

Title: The impact of standardised packaging in the United Kingdom on warning salience, appeal, harm perceptions, and cessation-related behaviours: A longitudinal online survey
(Word count 3576)

Authors: Crawford Moodie¹, Catherine Best¹, Sara C. Hitchman², Nathan Critchlow¹, Anne Marie Mackintosh¹, Ann McNeill², Martine Stead¹

Affiliations:

¹ Institute for Social Marketing and Health, Faculty of Health Sciences and Sport, University of Stirling, FK9 4LA, Scotland.

² Department of Addictions, Institute of Psychiatry, Psychology and Neuroscience, King's College London, SE5 8BB, England.

Corresponding author: Crawford Moodie, Institute for Social Marketing and Health, Faculty of Health Science and Sport, University of Stirling, Stirlingshire FK9 4LA. Email: c.s.moodie@stir.ac.uk Tel: +44 (0)1786 466456

Keywords: Standardised Packaging, Warnings, Appeal, Harm, Policy, Longitudinal

This article has been accepted for publication in *Tobacco Control* following peer review. The definitive copyedited, typeset version Moodie C, Best C, Hitchman SC, Critchlow N, MacKintosh AM, McNeill A & Stead M (2021) Impact of standardised packaging in the UK on warning salience, appeal, harm perceptions and cessation-related behaviours: A longitudinal online survey. *Tobacco Control* is available online at: <https://doi.org/10.1136/tobaccocontrol-2021-056634>
© Authors 2021. Reuse of this manuscript version (excluding any databases, tables, diagrams, photographs and other images or illustrative material included where a another copyright owner is identified) is permitted strictly pursuant to the terms of the Creative Commons Attribution-NonCommercial 4.0 International (CC-BY-NC 4.0) <http://creativecommons.org/licenses/by-nc/4.0/>

The impact of standardised packaging in the United Kingdom on warning salience, appeal, harm perceptions, and cessation-related behaviours: A longitudinal online survey

Abstract

Introduction: In the UK, since May 20th 2017 tobacco companies must sell cigarettes and rolling tobacco in standardised packs. **Methods:** Three waves of a longitudinal online survey with smokers (≥ 16) pre-standardised packaging (Wave 1: April-May 2016) and post-standardised packaging (Wave 2: September-November 2017; Wave 3: May-July 2019). Of the 6233 smokers at Wave 1, 4293 responded at Wave 2 and 3175 at Wave 3. We explored smokers' response to warning salience, appeal (appeal, quality, value, satisfaction, and taste compared to a year ago), harm (harmfulness compared to a year ago, harm compared to other brands, and whether some brands have more harmful substances), and quit plans, attempts and quitting. **Results:** Compared to Wave (W) 1, the proportions noticing warnings first on packs, and rating cigarettes/rolling tobacco less appealing and worse value than a year ago, was higher at W2 and W3. Disagreeing that some brands contain more harmful substances was higher at W2. Interactions between social grade and survey wave for warning salience, and each appeal and harm outcome, were non-significant. Smokers switching from not noticing warnings first at W1 to noticing warnings first at W2, or who had a lower composite appeal score at W2, were more likely to plan to quit and to have made a quit attempt at W2. Smokers who switched to disagreeing that some brands contain more harmful substances at W2, after giving a different response at W1, were more likely to quit at W3. **Conclusions:** Standardised packaging appears to be having the intended impacts.

Introduction

Belgium became the fifteenth country to require tobacco products to be sold in standardised (or plain) packaging in January 2021. The objectives of standardised packaging (SP) are to discourage uptake, encourage cessation, discourage relapse, and reduce exposure to tobacco smoke.¹⁻³ It is expected that standardised packaging will help meet these objectives by increasing the salience of the on-pack warnings, reducing the appeal of tobacco products, and reducing misperceptions of harm as a consequence of pack design.¹⁻³ Since May 2017, cigarettes and rolling tobacco in the UK must be sold in drab brown packs with pictorial warnings on 65% of the main display areas (previously text warnings covered 43% of the pack front and pictorial warnings 53% of the reverse), see Figure 1. We explore whether SP in the UK increased warning salience and reduced appeal and harm perceptions among smokers aged 16 and over, and the impact, if any, on cessation-related behaviours.

For warning salience, a survey in England in the last six months of the (12-month) transition-period, when both standardised and fully-branded packs were sold,^{4,5} found that smokers using SP were more likely than those who had never used SP to notice warnings often.⁶ A longitudinal survey in England found that the proportion of smokers usually noticing warnings on packs first increased from 18% at the start of the transition-period to 45% up to 12 months post-SP.⁷ A longitudinal survey in the UK and Norway (where SP was introduced but the warnings, which had been on packs for several years, were unchanged) found that noticing warnings on packs increased in the UK post-SP but not in Norway.⁸ In Australia, cross-sectional tracking surveys and longitudinal surveys found an increase in warning salience among smokers up to 15 months post-implementation.⁹⁻¹²

For appeal, a longitudinal survey in England found that smokers were four times more likely to ‘not at all’ like the look of their pack following the introduction of SP than they were prior to it being implemented.⁷ There was also a decrease in the proportion reporting how

much brands differed in terms of prestige, but an increase in reporting that the quality of their cigarettes was high.⁷ In France, smokers were approximately three times less likely to indicate that they enjoyed the look of their pack post-SP than they were pre-SP.¹³ In Australia, smokers using SP during the transition-period were more likely than those using fully-branded packs to rate their cigarettes lower in quality and less satisfying than a year before.¹⁴ Cross-sectional tracking surveys show that up to 12 months post-SP there was a significant increase in negative pack perceptions among smokers,^{9,10} with packs rated as having lower appeal and cigarettes considered lower quality, lower value and less satisfying than a year before.¹⁰

For harm, a survey in England in the transition period found that smokers using SP were more likely to think about the risks of smoking because of the look of the pack than smokers that had never used SP.⁶ A longitudinal survey in England found that the proportion of smokers indicating that their brand was no different in harmfulness, and no smoother or harsher, than other brands, did not change post-SP.⁷ In France, surveys with smokers and non-smokers found an increase in the perceived dangerousness of smoking and the fear of the consequences of smoking within a year of SP being introduced.¹⁵ In Australia, during the transition period smokers using SP did not differ from smokers using fully-branded packs in terms of frequency of thoughts about harms or perceived exaggeration of harms.¹⁴ Compared to smokers interviewed pre-SP, those interviewed in the year after SP was mandatory were more likely to believe that brands do not differ in harmfulness, but there was no change in perceived exaggeration of harms or the belief that brand variants do not differ in perceived harmfulness compared with a year before.¹⁰

During the transition periods in the UK and Australia smokers using SP were more likely than those using fully-branded packs to indicate that they thought about quitting because of the look of the pack,⁶ thought about quitting at least once a day in the past week,¹⁴

and rated quitting as a higher priority.¹⁴ Smokers in Australia were interviewed twice, a month apart, with those completing the follow-up in the late transition period more likely to intend to quit, and those followed-up in the early transition period or post-SP more likely to have reported having made a quit attempt, than those followed-up pre-SP.¹⁶ Additional analysis focusing only on smokers recruited post-SP found that several baseline measures suggesting improved warning effectiveness, and reduced appeal, increased the likelihood of quitting-related outcomes.¹⁷ For instance, smokers at baseline who noticed warnings on packs first, disliked the look of their pack, or reported lower satisfaction from their cigarettes compared to a year ago, were more likely to report daily thoughts about quitting at follow up.¹⁷ Smokers attributing much more motivation to quit to warnings at baseline were more likely to have attempted to quit at follow up.¹⁷

We explored whether SP in the UK increased warning salience and reduced appeal and misperceptions of harm and, for those smokers for whom this was the case, whether this was associated with quit plans, attempts and quitting. As socio-economic differences are often overlooked in SP research,¹⁸ we also explored whether any change in warning salience, appeal and harm across waves differed by social grade.

Methods

Design and sample

The ‘Adult Tobacco Policy Survey’ is a longitudinal online survey following cigarette smokers recruited pre-SP (April-May 2016) and followed up 4-6 months post-SP (September-November 2017) and 24-26 months post-SP (May-July 2019). To be eligible for inclusion at W1, participants had to be 16 or over and report smoking cigarettes (factory-made and/or hand-rolled) in the last three months. The sample was recruited from the online panel of market

research company YouGov. All W1 participants were eligible for inclusion at future waves. Of the 6233 cigarette smokers at W1, 4293 (69%) participated at W2 (3629 cigarette smokers, 607 ex-cigarette smokers, 36 non-cigarette smokers, 7 cigarette smokers that had not smoked in the past three months, 14 missing data on smoking status) and 3175 (51% of the W1 sample) at W3 (2412 cigarette smokers, 700 ex-cigarette smokers, 44 non-cigarette smokers, 6 cigarette smokers that had not smoked in the past three months, 13 missing data on smoking status). At each wave participants received a small incentive. There was an information page at the start of the survey, with consent required.⁸ The study received ethical approval from the University of Stirling.

Measures

Demographics

Information on gender, age, ethnicity, education, income and social grade was captured. Age was coded as '16-24', '25-39', '40-55' and '56 and over', with ethnicity recoded into 'White British', 'White non-British', 'Other ethnic group' and 'Not stated'. Highest educational qualification obtained was coded as 'High school', 'Technical, trade school, A levels, or community college', 'University degree or higher degree', and 'Don't know or prefer not to say'. Annual household income was recoded as 'under £30,000', '£30,000 to £44,999', '£45,000 and over', and 'Don't know or prefer not to answer'. Social grade was determined by occupation of the main income earner within the household using the National Readership Survey,¹⁹ with grades A, B and C1 (signifying upper- and middle-class grades) and C2, D and E (working-class grades) recoded into 'ABC1' and 'C2DE'.

Smoking and cessation-related behaviours

Participants were asked whether they smoked cigarettes (factory-made or hand-rolled) daily, smoked cigarettes but not every day (weekly, monthly, within the last three months, not in the last three months), did not smoke cigarettes at all but used some other tobacco product(s), or had quit. All participants at W1 had smoked cigarettes in the past three months. Participants were asked ‘Are you planning to quit smoking?’ with response options (Within the next month, Between 1 and 6 months from now, Sometime in the future, beyond 6 months, Not planning to quit, Don’t know) collapsed into ‘Planning to quit’ versus ‘Not planning to quit’, with ‘Don’t know’ excluded. Participants were asked how many attempts they had made to quit smoking in the past 12 months (‘No attempts’, ‘1 attempt’, ‘2 attempts’, ‘3 or more attempts’, and ‘Don’t Know’), collapsed into ‘One or more attempts’ and ‘No attempts’. Quitting at W3 was based on reported quitting when asking about smoking status.

Nicotine dependence

The Heaviness of Smoking Index (HSI)²⁰ combines cigarettes smoked per day (10 or fewer=0, 11-20=1, 21-30=2, 31 or more=3) and time to first cigarette on the days that they smoke (within 5 minutes=3, 6-30 minutes=2, 31-60 minutes=1, 61 minutes or more=0). Missing cases were included as a missing category.

Warning salience

Participants were asked ‘When you look at a pack of cigarettes/rolling tobacco what do you usually notice first - the warning labels, or other aspects of the pack, such as branding?’ Responses were ‘Warnings labels’, ‘Other aspects of the pack, such as branding’, and ‘Don’t know’. To examine change in warning salience between waves, we compared ‘Warning labels’ to any other response. To examine the association between change in warning salience between W1 and W2 and planning to quit and quit attempts at W2, and quitting at W3, we generated an

indicator variable for those who moved from not noticing warnings first at W1 to noticing warnings first at W2.

Appeal

Participants were asked ‘Compared to the cigarettes/rolling tobacco you were smoking a year ago, how would you rate your current cigarettes/rolling tobacco in terms of...’ ‘Value for money’, ‘Quality’ and ‘Taste’. Response options for each were ‘Better’, ‘About the same’, ‘Worse’, and ‘Don’t know’. They were also asked ‘Compared to the cigarettes/rolling tobacco you were smoking a year ago, how would you rate your current cigarettes/rolling tobacco in terms of whether they are...’ ‘Appealing’ and ‘Satisfying’. Responses were ‘More’, ‘About the same’, ‘Less’, and ‘Don’t know’. To examine change between waves we compared ‘Worse’ or ‘Less’ versus any other response. To examine the association between reduced appeal and planning to quit and quit attempts at W2, and quitting at W3, we created a change score for each appeal variable. ‘Worse’ or ‘less’ was scored 3, ‘about the same’ 2 and ‘better’ or ‘more’ 1. The response in W2 was subtracted from that in W1 to create a change score ranging from -2 to +2 with a positive score indicating evaluation becoming more negative over time. To examine the magnitude of the association between change across all appeal variables and cessation-related behaviours, a composite Appeal measure was created, with scores summed across the five appeal change variables to create a score from -10 to 10.

Harm

Participants were asked: 1) ‘Compared to the cigarettes/rolling tobacco you were smoking a year ago, how would you rate your current cigarettes/rolling tobacco in terms of harmfulness?’, with response options ‘Higher’, ‘About the same’, ‘Lower’, and ‘Don’t know’, 2) ‘Is your usual/current brand of cigarettes/rolling tobacco a little less harmful, no

different, or a little more harmful, compared with other brands?’ with response options ‘Little less harmful than other brands’, ‘No different’, ‘Little more harmful than other brands’, and ‘Don't know’, 3) ‘To what extent do you agree or disagree with the following statement: Some brands of cigarettes contain more harmful substances than other brands’, with response options ‘Strongly agree’, ‘Agree’, ‘Neither agree nor disagree’, ‘Disagree’, ‘Strongly disagree’ and ‘Don't know’.

When examining change between waves we compared the proportion responding ‘Higher’ versus any other response for the first question, ‘No different’ versus any other response for the second, and ‘Strongly disagree or disagree’ versus any other response for the third. To examine the association between change in perceived harm between W1 and W2 and planning to quit and quit attempts at W2, and quitting at W3, we generated three indicator variables. The first was for participants who moved to considering their usual brand as having higher harmfulness than a year ago at W2 after giving a different response at W1. The second for participants who moved to considering their current/usual brand no different in harm to other brands at W2 from any other response at W1, and the third for participants who disagreed that some cigarette brands contain more harmful substances at W2 after giving another response at W1.

Analysis

Firstly, we examined whether warning salience, appeal and harm perceptions changed over survey waves. To do so, generalised estimating equations (GEE) were employed for each outcome, with wave as the independent variable. The analysis was adjusted for these baseline values: age group, gender, ethnicity, social grade, household income, HSI score and education. GEE used an exchangeable correlation structure and robust standard errors. Analyses were not weighted as the sample is not a probability sample and frequency

weighting to match baseline population proportions is not useful for a repeated measures analysis. To examine whether any change across waves differed by social grade we added an interaction term between social grade and wave.

Secondly, we examined whether change in warning salience, appeal, and harm between W1 and W2 was associated with cessation-related behaviours. These outcomes were evaluated using a series of logistic regressions with planning to quit at W2, quit attempts in the previous 12 months at W2, and having quit at W3, as the dependent variables. The following were independent variables: change in warning salience; change in composite appeal score; change in each of the five appeal variables; and change in each of the three harm variables. Each was regressed against each of the cessation-related dependent variables. The analyses were adjusted for these baseline values: age group, gender, ethnicity, social grade, household income, HSI score and education. Where the dependent variable was planning to quit at W2 then the analysis was adjusted for planning to quit at W1, and where it was quit attempts at W2 the analysis was adjusted for quit attempts at W1.

Where the relationship between change in warning salience, appeal or harm and the cessation-related behaviours was significant, interaction between the independent variable and social grade was explored. Further details of the analysis are presented in sections 4 and 5 of the Supplementary file. As a sensitivity check, because questions on appeal, satisfaction, quality, taste and value asked participants to compare these attributes between the cigarettes they were smoking a year ago to those they were currently smoking, we restricted the analysis to brand loyal participants (those reporting smoking the same brand at W1 and W2).

Results

Sociodemographic characteristics of the sample across the three waves are shown in Table 1, with cessation-related variables shown in Table 2. Missing data rates for warning salience, appeal and harm variables are shown in Supplementary Table 1.1.

Tables 1 and 2 here

Compared to W1, the proportion noticing the warning first on their pack, or who thought their cigarettes were less appealing and worse value than a year ago, was higher at W2 and W3 (Table 3). Compared to W1, disagreeing that some brands contain more harmful substances than others was higher at W2. The interactions between social grade and wave for each outcome were not significant (see Supplementary Tables 2.1-2.3 and Supplementary Figures 1 and 2).

Table 3 here

A change from not noticing warnings on packs first at W1 to noticing warnings first at W2 was associated with higher odds of planning to quit and having made at least one quit attempt at W2, and increased quitting at W3 in an unadjusted model (although this no longer reached significance in an adjusted model) (Table 4). A change to lower composite appeal for cigarettes from W1 to W2 was associated with higher odds of planning to quit and having made at least one quit attempt at W2. Among the five appeal measures, a change to lower appeal of cigarettes from W1 to W2 was associated with higher odds of planning to quit at W2, and a change to cigarettes being less satisfying than a year ago was associated with higher odds of having made at least one quit attempt at W2. Participants who indicated that their usual brand was more harmful than a year ago at W2, when they had not responded that

way at W1, had higher odds of having made a quit attempt at W2. Participants who changed to disagreeing that some brands contain more harmful substances than others at W2 after giving another response at W1 were more likely to have quit smoking at W3. Where there were statistically significant relationships, potential interactions with social grade were investigated. There were no statistically significant interactions between the change scores and social grade (see Table 4 and Supplementary Tables 3.1-3.5).

Table 4 here

When the analysis was restricted to brand loyal smokers at W1 and W2 (Table 5), composite appeal at W2 was no longer significantly associated with a quit attempt at W2, and disagreeing that some brands were more harmful at W2 was no longer significantly associated with quitting at W3.

Table 5 here

Discussion

We found an increase in warning salience post-SP, consistent with past research,⁶⁻¹² with the proportion of smokers noticing warnings on packs first remaining significantly higher at W3 (24-26 months post-SP) than at W1. The warnings on SP in the UK (and Australia) were new and covered a greater proportion of the pack than they did on fully-branded packaging however; in the UK they also started from the top of the pack (rather than the bottom) and displayed pictorial images on the pack front and reverse (rather than just the reverse), with these images rotated annually (compared to not at all). Although it is not possible in this

paper to determine whether increased warning salience was a function of the new warnings or SP, recent research highlights the benefits of introducing both simultaneously.^{7,8}

Compared to baseline, smokers considered their cigarettes less appealing and worse value compared to a year ago at the post-SP waves. For the appeal measures, smokers at W3 were asked to compare their cigarettes to a year earlier, and therefore the comparison at this point would be between SP. Nevertheless, for all five appeal measures the proportion of smokers rating their cigarettes negatively declined from W2 to W3. It may be that over time smokers become more accustomed to SP. It may also be that product innovation has, at least in part, helped increase appeal. Tobacco industry journals highlight the increased importance of the cigarette stick as a promotional tool,²¹⁻²³ particularly in countries with SP.²⁴ There has been significant filter innovation in the UK, with flavour-changing capsule filters growing in popularity over the study period²⁵ and the continued introduction of firmer and recessed filters, which smokers view favourably.²⁶ Further research in markets with SP monitoring tobacco industry innovations and exploring smokers' perceptions of these innovations is warranted.

Smokers are more likely than non-smokers to have erroneous perceptions about the harmfulness of smoking due to pack design.²⁷ Whether SP can reduce these misperceptions among smokers is not clear given inconsistent findings.^{6,7,9,13,14} We found little evidence for a change in harm perceptions across waves, although there was an increase in the proportions disagreeing that some brands contain more harmful substances than others at W2. Consistent with research in Australia,¹⁰ no differences between higher (ABC1) and lower (C2DE) social grades for any of the harm, appeal or warning salience measures were observed between waves, suggesting that SP is not having a different impact among these groups.

Smokers who did not report noticing warnings on packs first at W1, but did at W2, were more likely to plan to quit and to have made a quit attempt at W2; they were also

significantly more likely to have quit at W3 in an unadjusted model but not an adjusted model, although the findings were in the same direction. Smokers with lower composite appeal of their cigarettes at W2 were more likely to plan to quit and to have made a quit attempt at W2. The findings are consistent with research in Australia, where it is the warnings on SP and, to a lesser extent reduced appeal, that appear most likely to help drive behaviour change.¹⁷ Despite few differences in harm perceptions over the three waves, those who disagreed that some brands were more harmful than others at W2, after giving a different response at W1, were more likely to have quit at W3. Concerns about harm have long been a key reason for quitting.²⁸ This finding would seem to highlight the value of correcting the misperception that different brands carry different levels of harm. Packaging is central to this erroneous belief, with tobacco companies having engineered pack design, through the use of descriptors, colour and size, to give the impression that some brands (or variants) are less harmful than others. By banning potentially misleading pack descriptors, standardising pack colour and banning slimmer designs, SP may help expose this deception.

In terms of limitations, the findings are reliant on self-report. Our sample was drawn from an online panel and therefore excludes those that lack internet access or regular internet access, such as those on lower incomes.²⁹ Attrition is an issue with longitudinal research, with almost half the sample lost at W3. In addition, our W1 sample under-represented young smokers, who were also more likely to be lost at subsequent waves. Our findings may, therefore, not be generalisable to smokers across the UK.

In conclusion, SP in the UK appears to be achieving its intended impact of increasing warning salience and reducing appeal and some misperceptions of harm among smokers aged 16 and over, and by doing so helping increase cessation-related behaviours.

What this paper adds

- There is a growing body of research exploring the core objectives of standardised packaging in countries where this has policy has been introduced.
- Using a longitudinal online survey in the UK we found that warning salience increased and appeal decreased among smokers post-standardised packaging.
- Interactions between social grade and survey wave on warning salience, appeal and harm were non-significant.
- For smokers for whom standardised packaging made the warnings more salient, or cigarettes less appealing, this was associated with planning to quit and quit attempts. For smokers for whom standardised packaging reduced the misperception that some brands contain more harmful substances than others, this was associated with quitting.

Acknowledgements The authors would like to thank YouGov for sample recruitment at each wave.

Contributors CM and SH designed the study. CM and MS obtained funding. CB was responsible for data management and analysis. CM drafted the manuscript, and all authors approved the final manuscript.

Funding The first two waves were funded by Cancer Research UK and the British Heart Foundation (Grant No: A18507). The third wave was conducted by the Public Health Policy Research Unit (PH-PRU), commissioned and funded by the National Institute for Health Research Policy Research Programme (Grant No: N/A). The views expressed are those of the authors and not necessarily those of the NHS, the National Institute for Health Research, the

Department of Health and Social Care or its arm's length bodies, and other Government Departments.

Competing interests None declared.

Provenance and peer review Not commissioned; externally peer reviewed.

References

1. World Health Organisation. Guidelines for implementation of Article 11 of the WHO Framework Convention on Tobacco Control; 2008.
www.who.int/fctc/guidelines/article_11.pdf
2. World Health Organisation. Guidelines for implementation of Article 13 of the WHO Framework Convention on Tobacco Control; 2008.
www.who.int/fctc/guidelines/article_13.pdf?ua=1
3. Australian Government. Tobacco Plain Packaging Act 2011. Australia: Commonwealth of Australia, 2011.
4. Breton MO, Britton J, Huang Y, et al. Cigarette brand diversity and price changes during the implementation of plain packaging in the United Kingdom. *Addiction* 2019;113:1883-94.
5. Critchlow N, Stead M, Moodie C, et al. Introduction of standardised tobacco packaging during a 12-month transition period: Findings from small retailers in the United Kingdom. *Nicot Tob Res* 2019;21:871-8.
6. Moodie C, Brose LS, Hyun L, et al. How did smokers respond to standardised cigarette packaging with new, larger health warnings in the United Kingdom during the transition period? *Addict Res Theory* 2020;28:53-61.
7. Aleyan S, Driezen P, McNeill A, et al. Evaluating the impact of introducing standardized packaging with larger health-warning labels in England: findings from adult smokers within the EUREST-PLUS ITC Europe Surveys. *Eur J Pub Health* 2020;30(Suppl.3):iii91-7.
8. Moodie C, Best C, Lund I, et al. The response of smokers to health warnings on packs in the United Kingdom and Norway following the introduction of standardised packaging. *Nicot Tob Res*, in press.

9. Dunlop SM, Dobbins T, Young JM, et al. 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* 2014;4:e005836
10. Wakefield M, Coomber K, Zacher M, et al. Australian adult smokers' responses to plain packaging with larger graphic health warnings 1 year after implementation: results from a national cross-sectional tracking survey. *Tob Control* 2015;24:ii17-25.
11. Nagelhout GE, Osman A, Yong HH, et al. Was the media campaign that supported Australia's new pictorial cigarette warning labels and plain packaging policy associated with more attention to and talking about warning labels? *Addict Behav* 2015;49:64-7.
12. Yong HH, Borland R, Hammond D, et al. Smokers' reactions to the new larger health warning labels on plain cigarette packs in Australia: findings from the ITC Australia project. *Tob Control* 2016;25:181-7.
13. Pasquereau A, Andler R, Guignard R, et al. Smokers' perception of cigarette packaging in France before and after the plain packaging. *Eur J Pub Health* 2020;30(Suppl.5):636-7.
14. Wakefield MA, Hayes L, Durkin S, et al. Introduction effects of the Australian plain packaging policy on adult smokers: a cross-sectional study. *BMJ Open* 2013;3:e003175.
15. El-Khoury F, El-Khoury F, Bolze C, et al. Lower smoking rates and increased perceived harm of cigarettes among French adults one year after comprehensive tobacco control measures. *Drug Alc Dep* 2019;201:65-70.
16. Durkin S, Brennan E, Coomber K, et al. 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. *Tob Control* 2015;24(Suppl.2):ii26-32.
17. Brennan E, Durkin S, Coomber K, et al. Are quitting-related cognitions and behaviours predicted by proximal responses to plain packaging with larger health warnings? Findings

from a national cohort study with Australian adult smokers. *Tob Control* 2015;24(Suppl.2):ii33-41.

18. Moodie C, Angus K, Stead M. A systematic review of research exploring the response of consumers, retailers and tobacco companies to standardised packaging in the United Kingdom. Stirling, Scotland: Centre for Tobacco Control Research, University of Stirling; 2019.

19. National Readership Survey. Social grade; undated.

www.nrs.co.uk/nrs-print/lifestyle-and-classification-data/social-grade/

20. Heatherton TF, Kozlowski LT, Frecker RC, et al. The Fagerstrom test for nicotine dependence: A revision of the Fagerstrom tolerance questionnaire. *Br J Addiction* 1991;86:1119-27.

21. Rossel S. Ready to roll. *Tob Reporter* 2017;2:44-5.

22. Schmid T. As special as it gets. *Tob Asia* 2019;3:40-4.

23. Tobacco Asia. Alternatives to JTI's menthol cigs. *Tob Asia* 2020;4:22.

24. TR Staff Report. Up the value chain. *Tob Reporter* 2019;2:46-7.

25. Moodie C, Thrasher JF, Cho YJ, et al. Flavour capsule cigarettes continue to experience strong global growth. *Tob Control* 2019;28:595-6.

26. Wakefield MA, Dunstone K, Brennan E, et al. Australian smokers' experiences and perceptions of recessed and firm filter cigarettes. *Tob Control*, in press.

27. Moodie C, Stead M, Bauld L, et al. Plain tobacco packaging: A systematic review. Report prepared for the Department of Health. Stirling: Centre for Tobacco Control Research, University of Stirling; 2012.

28. Duncan CL, Cummings SR, Hudes ES, et al. Quitting smoking. *J General Internal Medicine* 1992;7:398-404.

29. ONS. Frequency of internet use, by age group and by income, 2018.

www.ons.gov.uk/peoplepopulationandcommunity/householdcharacteristics/homeinternetandsocialmediausage/adhocs/009137frequencyofinternetusebyagegroupandbyincome2018

Table 1: Sociodemographic characteristics of sample

		All			Cigarette smokers		
Wave		1	2	3	1	2	3
	Total number	6233	4293	3175	6233	3629	2412
Education	High school or less %	32.6	34.1	34.5	32.6	35.0	35.6
	Technical, trade school, A levels, or community college %	25.8	23.1	22.7	25.8	23.2	22.2
	At least university degree %	38.4	39.4	40	38.4	38.8	39.3
	Don't know / prefer not to say %	3.1	3.4	2.8	3.1	3.1	2.9
Gender	Male %	46.4	46.7	47.8	46.4	46.5	47.8
	Female %	53.7	53.3	52.2	53.7	53.5	52.2
Gross Household Income	Under £30,000 %	45.6	44.5	42.8	45.6	45.7	43.9
	£30,000 to £44,999 %	20.8	20.8	20.9	20.8	20.5	21.0
	£45,000 and over %	15.6	15.5	17.7	15.6	15.1	16.9
	Don't know or prefer not to answer %	18.1	19.2	18.6	18.1	18.7	18.3
Ethnic group	White British %	88.2	89.5	90.2	88.2	89.7	90.2
	Other white ethnic group %	5.7	4.9	4.4	5.7	4.7	4.3
	Other ethnic group %	5.1	4.6	4.3	5.1	4.5	4.4
	Prefer not to say %	1.0	1.15	1.1	1.0	1.1	1.2
Age group	16 to 24 %	10.4	4.1	2.6	10.4	3.6	2.4
	25 to 39 %	28.8	25.4	21.2	28.8	23.9	20.2
	40 to 55 %	32.9	34.9	36.1	32.9	35.5	36.3
	56 and above %	27.8	35.7	40.1	27.8	37.0	41.1
Social grade	ABC1 %	57.5	57.2	57.0	56.1	56.5	56.9

C2DE %	39.7	41.4	40.6	41.3	42.3	40.6
Refused or unknown %	2.9	1.5	2.5	2.7	1.2	2.5

Table 2: Heaviness of smoking index, planning to quit, and quit attempts by survey wave

		Wave 1	Wave 2	Wave 3
Heaviness of smoking index	0	1927 (30.9%)	945 (26.0%)	623 (25.8%)
	1	746 (12.0%)	442 (12.2%)	280 (11.6%)
	2	1098 (17.6%)	658 (18.1%)	457 (19.0%)
	3	1420 (22.8%)	921 (25.4%)	579 (24.0%)
	4	651 (10.4%)	424 (11.7%)	307 (12.7%)
	5	217 (3.5%)	145 (4.0%)	98 (4.1%)
	6	78 (1.3%)	42 (1.2%)	24 (1.0%)
	Missing	96 (1.5%)	52 (1.4%)	44 (1.8%)
Planning to quit	Within the next month	716 (11.5%)	353 (9.7)	212 (8.8%)
	Between 1 and 6 months	1355 (21.7%)	723 (19.9%)	409 (17.0%)
	Beyond 6 months	1834 (29.4%)	982 (27.1%)	670 (27.8%)
	Not planning to quit	1695 (27.2%)	1076 (29.7%)	754 (31.3%)
	Don't know	633 (10.2%)	494 (13.6%)	367 (15.2%)
	Missing	0	1	0
Quit attempts	No attempts	3758 (60.3%)	2387 (65.8%)	1619 (67.1%)
	1 attempt	1273 (20.4%)	694 (19.1%)	449 (18.6%)
	2 attempts	665 (10.7%)	313 (8.6%)	177 (7.3%)
	3 or more attempts	454 (7.3%)	199 (5.5%)	126 (5.2%)
	Don't know	83 (1.3%)	35 (1.0%)	41 (1.7%)
	Missing	0	1	0

Table 3: Change across survey waves in warning salience, appeal, satisfaction, quality, taste and value by social group

Variable	Response	Social grade	W1	W2	W3
Warning salience	Warning noticed first	ABC1	512	894	519
			14.3%	43.9%	38.8%
		C2DE	289	534	336
			11.7%	35.7%	33.0%
		All	824	1469***	877***
Taste	Worse		13.2%	40.5%	36.4%
		ABC1	154	97	57
			4.4%	4.8%	4.3%
		C2DE	112	62	26
			4.6%	4.2%	2.6%
Satisfying	Less	All	275	166	88
			4.5%	4.6%	3.7%
		ABC1	215	132	64
			6.2%	6.5%	4.8%
		C2DE	153	81	46
Appealing	Less		6.3%	5.4%	4.6%
		All	381	221	116
			6.3%	6.1%	4.8%
		ABC1	280	283	127
			8.1%	14.0%	9.6%
		C2DE	198	205	90
			8.2%	13.8%	8.9%
		All	490	497***	224***

			8.1%	13.8%	9.4%
Quality	Worse	ABC1	187	129	53
			5.4%	6.4%	4.0%
		C2DE	156	96	53
			6.5%	6.5%	5.3%
		All	355	231	110
			5.9%	6.4%	4.6%
Value	Worse	ABC1	1461	997	625
			42.0%	49.3%	47.1%
		C2DE	992	720	459
			41.0%	48.4%	45.5%
		All	2529	1771***	1108***
			41.7%	49.1%	46.3%
Harm	Higher	ABC1	92	46	28
compared to a			2.6%	2.3%	2.1%
year ago		C2DE	65	43	23
			2.7%	2.9%	2.3%
		All	164	92	53
			2.7%	2.6%	2.2%
Usual brand a	No different	ABC1	2104	1247	769
little more/less			63.0%	65.5%	62.0%
harmful than		C2DE	1506	932	625
other brands			65.3%	67.1%	66.9%
		All	3711	2232	1431
			63.9%	65.9%	64.2%
Some brands	Strongly	ABC1	363	243	127
contain more	disagree/disagree		10.1%	11.9%	9.5%

harmful substances		C2DE	245	145	95
			9.9%	9.7%	9.3%
		All	632	401*	227
			10.1%	11.1%	9.4%

*** p<0.001, ** p<0.01, * p<0.05. Adjusted for baseline values: age group, gender, education, HSI score, household income and ethnicity

Table 4: Association between change in warning salience, appeal and harm, and planning to quit, quit attempts and quitting

Change between W1-W2	% change	Planning to quit W2		Quit attempts W2		Quitting W3	
		OR (95% CI)		OR (95% CI)		OR (95% CI)	
		unadjusted	adjusted ^a	unadjusted	adjusted ^b	unadjusted	adjusted
Warning - most salient	32.6%	2.05 (1.73-2.43)*	1.66 (1.33-2.09)*	1.35 (1.17-1.56)*	1.23 (1.04-1.46)*	1.23 (1.02-1.49)*	1.14 (0.94-1.39)
Composite appeal – less	34.7%	1.10 (1.05-1.16)*	1.10 (1.03-1.18)*	1.06 (1.01-1.12)*	1.06 (1.00-1.12)*	1.03 (0.95-1.12)	1.04 (0.95-1.13)
Taste – worse	9.5%	1.17 (0.97-1.40)	1.00 (0.78-1.28)	1.16 (0.97-1.38)	1.17 (0.96-1.43)	0.93 (0.69-1.26)	0.94 (0.70-1.27)
Satisfying – less	7.9%	1.16 (0.95-1.42)	1.14 (0.87-1.50)	1.26 (1.04-1.53)*	1.31 (1.06-1.62)*	1.07 (0.77-1.49)	1.06 (0.76-1.48)
Appeal – less	13.9%	1.29 (1.09-1.53)*	1.40 (1.10-1.77)*	1.15 (0.98-1.35)	1.19 (0.99-1.42)	1.07 (0.82-1.41)	1.07 (0.81-1.40)
Quality – worse	9.5%	1.16 (0.97-1.40)	1.18 (0.92-1.51)	0.96 (0.81-1.15)	0.96 (0.78-1.17)	1.03 (0.76-1.41)	1.05 (0.77-1.43)

Value – worse	26.2%	1.13 (1.03-1.25)*	1.13 (0.99-1.29)	1.11 (1.01-1.21)*	1.09 (0.98-1.21)	1.01 (0.87-1.19)	1.02 (0.87-1.19)
Harm compared to a year ago – more harmful	2.1%	2.31 (1.26-4.24)*	1.76 (0.83-3.74)	3.30 (2.07-5.27)*	2.58 (1.49-4.45)*	1.29 (0.60-2.79)	1.36 (0.62-2.99)
Usual brand a little more / less harmful than other brands – no different	7.9%	1.83 (1.24-2.70)	1.41 (0.86-2.32)	1.07 (0.78-1.49)	0.86 (0.60-1.23)	1.15 (0.67-1.97)	1.11 (0.64-1.93)
Some brands contain more harmful substances – disagree/strongly disagree	7.9%	1.19 (0.89-1.59)	1.00 (0.68-1.47)	1.15 (0.89-1.50)	1.00 (0.74-1.35)	1.45 (1.06-1.96)*	1.41 (1.03-1.93)*

*p<0.05 Each of the 30 separate adjusted GEE analyses presented above were adjusted for baseline values of age group, gender, ethnicity, social grade, household income, HSI score and education.

^a Adjusted analysis of planning to quit at W2 was adjusted for planning to quit at W1.

^b Adjusted analysis of quit attempts at W2 was adjusted for quit attempts at W1.

Table 5: Change in composite score, warning salience, appeal and harm and planning to quit, quit attempts and quitting for those who smoked the same brand at W1 and W2

Change between W1-W2	% change	Planning to quit W2 OR (95% CI)	Quit attempts W2 OR (95% CI)	Quitting W3 OR (95% CI)
Warning - most salient	32.3%	1.83 (1.36-2.47)*	1.36 (1.09-1.71)*	1.24 (0.90-1.70)
Composite appeal - less	34.0%	1.20 (1.08-1.33)*	1.03 (0.95-1.12)	1.02 (0.89-1.16)
Taste - worse	7.4%	0.91 (0.62-1.34)	1.07 (0.79-1.45)	0.90 (0.55-1.46)
Satisfying - less	6.7%	1.40 (0.94-2.09)	1.43 (1.05-1.94)*	1.27 (0.80-2.00)
Appeal - less	13.5%	1.83 (1.30-2.58)*	1.17 (0.91-1.50)	1.08 (0.74-1.57)
Quality - worse	7.8%	1.30 (0.90-1.87)	0.91 (0.68-1.21)	0.82 (0.52-1.31)
Value - worse	25.2%	1.32 (1.09-1.60)*	1.06 (0.91-1.24)	0.99 (0.78-1.26)
Harm compared to a year ago – more harmful	1.4%	3.15 (0.83-11.97)	3.37 (1.40-8.10)*	0.52 (0.18-1.48)
Usual brand a little more / less harmful than other brands – no different	6.9%	1.75 (0.85-3.58)	0.76 (0.46-1.27)	0.66 (0.29-1.52)
Some brands contain more harmful substances – disagree/strongly disagree	11.8%	1.48 (0.86-2.57)	0.92 (0.61-1.40)	1.04 (0.58-1.86)

* p<0.05

Each of the 30 separate GEE analyses presented were adjusted for baseline values of age group, gender, ethnicity, social grade, household income, HSI score and education.