

# Tobacco Control

## Reactions to, and trial intentions for, three dissuasive cigarette designs: A cross-sectional survey of adolescents in Scotland Word Count: 3040

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Figure 1: Standard cigarette and three dissuasive cigarette designs



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4 survey of adolescents in Scotland  
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10 **Authors:** Danielle Mitchell<sup>1</sup>, Nathan Critchlow<sup>1</sup>, Crawford Moodie<sup>1</sup>, Linda Bauld<sup>2,3</sup>  
11  
12  
13

14 **Affiliations:**

15  
16  
17 <sup>1</sup> Institute for Social Marketing and Health, Faculty of Health Sciences and Sport, University  
18 of Stirling, FK9 4LA, Scotland.  
19

20  
21 <sup>2</sup> Usher Institute, College of Medicine and Veterinary Medicine, University of Edinburgh,  
22 Teviot Place, Edinburgh, EH8 9AG, Scotland.  
23

24  
25  
26 <sup>3</sup>SPECTRUM Consortium, University of Edinburgh, Usher Institute, Old Medical School,  
27 University of Edinburgh, Teviot Place, Edinburgh EH8 9AG  
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32

33 **Corresponding author:** Danielle Mitchell, Institute for Social Marketing and Health, Faculty  
34 of Health Science and Sport, University of Stirling, Stirling, FK9 4LA. Email:  
35 [danielle.mitchell1@stir.ac.uk](mailto:danielle.mitchell1@stir.ac.uk) Tel: +44 (0)1786 467390  
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## Abstract

**Objectives:** There has been growing academic and policy interest in opportunities to decrease the appeal of cigarette sticks, such as making them an unattractive colour or requiring them to display a health warning. We therefore explored reactions to, and trial intentions for, three ‘dissuasive’ cigarette designs among adolescents in Scotland.

**Methods:** A cross-sectional survey with 12-17 year olds in Scotland ( $n=594$ ) was conducted between November 2017 and November 2018. Participants were shown one ‘standard’ cigarette (imitation cork filter with white paper casing) and three dissuasive cigarettes: (1) a cigarette with the warning ‘smoking kills’; (2) a cigarette with the warning ‘toxic’ and a skull and cross-bones image; and (3) a dark green cigarette. Participants rated each cigarette on nine five-point reaction measures (e.g. appealing/unappealing or attractive/unattractive). A composite reaction score was computed for each cigarette, which was binary coded (overall negative reactions versus neutral/positive reactions). Participants also indicated whether they would try each cigarette (coded: Yes/No). Demographics, smoking status, and smoking susceptibility were also measured.

**Results:** More participants had negative reactions to the dark green (93% of adolescents), ‘smoking kills’ (94%) and ‘toxic’ (96%) cigarettes, compared to the standard cigarette (85%). For all three dissuasive designs, Chi-square tests found that negative reactions were more likely among younger adolescents (vs. older adolescents), never-smokers (vs. ever smokers), and non-susceptible never-smokers (vs. susceptible never-smokers). Most participants indicated that they would not try any of the cigarettes (range: 84-91%).

**Conclusion:** Dissuasive cigarettes present an opportunity to further reduce the appeal of smoking among adolescents.

**Keywords:** Dissuasive cigarettes, Survey research, Adolescent smoking, Tobacco control, Smoking cessation, Health communication

## INTRODUCTION

At least 14 countries require cigarettes to be sold in standardised (or plain) packaging.<sup>1</sup> Such legislation stipulates not only how the pack exterior and interior should look, but also the appearance of cigarette sticks. For instance, in the first five countries to fully implement standardised packaging (Australia, France, United Kingdom, New Zealand, Norway), the cigarette must be wrapped in white paper casing, the filter must be white or imitation cork, and a brand variant name or alphanumeric code must appear in a standardised font and size near to the filter.<sup>2</sup> In a separate effort to reduce the promotional power of cigarettes, some countries (Uganda, Senegal, Ethiopia, Canada, Brazil) have banned flavoured cigarettes, and these will also be banned from May 2020 across both the European Union and in the United Kingdom (UK), Turkey and Moldova.<sup>3,4</sup>

In addition to standardising elements of cigarette appearance<sup>2,5</sup> and removing opportunities to use flavouring to create appeal<sup>3,4,6,7</sup> some countries are considering additional measures to reduce the appeal of cigarette sticks.<sup>8,9</sup> For example, the Scottish Government intend to review the evidence on cigarettes that are unattractively coloured or display a health warning, often referred to as ‘dissuasive cigarettes’, as part of their tobacco control strategy.<sup>8</sup> The Canadian Government has also consulted on the inclusion of warnings on cigarettes.<sup>9</sup>

While the cigarette pack and cigarette stick provide an opportunity for tobacco companies to promote their products, research has typically focused on the promotional influence of the pack. The cigarette stick, however, can also create appeal through decorative features, colour, length and diameter.<sup>10-14</sup> With respect to whether this communicative power could be used for health promotion, two types of dissuasive cigarette designs have been examined. Firstly, research has explored reactions to unattractively coloured cigarettes, particularly different shades of green.<sup>15-19</sup> Secondly, research has explored cigarettes that feature a health warning on the stick, including ‘Smoking kills’, average minutes of life lost

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3 from smoking each cigarette, and the short and long-term harms of smoking.<sup>16-27</sup> More recently,  
4 research has also explored including both a warning message (smoking kills) and an image  
5 (skull and cross bones).<sup>26,27</sup> Irrespective of design, dissuasive cigarettes are generally  
6 considered to reduce appeal and increase perceptions of harm, with some research suggesting  
7 that they may have the potential to encourage thoughts about quitting or prevent uptake among  
8 young people.<sup>15-27</sup>

9  
10 Only a few studies have examined how adolescents react to dissuasive cigarettes.<sup>17,20,27</sup>  
11 Adolescents are a key group because when starting to smoke they often do so with single  
12 cigarettes which they have bought, been given or have stolen, and therefore may avoid  
13 exposure to the on-pack warnings at the point of consumption.<sup>28,29,30</sup> Investigation with  
14 adolescents is particularly important in Scotland, where longer-term declines in youth smoking  
15 have recently begun to stall<sup>31</sup> and because the Scottish Government has expressed a willingness  
16 to consider implementing dissuasive cigarettes if supported by the evidence.<sup>8</sup>

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19 In this study, we therefore examine reactions to, and trial intentions for, a standard  
20 cigarette and three dissuasive cigarettes among adolescents in Scotland: (1) An unattractively  
21 coloured cigarette; (2) A cigarette with text warning; and (3) A cigarette with text and an image.  
22 This is the first quantitative study to examine reactions to a dissuasive cigarette with both a text  
23 and image warning among adolescents, a key target for preventative measures, in a market  
24 where standardised packaging is fully-implemented.

## 25 26 27 **METHODS**

### 28 29 30 **Design and Recruitment**

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33 A cross-sectional self-report survey was conducted with 12-17 year olds ( $n=594$ ) in secondary  
34 schools in three regions of Scotland (Central, East, and South). Data were collected between  
35 November 2017 and November 2018, covering between 6 and 18 months post-implementation  
36 of standardised packaging. Data collection took place post-implementation of standardised  
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3 packaging as the survey also contained questions about how young people had reacted to the  
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5 new legislation (reported elsewhere). The length of data collection was determined by the speed  
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7 of response from local authorities and schools, and availability of schools to administer the  
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9 survey (e.g. avoiding school holidays and exam periods).  
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12 Before contacting schools, approval was obtained from local education authorities and,  
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14 once granted, schools were contacted through letters and emails, and followed up by a phone  
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16 call. Three schools agreed to take part. Pupils were informed about the study aim and objectives  
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18 (e.g. We want to find out young people's opinions and attitudes towards tobacco packaging  
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20 and cigarettes) by the lead researcher (DM) or a designated teacher (e.g. someone delivering  
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22 health and wellbeing education), and provided with participant and parental information sheets,  
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24 parent opt-out forms, and data privacy notices. Participants completed the survey under exam  
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26 style conditions (i.e. individually and in silence) during designated class times that suited each  
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28 school. Schools were given the option for pupils to complete either an online or physical  
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30 version of the survey (both identical in content and question order). All participants were able  
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32 to enter a ballot to win a computer tablet (an iPad) in return for participating.  
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## 40 **Materials**

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42 Participants were shown four cigarette designs (Figure 1), consistent with those used in  
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44 developmental focus group research with adolescents in Scotland.<sup>27</sup> The first had an imitation  
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46 cork filter and white cigarette paper, as this mirrors the 'standard' cigarette design in Scotland.  
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48 The second cigarette was dark green, consistent with research with adults in Australia and the  
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50 UK,<sup>15,16,18,19</sup> and with adolescents in Norway<sup>17</sup> and Scotland.<sup>27</sup> Although this design has been  
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52 explored with adolescents in two studies, only one of these was quantitative, and was conducted  
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54 in Norway,<sup>17</sup> which means there remains a gap in empirical understanding as to how  
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56 adolescents react to dark green cigarettes. The third cigarette carried the warning 'Smoking  
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3 kills' in red writing on white cigarette paper, as used in past research with adolescents and  
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5 adults in Australia, the UK and Norway.<sup>16-21,27</sup> Smoking kills is also a warning regularly  
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7 communicated on the outer packaging, and with high recognition among adolescents.<sup>32</sup> The  
8  
9 final cigarette featured the word 'toxic' in black writing and a yellow skull and cross bones  
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11 image on white cigarette paper. This image (i.e. skull and crossbones) is often used on other  
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13 hazardous substances (e.g. chemicals such as bleach) and is used by the Health and Safety  
14  
15 executive to describe 'acutely toxic' chemicals.<sup>33</sup> The image has also been used in a study in  
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17 France,<sup>26</sup> and was considered to clearly communicate the harmfulness of smoking among  
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19 developmental focus groups with adolescents in Scotland.<sup>27</sup>  
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26 [Figure 1]  
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## 30 Measures

### 31 *Demographics*

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33 Demographic variables included age, gender, ethnicity (coded: 'White British' and 'Other or  
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35 prefer not to say') and socioeconomic status (SES). Consistent with previous health and  
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37 behaviour surveys with adolescents in the UK, the Family Affluence Scale (FAS) was used to  
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39 provide a measure of SES.<sup>34,35</sup> Participants reported whether they have their own bedroom  
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41 (0=No, Yes=1); how many vehicles their family own (0=None, 1 = Yes, one, 2=Two or more);  
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43 how many computers their family own (0=None, 1 = One, 2 = Two, 3=More than two); and  
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45 how many times they have travelled on holiday with their family in the last 12 months (0=Not  
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47 all, 1 = Once, 2 = Twice, 3=More than twice).<sup>35</sup> Scores were summed and divided into low (0-  
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49 2), medium (3-5), and high SES (6-9).<sup>36</sup>  
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### 58 *Smoking status*

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3 Consistent with research with adolescents,<sup>37</sup> participants were shown five statements and asked  
4 to select which best described them: (1) *'I have never smoked, not even a puff or two'*; (2) *'I*  
5 *have only ever smoked once or twice but not anymore'*; (3) *'I smoke at least once a month'*;  
6  
7 (4) *'I usually smoke between one and six cigarettes a week'*; and (5) *'I smoke more than six*  
8 *cigarettes a week'*. Those selecting the first option were categorised *'never-smokers'* and all  
9 others *'ever-smokers'*.

### 19 ***Smoking susceptibility***

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21 Among never-smokers, three items assessed susceptibility: (1) *'If one of your friends offered*  
22 *you a cigarette would you smoke it?'*; (2) *'Do you think you will smoke a cigarette at any point*  
23 *in the next year?'*; and (3) *'Do you think you will be smoking by the time you are 18?'*<sup>38</sup> All  
24 were scored on a four-point Likert scale (*1=Definitely yes, 2= Probably yes, 3= Probably not,*  
25 *4= Definitely not*). Never-smokers who selected *'Definitely not'* to all three items were  
26 categorised as *'Non-susceptible'*, with all other participants categorised as *'Susceptible'*.  
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### 38 ***Reactions to cigarettes***

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40 Participants were asked to rate each cigarette on nine reaction measures adapted from previous  
41 research<sup>18,38,39</sup>: (1) Attractive/Unattractive and (2) Stylish/Unstylish; (3) Would be nice to be  
42 seen with/Would not be nice to be seen with; (4) Appealing to people my age/Not at all  
43 appealing to people my own age; (5) In general, my friends would approve of this cigarette/In  
44 general my friends would not approve of this cigarette; (6) In general, I would approve of my  
45 friends using this cigarette/In general, I would not approve of my friends using this cigarette;  
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47 (7) Would be totally acceptable to family members/Would be totally unacceptable to family  
48 members; (8) Does look harmful to my health/Does not look harmful to my health; and (9)  
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50 Would not put people off starting to smoke/Would put people off starting to smoke (henceforth  
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3 this measure will be referred to as ‘off-putting’). Each reaction was scored on a five-point scale  
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5 (e.g. 1=Not appealing to people my age – 5=Appealing to people my age). Reactions were  
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7 given separately for each cigarette design.  
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10 Consistent with a previous survey research exploring dissuasive cigarettes,<sup>18</sup> a  
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12 composite score was calculated for each cigarette across the nine reaction measures (range: 9-  
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14 45). There was acceptable internal reliability in composite scores for each of the four cigarettes  
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16 (range:  $\alpha=0.80$  to  $0.81$ ). Composite scores were binary coded based on whether the participant  
17  
18 had a negative reaction to each cigarette. As the middle possible score was 27, all participants  
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20 with a composite score  $\leq 26$  were classed as having a negative overall reaction, while those  
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22 with a score  $\geq 27$  were classed as having a neutral or positive reaction.  
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### 28 **Trial intentions**

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30 Consistent with previous assessment of trial intentions,<sup>19</sup> participants were asked ‘*If one of your*  
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32 *friends offered you one of the cigarettes how likely would you be to try each?*’, with response  
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34 options ranging from 1=Very likely to 5=Not at all likely. Scale responses were binary coded  
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36 based on whether participants indicated that they would not try the cigarette (scores 4-5) versus  
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38 those who provided a neutral answer or suggested they would try the cigarette (scores 1-3).<sup>18</sup>  
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### 45 **Analysis**

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47 A total of 686 responses were collected. We excluded 73 cases for not completing the consent  
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49 form or for providing invalid or incomplete responses and 19 for being outwith the age range  
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51 of the study (those aged 11 or 18 years old). The final sample used for analysis was 594.  
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54 Data were analysed using SPSS version 23 (Chicago, SPSS Inc). Descriptive statistics  
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56 examined demographics, smoking status, susceptibility, and trial intentions. Descriptive  
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58 statistics examined mean scores for each cigarette on each of the nine reaction measures. As  
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3 the scale data were ordinal, Wilcoxon Signed Rank tests examined differences in reactions to  
4 each of the cigarettes. Wilcoxon Signed Rank tests were conducted across all reaction measures  
5 and for all cigarette combinations (e.g. attractiveness reactions for the 'standard' cigarette vs.  
6 the green cigarette). A Bonferroni correction was applied to account for the six multiple  
7 comparisons on each reaction variable, resulting in a revised critical value of  $p=0.008$ .

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15 Pearson Chi Square tests examined between-group differences in overall reactions  
16 (*negative vs. neutral and positive*) and trial intentions (*would not try vs. neutral and would try*).  
17 Chi-squares were run separately across all four cigarette designs for age, gender, SES group,  
18 ethnicity, smoking status, and susceptibility to smoke. As numbers in the lowest SES category  
19 were small (1.9% of total sample), we combined the low and medium categories for the  
20 purposes of analysis. We considered using multivariate logistic regressions with trial intentions  
21 for each cigarette the dependent variable and the aforementioned between-group variables as  
22 covariates.<sup>36</sup> This was not possible, however, as the proportion of participants reporting trial  
23 intentions was very low for some of the cigarette designs (see results), which meant that  
24 acceptable model fit could be not obtained for all four cigarette designs.  
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#### 40 **Ethical approval**

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42 Ethical approval was obtained from the University of Stirling's General University Ethics  
43 Panel (GUEP273). At the beginning of the survey, participants were informed that participation  
44 would be confidential and anonymous, and consent was obtained. Once completed, participants  
45 were provided with a debrief leaflet, which included information on the harms of smoking and  
46 where to find further advice and information.  
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## 56 **RESULTS**

### 57 **Sample characteristics**

Accounting for missing data on gender ( $n=1$ ), SES ( $n=5$ ), smoking status ( $n=12$ ) and susceptibility ( $n=2$ ), 35% of participants were aged 12-13 years, 35% were 14-15 years, and 29% were aged 16-17 years. Just over half were female (53%), with most categorised as high SES (75%), and 'White British' (83%). Most participants were never-smokers (87%) and, among never-smokers, the majority (67%) were non-susceptible.

### Reactions to dissuasive cigarettes versus the standard cigarette

Mean reaction scores to each of the four cigarettes were towards the negative end of each scale for all nine items ( $<3$ ) (Table 1). The exception was whether the standard cigarette was considered off-putting, with the mean score ( $M=3.21$ ;  $SD=1.59$ ) suggesting a mostly neutral reaction. Wilcoxon Signed Rank tests found significantly less negative reactions to the standard cigarette than the dissuasive cigarettes for all nine measures (all  $p<0.001$ ).

[Table 1]

### Reactions to the dissuasive cigarettes

Compared to the 'Smoking kills' cigarette, Wilcoxon Signed-Rank tests found that the 'toxic' cigarette was rated significantly more negatively on all reaction measures (all  $p<0.008$ ; except approving of friends,  $p=0.007$ , and perceived family acceptability  $p=0.003$ ) (Table 1). Compared to the green cigarette, Wilcoxon Signed Rank tests found that the 'toxic' cigarette was rated significantly more negatively for appeal, attraction, being nice to be seen with, perceived harm, and being off-putting (all  $p<0.001$ ). There were no significant differences in reactions between the green cigarette and 'smoking kills' cigarette.

### Overall reactions to cigarettes

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3 Based on the binary coded composite reaction score, almost all participants had an overall  
4 negative reaction to the 'smoking kills' (94%), green (93%) and 'toxic' cigarette (96%). Over  
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6 four-fifths (85%) had a negative reaction to the standard cigarette. Chi-square tests found a  
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8 difference of age for all for cigarettes (range:  $p < 0.001$  to  $p = 0.007$ ) (Table 2), with the linear-  
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10 by-linear associations showing that negative reactions were greater among 12-13 year olds than  
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12 older age groups for the standard cigarette ( $\chi^2 = 7.11$ ,  $p = 0.008$ ), 'smoking kills' cigarette  
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14 ( $\chi^2 = 5.89$ ,  $p = 0.015$ ), green cigarette ( $\chi^2 = 10.66$ ,  $p = 0.001$ ), and 'toxic' cigarette ( $\chi^2 = 4.72$ ,  
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16  $p = 0.030$ ). Never-smokers were more likely to react negatively to all four cigarettes than ever-  
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18 smokers (all  $p < 0.001$ ). Non-susceptible never-smokers were more likely to react negatively to  
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20 all four cigarettes than susceptible never-smokers (all  $p < 0.001$ ). Concerning gender, females  
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22 were more likely to react negatively to the green cigarette than males ( $\chi^2 = 5.32$ ,  $p = 0.021$ ). For  
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24 ethnicity, participants categorised as 'Other or preferred not to say' were more likely to react  
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26 negatively to the standard cigarette than those identifying as 'White British' ( $\chi^2 = 3.68$ ,  
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28  $p = 0.055$ ).

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37 [Table 2]

### 38 39 40 41 42 **Trial intentions**

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44 Most participants indicated that they would not try the standard (84%), 'smoking kills' (89%),  
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46 green (90%), and 'toxic' cigarette (91%) (Table 3). Chi-square tests found a main difference  
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48 of age for all four cigarettes (all  $p < 0.001$ ), with the linear-by-linear associations showing that  
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50 trial intentions were lower among 12-13 year olds than older age group for the standard  
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52 ( $\chi^2 = 14.64$ ,  $p < 0.001$ ), 'smoking kills' ( $\chi^2 = 9.60$ ,  $p = 0.002$ ), green ( $\chi^2 = 12.63$ ,  $p < 0.001$ ), and  
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54 'toxic' cigarette ( $\chi^2 = 13.32$ ,  $p < 0.001$ ). Never-smokers (vs. ever-smokers) and non-susceptible  
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3 never-smokers (vs. susceptible) were less likely to have trial intentions for all four cigarettes  
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5 (all  $p < 0.001$ ). There were no differences by SES, gender, or ethnicity.  
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10 [Table 3]  
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## 14 **DISCUSSION**

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17 We found that adolescents rated the three dissuasive cigarettes (featuring a text warning, text  
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19 warning and symbol, or unattractively coloured) more negatively than a standard cigarette.  
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21 Across the cigarettes, reactions were consistently more negative for the toxic cigarette featuring  
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23 the image of a skull and cross bones on all key reaction measures, including appeal,  
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25 attractiveness, harmfulness and whether it was off-putting. Most adolescents had overall  
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27 negative reactions to each dissuasive cigarette – particularly the toxic cigarette - with the vast  
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29 majority indicating that they would not try any of these, particularly younger adolescents and  
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31 non-susceptible never-smokers.  
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36 Our findings are consistent with research that has shown that consumers have negative  
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38 reactions to dissuasive cigarettes.<sup>15-27</sup> The findings are important given that there are fewer  
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40 studies with adolescents than adults, even though the potential impact would be expected to be  
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42 greater with the former.<sup>19</sup> Adolescents are a population who often access single cigarettes from  
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44 friends, peers or family<sup>28,29,30</sup> and, as a consequence, may avoid exposure to prominent health  
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46 warnings or unattractively coloured packaging (for those countries with standardised  
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48 packaging) at the point of experimentation or consumption.<sup>40</sup> As tobacco companies have a  
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50 long history of using the cigarette as a communication tool,<sup>10-14</sup> and continue to do so in  
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52 countries with large pictorial health warnings and/or standardised packaging (e.g. through  
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54 capsule cigarettes and other novel filter designs)<sup>41,42</sup> the evidence on dissuasive cigarettes  
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56 suggests that they may help to further reduce the appeal of smoking.  
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3 Combining pictorials with a concise message has been suggested to increase the  
4 chances of attention being paid to the warning, the comprehension and retention of the  
5 message,<sup>43,44</sup> and potential impact on preventing smoking initiation.<sup>44</sup> Consistent with this, we  
6 found that the cigarette with a warning ('toxic') and image (skull and crossbones) was  
7 perceived most negatively by adolescents; however, all three dissuasive cigarettes were viewed  
8 more negatively than the standard cigarette and trial intentions were low for each. As  
9 desensitisation occurs with all warnings, rotating dissuasive cigarette designs may help  
10 maximise impact. For instance, this could be achieved by requiring text warnings on cigarettes  
11 for one year, unattractively coloured cigarettes for the second year, text warnings and symbols  
12 on cigarettes for the third year, and then starting the rotation sequence again for subsequent  
13 years. This would mirror the approach used in the European Union for on-pack health  
14 warnings, where the images are replaced annually.

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31 Regarding limitations, the study was conducted in a school setting with teachers and  
32 peers present and, therefore, participants may have felt uncomfortable disclosing their smoking  
33 status or may have provided socially desirable responses. Most participants were of high or  
34 medium SES, due to a large proportion of the sample being recruited from one school in an  
35 affluent area, and the majority were never-smokers. We therefore provide very limited insight  
36 into reactions and trial intentions among those from low SES backgrounds or ever-smokers.  
37 Nevertheless, although the absolute values given may not be representative, that our findings  
38 are consistent with previous research suggests that the overall trends are likely to be  
39 generalisable to other populations. Future research using a larger and more representative  
40 sample would be able to examine to what extent reactions vary by SES (if at all) and how  
41 findings differ between never and ever-smokers (or between different levels of smoking  
42 heaviness, e.g. experimenters versus established smokers). Few participants reported trial  
43 intentions for any of the dissuasive cigarettes and therefore this distribution of responses,  
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3 combined with the modest sample size, meant it was not possible to use multivariate models to  
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5 examine the association between cigarette reactions and trial intentions while controlling for  
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7 other covariates (e.g. demography and smoking status). To reduce participant burden we only  
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9 explored three dissuasive designs. Given that the cigarettes were displayed in the same order;  
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11 this may have caused an order effect. Randomisation would be beneficial in future research, as  
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13 would research exploring how reactions vary among participants who are randomised to see  
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15 only one cigarette design, thus removing any bias or confounding effect from exposure to  
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17 multiple designs. Further research exploring alternative colours or dissuasive messages, or  
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19 cigarettes featuring multiple dissuasive features (e.g. a warning, unattractive colour and  
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21 imagery),<sup>25,26</sup> would be also beneficial.

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26 In conclusion, adding dissuasive features to cigarettes, for example by making them an  
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28 unattractive colour or featuring a written and/or pictorial warning, elicits negative reactions  
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30 among adolescents in Scotland and reduces interest in trialling these. The findings therefore  
31  
32 provide support to the Scottish and Canadian Government's willingness to consider dissuasive  
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34 cigarettes as a future tobacco control measure.

#### 35 36 37 38 39 40 **What this paper adds:**

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- In addition to standardised packaging, there is growing interest in communicating health messages through dissuasive cigarettes.
  - Most research has focused on adults and on limited styles of dissuasive cigarettes (warning messages and unappealing colours), therefore, we examined how adolescents in Scotland reacted to three different dissuasive cigarette designs, including a cigarette with both a written warning and hazardous image.
  - Reactions to all three dissuasive cigarette designs were negative. Rotating these designs may help reduce habituation.

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3 ➤ The findings demonstrate that dissuasive cigarettes would likely have the intended  
4 impact in dissuading smoking uptake among young people.  
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10 **Acknowledgments:** We would like to thank all schools and participants that took part in this  
11 study.  
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21 **Declaration of interests:** No conflicts to declare.  
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**Table 1:** Within-group individual reactions towards a 'standard' cigarette and three dissuasive cigarettes

| Individual items                                      | <sup>1</sup> Standard vs. Smoking kills |                    |                       | <sup>2</sup> Standard vs. Green |                |                       | <sup>3</sup> Standard vs. Toxic |                |                       | <sup>4</sup> Smoking kills vs. Green |                |                       | <sup>5</sup> Smoking kills vs. Toxic |                |                       | <sup>6</sup> Green vs. Toxic |                |                          |
|---|---|--------------------|-----------------------|---------------------------------|----------------|-----------------------|---------------------------------|----------------|-----------------------|--------------------------------------|----------------|-----------------------|--------------------------------------|----------------|-----------------------|------------------------------|----------------|--------------------------|
|   | Standard (SD)                           | Smoking kills (SD) | <i>p</i> <sup>1</sup> | Standard (SD)                   | Green (SD)     | <i>p</i> <sup>1</sup> | Standard (SD)                   | Toxic (SD)     | <i>p</i> <sup>1</sup> | Smoking kills (SD)                   | Green (SD)     | <i>p</i> <sup>1</sup> | Smoking kills (SD)                   | Toxic (SD)     | <i>p</i> <sup>1</sup> | Green (SD)                   | Toxic (SD)     | <i>p</i> <sup>1</sup>    |
| Unappealing(1)/Appealing(5)                           | 2.59<br>(1.45)                          | 1.96<br>(1.19)     | <0.001                | 2.59<br>(1.45)                  | 1.95<br>(1.25) | <0.001                | 2.59<br>(1.45)                  | 1.70<br>(1.09) | <0.001                | 1.96<br>(1.19)                       | 1.95<br>(1.25) | <i>n.s.</i>           | 1.96<br>(1.19)                       | 1.70<br>(1.09) | <0.001                | 1.95<br>(1.25)               | 1.70<br>(1.09) | <0.001                   |
| Unattractive(1)/Attractive(5)                         | 2.13<br>(1.26)                          | 1.58<br>(0.89)     | <0.001                | 2.13<br>(1.26)                  | 1.54<br>(1.01) | <0.001                | 2.13<br>(1.26)                  | 1.33<br>(0.82) | <0.001                | 1.58<br>(0.89)                       | 1.54<br>(1.01) | <i>n.s.</i>           | 1.58<br>(0.89)                       | 1.33<br>(0.82) | <0.001                | 1.54<br>(1.01)               | 1.33<br>(0.82) | <0.001                   |
| Unstylish(1)/Stylish(5)                               | 2.05<br>(1.39)                          | 1.75<br>(1.24)     | <0.001                | 2.05<br>(1.39)                  | 1.77<br>(1.30) | <0.001                | 2.05<br>(1.39)                  | 1.66<br>(1.25) | <0.001                | 1.75<br>(1.24)                       | 1.77<br>(1.30) | <i>n.s.</i>           | 1.75<br>(1.24)                       | 1.66<br>(1.25) | <0.001                | 1.77<br>(1.30)               | 1.66<br>(1.25) | <i>n.s.</i> <sup>2</sup> |
| Friends would not approve(1)/would approve(5)         | 1.88<br>(1.35)                          | 1.68<br>(1.20)     | <0.001                | 1.88<br>(1.35)                  | 1.65<br>(1.17) | <0.001                | 1.88<br>(1.35)                  | 1.58<br>(1.15) | <0.001                | 1.68<br>(1.20)                       | 1.65<br>(1.17) | <i>n.s.</i>           | 1.68<br>(1.20)                       | 1.58<br>(1.15) | <0.001                | 1.65<br>(1.17)               | 1.58<br>(1.15) | <i>n.s.</i> <sup>2</sup> |
| Would not approve of friends(1)/would approve(5)      | 1.64<br>(1.17)                          | 1.55<br>(1.10)     | <0.001                | 1.64<br>(1.17)                  | 1.51<br>(1.06) | <0.001                | 1.64<br>(1.17)                  | 1.49<br>(1.06) | <0.001                | 1.55<br>(1.10)                       | 1.51<br>(1.06) | <i>n.s.</i>           | 1.55<br>(1.10)                       | 1.49<br>(1.06) | 0.007                 | 1.51<br>(1.06)               | 1.49<br>(1.06) | <i>n.s.</i>              |
| Family would not accept(1)/would accept(5)            | 1.40<br>(0.93)                          | 1.33<br>(0.85)     | <0.001                | 1.40<br>(0.93)                  | 1.31<br>(0.85) | <0.001                | 1.40<br>(0.93)                  | 1.30<br>(0.83) | <0.001                | 1.33<br>(0.85)                       | 1.31<br>(0.85) | <i>n.s.</i>           | 1.33<br>(0.85)                       | 1.30<br>(0.83) | 0.003                 | 1.31<br>(0.85)               | 1.30<br>(0.83) | <i>n.s.</i>              |
| Would not be nice to be seen with(1)/would be nice(5) | 1.69<br>(1.18)                          | 1.40<br>(0.89)     | <0.001                | 1.69<br>(1.18)                  | 1.46<br>(1.02) | <0.001                | 1.69<br>(1.18)                  | 1.33<br>(0.89) | <0.001                | 1.40<br>(0.89)                       | 1.46<br>(1.02) | <i>n.s.</i>           | 1.40<br>(0.89)                       | 1.33<br>(0.89) | <0.001                | 1.46<br>(1.02)               | 1.33<br>(0.89) | <0.001                   |
| Harmful(1)/not at all harmful                         | 1.73<br>(1.17)                          | 1.46<br>(1.04)     | <0.001                | 1.73<br>(1.17)                  | 1.46<br>(1.06) | <0.001                | 1.73<br>(1.17)                  | 1.34<br>(1.0)  | <0.001                | 1.46<br>(1.04)                       | 1.46<br>(1.06) | <i>n.s.</i>           | 1.46<br>(1.04)                       | 1.34<br>(1.0)  | <0.001                | 1.46<br>(1.06)               | 1.34<br>(1.00) | <0.001                   |
| Off-putting(1)/Not at all off-putting                 | 3.21<br>(1.59)                          | 2.32<br>(1.41)     | <0.001                | 3.21<br>(1.59)                  | 2.27<br>(1.46) | <0.001                | 3.21<br>(1.59)                  | 1.91<br>(1.31) | <0.001                | 2.32<br>(1.41)                       | 2.27<br>(1.46) | <i>n.s.</i>           | 2.32<br>(1.41)                       | 1.91<br>(1.31) | <0.001                | 2.27<br>(1.46)               | 1.91<br>(1.31) | <0.001                   |

Notes:

All test subject to Bonferroni correction, critical value  $p=0.008$ .<sup>1</sup> Wilcoxon Signed Rank Test.<sup>2</sup> Value significant before Bonferroni correction.Range of missing data across comparisons: <sup>1</sup>5-26, <sup>2</sup>6-26, <sup>3</sup>7-27, <sup>4</sup>6-25, <sup>5</sup>7-25, <sup>6</sup>7-27.

**Table 2.** Whether participant had an overall negative reaction to the 'standard' and dissuasive cigarettes and differences by demography and smoking status

| Variable                          | <i>Standard cigarette</i> |          |          |                  | <i>'Smoking Kills' cigarette</i> |          |          |                  | <i>Green cigarette</i> |          |          |                  | <i>'Toxic' cigarette</i> |          |          |                  |
|-----------------------------------|---------------------------|----------|----------|------------------|----------------------------------|----------|----------|------------------|------------------------|----------|----------|------------------|--------------------------|----------|----------|------------------|
|                                   | %                         | <i>n</i> | $\chi^2$ | <i>p</i>         | %                                | <i>n</i> | $\chi^2$ | <i>p</i>         | %                      | <i>n</i> | $\chi^2$ | <i>p</i>         | %                        | <i>n</i> | $\chi^2$ | <i>p</i>         |
| <b>Overall</b>                    | 85                        | 445      |          |                  | 94                               | 492      |          |                  | 93                     | 480      |          |                  | 96                       | 497      |          |                  |
| <b>Age</b>                        |                           |          | 15.94    | <b>&lt;0.001</b> |                                  |          | 12.84    | <b>0.002</b>     |                        |          | 16.94    | <b>&lt;0.001</b> |                          |          | 10.03    | <b>0.007</b>     |
| 12-13 years                       | 94                        | 151      |          |                  | 99                               | 161      |          |                  | 100                    | 156      |          |                  | 100                      | 160      |          |                  |
| 14-15 years                       | 79                        | 152      |          |                  | 91                               | 172      |          |                  | 90                     | 170      |          |                  | 94                       | 175      |          |                  |
| 16-17 years                       | 83                        | 142      |          |                  | 93                               | 159      |          |                  | 91                     | 154      |          |                  | 95                       | 162      |          |                  |
| <b>Gender</b>                     |                           |          | 0.33     | n.s.             |                                  |          | 0.10     | n.s.             |                        |          | 5.32     | <b>0.021</b>     |                          |          | 1.71     | n.s.             |
| Female                            | 86                        | 243      |          |                  | 94                               | 268      |          |                  | 95                     | 268      |          |                  | 97                       | 272      |          |                  |
| Male                              | 84                        | 201      |          |                  | 94                               | 223      |          |                  | 90                     | 211      |          |                  | 95                       | 224      |          |                  |
| <b>SES</b>                        |                           |          | 0.28     | n.s.             |                                  |          | 0.10     | n.s.             |                        |          | 0.12     | n.s.             |                          |          | 0.004    | n.s.             |
| Low and Medium                    | 84                        | 111      |          |                  | 95                               | 126      |          |                  | 93                     | 123      |          |                  | 96                       | 126      |          |                  |
| High                              | 85                        | 327      |          |                  | 94                               | 360      |          |                  | 93                     | 351      |          |                  | 96                       | 365      |          |                  |
| <b>Ethnicity</b>                  |                           |          | 3.68     | <b>0.055</b>     |                                  |          | 0.05     | n.s.             |                        |          | 0.12     | n.s.             |                          |          | 0.10     | n.s.             |
| Other/prefer not to say           | 78                        | 71       |          |                  | 95                               | 86       |          |                  | 92                     | 82       |          |                  | 96                       | 85       |          |                  |
| White British                     | 86                        | 369      |          |                  | 94                               | 402      |          |                  | 93                     | 394      |          |                  | 96                       | 408      |          |                  |
| <b>Smoking status</b>             |                           |          | 63.69    | <b>&lt;0.001</b> |                                  |          | 40.60    | <b>&lt;0.001</b> |                        |          | 36.59    | <b>&lt;0.001</b> |                          |          | 24.71    | <b>&lt;0.001</b> |
| Never-smoker                      | 90                        | 402      |          |                  | 97                               | 430      |          |                  | 96                     | 420      |          |                  | 98                       | 432      |          |                  |
| Ever-smoker                       | 53                        | 37       |          |                  | 77                               | 54       |          |                  | 76                     | 53       |          |                  | 85                       | 57       |          |                  |
| <b>Susceptibility<sup>1</sup></b> |                           |          | 26.70    | <b>&lt;0.001</b> |                                  |          | 10.14    | <b>0.001</b>     |                        |          | 14.28    | <b>&lt;0.001</b> |                          |          | 11.90    | <b>0.001</b>     |
| Non-susceptible                   | 95                        | 296      |          |                  | 98                               | 307      |          |                  | 98                     | 302      |          |                  | 99                       | 307      |          |                  |
| Susceptible                       | 78                        | 105      |          |                  | 92                               | 122      |          |                  | 90                     | 117      |          |                  | 94                       | 126      |          |                  |

Notes:

<sup>1</sup> Never-smokers only $\chi^2$  = Pearson Chi SquareOverall reaction: Total score across nine reaction items, binary coded into negative ( $\leq 26$ ) or neutral or positive reaction ( $\geq 27$ ).

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**Table 3:** Participants who said they would not trial the standard and dissuasive cigarette, and differences by demography and smoking status.

| Variable                | Standard cigarette |     |          |        | 'Smoking Kills' cigarette |     |          |        | Green cigarette |     |          |        | 'Toxic' cigarette |     |          |        |
|-------------------------|--------------------|-----|----------|--------|---------------------------|-----|----------|--------|-----------------|-----|----------|--------|-------------------|-----|----------|--------|
|                         | %                  | n   | $\chi^2$ | p      | %                         | n   | $\chi^2$ | p      | %               | n   | $\chi^2$ | p      | %                 | n   | $\chi^2$ | p      |
| <b>Overall</b>          | 84                 | 478 |          |        | 89                        | 502 |          |        | 90              | 508 |          |        | 91                | 512 |          |        |
| <b>Age</b>              |                    |     | 22.12    | <0.001 |                           |     | 16.93    | <0.001 |                 |     | 24.47    | <0.001 |                   |     | 21.09    | <0.001 |
| 12-13 years             | 94                 | 180 |          |        | 96                        | 182 |          |        | 98              | 186 |          |        | 98                | 186 |          |        |
| 14-15 years             | 78                 | 159 |          |        | 84                        | 170 |          |        | 84              | 170 |          |        | 86                | 174 |          |        |
| 16-17 years             | 80                 | 139 |          |        | 86                        | 150 |          |        | 87              | 152 |          |        | 87                | 152 |          |        |
| <b>Gender</b>           |                    |     | 1.66     | n.s.   |                           |     | 0.03     | n.s.   |                 |     | 0.75     | n.s.   |                   |     | 0.08     | n.s.   |
| Female                  | 82                 | 251 |          |        | 88                        | 268 |          |        | 91              | 275 |          |        | 91                | 275 |          |        |
| Male                    | 86                 | 226 |          |        | 89                        | 233 |          |        | 89              | 232 |          |        | 90                | 236 |          |        |
| <b>SES</b>              |                    |     | 0.43     | n.s.   |                           |     | 0.38     | n.s.   |                 |     | 0.03     | n.s.   |                   |     | 0.26     | n.s.   |
| Low and medium          | 82                 | 116 |          |        | 87                        | 123 |          |        | 89              | 126 |          |        | 89                | 126 |          |        |
| High                    | 85                 | 352 |          |        | 89                        | 369 |          |        | 90              | 372 |          |        | 91                | 376 |          |        |
| <b>Ethnicity</b>        |                    |     | 0.50     | n.s.   |                           |     | 0.97     | n.s.   |                 |     | 1.10     | n.s.   |                   |     | 1.81     | n.s.   |
| Other/prefer not to say | 82                 | 80  |          |        | 86                        | 84  |          |        | 87              | 85  |          |        | 87                | 85  |          |        |
| White British           | 85                 | 393 |          |        | 89                        | 413 |          |        | 90              | 418 |          |        | 91                | 422 |          |        |
| <b>Smoking status</b>   |                    |     | 155.04   | <0.001 |                           |     | 126.31   | <0.001 |                 |     | 69.95    | <0.001 |                   |     | 120.44   | <0.001 |
| Never-smoker            | 92                 | 443 |          |        | 94                        | 455 |          |        | 94              | 452 |          |        | 96                | 461 |          |        |
| Ever-smoker             | 34                 | 25  |          |        | 49                        | 36  |          |        | 62              | 45  |          |        | 55                | 40  |          |        |
| <b>Susceptibility</b>   |                    |     | 36.21    | <0.001 |                           |     | 22.52    | <0.001 |                 |     | 20.80    | <0.001 |                   |     | 14.28    | <0.001 |
| Non-susceptible         | 97                 | 327 |          |        | 98                        | 329 |          |        | 97              | 327 |          |        | 98                | 330 |          |        |
| Susceptible             | 80                 | 114 |          |        | 87                        | 124 |          |        | 86              | 123 |          |        | 90                | 129 |          |        |

Notes:

<sup>1</sup> Never-smokers only

$\chi^2$  = Pearson Chi Square

Trial intentions: Binary from original scale variable, No trial intentions (score 4/5) or neutral/positive trial intentions (score 1-3).