A Cross-Sectional Study of the Impact of Standardized Tobacco Packaging Legislation on University Students

Thomas Poundalla, Ilze Bogdanovica, and Tessa Langley

University of Nottingham, Nottingham, UK; UK Centre for Tobacco and Alcohol Studies, Nottingham, UK

ABSTRACT

Background: European Union and national legislation implemented from May 2016 mean that from May 2017 all tobacco products in the United Kingdom must be sold in standardized packs without external branding and with prominent graphic health warnings. This study investigates the level of awareness and acceptability of the legislation in students during the implementation period, and how the legislation may impact on student perceptions of pack attributes, health warning effectiveness, student smokers’ willingness to pay for cigarette packs, and intentions to quit.

Methods: An online survey link was e-mailed to randomly selected University of Nottingham students in autumn 2016. Descriptive statistics and multivariate logistic regression models were used to investigate awareness, acceptability, and potential quitting behavior.

Results: 546 students (175 smokers, 371 nonsmokers) responded. Very few of students had seen a standardized pack. Smokers were more likely to be aware of the new legislation than non-smokers. More smokers noticed the warnings on standardized packs than on branded ones. Fewer smokers were willing to pay current prices for standardized packs than for 20 branded packs. Just under half of smokers anticipated quitting in response to the new legislation, with those who smoke infrequently being more likely to anticipate quitting than daily smokers.

Conclusions: Few students had seen a standardized pack, suggesting that the level of implementation of the legislation was low five to six months into the implementation period. However, the findings suggest that the legislation has the potential to increase quitting behavior in smoking students.

KEYWORDS

price-minimizing behavior; smoking; tobacco taxation; young adults

Introduction

Historically, tobacco packaging has been designed to promote brand names, change perceptions of product risk and quality, distract attention away from health warnings, and, in particular, appeal to young people—the next generation of smokers (Borland, Savvas, Sharkie, & Moore, 2013; Ford, MacKintosh, Moodie, Richardson, & Hastings, 2013; Ford, Moodie, MacKintosh, & Hastings, 2013a, 2013b; Gendall et al., 2011; Hammond, Dockrell, Arnott, Lee, & McNell, 2009; Hammond & Parkinson, 2009; Maynard, Munafo, & Leonards, 2013; Moodie, Angus, Stead, & Bauld, 2013; Moodie et al., 2012; Scheffels & Saebo, 2013). Until recently, following bans on tobacco advertising, tobacco direct marketing, and tobacco company sponsorship, tobacco packaging remained as one of the few means for tobacco companies to promote smoking in the United Kingdom.

From May 2016 new tobacco standardized (unbranded) packaging legislation was implemented in the United Kingdom with a view to reducing the appeal of tobacco products to consumers, particularly young people (Department of Health, 2016). The new European Union Tobacco Products Directive introduced changes to tobacco packaging, including increased graphic health warnings covering 65% of the front and back of these packs, minimum pack sizes of 20 cigarettes or 30 g of loose tobacco, and the prohibition of novel pack shapes (Directive 2014/40/EU, 2014). National legislation implemented in parallel with the EU legislation saw the United Kingdom become the second country in the world (after Australia in 2012) to implement standardized tobacco packaging. Standardized packaging legislation requires packs to be free from all imagery and branding with the exception of the product and variant name in standard-sized Helvetica font (The Standardised Packaging of Tobacco Products Regulations 2015, 2015). The only color permitted on the external packaging is pantone 448C, a drab dark brown color. A one-year
implementation period until May 20, 2017, was permitted for the sale of the remaining stock of packs that did not comply with the new legislation.

Evidence from Australia suggests that standardized packaging increased quit attempts in adult smokers and reduced smoking prevalence (Diethelm & Farley, 2015; Durkin et al., 2015). However, the timing of any changes in behavior related to standardized packaging is dependent on the time at which the packs actually appear in shops and become the norm. Evidence on the speed of implementation in the United Kingdom is currently lacking. Furthermore, the majority of the existing evidence on standardized packaging precedes the implementation of the legislation and focuses on attitudes and potential behavior change among adults and school-age children (Doxey & Hammond, 2011; Ford et al., 2013a; Ford et al., 2013b; Germain, Wakefield, & Durkin, 2010; Shankleman, Sykes, Mandeville, Di Costa, & Yarrow, 2015; White & Hammond, 2012). These studies suggest that standardized packaging reduces brand appeal and susceptibility to smoking, and increases attention to pack health warnings. Evidence of the impact of the legislation on young adults in the United Kingdom, one in six of whom are smokers, is limited; student populations offer a convenient opportunity to investigate the responses of young adults to standardized packaging in a timely fashion (Office for National Statistics [ONS], 2016).

This study investigated university students’ awareness of and attitudes toward the legislation and sightings of the new packs five to six months into the implementation period, as well as their views on potential changes in smoking behavior in response to the new legislation. We surveyed both smokers and non-smokers so as to compare awareness of attitudes toward the legislation between these groups.

Methods

Design

We conducted a cross-sectional survey of students at the University of Nottingham using the Bristol Online Survey (BOS) tool. Participants completed the survey between October 26, 2016, and November 26, 2016. The study was approved by the University of Nottingham Faculty of Medicine and Health Sciences Research Ethics Committee.

Study population and sampling method

The study population was current University of Nottingham undergraduate and postgraduate students during the autumn term of the 2016–2017 academic year. Students studying outside the United Kingdom, such as those on years abroad, were excluded. Participants could be smokers or nonsmokers. Smokers were defined as students who ever smoked, including “social smokers” who only smoke on rare social occasions.

To obtain a representative sample of students in the population, a randomized cluster sampling method was used. We estimated that a sample of 423 would provide estimates of smoking prevalence to within 10%. Given the relatively low response rate of previous similar studies, a large sampling frame was used (Rutter, Britton, & Langley, 2017). A random number generator was used to select four of the university’s five faculties and three departments from each faculty. University courses from a list of all 93 offered by those departments were randomly selected. The administration at the university then forwarded an e-mail from the researcher to all 3,865 students studying the 32 selected courses. The e-mail contained a short message inviting them to complete a survey about tobacco product packaging and a Web link to the online survey. Participation was incentivized by optional entry into a prize draw to win a £50 Amazon.com voucher. Participation in the survey was anonymous, but those who wanted to be included in the prize draw were required to provide their e-mail address.

Data collection instrument

All respondents were asked about basic information including age, sex, whether they ever smoked, frequency of smoking, type of tobacco product and pack sized used, and whether they ever use e-cigarettes. We also asked questions about smoking among participants’ family and friends. Participants were then shown an image of a branded cigarette pack from one of the United Kingdom’s top selling brands (Lambert and Butler Original; image provided by Action on Smoking and Health [ASH] image library) and asked questions about whether they noticed the health warnings on the branded packs (yes/no/unsure), and whether they thought the health warning labels would put them off smoking (yes/no/unsure) (ASH, 2015.). Participants were then asked if they were aware of standardized packaging legislation prior to being given an explanation of the new legislation and being shown an image of a standardized cigarette pack meeting the specifications of those which have been introduced in the United Kingdom (image provided by ASH image library). After viewing it they were asked if they had seen any standardized packs (yes/no/unsure), whether they noticed the health warnings on the packs (yes/no/unsure), and whether they thought the health warning labels would put them off smoking (yes/no/unsure), and whether they thought the change in

Evidence from Australia suggests that standardized packaging increased quit attempts in adult smokers and reduced smoking prevalence (Diethelm & Farley, 2015; Durkin et al., 2015). However, the timing of any changes in behavior related to standardized packaging is dependent on the time at which the packs actually appear in shops and become the norm. Evidence on the speed of implementation in the United Kingdom is currently lacking. Furthermore, the majority of the existing evidence on standardized packaging precedes the implementation of the legislation and focuses on attitudes and potential behavior change among adults and school-age children (Doxey & Hammond, 2011; Ford et al., 2013a; Ford et al., 2013b; Germain, Wakefield, & Durkin, 2010; Shankleman, Sykes, Mandeville, Di Costa, & Yarrow, 2015; White & Hammond, 2012). These studies suggest that standardized packaging reduces brand appeal and susceptibility to smoking, and increases attention to pack health warnings. Evidence of the impact of the legislation on young adults in the United Kingdom, one in six of whom are smokers, is limited; student populations offer a convenient opportunity to investigate the responses of young adults to standardized packaging in a timely fashion (Office for National Statistics [ONS], 2016).

This study investigated university students’ awareness of and attitudes toward the legislation and sightings of the new packs five to six months into the implementation period, as well as their views on potential changes in smoking behavior in response to the new legislation. We surveyed both smokers and non-smokers so as to compare awareness of attitudes toward the legislation between these groups.

Methods

Design

We conducted a cross-sectional survey of students at the University of Nottingham using the Bristol Online Survey (BOS) tool. Participants completed the survey between October 26, 2016, and November 26, 2016. The study was approved by the University of Nottingham Faculty of Medicine and Health Sciences Research Ethics Committee.

Study population and sampling method

The study population was current University of Nottingham undergraduate and postgraduate students during the autumn term of the 2016–2017 academic year. Students studying outside the United Kingdom, such as those on years abroad, were excluded. Participants could be smokers or nonsmokers. Smokers were defined as students who ever smoked, including “social smokers” who only smoke on rare social occasions.

To obtain a representative sample of students in the population, a randomized cluster sampling method was used. We estimated that a sample of 423 would provide estimates of smoking prevalence to within 10%. Given the relatively low response rate of previous similar studies, a large sampling frame was used (Rutter, Britton, & Langley, 2017). A random number generator was used to select four of the university’s five faculties and three departments from each faculty. University courses from a list of all 93 offered by those departments were randomly selected. The administration at the university then forwarded an e-mail from the researcher to all 3,865 students studying the 32 selected courses. The e-mail contained a short message inviting them to complete a survey about tobacco product packaging and a Web link to the online survey. Participation was incentivized by optional entry into a prize draw to win a £50 Amazon.com voucher. Participation in the survey was anonymous, but those who wanted to be included in the prize draw were required to provide their e-mail address.

Data collection instrument

All respondents were asked about basic information including age, sex, whether they ever smoked, frequency of smoking, type of tobacco product and pack sized used, and whether they ever use e-cigarettes. We also asked questions about smoking among participants’ family and friends. Participants were then shown an image of a branded cigarette pack from one of the United Kingdom’s top selling brands (Lambert and Butler Original; image provided by Action on Smoking and Health [ASH] image library) and asked questions about whether they noticed the health warnings on the branded packs (yes/no/unsure), and whether they thought the health warning labels would put them off smoking (yes/no/unsure) (ASH, 2015.). Participants were then asked if they were aware of standardized packaging legislation prior to being given an explanation of the new legislation and being shown an image of a standardized cigarette pack meeting the specifications of those which have been introduced in the United Kingdom (image provided by ASH image library). After viewing it they were asked if they had seen any standardized packs (yes/no/unsure), whether they noticed the health warnings on the packs (yes/no/unsure), and whether they thought the health warning labels would put them off smoking (yes/no/unsure), and whether they thought the change in
packaging was a good idea (very good/fairly good/fairly bad/very bad/unsure). Smokers were asked how willing they would be to pay current prices for a pack bearing this packaging (yes/no/unsure) and if they thought that they would make behavior changes such as quitting or switching to a cheaper brand or alternative products as a result of the legislation.

The survey was piloted in a small student group prior to distribution.

Statistical analysis

The survey data were exported from the BOS server into Microsoft Excel and then imported into Stata version 14.0 for analysis. Descriptive analysis of the sample demographics was performed.

Univariate and multivariate logistic regression models were run to investigate if smoking status or any other factors influenced student awareness and acceptance of the new legislation. An additional model was run for smokers only, to investigate which factors influenced whether a student anticipated that they would quit in response to the legislation. Age and sex were included in all models as a priori variables. Other variables (smoking status, e-cigarette use, number of close friends who smoke, and number of immediate family members who smoke) that it was hypothesized might influence legislation awareness and perceived acceptability were also tested in each model. Number of close friends who smoke was defined as the number of friends who ever smoke out of the 10 friends with whom the respondent spent the most time whilst at university. Immediate family members were defined as parents/siblings. All the variables were coded as binary variables except age and numbers of friends and family who smoke, which were treated as continuous variables in the model. A variable was included in the multivariate model if it was statistically significant ($p < 0.05$) in the univariate model.

Results

Sample characteristics and smoking behavior

A total of 546 of the 3,865 students contacted participated in the survey, giving a response rate of 14.1%. A total of 58% of the sample was female and the median age was 19 (Interquartile range (IQR) 18–21) (Table 1).

A total of 31.3% of students were smokers and 9.2% ever used e-cigarettes; 26% of smokers reported using e-cigarettes, compared with 1.3% of nonsmokers.

Although the majority of smoking students smoked monthly or less than monthly, 26% of smokers in the sample reported being daily smokers. Equal proportions of students reported that they usually bought 10 to 14 cigarette packs and 20 cigarette packs; however, one-third reported not buying their own tobacco products.

Awareness of and responses to standardized packaging

More than half of the sample was aware of the new legislation, but only 12% had seen a standardized pack (Table 2). More than 90% of the sample thought that the legislation was a very or fairly good idea, including more than 80% of smokers. Frequent smokers were more likely than infrequent smokers to be aware of standardized packaging and to have seen a standard pack, but less likely to think it was a very good idea.

The majority of student smokers reported that their likely response to the legislation would be cutting down on smoking (61%), quitting (46%), or switching to a cheaper brand (29%; Table 2, multiple responses permitted). One in five student smokers anticipated switching to e-cigarettes in response to the new legislation (Table 2).

In the logistic regression analyses being a smoker was still found to be associated with greater awareness of the new legislation ($OR = 2.15$, 95% CI $= 1.41–3.27$; Table 3). No other factors were significantly associated with awareness of the new legislation. Smokers were still found to be significantly less likely to find the new legislation acceptable ($OR = 0.66$, 95% CI $= 0.45–0.95$).

Smokers who smoked less than once a month were more than 3 times as likely to believe that they would quit in response to the new legislation than those who smoked daily ($OR = 3.30$, CI $= 1.06–10.00$; Table 4).

Warning message effectiveness (data not shown)

After being shown an image of both a branded and a standardized pack, all participants were asked about the health warnings on tobacco packaging. Both smokers and nonsmokers were significantly more likely to report noticing the health warnings on the standardized packs ($p < 0.001$) than on branded packs. A total of 99% of nonsmokers reported noticing the warnings on standardized packs compared with 90% on the branded packs ($p < 0.001$), and 99% of smokers noticed the warnings on standardized packs, but only 79% noticed them on the branded packs ($p < 0.001$). Most nonsmokers (92%) also reported that the warnings on the standardized packs deterred them from starting smoking, as opposed to just under two-thirds for the branded packs (60%, $p < 0.001$). Well over half of smokers reported that the warnings on the standardized packs made them want to quit (59%), compared with under one-quarter for the branded packs (23%, $p = 0.048$).
This study found that in autumn 2016 only a small proportion of students had seen a standardized pack, suggesting that implementation of the new packaging was low five to six months into the 12-month transition period. Fewer smokers than nonsmokers found the new legislation acceptable, but overall acceptability was high. Students reported that the warning messages on standardized packs are clearer and more effective at deterring both smokers and nonsmokers. Many smokers anticipated that they would quit, cut down, or switch to other products in response to the new legislation. One in five said they would switch to e-cigarettes.

This study has a number of strengths and limitations. The timing of the study was advantageous in that it allowed awareness and acceptability to be studied during the transition between branded and standardized packaging. The online survey design ensured anonymity and therefore minimized the risk of social desirability bias (Durkin et al., 2015; Gillham, 2008). While the response rate was relatively low, the sample size was high compared to prior studies of this type in this population (Rutter et al., 2017). The study population is unlikely to be representative of young people in the United Kingdom and therefore cannot be generalized beyond student populations. However, the sample reflected that the majority of the university’s students are between ages 18 and 20. The sample consisted predominantly of young adults and the survey therefore captured the views of a key target group for standardized packaging legislation. Furthermore, while 30% of our sample reported ever

**Table 1. Characteristics of Participants**

| Variable                                      | Overall (N) | Overall (%) | Smokers (N) | Smokers (%) | Non-smokers (N) | Non-smokers (%) |
|-----------------------------------------------|-------------|-------------|-------------|-------------|-----------------|-----------------|
| Total                                         | 546         | 100         | 171 (31.3)  | 375         | 68.7            |
| Sex                                           |             |             |             |             |                 |
| Male                                          | 228         | 41.8        | 88          | 51.5        | 140             | 37.3            |
| Female                                        | 318         | 58.2        | 83          | 48.5        | 235             | 62.7            |
| Age                                           |             |             |             |             |                 |
| ≤18                                           | 162         | 29.7        | 50          | 29.2        | 112             | 29.9            |
| 19                                            | 135         | 24.7        | 58          | 33.9        | 77              | 20.5            |
| 20                                            | 110         | 20.1        | 24          | 14.0        | 86              | 22.9            |
| 21                                            | 55          | 10.1        | 12          | 7.0         | 43              | 11.5            |
| ≥22                                           | 84          | 15.4        | 27          | 15.8        | 57              | 15.2            |
| Do you ever use e-cigarettes?                 |             |             |             |             |                 |
| Yes                                           | 50          | 9.2         | 45          | 26.3        | 5               | 1.3             |
| No                                            | 496         | 90.8        | 126         | 73.7        | 370             | 98.7            |
| Number of immediate family members who smoke  |             |             |             |             |                 |
| 0                                             | 412         | 75.5        | 104         | 60.8        | 308             | 82.1            |
| 1 or 2                                        | 120         | 22          | 61          | 35.7        | 59              | 15.7            |
| ≥3                                            | 14          | 2.6         | 6           | 3.5         | 8               | 2.2             |
| Number of friends who smoke                   |             |             |             |             |                 |
| 0                                             | 171         | 31.3        | 27          | 15.8        | 144             | 38.4            |
| 1 or 2                                        | 266         | 48.7        | 84          | 49.1        | 182             | 48.5            |
| 3 or 4                                        | 83          | 15.2        | 40          | 23.4        | 43              | 11.5            |
| ≥5                                            | 26          | 4.8         | 20          | 11.7        | 6               | 1.6             |
| Smoking frequency                             |             |             |             |             |                 |
| Daily                                         | 45          |             |             |             |                 |
| Weekly                                        | 28          |             |             |             |                 |
| Monthly                                       | 31          |             |             |             |                 |
| <Monthly                                      | 67          |             |             |             |                 |
| Type of tobacco most frequently smoked        |             |             |             |             |                 |
| Manufactured                                  | 91          |             |             |             |                 |
| Hand-rolled                                   | 69          |             |             |             |                 |
| Shisha/hookah                                 | 8           |             |             |             |                 |
| Other                                         | 3           |             |             |             |                 |
| Quantity of tobacco most frequently purchased |             |             |             |             |                 |
| 10–14 cigarette pack                          | 27          |             |             |             |                 |
| 15–19 cigarette pack                          | 9           |             |             |             |                 |
| 20 cigarette pack                             | 27          |             |             |             |                 |
| >20 cigarette pack                            | 1           |             |             |             |                 |
| 12.5 g loose tobacco                          | 29          |             |             |             |                 |
| 25 g loose tobacco                            | 17          |             |             |             |                 |
| 50 g loose tobacco                            | 3           |             |             |             |                 |
| Don’t buy cigarettes/tobacco                  | 58          |             |             |             |                 |
| Quitting intentions                           |             |             |             |             |                 |
| Yes-Within next month                         | 49          |             |             |             |                 |
| Yes-Within next 6 months                      | 23          |             |             |             |                 |
| Yes-Within next year                          | 15          |             |             |             |                 |
| Yes-Not within next year                      | 39          |             |             |             |                 |
| No                                            | 45          |             |             |             |                 |

**Discussion**

This study found that in autumn 2016 only a small proportion of students had seen a standardized pack, suggesting that implementation of the new packaging was low five to six months into the 12-month transition period. Fewer smokers than nonsmokers found the new legislation acceptable, but overall acceptability was high. Students reported that the warning messages on standardized packs are clearer and more effective at deterring both smokers and nonsmokers. Many smokers anticipated that they would quit, cut down, or switch to other products in response to the new legislation. One in five said they would switch to e-cigarettes.
Table 2. Awareness of and Anticipated Responses to Standardized Packaging

|                                      | Overall (N) | Overall (%) | Smokers (N) | Smokers (%) | Frequent Smokers (N) | Frequent Smokers (%) | Infrequent Smokers (N) | Infrequent Smokers (%) | Non-smokers (N) | Non-smokers (%) |
|--------------------------------------|-------------|-------------|-------------|-------------|-----------------------|-----------------------|------------------------|------------------------|----------------|----------------|
| Aware of new legislation             |             |             |             |             |                       |                       |                        |                        |                |                |
| Yes                                  | 294         | 53.8        | 120         | 70.2        | 60                    | 82.2                  | 60                     | 61.2                   | 174            | 46.4           |
| No/ Unsure                           | 252         | 46.2        | 51          | 29.8        | 13                    | 17.8                  | 38                     | 38.8                   | 201            | 53.6           |
| Have seen a standard pack            |             |             |             |             |                       |                       |                        |                        |                |                |
| Yes                                  | 64          | 11.7        | 29          | 17.0        | 17                    | 23.3                  | 12                     | 12.2                   | 35             | 9.3            |
| No/ Unsure                           | 482         | 88.3        | 142         | 83.0        | 56                    | 76.7                  | 86                     | 87.8                   | 340            | 90.7           |
| Opinion of new legislation           |             |             |             |             |                       |                       |                        |                        |                |                |
| Very good idea                      | 324         | 59.3        | 84          | 49.1        | 23                    | 31.5                  | 61                     | 62.2                   | 240            | 64             |
| Fairly good idea                    | 171         | 31.3        | 59          | 34.5        | 36                    | 49.3                  | 23                     | 23.5                   | 112            | 29.9           |
| Unsure                               | 19          | 3.5         | 7           | 4.1         | 1                     | 1.4                   | 6                      | 6.1                    | 12             | 3.2            |
| Fairly or very bad idea             | 32          | 5.9         | 21          | 12.3        | 13                    | 17.8                  | 8                      | 8.2                    | 11             | 3.0            |
| Anticipated behavior change in response to legislation (multiple responses permitted) | | | | | | | | | | |
| Cut down smoking                     | —           | —           | 104         | 60.8        | 41                    | 56.2                  | 63                     | 64.3                   | —              | —              |
| Quit smoking                         | —           | —           | 79          | 46.2        | 23                    | 31.5                  | 56                     | 57.14                  | —              | —              |
| Switch to rolling tobacco            | —           | —           | 71          | 41.5        | 39                    | 53.4                  | 32                     | 32.6                   | —              | —              |
| Switch to a cheaper brand            | —           | —           | 49          | 28.7        | 22                    | 30.1                  | 27                     | 27.6                   | —              | —              |
| Switch to e-cigarettes               | —           | —           | 33          | 19.3        | 18                    | 24.6                  | 15                     | 15.3                   | —              | —              |
| Willing to pay current prices for their tobacco when in standardized packs       |             |             |             |             |                       |                       |                        |                        |                |                |
| Yes                                  | —           | —           | 123         | 72          | —                     | —                     | —                      | —                      |                |                |
| No                                   | —           | —           | 48          | 28          | —                     | —                     | —                      | —                      |                |                |

Note. Frequent = at least once a week; infrequent = less than once a week.
Table 3. Results of Logistic Regression Analysis to Investigate Which Factors Influence Awareness and Acceptance of the New Legislation

| Variable                          | Awareness of Standardized Packaging | Legislation a Good Idea |
|------------------------------------|-------------------------------------|-------------------------|
|                      | Unadjusted | Adjusted | Unadjusted | Adjusted | Unadjusted | Adjusted |
|                      | %  | OR  | 95% CI | p-value | %  | OR  | 95% CI | p-value | %  | OR  | 95% CI | p-value |
| Age                  | 1.00 | 0.66–1.10 | 0.996 | 0.98 | 0.86–1.11 | 0.70 | 1.20 | 0.84–1.71 | 0.31 | 1.00 | 0.38–2.89 | 0.97 |
| Sex                  | Male     | 49.1 | 1.00 | 0.65–0.91 | 0.013 | 0.74 | 0.52–1.06 | 0.10 | 88.6 | 0.99 | 0.88–1.13 | 0.91 | 1.14 | 0.80–1.63 | 0.48 |
|                      | Female   | 39.9 | 0.65 | 0.46–0.91 | — | 1.00 | — | — | 92.1 | 1.00 | — | 1.00 | — |
| Smoking status       | Non-smoker | 46.4 | 1.00 | — | 1.00 | — | — | 93.9 | 1.00 | — | 1.00 | — |
|                      | Smoker   | 70.2 | 2.72 | 1.85–4.00 | <0.001 | 2.15 | 1.41–3.27 | <0.001 | 83.6 | 0.65 | 0.45–0.94 | 0.02 | 0.66 | 0.45–0.95 | 0.03 |
| E-cigarette use      | Yes      | 51.2 | 1.00 | — | 1.00 | — | — | 91.5 | 1.00 | — | — | — |
|                      | No       | 80.0 | 3.81 | 1.86–7.79 | <0.001 | 2.09 | 0.96–4.53 | 0.06 | 82.0 | 0.69 | 0.47–1.01 | 0.06 | — | — | — |
| Number of family members who smoke | 69.0 | 0.49–0.97 | 0.032 | 0.80 | 0.56–1.14 | 0.22 | — | 1.47 | 0.97–1.95 | 0.07 | — | — | — |
| Number of close friends who smoke | 84.0 | 0.68–1.04 | 0.103 | — | — | — | 1.21 | 0.98–1.50 | 0.08 | — | — | — |

Note. Age and sex included in adjusted models as a priori confounders. Bold values denotes statistical significance (p < 0.05).
smoking, only about 1 in 5 respondents smoked at least monthly. This is comparable to estimates of national smoking prevalence in this age group (17% in 18-to-24-year-olds in the United Kingdom in 2015) and suggests that our sample is representative in terms of smoking behavior (ONS, 2016).

Our study is based on self-reported data and, given decreasing trends in smoking about young adults in the United Kingdom, there is a risk of reporting bias due to the decreasing acceptability of smoking (ONS, 2016). However, responses to our study were anonymous, and this is therefore unlikely to have had a significant impact on our findings. A key limitation of the study is that our findings on potential behavior change are hypothetical and may therefore not be borne out in practice. Consistent monitoring and evaluation will be required among all age groups to establish the impact of standardized packaging on smoking behavior.

A high proportion of students were aware of the new packaging legislation; this is unlikely to have been influenced by the invitation to take part in the study, which did not mention the legislation. Despite high levels of awareness in autumn 2016, particularly among frequent smokers, very few students had actually seen one of the new standardized packs. This was true of both frequent and infrequent smokers. This suggests that implementation of the legislation was delayed as far as possible in the implementation period. It is possible the companies exploited the one-year implementation period by flooding the market with a large stock of branded packs prior to the May deadline. This is supported by evidence from Australia where even shortly before the implementation deadline, only a limited proportion of tobacco products were being sold in standardized packaging; two months before the deadline less than 20% of packs being sold bore the new packaging, suggesting that tobacco companies apparently sought to delay the impact of standardized packaging legislation (Scollo & Lindorff, 2015). Given the small proportion of respondents that had seen a new pack, there is potential for novelty bias whereby the novel nature of the standardized packs makes students perceive them to be more effective (Dunlop, Dobbins, Young, Perez, & Currow, 2014). However, preliminary findings from Australia suggest that these perceptions will not diminish over time (Wakefield et al., 2015).

The acceptability of the legislation was found to be very high, with a large proportion of respondents saying it was a good idea. This is consistent with evidence from the UK general population. In January 2015 support for the change to packaging was estimated at 72% (Cancer Research UK, 2015). Evidence from Australia, where support increased after the implementation of the new legislation, suggests that support for standardized packaging in the United Kingdom could continue to increase further now that the legislation has been fully implemented (Swift et al., 2015; Young et al., 2014).

Students were more likely to notice the health warnings on the standardized packs; the literature suggests this is likely due to the removal of distracting imagery/branding. In line with this finding, more students reported being deterred by the health warnings on the standardized packs than those on the branded packs. This suggests that the new health warnings will be more effective at deterring young people from starting smoking and encouraging current young smokers to quit; however, it is unclear from this study whether this effect is due to the new, larger health warnings featured on the packs or due to changes in the overall pack design.

Nearly half of student smokers said they expected to quit in response to the legislation, although less-frequent smokers were much more likely to say that they would do so than regular smokers. While these changes in

### Table 4. Results of Logistic Regression Analysis to Investigate Which Factors Influence Whether Smokers Feel They Are Likely to Quit in Response to the New Legislation

| Variable          | % Who Anticipated Quitting in Category | OR (Unadjusted) | 95% CI (Unadjusted) | p-value (Unadjusted) | OR (Adjusted) | 95% CI (Adjusted) | p-value (Adjusted) |
|-------------------|---------------------------------------|-----------------|---------------------|----------------------|---------------|------------------|-------------------|
| Age               |                                      | 0.86            | 0.67–1.11           | 0.25                 | 0.78          | 0.43–1.42        | 0.42              |
| Sex               |                                      | 1.00            | —                   | —                    | 1.00          | —                | —                 |
| Female            |                                      | 43.2            | —                   | —                    | 1.00          | —                | —                 |
| Male              |                                      | 49.4            | 1.30                | 0.66–2.57            | 0.45          | 1.15             | 0.93–1.43         | 0.21              |
| Frequency of smoking |                                  |                 |                     |                      |               |                  |                   |
| Daily             |                                      | 31.1            | 1.00                | —                    | 1.00          | —                | —                 |
| Weekly            |                                      | 32.1            | 1.02                | 0.27–3.85            | 0.97          | 1.05             | 0.38–2.89         | 0.03              |
| Monthly           |                                      | 41.9            | 1.32                | 0.34–2.00            | 0.69          | 1.80             | 0.62–4.14         | 0.33              |
| <Monthly          |                                      | 64.2            | 3.30                | 1.06–10.00           | 0.04          | 3.97             | 1.77–8.87         | 0.001             |
| Pack size         |                                      |                 |                     |                      |               |                  |                   |
| 10–14             |                                      | 59.3            | 1.00                | —                    | 1.00          | —                | —                 |
| 15–19             |                                      | 77.8            | 3.45                | 0.93–12.84           | 0.07          | 2.41             | 0.42–13.83        | 0.33              |
| 20                |                                      | 22.2            | 0.22                | 0.03–1.46            | 0.12          | 0.20             | 0.06–0.64         | 0.007             |

*Pack sizes >20 and RYO excluded due to small sample sizes. Bold denotes statistical significance (p < 0.05). RYO = roll your own.
behavior may not be fully borne out in practice, it is encouraging that the new packaging is leading young adults to consider quitting. One in five smokers said they would switch to e-cigarettes, which highlights the potential of these products as an alternative to tobacco in the context of standardized packaging implementation. Nevertheless, there was some inconsistency in students’ responses, with 61% saying they would cut down, 41% that they would switch to hand-rolling tobacco, and 29% saying they would switch to a cheaper brand. This indicates that many students are likely to engage in price-minimizing behaviors as opposed to quitting, thus undermining the effect of the new packaging. It underlines the need for measures to reduce the appeal of switching products, in particular reducing the price differentials between different products, if the effect of standardized packaging is to be maximized.

Six months into the 12-month transition period, the majority of students had not yet seen a standardized pack. However, the majority of students supported the new legislation, and our findings suggest that some young adults will attempt to quit or switch to e-cigarettes in response to the new legislation. Longitudinal research will be required to investigate whether these expected outcomes are borne out.

References

Action on Smoking and Health. (2015). The UK tobacco industry. Retrieved from http://ash.org.uk/files/documents/ASH_123.pdf

Borland, R., Savvas, S., Sharkie, F., & Moore, K. (2013). The impact of structural packaging design on young adult smokers’ perceptions of tobacco products. Tobacco Control, 22, 97–102. doi:10.1136/tobaccocontrol-2011-050078

Cancer Research UK. (2015). Cancer Research UK welcomes government action on standardised cig packs with voter support at a high of nearly three quarters. Retrieved from http://www.cancerresearchuk.org/about-us/cancer-news/press-release/2015-01-21-cancer-research-uk-welcomes-government-action-on-standardised-cig-packs-with-votersonpetition.html

Department of Health. (2016). Tobacco packaging guidance: Guidance for retailers and distributors of tobacco products, enforcement agencies and the public on changes to tobacco packaging. Retrieved from https://www.gov.uk/government/publications/packaging-of-tobacco-products

Diethelm, P., & Farley, T. (2015). Refuting tobacco-industry funded research: Empirical data shows decline in smoking prevalence following introduction of plain packaging in Australia. Tobacco Prevention and Cessation, 1(6).

Directive 2014/40/EU of the European Parliament and the Council on the approximation of the laws, regulations and administrative provisions of the Member States concerning the manufacture, presentation and sale of tobacco and related products and repealing Directive 2001/37/EC (2014).

Doxey, J., & Hammond, D. (2011). Deadly in pink: The impact of cigarette packaging among young women. Tobacco Control, 20(5), 353–360. doi:10.1136/tc.2010.038315

Dunlop, S., Dobbins, T., Young, J., Perez, D., & Currow, D. (2014). Impact of Australia’s introduction of tobacco plain packs on adult smokers’ pack related perceptions and responses: Results from a continuous tracking survey. BMJ Open, 4(12), e005836. doi:10.1136/bmjopen-2014-005836

Durkin, S., Brennan, E., Coomber, K., Zacher, M., Scollo, M., & Wakefield, M. (2015). Short-term changes in quitting-related cognitions and behaviours after the implementation of plain packaging with larger health warnings: Findings from a national cohort study with Australian adult smokers. Tobacco Control, 24, 26–32. doi:10.1136/tobaccocontrol-2014-052058

Ford, A., MacKintosh, A., Moodie, C., Richardson, S., & Hastings, G. (2013). Cigarette pack design and adolescent smoking susceptibility: A cross-sectional survey. BMJ Open, 3(9), e003282. doi:10.1136/bmjopen-2013-003282

Ford, A., Moodie, C., MacKintosh, A., & Hastings, G. (2013a). Adolescent perceptions of cigarette appearance. European Journal of Public Health, 24(3), 464–468. doi:10.1093/eurpub/ckt161

Ford, A., Moodie, C., MacKintosh, A. M., & Hastings, G. (2013b). How adolescents perceive cigarette packaging and possible benefits of plain packaging. Education and Health, 31, 83–88.

Gendall, P., Hoek, J., Thomson, G., Edwards, R., Pene, G., Gifford, H., … McCool, J. (2011). Young adults’ interpretations of tobacco brands: Implications for tobacco control. Nicotine and Tobacco Research, 13, 911–918. doi:10.1093/ntr/ntr094

Germain, D., Wakefield, M., & Durkin, S. (2010). Adolescents’ perceptions of cigarette brand image: Does plain packaging make a difference? Journal of Adolescent Health, 46(4), 385–392. doi:10.1016/j.jadohealth.2009.08.009

Gillham, B. (2008). Developing a questionnaire (2nd ed.). London, UK: Bloomsbury.

Hammond, D., Dockrell, M., Arnott, D., Lee, A., & McNeill (2009). Cigarette pack design and perceptions of risk among UK adults and youth. European Journal of Public Health, 19(6), 631–637. doi:10.1093/europub/kcp122

Hammond, D., & Parkinson, C. (2009). The impact of cigarette package design on perceptions of risk. Journal of Public Health, 31, 345–353. doi:10.1093/eurpub/ckp066

Maynard, O., Munafo, M., & Leonards, U. (2013). Visual attention to health warnings on plain tobacco packaging in adolescent smokers and non-smokers. Addiction, 108(2), 413–419. doi:10.1111/j.1360-0443.2012.04028.x

Moodie, C., Angus, K., Stead, M., & Bauld, L. (2013). Plain tobacco packaging research: An update. Retrieved from http://www.stir.ac.uk/media/schools/management/documents/Plain%20Packaging%20Studies%20Update.pdf

Moodie, C., Stead, M., Bauld, L., McNeill, A., Angus, A., Hinds, K., … O’Mara-Eves, A. (2012). Plain tobacco packaging: A systematic review. Retrieved from http://phrcl.slshtm.ac.uk/papers/PHRC_006_Final_Report.pdf

Office for National Statistics. (2016). Adult smoking habits in the UK: 2016. Retrieved from https://www.ons.gov.uk/peo
Rutter, L., Britton, J., & Langley, T. (2017). Price-minimizing behaviors in response to increasing tobacco price: A cross-sectional study of students. *Journal of Child and Adolescent Substance Abuse, 26*(5), 367–375. doi:10.1080/1067828X.2017.1306472

Scheffels, J., & Saebo, G. (2013). Perceptions of plain and branded cigarette packaging among Norwegian youth and adults: A focus group study. *Nicotine & Tobacco Research, 15*, 450–456. doi:10.1093/ntr/nts153

Scollo, M., & Lindorff, K. (2015). Standardised packaging and new enlarged graphic health warnings for tobacco products in Australia. *Tobacco Control, 24*(2), 9–16. doi:10.1136/tobaccocontrol-2014-052073

Shankleman, M., Sykes, C., Mandeville, K. L., Di Costa, S., & Yarrow, K. (2015). Standardised (plain) cigarette packaging increases attention to both text-based and graphical health warnings: Experimental evidence. *Public Health, 129*(1), 37–42. doi:10.1016/j.puhe.2014.10.019

Swift, E., Borland, R., Cummings, M., Fong, G., McNeill, A., Hammond, D., … Yong, H.-H. (2015). Australian smokers’ support for plain or standardised packs before and after implementation: Findings from the ITC Four Country Survey. *Tobacco Control, 24*(6), 616–621. doi:10.1136/tobaccocontrol-2014-051880

The Standardised Packaging of Tobacco Products Regulations 2015 No. 829, (2015).

Wakefield, M., Coomber, K., Zacher, M., Durkin, S., Brennan, E., & Scollo, M. (2015). Australian adult smokers’ responses to plain packaging with larger graphic health warnings 1 year after implementation: Results from a national cross-sectional tracking survey. *Tobacco Control, 24*, 17–25. doi:10.1136/tobaccocontrol-2014-052050

White, C., & Hammond, D. (2012). The potential impact of plain packaging of cigarette products among Brazilian young women: An experimental study. *BMC Public Health, 12*(737), 737.

Young, J., Stacey, I., Dobbins, T., Dunlop, S., Dessai, A., & Currow, D. (2014). Association between tobacco plain packaging and Quitline calls: A population-based, interrupted time-series analysis. *The Medical Journal of Australia, 200*(1), 29–32. doi:10.5694/mja13.11070