%[a]	28%[a]	31.2%	20.8%	23.4%	25.8%	12.9%	17.7%
Plain	8.2%[a]	5.7%[a]	19.4%	12.3%	15.6%[a]	23.4%	9.0%	14.5%
'A little' or 'a lot' less tar than other brands (percentage agreement)								
Standard	9.2%	9.9%	14.9%	3.5%	16.3%	14.9%	14.9%	3.6%
No descriptors	17.6%[a]	12.1%	20.0%[a]	8.0%	18.4%	16.8%	8.8%	7.2%
Plain	7.4%[a]	9.9%	10.7%[a]	9.0%	12.4%	13.9%	13.1%	5.7%
'A little' or 'a lot' less health risk than other brands (percentage agreement)								
Standard	5.7%	5.0%	5.0%[a]	2.1%	7.8%	7.1%	7.1%	0.7%
No descriptors	12.8%[a]	8.8%	14.4%[ab]	5.6%	9.6%	9.6%	5.6%	7.2%
Plain	3.3%[a]	4.1%	6.6%[b]	6.6%	4.1%	8.2%	8.2%	4.1%

Letters are used to indicate statistical significance between values in the same column. Values with the same letter are significantly different at the p<0.05 level.
Note that results are not shown for the 'male' condition. Unlike the three 'female' conditions shown in the table, for which the same brand was systematically altered across conditions, different brands were used in the 'male' condition and no brand-specific comparisons can be made across conditions.

that smoking helps people control their appetite compared to participants in the standard (β=−0.32, p=0.03) and male (β=−0.39, p=0.009) conditions. Respondent with higher education, smokers and those who expressed greater weight concerns were more likely to believe that smoking helps people control their appetites (table 3).

In a linear regression predicting the belief that, 'Quitting smoking causes weight gain', no significant differences were observed between experimental conditions. White respondents, smokers, respondents with high income and those who expressed higher weight concerns were more likely to believe that quitting smoking causes weight gain (table 3).

DISCUSSION

Female-oriented cigarette packaging is becoming increasingly common and has been identified as an important market driver, particularly with respect to convincing women in low-income and middle-income countries to smoke.[25] The results of the current study demonstrate that female-oriented packs have considerable appeal among young women. For example, the highest-rated female pack, *Capri Cherry*, was rated 'more appealing than other brands' by almost 67% of participants. In addition, removing descriptors and colours from packs reduced the appeal of brands: for example, the appeal of *Capri Cherry* fell from 67% to 17% among women who viewed plain packs without the word 'Cherry'. Plain packs were also associated with significantly fewer positive characteristics than fully branded packs, including glamour, being slim, popular, attractive and sophisticated. These findings are consistent with previous research demonstrating that plain packages are less attractive and engaging than fully branded packs, particularly among youth.[20 26−28] As expected, smokers rated female brands as more appealing than non-smokers. Nevertheless,

a surprising number of non-smokers also rated packs as appealing: almost 45% of non-smokers rated at least one of the eight packs as appealing. In addition, younger women were more likely to endorse positive smoker traits than the older women. Given that smoking initiation tends to occur in adolescence, this means that the youngest women in our study—those who are most at risk of smoking initiation—were the most likely to believe that female brands are smoked by slim, attractive and glamorous women. Ratings of appeal were also greater among higher-income participants. This may reflect the selection of 'premium' brands as examples of female-oriented packaging.

When examining appeal ratings for individual packages, three of the four highest-rated female packs (*Capri Vanilla, Capri Cherry, Vogue Blue*) were predominantly white in colour and featured small abstract pink or blue designs, while the fourth (*JPS Pink*) was predominantly pink in colour, with the word 'pink' written in large letters. The pack with the lowest appeal ratings (*Camel no. 9*) was predominantly black with a small amount of fuchsia. This finding is consistent with other research that suggests that the colour pink, as well as other lighter colours such as purple, white and light yellow, convey positive qualities that women find appealing, such as freshness, femininity, purity and cleanliness.[1 29]

Perceptions of taste were similar to perceptions of brand appeal: fully branded female packs were rated as having better taste. As predicted, packs with flavour descriptors (menthol, vanilla and cherry) were given the highest taste ratings among the eight packs. These findings are consistent with previous research,[3] as well as studies indicating that youth and younger age groups are more likely to be attracted to flavoured brands, such as vanilla, chocolate and cherry.[30] New federal regulations in Canada prohibit flavours in tobacco products other than menthol.[31]

Table 3 Linear regression models for perceptions of packaging and weight-related beliefs

	Appeal index	Taste index	Tar index	Health index	Smoker trait index	Slim	Appetite	Weight gain
Experimental condition								
Standard vs no descriptors	**−0.58** (−1.04 to −0.11)	**0.54** (−0.94 to −0.13)	0.18 (−0.14 to 0.50)	**0.31** (0.03 to 0.59)	−1.54 (−4.0 to 0.87)	0.21 (−0.06 to 0.47)	−0.12 (−0.4 to 0.16)	−0.09 (−0.35 to 0.17)
Standard vs plain	**−2.29** (−2.76 to −1.82)	**−1.32** (−1.73 to −0.91)	−0.09 (−0.41 to 0.23)	0.02 (−0.26 to 0.31)	**−4.9** (−7.3 to −2.44)	−0.1 (−0.37 to 0.17)	**−0.32** (−0.6 to −0.04)	−0.19 (−0.45 to 0.07)
Standard vs male	**−1.78** (−2.24 to −1.32)	**−0.43** (−0.84 to −0.02)	−0.26 (−0.58 to 0.06)	−0.05 (−0.33 to 0.23)	**−5.68** (−8.1 to −3.27)	0.13 (−0.14 to 0.4)	0.07 (−0.21 to 0.35)	0.04 (−0.22 to 0.29)
Male vs plain	**−0.51** (−0.99 to −0.03)	**−0.9** (−1.32 to −0.47)	0.17 (−0.16 to 0.51)	0.07 (−0.22 to 0.37)	0.81 (−1.69 to 3.31)	−0.23 (−0.51 to 0.05)	**−0.39** (−0.68 to −0.1)	−0.22 (−0.49 to 0.04)
Male vs no descriptors	**−1.20** (−1.68 to −0.72)	0.11 (−0.31 to 0.53)	**−0.44** (−0.77 to −0.11)	**−0.36** (−0.65 to −0.07)	**−4.15** (−6.63 to −1.66)	−0.08 (−0.35 to 0.20)	0.19 (−0.1 to 0.48)	0.13 (−0.14 to 0.39)
No descriptors vs plain	**−1.71** (−2.2 to −1.23)	**−0.79** (−1.21 to −0.37)	−0.27 (−0.6 to 0.06)	−0.29 (−0.58 to 0.01)	**−3.33** (−5.82 to −0.84)	**−0.31** (−0.58 to −0.03)	−0.2 (−0.49 to 0.09)	−0.1 (−0.36 to 0.17)
Age	−0.05 (−0.13 to 0.03)	−0.05 (−0.12 to 0.03)	−0.03 (−0.09 to 0.02)	−0.02 (−0.07 to 0.03)	**−0.6** (−1.02 to −0.17)	−0.02 (−0.07 to 0.03)	−0.01 (−0.06 to 0.04)	0.003 (−0.04 to 0.05)
Education								
Low vs medium	−0.06 (−0.58 to 0.45)	**−0.47** (−0.92 to −0.02)	**−0.42** (−0.78 to −0.07)	**−0.36** (−0.67 to −0.04)	0.02 (−2.47 to 2.86)	−0.15 (−0.44 to 0.15)	−0.17 (−0.48 to 0.14)	−0.003 (−0.29 to 0.28)
Low vs high	0.16 (−0.26 to 0.57)	−0.07 (−0.44 to 0.29)	−0.12 (−0.4 to 0.17)	−0.02 (−0.27 to 0.23)	**2.29** (0.13 to 4.44)	0.23 (−0.004 to 0.47)	0.25 (−0.001 to 0.5)	0.09 (−0.14 to 0.32)
Medium vs high	0.22 (−0.23 to 0.67)	**0.39** (0.01 to 0.78)	0.3 (−0.01 to 0.61)	**0.34** (0.07 to 0.61)	2.09 (−0.21 to 4.4)	**0.38** (0.12 to 0.63)	**0.42** (0.15 to 0.69)	0.09 (−0.16 to 0.34)
Ethnicity	−0.24 (−0.62 to 0.15)	**−0.50** (−0.83 to −0.16)	−0.12 (−0.38 to 0.15)	−0.17 (−0.4 to 0.06)	**−2.48** (−4.47 to −0.5)	−0.13 (−0.35 to 0.09)	0.02 (−0.22 to 0.25)	**0.29** (0.08 to 0.5)
Income								
Low vs medium	0.24 (−0.2 to 0.69)	0.06 (−0.33 to 0.45)	0.11 (−0.2 to 0.42)	0.13 (−0.14 to 0.4)	**2.91** (0.61 to 5.21)	−0.13 (−0.38 to 0.13)	−0.06 (−0.33 to 0.21)	−0.01 (−0.25 to 0.24)
Low vs high	**0.45** (0.01 to 0.89)	0.17 (−0.22 to 0.55)	0.06 (−0.24 to 0.37)	−0.002 (−0.27 to 0.27)	**2.45** (0.16 to 4.73)	0.19 (−0.06 to 0.44)	0.18 (−0.09 to 0.45)	0.17 (−0.08 to 0.41)
Low vs not stated	−0.31 (−0.92 to 0.31)	**−0.62** (−1.15 to −0.08)	**−0.55** (−0.97 to −0.13)	−0.33 (−0.71 to 0.04)	−1.2 (−4.41 to 2.0)	**−0.45** (−0.8 to −0.1)	−0.27 (−0.64 to 0.1)	−0.32 (−0.67 to 0.03)
Medium vs high	0.21 (−0.22 to 0.64)	0.11 (−0.27 to 0.48)	−0.05 (−0.34 to 0.25)	−0.13 (−0.39 to 0.13)	−0.46 (−2.68 to 1.75)	**0.32*** (0.07 to 0.56)	0.24 (−0.02 to 0.5)	0.17 (−0.06 to 0.41)
Medium vs not stated	0.55 (−0.06 to 1.16)	**0.68** (0.14 to 1.21)	**0.66** (0.24 to 1.08)	**0.46** (0.09 to 0.83)	**4.11** (0.93 to 7.30)	0.33 (−0.02 to 0.68)	0.21 (−0.16 to 0.58)	0.31 (−0.04 to 0.66)
High vs not stated	**0.76** (0.16 to 1.36)	**0.78** (0.26 to 1.31)	**0.61** (0.2 to 1.03)	0.33 (−0.04 to 0.7)	**3.65** (0.50 to 6.80)	**0.64** (0.3 to 0.99)	**0.45** (0.09 to 0.82)	**0.48** (0.14 to 0.83)
Smoking Status	**0.56** (0.21 to 0.91)	**0.57** (0.27 to 0.88)	**0.35** (0.11 to 0.59)	0.19 (−0.03 to 0.4)	**2.71** (0.89 to 4.52)	**0.58** (0.38 to 0.78)	**0.67** (0.46 to 0.88)	**0.44** (0.25 to 0.63)
Weight concerns	0.08 (−0.09 to 0.26)	0.1 (−0.05 to 0.26)	−0.01 (−0.12 to 0.12)	−0.03 (−0.14 to 0.08)	0.64 (−0.28 to 1.56)	**0.11** (0.01 to 0.2)	**0.1** (0.02 to 0.22)	**0.13** (0.03 to 0.22)
Self-esteem	0.01 (−0.24 to 0.26)	−0.05 (−0.27 to 0.16)	−0.07 (−0.24 to 0.1)	−0.08 (−0.23 to 0.07)	0.4 (−0.88 to 1.67)	NA	NA	NA

Unstandardised β values and 95% CIs are shown. Numbers in bold indicate p<0.05.
NA, not applicable.

Table 4 Smoker trait ratings for packages by experimental condition (n=512)

Experimental condition	Number of packs (out of eight) endorsed for each trait							
	Female	Slim	Glamorous	Cool	Popular	Attractive	Exciting	Sophisticated
Standard	5.26[a]	2.01[a]	2.50[ab]	1.87[ab]	2.01[ab]	1.84[ab]	0.79	2.19[ab]
No descriptors	4.34[ab]	1.67[b]	2.31[cd]	1.87[cd]	1.74[cd]	1.67[cd]	0.85	1.98[cd]
Plain	2.94[abc]	1.73[d]	1.48[ace]	0.97[ac]	1.18[ac]	1.10[ac]	0.98	1.22[ac]
Non-female	1.28[abc]	1.13[abd]	1.01[bde]	1.19[bd]	1.13[bd]	0.92[bd]	1.11	1.02[bd]

Letters are used to indicate statistical significance between values in the same column. Values with the same letter are significantly different at the p<0.05 level.

Perhaps most importantly, the results of the current study are the first to empirically demonstrate a link between cigarette packaging and smoking and weight control beliefs—a potent predictor of smoking among girls and young women. Young women who viewed the plain packs were significantly less likely to believe that smoking helps people control their appetites and helped them to stay slim compared to women who viewed the same packs with colours and brand descriptors. In addition, female packs with full branded information were more likely to be associated with 'slim' smokers than the 'plain' packs. No significant differences were observed for the 'slim' trait between the three female pack conditions, including the 'standard' and 'plain' pack conditions. The lack of differences between the female conditions may be due to the fact that at least some of the attributes that connote slimness were present in all three female conditions. For example, although the word 'slim' was removed as a descriptor in several cases, packs retained their original shape, which in most cases was a narrow, tall shape. In addition, a number of the packs incorporated words that may suggest fashion and an association with slimness in their actual brand name which remained constant across all conditions: *Vogue, Silk Cut* and *XS*, for example. Therefore, although endorsements of 'slimness' decreased between the 'standard' packs and those in the conditions without colour and descriptors, information connoting slimness remained on the packs, such that these differences were not statistically significant. Overall, these results demonstrate that tobacco industry marketing in the form of pack design manipulates a key predictor of smoking for young women. Previous research suggests that women perceive 'slim' cigarettes as less harmful due to a belief that less tobacco is consumed[18]; however, to our knowledge, the current findings are the first published research on the impact of 'slims' descriptors on weight-related beliefs among young women.

Relatively modest effects were observed with respect to the influence of pack design on perceived health risk and tar level. The proportion of young women who rated packs as being 'less harmful than other brands' was relatively low and few differences were observed across experimental conditions, including between fully branded and plain packs. These results are inconsistent with previous research, which suggests that branded packs are associated with a greater level of false health beliefs about the relative risks of cigarette brands.[20 21] Methodological differences across study designs may account for this inconsistency. In the current study, participants were asked to compare individual packs to 'other brands on the market', whereas other studies have asked participants to compare two specific brands using side-by-side comparisons. The absence of a concrete comparator and the vagueness of the question in the current study may have limited the utility of these measures. In addition, the use of 'white' in the current study as the standard background colour for plain packs may have attenuated differences between the branded and plain conditions. Many of the fully branded packs in the current study featured white as their predominant colour, which is typically associated with cleanliness and health, and participants may have simply believed they were rating a series of branded packs that happened to be white. Indeed, young women in the current study rated branded packs that were predominantly white the most appealing. Recent research indicates that other background colours, such as 'brown', are associated with fewer false health beliefs compared to branded packs and are significantly less appealing.[21 28 32]

Strengths and limitations

This study is subject to several limitations. Participants in the study were not recruited using random sampling and are therefore not necessarily representative of the Canadian population. For example, the current sample reported somewhat higher levels of educational status than population-based surveys.[2] However, our sample was drawn from a national sample of heterogeneous smokers and non-smokers from throughout Canada, representing different socioeconomic levels that are broadly similar to the general Canadian population of youth and young adults. In addition, although an attempt was made to select female packages that were thought to display overtly feminine brand elements, there are no objective criteria for what constitutes a female-oriented cigarette brand. As a result, it is possible that some brands were less appealing to women, and that some of the 'male' packages were not perceived as being masculine. However, this would have reduced, rather than enhanced, the main effects observed in the study. A considerable strength of this study was the between-subjects experimental design and randomisation of participants to experimental conditions, which should ensure that any sampling biases were equal across groups. Self-reported evaluations of cigarette packs may also be subject to social desirability bias. In the current study, the socially desirable response may have been to provide reduced ratings of appeal and other positive attributes of cigarette brands given prevailing social norms around tobacco use, thereby underestimating positive pack and trait ratings. Finally, the study used weight-related beliefs as one of the primary outcomes rather than smoking intentions, as is often the case. Using smoking intentions as the primary outcome may be an unreasonably high threshold: smoking intentions are the product of many different influences that accumulate over time. While it is plausible that packaging may influence intentions in 'real life', it is unlikely that viewing a series of packages for several minutes during an online survey would be sufficient to shift smoking intentions. As a result, the study focused on a more 'proximal' outcome in the form of weight related beliefs, but one that has nevertheless been associated with smoking behaviour in other studies.

Implications

The use of cigarette packaging is becoming more important as a marketing tool as other forms of tobacco marketing and advertising are restricted. In Canada, Section 22 of the 1997 Tobacco Act prohibits tobacco promotion through 'life-style advertising', defined as: '…advertising that associates a product with, or evokes a positive or negative emotion about or image of,

What this paper adds

► Cigarette packaging is an important component of tobacco marketing and among the most prominent forms of marketing in jurisdictions with comprehensive restrictions on traditional advertising channels. Few studies have examined the impact of package branding on beliefs about smoking among young women, including the impact of 'plain' or 'standardised' packaging, in which branding has been removed.

► 'Plain' packaging—removing colours and design elements—and removing descriptors such as 'slims' from packs may reduce brand appeal and predictors of smoking among young women. The findings add to the evidence base on the potential effectiveness of plain packaging regulations.

a way of life such as one that includes glamour, recreation, excitement, vitality, risk or daring'.[33] The current findings suggest that current tobacco industry practices may violate these regulations given the lifestyle images associated with pack designs in the current study, including glamour, which is specifically mentioned in the regulations. Indeed, one of the brands displayed the word 'luxury' on the back of the pack, which would appear to be in direct contravention of regulations.

This study also adds to the evidence that packaging may promote smoking. The current study provides experimental evidence that viewing female packs, even for a brief period of time, can increase a potent predictor of smoking among girls—beliefs about weight control. In contrast, women who viewed plain packaging were less likely to endorse the link between smoking and weight control. Overall, these findings support recommendations for plain packaging in the WHO's Framework Convention on Tobacco Control, as well as proposed regulations in Australia and ongoing consultations in countries such as the UK.[34]

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