Socioeconomically disadvantaged smokers' ratings of plain and branded cigarette packaging: An experimental study

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Socioeconomically disadvantaged smokers' ratings of plain and branded cigarette packaging: An experimental study

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ABSTRACT

Objectives: This study aimed to test the impact of plain packaging for cigarettes on brand appeal among highly socioeconomically disadvantaged smokers using the new design for cigarettes implemented in Australia, which combines plain packaging with larger health warning labels.

Design: A 2x2 factorial design trial embedded within a cross-sectional computer touchscreen survey. Data was collected between March and December 2012.

Setting: Socially disadvantaged welfare aid recipients were recruited through a large Social and Community Service Organisation in NSW, Australia.

Participants: N=354 smokers. The majority of the sample had not completed high school (64%), earned less than AUD$300/week (55%) and received their income from Government payments (95%).

Interventions: Participants were randomised to one of four different pack conditions determined by brand name: Winfield versus Benson & Hedges, and packaging type: branded versus plain. Participants were required to rate their assigned pack on measures of brand appeal and purchase intentions.

Results: Plain packaging was associated with significantly reduced smoker ratings of 'positive pack characteristics' ($p < 0.001$), 'positive smoker characteristics' ($p = 0.003$), and 'positive taste characteristics' ($p = 0.033$) in the Winfield brand name condition only. Across the four pack conditions, no main differences were found for 'negative smoker characteristic' ($p = 0.427$) or 'negative harm characteristics' ($p = 0.411$). In comparison to branded packaging, the presentation of plain packaging was associated with lower odds of smokers' purchase intentions (OR = 2.18, 95%CI = 1.34, 3.54; $p = 0.002$).

Conclusions: Plain packs stripped of branding elements, featuring larger health warning labels, were associated with reduced positive cigarette brand image and purchase intentions among highly socioeconomically disadvantaged smokers.

ARTICLE SUMMARY

Article focus

- Previous simulation studies have shown that plain packaging for cigarettes is associated with reduced perceptions of brand appeal and cessation intentions, however none have been conducted with socially disadvantaged smokers who have among the highest smoking rates.
- This study tested the Australian Government's new plain pack design for cigarettes which combines plain packaging with larger pictorial health warning labels.

Key messages

- This experimental simulation study found that plain packaging for cigarettes reduced positive brand appeal ratings and purchase intentions among socially disadvantaged smokers compared to branded cigarette packaging.
- In this study the plain pack condition tested the new design for plain cigarette packs in Australia, which combines plain packaging with larger health warning labels.
- The results of this study support the move toward plain packaging policies for cigarettes.

Strengths and limitations of this study

- This study is the first to obtain a large sample of socially disadvantaged smokers' responses to a simulation of a one-off exposure to an important tobacco control policy development.
- Use of a convenience sample limits the external validity and generalizability of the results.
- Use of a wider range of brands for comparison is recommended for research in countries considering implementing plain packaging.

INTRODUCTION

Smoking rates are disproportionately high among groups who experience multiple levels of disadvantage such as those with low income (26%),[1] Indigenous populations (50%),[2] the homeless (69% – 73%)[3, 4] and individuals with a mental illness (35% – 90%).[5-7] Comparatively, the population smoking rate in Australia is 15%.[1] Therefore, evaluating tobacco control approaches for effectiveness with disadvantaged social groups is a priority.

Cigarette manufacturers use the cigarette pack to promote their product in a number of ways. The cigarette pack is highly visible to both the user and others,[8] and reinforces brand image.[9] Packaging distinguishes brands from competitors and communicates brand imagery, character and values.[9, 10] Pack design can also be used to target segments of the market. For example, packs targeting women typically use bright graphics and feminine colours, descriptor terms such as 'slim' and 'thin' and packaging with increased height and decreased width compared to standard packaging.[11] To engage the youth market, pack designs are novel, with fashionable designs and attractive imagery, have innovative pack construction (i.e. pack shape and method of opening), and promote 'mild' taste or 'smoothness'.[12] Economy packs that emphasise quality are important for targeting low-income smokers, and often use design elements such as price-marking (printing product price on packaging).[13] Packaging has been particularly important in markets such as Australia where stringent advertising restrictions have long prohibited traditional avenues of advertising and promotion of brand and product.

Design elements of the cigarette pack are constructed to capture starter smokers, encourage brand-switching and brand loyalty, and to expand market share.[9, 13] Packaging colours, product descriptors, brand imagery and logos have all been shown to impact on the perceptions and experiences of the product.[14] A colour code for tobacco products is well established: lighter packaging colours are perceived to contain a product that is less harmful to health. Numerous studies have shown that smokers associate the colour 'red' with high strength and harshness, 'blue' as being mild, and anything progressively lighter as healthier or less harmful.[15, 16]. Similarly, many countries have banned the use of descriptor terms such as 'light', 'mild' and 'low tar' as cigarettes labelled with these terms are falsely perceived as being less harmful to health, and easier to give up.[16] Replacement terms such as 'gold', 'silver' and 'smooth' were still perceived as less harmful than regular varieties, suggesting that removal of both colours and descriptor terms may be more effective than the

removal of either alone in reducing false beliefs about tobacco risk.[14] Health warning labels (HWLs) that use pictures, supportive text and take up larger portions of the pack space have been shown to increase the effectiveness of the warnings in communicating risk and promoting cessation.[17, 18] Specifically, in a cross-sectional survey in the US, Bansal-Travers *et al.*[17] found that participants selected larger, pictorial, and loss-framed HWLs as the most effective in communicating health risks.

Evidence from plain packaging simulation studies shows that progressively plainer cigarette packaging, incorporating larger HWLs and fewer branding elements, was perceived as less attractive,[19, 20] reduced false beliefs about tobacco risk[14, 17] and was associated with cessation intentions.[8, 20] Wakefield and colleagues have conducted a number of online simulation experiments, exposing participants to pack conditions which vary by brand, degree of plain packaging[19, 21] and HWL size.[20] The studies found that packs with progressively fewer branding elements were perceived as less appealing overall,[19] larger HWLs combined with plain packs reduced adolescents' positive ratings of packs,[21] and presentation of plain packs compared with branded packs increased participant intentions of not purchasing a pack.[20] Additionally, best-worst[8] and experimental auction[22] studies have found plain packs featuring large graphic HWLs were the most effective pack type in reducing demand and promoting cessation among adult smokers.

The Australian Government's *Tobacco Plain Packaging Act 2011*, legislated mandatory plain and standardised packaging on cigarettes sold in Australia which include dark colour, pictorial and supportive text HWLs that cover at least 75% front-of-pack and 90% back-of-pack, have all logos and branding removed, and use only specified font styles and sizes.[23] The legislation was introduced to reduce product appeal, increase the effectiveness of health warnings, and reduce misperceptions about the harms of smoking. Providing some early support, the first study to examine effects of plain packaging during the roll-out phase found that compared to smokers smoking from branded packs, smokers with plain packs were more likely to perceive their tobacco as being lower in both quality and satisfaction, to think about and prioritise quitting and to support the plain packaging policy.[24] While there is evidence of reduced appeal for plain packaging compared to branded packaging of tobacco products within the general population, it is important to investigate whether similar effects are likely to occur for groups experiencing social and financial hardship. The aim of this study was to examine brand appeal and purchase intentions associated with branded cigarette packs

compared to the new design Australian plain packs among a sample of socioeconomically disadvantaged smokers.

METHODS

Design

A two by two packaging type (branded versus plain) by brand name (Winfield versus Benson & Hedges (B&H)) factorial experimental design was used; randomly exposing participants to one out of a possible four cigarette pack conditions. Each participant completed a uniform series of pack ratings within the experimental condition they were assigned. Data were collected using a touchscreen computer between March and December 2012.

Setting & Sample

As the target population for the study was smokers with high social disadvantage, the sample was drawn from a service outlet of a large, national non-government, social and community service organisation (SCSO). The service provides 'emergency relief' welfare such as food vouchers, grocery items, and financial aid to individuals experiencing various forms of social and financial hardship in a large catchment area of Western Sydney, NSW. The client profile of SCSO's includes an over-representation of a number of disadvantaged groups including Aboriginal and Torres Strait Islanders, single parents, long-term unemployed, and those whose primary income is a government benefit.[25]

Those eligible to participate were clients aged over 18 years, able to comprehend English, and who were not too ill or distressed to take part (as judged by SCSO staff). Previous research has demonstrated high smoking prevalence rates of 60%-70% amongst SCSO clients.[26]

Recruitment Clients were introduced to the study when they attended the SCSO for their emergency relief appointment. SCSO staff explained that a touchscreen computer survey about smoking was being conducted and if clients were interested they were led to a private room where a Research Assistant (RA) provided further detailed information. The RA provided assistance to complete the survey if required. As the survey was anonymous, survey completion was taken as implied consent. Participants were reimbursed for their time with an AUD$20 grocery voucher.

Smoking status

Smoking status was assessed by asking "Do you currently smoke tobacco products?" with response options i) 'Yes, daily', ii) 'Yes, at least once a week', iii) Yes, but less often than once a week' and iv) 'No, not at all', followed by asking "Have you smoked at least 100 cigarettes or a similar amount of tobacco in your life" (yes/no/not sure). Those who reported to smoke daily, or who reported to smoke occasionally as well as having smoked at least 100 cigarettes in their life were classified as current smokers. Once smoking status was assessed non-smokers exited from the survey.

Figure 1 about here

Presentation of experimental conditions

The study was conducted on a Dell Latitude XT3 (2.50 GHz processor) touchscreen computer, using Digivey version 4 software.[27] Participants were randomly allocated to one of four cigarette pack conditions by Digivey's randomise function, which uses a pseudo random number generator provided by the underlying programming language (see: http://msdn.microsoft.com/en-us/library/system.random(v=vs.90).aspx). Branded pack conditions replicated cigarette packs available for purchase at the time of survey; plain pack conditions tested the new plain packaging design, combining plain packaging stripped of branding elements with larger HWLs. The four pack conditions were: a) Branded Winfield Blue 25; b) Plain Winfield Blue 25; c) Branded B&H Smooth 25, and; d) Plain B&H Smooth 25, see Figure 1. Within each pack condition, respondents were presented with a standard set of items to rate their assigned pack. All pack conditions featured the same HWL: 'Smoking causes peripheral vascular disease'. The brands used were two of the most popular brand variants in Australia: Winfield (Blue 25) and B&H (Smooth 25).[28] Plain pack digital images were created using specifications outlined in the Australian Government's *Tobacco Plain Packaging Act 2011*, while images of branded packs were supplied by the Centre for Behavioural Research in Cancer, Victoria, Australia.

Outcome measures

Brand appeal

While viewing the assigned pack image, respondents were asked to rate packs on various pack, smoker and taste characteristic statements, see Table 1. These items were developed by

Wakefield and colleagues[19-21] based on past tobacco industry packaging studies used to assess pack attractiveness, brand imagery characteristics and perceived sensory attributes. Among adult smokers, these items have variably been used as: individual outcome items;[19] or combined to form four outcome scales and one individual item with inter-item reliability statistics presented.[20]

Table 1 about here

Purchase intentions

Participants were presented with images of the two brand name options (Winfield and B&H) on a single screen and asked: "If you ran out of cigarettes and only the packs below were available in the store you went to, which would you be most tempted to buy?" Participants could choose between the two brand name images or select 'I would not buy any'. Participants who had previously viewed and rated a plain packaging image (i.e. Pack B or D; see Figure 1) received plain image response options, and those who had previously rated a branded packaging image (i.e. Pack A or C) received branded image response options at this question.

Socio-demographic variables

Gender, age, income, income source, Aboriginal or Torres Strait Islander status, marital status, highest level of education and housing type were assessed.

Statistical Analyses

Analyses were conducted using Stata v11 (www.stata.com). Characteristics of participants are presented by intervention group to assess the success of the randomisation.

Instrument evaluation

Brand appeal rating items were combined to form four scales and one stand-alone item in order to replicate the outcome measure structure of Wakefield *et al.*'s previous plain packaging study.[20] The outcome measures were: (1) positive pack characteristics - 'popular among smokers'; 'attractive'; 'sophisticated'; 'a brand you might try/smoke'; (2) positive smoker characteristics – 'trendy' and 'successful'; (3) negative smoker characteristic – 'boring'; (4) positive taste characteristics – 'enjoyable to smoke' and 'satisfying in taste'; and

(5) negative harm characteristics – 'high in tar and nicotine' and 'harmful to your health'. Although these measures have shown strong to moderate internal consistency on Cronbach's alpha previously,[20] they have not been tested in the current population, thus we undertook Cronbach's alpha assessment on scales with more than one item.

Outcome measure assessment

As the outcome variables were not normally distributed we used non-parametric methods for analysis. Median scores with 95% confidence intervals are presented graphically for each of the four pack conditions. Exploratory data analysis indicated that there may be a potential pack type by brand name interaction, i.e. the relationship between packaging types (branded versus plain packaging) differed for the two different cigarette brand names. As the study had limited statistical power to assess interaction effects, we did not formally test this, but undertook analysis considering the four pack conditions separately, rather than as a factorial design. The Kruskal-Wallis test was used as a global assessment of differences in factor scores among the four pack conditions. If the *p*-value for this test was <0.1, pairwise comparisons using the Wilcoxon rank sum test were undertaken to compare median scores between branded packaging and plain packaging for each of the two brand names. Odds ratio analyses were used to assess the effect of packaging type (branded versus plain) on purchase intention.

Sample size for this study was determined by requirements for another trial for which participants were recruited. Post hoc power calculations demonstrated that a sample of 350 participants (approximately 85 in each of the pack type by brand name groups) would allow detection of differences in scores between branded and plain packaging (within each brand name) of approximately half a standard deviation, with 5% significance level and 90% power (to allow for some loss of power due to the use of non-parametric analyses).

RESULTS

Sample

A total of 787 clients were approached by SCSO staff during the study period and 608 were eligible to be approached to participate by the RA. Of those, 581 (96%) completed the survey and 362 (62%) of these were identified as current smokers (daily and occasional). Eight smokers were excluded as they primarily used something other than manufactured or roll-your-own tobacco. The demographic details of the study participants in each intervention

group are presented in Table 2. The majority of the sample had not finished high school (64%), earned less than AUD$300/week (55%) and received their income from Government benefit payments (95%). Socio-demographic characteristics were similar across the four intervention groups.

Table 2 about here

Brand Appeal Ratings

Scale reliability assessments revealed the outcome measures had moderate to strong internal consistency: positive pack characteristics (α = .83); positive smoker characteristics (α = .71); positive taste (α = .84), and; negative harm characteristics (α = .65).

Figure 2 about here

Figure 2 displays ratings across the four pack conditions on the positive pack (2a), positive smoker (2b), negative smoker (2c), positive taste (2d), and negative harm (2e) response scales. The positive pack scale varied significantly across the pack conditions ($p = 0.001$), with pairwise comparisons revealing that branded packaging images were rated significantly more positively than plain packaging images in the Winfield condition ($p < 0.001$), however there was no difference in the B&H condition ($p = 0.102$), see Table 3. Positive smoker characteristic ratings were significantly different across the four pack conditions ($p = 0.003$); branded packaging images were rated more positively than plain packaging images within the Winfield condition ($p = 0.001$), but not the B&H brand name condition ($p = 0.197$), see Table 3. There was no difference in the negative smoker characteristic ratings across the four pack conditions ($p = 0.427$). The four pack conditions were rated significantly differently when assessing positive taste characteristics ($p = 0.033$). Pairwise comparisons revealed plain packaging images were less appealing on taste attributes than branded packaging images for the Winfield condition ($p = 0.004$), however there were no differences detected in taste ratings between plain and branded packaging images in the B&H condition. The four pack conditions rated similarly in regards to negative harm characteristics ($p = 0.411$) as shown in Figure 2e and Table 3.

Table 3 about here

Purchase Intent

Participants were asked to choose which pack, if any, they would prefer to purchase out of the two brand names used in this study. Participants who viewed plain packaging images only were more likely to select that they would not buy any of the presented options (35%), compared to those who viewed branded packaging images (19%) [OR = 2.2, 95%CI = 1.3, 3.5; $p = 0.002$].

DISCUSSION

This study found that plain cigarette packs were rated as significantly less appealing than branded packs in a sample of socioeconomically disadvantaged smokers. Branded packaging was viewed as more appealing, smokers of these packs were rated in a more positive way, and the cigarette taste was preferred compared to cigarettes in plain packaging. No differences between branded and plain packaging relating to negative smoker or negative harm characteristics were detected. Finally, plain packaging reduced cigarette purchase intentions in comparison to branded packaging among smokers. The overall results of this study are supportive of previous plain packaging simulation research conducted with general population samples suggesting that plain packs are viewed less favourably on measures of brand appeal than branded packs.[19, 20]

One unexpected finding of this research was a possible interaction effect between packaging type (branded versus plain) and brand name (Winfield versus B&H). Plain pack images were rated consistently lower than branded images on measures of positive pack, positive smoker and positive taste appeal for the Winfield condition, but no differences were detected for the B&H condition. This sample of smokers may have less experience with the B&H brand, positioned as a 'premium' brand in Australia with a higher recommended retail price than the Winfield brand, which is considered a 'mainstream' brand offering value for money.[29] While 19% of the sample reported regularly using the Winfield brand only 1.6% reported regularly using B&H cigarettes, compared to 19% and 9%, respectively, in the general population.[28] It could be interpreted that the effect of plain packaging may be stronger for personally relevant brands, or brands within market segmentations relevant to the smoker.

Similarly to Wakefield *et al.'s* previous simulation studies, this study found no difference between plain and branded cigarette packaging on negative harm ratings. This may indicate

that the removal of branding elements such as colours, logos, and fonts on packs is more effective in reducing brand appeal associations rather than tapping into negative harm perceptions. It is also likely that the measures used in this study, intended to assess brand appeal, were not adequate to assess negative harm perceptions related to packaging. There are, however, other simulation studies that indicate plain packaging reduces false beliefs about smoking[14] and increases cessation intentions.[8] Our study also found that the presentation of plain packaging, compared to branded packaging, reduced purchase intentions among socioeconomically disadvantaged smokers, consistent with previous simulations conducted with general population smokers.[20, 22]

Implications

The results of this study support the move toward plain packaging policies for cigarettes. Most research used in the development of plain packaging policies was conducted with general population samples, with limited data to indicate how socioeconomically disadvantaged groups, who have among the highest smoking rates, may respond to this tobacco control policy. The current study indicates that socioeconomically disadvantaged smokers are likely to respond similarly to the general population, with plain packaging reducing brand appeal ratings and purchase intentions among these smokers. Further research, particularly in low-income countries could provide insight about the possibility of disseminating this policy internationally.

Early research in Australia indicates plain packaging makes tobacco less appealing and increases the urgency to quit smoking,[24] however it will be important to monitor impact over time. Plain packaging policies have the potential to reduce smoking initiation. Associations with brand identity and appeal are motivating factors in smoking uptake among youth.[30, 31] There are documented cases of cigarette rebranding, for example the development of the Camel 'Smooth Character', to appeal to young adult smokers with the explicit intentions of increasing market share and prevalence of smoking among youth.[32] Plain packaging policies prevent this kind of brand targeting and have the potential to reduce uptake among youth by reducing brand appeal and purchase intentions. It will also be important to assess the use of any avoidance strategies, such as pack stickers and cigarette cases, and to monitor whether these are temporary solutions, or whether on-going changes to policy are required.

Strengths and Limitations

The primary limitation of the study is its reliance on a convenience sample limiting its external validity and generalizability. However, socially disadvantaged groups are notoriously difficult to recruit and retain in health research.[33, 34] Recruitment challenges were overcome by accessing community services as recruitment sites and using convenience samples. As a result, this study is the first to obtain a large sample of socially disadvantaged smokers' responses to a simulation of a one-off exposure to an important tobacco control policy development. Since the policy has been implemented, socially disadvantaged smokers' day-to-day experience is one of being exposed to these plain packs multiple times a day, and so the findings from this study may underestimate the real world effects of this change. This study was also limited by the use of only two cigarette brands for comparison. Use of a wider range of brands for comparison is recommended for research in countries considering implementing plain packaging.

As this study tested the Australian Government's new plain pack design, which combines plain packaging with larger HWLs, we were unable to distinguish which factor (plain packaging or larger HWLs) produced the observed results. Previously, Wakefield *et al*.[20] examined the importance of branding versus HWL size on cigarette packaging, concluding that plain packaging reduced elements of brand appeal far more than increasing the size of HWLs. In their study, when packs were plain, increasing the size of HWLs above 30% did not reduce brand appeal further. This finding suggests that the effects observed in the current study are more likely due to stripping the pack of branding elements, than increasing the HWL size.

Conclusions

The findings of this study support plain packaging policy, and show this strategy has the potential to reduce positive associations with cigarette packs among a group of highly socioeconomically disadvantaged smokers. It will be important to monitor the long-term outcomes of plain packaging policy, particularly with regards to uptake of smoking in disadvantaged groups. Further plain pack research in low-income countries is recommended, to support the potential dissemination of the policy internationally.

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COMPETING INTERESTS

None to declare.

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ETHICS APPROVAL

University of Newcastle's Human Research Ethics Committee.

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Table 1. Standard items used to assess responses to pack images.

Survey items	Response scale
Pack characteristics: *How well do you think the following phrases relate to the cigarette pack shown?* This pack is popular among smokers This pack is attractive This pack is sophisticated This pack is a brand you might try/smoke	Visual analogue scale: 1 (not at all) to 7 (extremely)
Smoker characteristics: *How well do you think the following characteristics describe a typical smoker of the pack shown?* A typical smoker of this pack is trendy A typical smoker of this pack is boring A typical smoker of this pack is successful	Visual analogue scale: 1 (not at all) to 7 (extremely)
Taste attributes: *Please rate the following phrases describing the taste of cigarettes from the pack shown.* I would expect the cigarettes in this pack to be enjoyable to smoke I would expect the cigarettes in this pack to be high in tar and nicotine I would expect the cigarettes in this pack to be satisfying in taste I would expect the cigarettes in this pack to be harmful to your health	Visual analogue scale: 1 (not at all) to 7 (extremely)

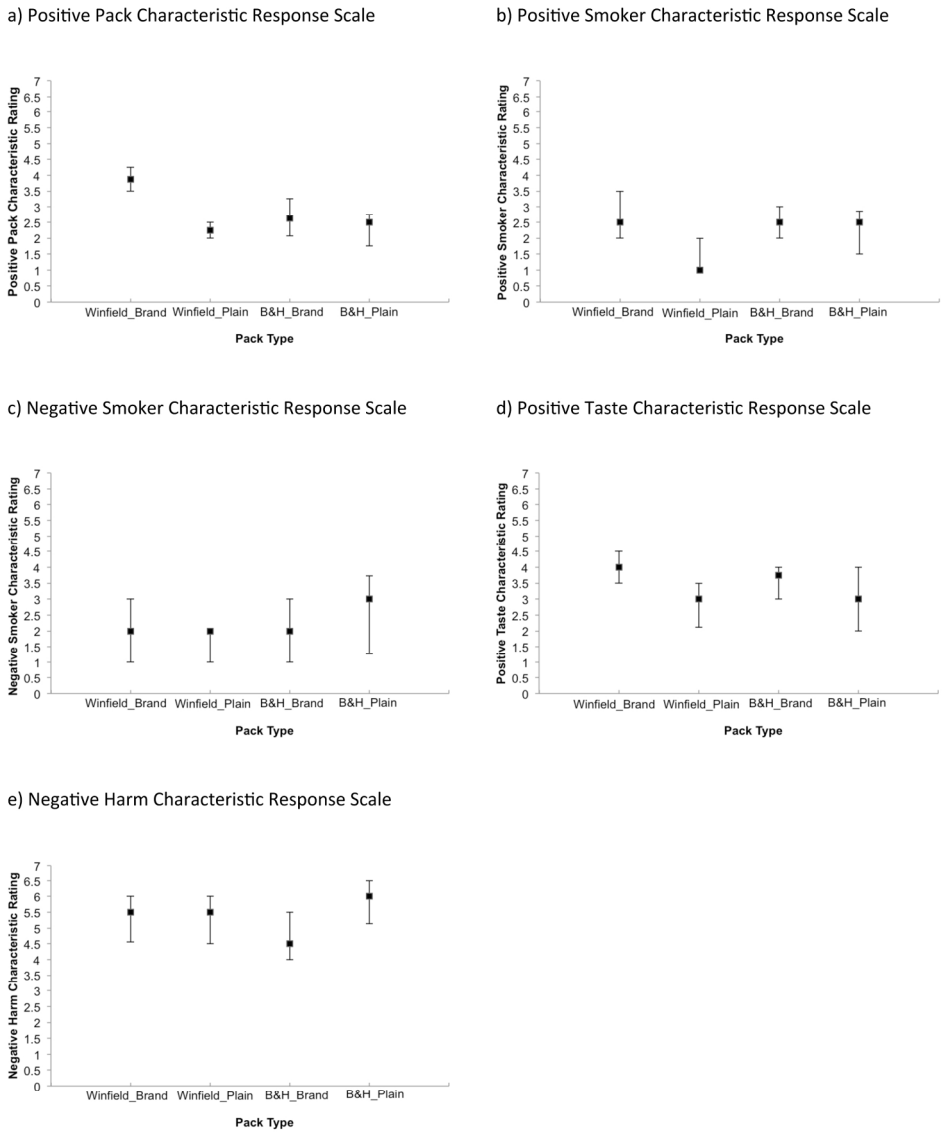
Table 2. Demographic characteristics of the survey sample ($N = 354$).

Characteristic	Winfield Branded N (%)	Winfield Plain N (%)	B&H Branded N (%)	B&H Plain N (%)	Total N (%)
N	92 (26)	95 (27)	88 (25)	79 (22)	354
Age					
18 – 39	56 (61)	51 (54)	51 (58)	48 (61)	206 (58)
40+	36 (39)	44 (46)	37 (42)	31 (39)	148 (42)
Gender					
Female	61 (66)	46 (52)	66 (70)	43 (54)	216 (61)
Aboriginal and/or Torres Strait Islander					
Yes	23 (25)	14 (16)	17 (18)	10 (13)	64 (18)
Marital Status					
Married / De facto / Living with partner	29 (32)	15 (17)	23 (24)	20 (25)	87 (25)
Separated / Divorced	27 (29)	29 (33)	27 (28)	20 (25)	103 (29)
Never married / Single / Widowed	36 (39)	44 (50)	45 (47)	39 (49)	164 (46)
Highest Education					
Primary school	0 (0)	4 (5)	4 (4)	4 (5)	12 (3.4)
High school years 7-10	62 (67)	54 (61)	59 (62)	39 (49)	214 (61)
High school years 11-12	11 (12)	13 (15)	13 (14)	14 (18)	51 (14)
TAFE / trade qualification	14 (16)	13 (15)	16 (17)	21 (27)	64 (18)
University degree	5 (5)	4 (5)	3 (3)	1 (1)	13 (3.7)
Personal Weekly Income					
<$299	54 (59)	55 (58)	48 (56)	38 (48)	195 (55)
>$300	36 (39)	33 (35)	31 (35)	37 (47)	137 (39)
Prefer not to answer	2 (2)	7 (7)	9 (10)	4 (5)	22 (6)
Income source					
Paid work	6 (7)	2 (2)	4 (4)	1 (1)	13 (3.7)
Government payment (Centrelink)	85 (92)	85 (97)	89 (94)	76 (96)	335 (95)
Other	1 (1)	1 (1)	2 (2)	2 (3)	6 (1.7)
Housing type					
Own house/private rental	26 (28)	31 (33)	28 (32)	23 (29)	108 (31)
Government rental	55 (60)	42 (44)	44 (50)	43 (54)	184 (52)
Homeless/Supported accommodation	11 (12)	22 (23)	16 (18)	13 (17)	62 (18)
Regular cigarette brand					
Winfield	10 (17)	16 (21)	14 (24)	10 (18)	50 (20)
Benson & Hedges	1 (1.7)	1 (1.3)	2 (3.5)	0 (0)	4 (1.6)
Other	36 (62)	50 (65)	34 (59)	36 (66)	156 (63)
I don't have a regular brand	11 (19)	10 (13)	8 (14)	9 (16)	38 (15)

Table 3. Effect of pack condition on brand appeal ratings ($N = 354$).

	Pack Condition						
	Winfield_Branded	*Winfield_Plain*	*B&H_Branded*	*B&H_Plain*	*Global test*	*Pairwise*	
						Winfield (branded v plain)	*Benson&Hedges (branded v plain)*
	(n = 92) Median (95%CI)	*(n = 95) Median (95%CI)*	*(n = 88) Median (95%CI)*	*(n = 79) Median (95%CI)*	*P*	*P*	*P*
Positive pack	3.86 (3.5 – 4.25)	2.25 (2 – 2.5)	2.63 (2.07 – 3.25)	2.5 (1.75 – 2.75)	<0.001	<0.001	0.102
Positive smoker	2.5 (2 – 3.5)	1 (1 – 2)	2.5 (2 – 3)	2.5 (1.5 – 2.87)	0.003	0.001	0.197
Negative smoker (boring)	2 (1 – 3)	2 (1 – 2)	2 (1 – 3)	3 (1.27 – 3.73)	0.427	n/a	n/a
Positive taste	4 (3.5 – 4.5)	3 (2.11 – 3.5)	3.75 (3 – 4)	3 (2 – 4)	0.033	0.004	0.804
Negative harm	5.5 (4.55 – 6)	5.5 (4.5 – 6)	4.5 (4 – 5.5)	6 (5.14 – 6.5)	0.411	n/a	n/a

Figure 1. Pack image used for each pack condition within the two by two packaging type (branded versus plain) by brand name (Winfield versus Benson & Hedges) between-subject experimental design.
150x183mm (300 x 300 DPI)



*B&H refers to the Benson & Hedges brand name condition.

Figure 2. Median ratings with 95%CI for each response scale by pack condition (N = 354).
173x212mm (300 x 300 DPI)

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Yes
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Yes
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Yes
Objectives	3	State specific objectives, including any prespecified hypotheses	Yes
Methods			
Study design	4	Present key elements of study design early in the paper	Yes
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Yes
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Yes
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Yes
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Yes
Bias	9	Describe any efforts to address potential sources of bias	Yes
Study size	10	Explain how the study size was arrived at	Yes
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Yes
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Yes
		(*b*) Describe any methods used to examine subgroups and interactions	NA
		(*c*) Explain how missing data were addressed	NA
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	NA
		(*e*) Describe any sensitivity analyses	NA
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Yes
		(b) Give reasons for non-participation at each stage	Yes
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Yes
		(b) Indicate number of participants with missing data for each variable of interest	NA
Outcome data	15*	Report numbers of outcome events or summary measures	Yes
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for	NA

		a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	Yes
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Yes
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Yes
Generalisability	21	Discuss the generalisability (external validity) of the study results	Yes
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Yes

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

Socioeconomically disadvantaged smokers' ratings of plain and branded cigarette packaging: An experimental study

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Socioeconomically disadvantaged smokers' ratings of plain and branded cigarette packaging: An experimental study

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Running head: Disadvantaged smokers and plain packaging

Keywords: social disadvantage; plain packaging; tobacco

Word Count: 3500

ABSTRACT

Objectives: This study aimed to test the potential impact of plain packaging for cigarettes on brand appeal among highly socioeconomically disadvantaged smokers using the new design for cigarettes implemented in Australia, which combines plain packaging with larger health warning labels.

Design: A 2x2 factorial design trial embedded within a cross-sectional computer touchscreen survey. Data was collected between March and December 2012.

Setting: Socially disadvantaged welfare aid recipients were recruited through a large Social and Community Service Organisation in NSW, Australia.

Participants: N=354 smokers. The majority of the sample had not completed high school (64%), earned less than AUD$300/week (55%) and received their income from Government payments (95%).

Interventions: Participants were randomised to one of four different pack conditions determined by brand name: Winfield versus Benson & Hedges, and packaging type: branded versus plain. Participants were required to rate their assigned pack on measures of brand appeal and purchase intentions.

Results: Plain packaging was associated with significantly reduced smoker ratings of 'positive pack characteristics' ($p < 0.001$), 'positive smoker characteristics' ($p = 0.003$), and 'positive taste characteristics' ($p = 0.033$) in the Winfield brand name condition only. Across the four pack conditions, no main differences were found for 'negative smoker characteristic' ($p = 0.427$) or 'negative harm characteristics' ($p = 0.411$). In comparison to plain packaging, the presentation of branded packaging was associated with higher odds of smokers' purchase intentions (OR = 2.18, 95%CI = 1.34, 3.54; $p = 0.002$).

Conclusions: Plain packs stripped of branding elements, featuring larger health warning labels, were associated with reduced positive cigarette brand image and purchase intentions among highly socioeconomically disadvantaged smokers.

ARTICLE SUMMARY

Article focus

- Previous simulation studies have shown that plain packaging for cigarettes is associated with reduced perceptions of brand appeal, reduced demand and cessation intentions, however none have been conducted with socially disadvantaged smokers who have among the highest smoking rates.
- This study tested the Australian Government's new plain pack design for cigarettes which combines plain packaging with larger pictorial health warning labels.

Key messages

- This experimental simulation study found that plain packaging for cigarettes reduced positive brand appeal ratings and purchase intentions among socially disadvantaged smokers compared to branded cigarette packaging.
- In this study the plain pack condition tested the new design for plain cigarette packs in Australia, which combines plain packaging with larger health warning labels.
- The results of this study support the move toward plain packaging policies for cigarettes.

Strengths and limitations of this study

- This study is the first to obtain a large sample of socially disadvantaged smokers' responses to a simulation of a one-off exposure to an important tobacco control policy development.
- Use of a convenience sample limits the external validity and generalizability of the results.
- Use of a wider range of brands for comparison is recommended for research in countries considering implementing plain packaging.

INTRODUCTION

Smoking rates are disproportionately high among groups who experience multiple levels of disadvantage such as those with low income (26%),[1] Indigenous populations (50%),[2] the homeless (69% – 73%)[3, 4] and individuals with a mental illness (35% – 90%).[5-7] Comparatively, the population smoking rate in Australia is 15%.[1] Therefore, evaluating tobacco control approaches for effectiveness with disadvantaged social groups is a priority.

Cigarette manufacturers use the cigarette pack to promote their product in a number of ways. The cigarette pack is highly visible to both the user and others,[8] and reinforces brand image.[9] Packaging distinguishes brands from competitors and communicates brand imagery, character and values.[9, 10] Pack design can also be used to target segments of the market. For example, packs targeting women typically use bright graphics and feminine colours, descriptor terms such as 'slim' and 'thin' and packaging with increased height and decreased width compared to standard packaging.[11] To engage the youth market, pack designs are novel, with fashionable designs and attractive imagery, have innovative pack construction (i.e. pack shape and method of opening), and promote 'mild' taste or 'smoothness'.[12] Economy packs that emphasise quality are important for targeting low-income smokers, and often use design elements such as printing product price on packaging.[13] Packaging has been particularly important in markets such as Australia where stringent advertising restrictions have long prohibited traditional avenues of advertising and promotion of brand and product.

Design elements of the cigarette pack are constructed to capture starter smokers, encourage brand-switching and brand loyalty, and to expand market share.[9, 13] Packaging colours, product descriptors, brand imagery and logos have all been shown to impact on the perceptions and experiences of the product.[14] A colour code for tobacco products is well established: lighter packaging colours are perceived to contain a product that is less harmful to health. Numerous studies have shown that smokers associate the colour 'red' with high strength and harshness, 'blue' as being mild, and anything progressively lighter as healthier or less harmful.[15, 16]. Similarly, many countries have banned the use of descriptor terms such as 'light', 'mild' and 'low tar' as cigarettes labelled with these terms are falsely perceived as being less harmful to health, and easier to give up.[16] Replacement terms such as 'gold', 'silver' and 'smooth' were still perceived as less harmful than regular varieties, suggesting that removal of both colours and descriptor terms may be more effective than the

removal of either alone in reducing false beliefs about tobacco risk.[14] Health warning labels (HWLs) that use pictures, supportive text and take up larger portions of the pack space have been shown to increase the effectiveness of the warnings in communicating risk and promoting cessation.[17, 18] Specifically, in a cross-sectional survey in the US, Bansal-Travers *et al.*[17] found that participants selected larger, pictorial, and loss-framed HWLs as the most effective in communicating health risks.

Evidence from plain packaging simulation studies shows that progressively plainer cigarette packaging, incorporating larger HWLs and fewer branding elements, was perceived as less attractive,[19, 20] reduced false beliefs about tobacco risk[14, 17] and was associated with cessation intentions.[8, 20] Wakefield and colleagues have conducted a number of online simulation experiments, exposing participants to pack conditions which vary by brand, degree of plain packaging[19, 21] and HWL size.[20] The studies found that packs with progressively fewer branding elements were perceived as less appealing overall,[19] larger HWLs combined with plain packs reduced adolescents' positive ratings of packs,[21] and presentation of plain packs compared with branded packs increased participant intentions of not purchasing a pack.[20] However, none of these studies examined differences in effects by socioeconomic status (SES). Additionally, best-worst[8] and experimental auction[22] studies have found plain packs featuring large graphic HWLs were the most effective pack type in reducing demand and promoting cessation among adult smokers.

The Australian Government's *Tobacco Plain Packaging Act 2011*, legislated mandatory plain and standardised packaging on cigarettes sold in Australia which include dark colour, pictorial and supportive text HWLs that cover at least 75% front-of-pack and 90% back-of-pack, have all logos and branding removed, and use only specified font styles and sizes.[23] The policy also limits pack and stick dimensions. The legislation was introduced to reduce product appeal, increase the effectiveness of health warnings, and reduce misperceptions about the harms of smoking. The first study to examine effects of plain packaging during the roll-out phase using a computer-assisted telephone survey found that compared to smokers smoking from branded packs, smokers with plain packs were more likely to perceive their tobacco as being lower in both quality and satisfaction, to think about and prioritise quitting and to support the plain packaging policy.[24] However, this study had a low representation of disadvantaged smokers, did not examine effects by SES and did not control for novelty of HWL content. While there is evidence of reduced appeal for plain packaging compared to

branded packaging of tobacco products within the general population, it is important to investigate whether similar effects are likely to occur for groups experiencing social and financial hardship. The aim of this study was to examine brand appeal and purchase intentions associated with branded cigarette packs compared to the new design Australian plain packs among a sample of socioeconomically disadvantaged smokers.

METHODS

Design

A two by two packaging type (branded versus plain) by brand name (Winfield versus Benson & Hedges (B&H)) factorial experimental design was used; randomly exposing participants to one out of a possible four cigarette pack conditions. Each participant completed a uniform series of pack ratings within the experimental condition they were assigned. Data were collected using a touchscreen computer between March and December 2012.

Setting & Sample

As the target population for the study was smokers with high social disadvantage, the sample was drawn from a service outlet of a large, national non-government, social and community service organisation (SCSO). The service provides 'emergency relief' welfare such as food vouchers, grocery items, and financial aid to individuals experiencing various forms of social and financial hardship in a large catchment area of Western Sydney, NSW. The client profile of SCSO's includes an over-representation of disadvantaged groups including Aboriginal and Torres Strait Islanders, single parents, long-term unemployed, and those whose primary income is a government benefit.[25]

Those eligible to participate were clients aged over 18 years, able to comprehend English, and who were not too ill or distressed to take part (as judged by SCSO staff). Previous research has demonstrated high smoking prevalence rates of 60%-70% amongst SCSO clients.[26]

Recruitment

Clients were introduced to the study when they attended the SCSO for their emergency relief appointment. SCSO staff explained that a touchscreen computer survey about smoking was being conducted and if clients were interested they were led to a private room where a Research Assistant (RA) provided further detailed information. The RA provided assistance

to complete the survey if required. As the survey was anonymous, survey completion was taken as implied consent. Participants were reimbursed for their time with an AUD$20 grocery voucher.

Smoking status

Smoking status was assessed by asking "Do you currently smoke tobacco products?" with response options i) 'Yes, daily', ii) 'Yes, at least once a week', iii) Yes, but less often than once a week' and iv) 'No, not at all', followed by asking "Have you smoked at least 100 cigarettes or a similar amount of tobacco in your life" (yes/no/not sure). Those who reported to smoke daily, or who reported to smoke occasionally as well as having smoked at least 100 cigarettes in their life were classified as current smokers. Once smoking status was assessed non-smokers exited from the survey.

Figure 1 about here

Presentation of experimental conditions

The study was conducted on a Dell Latitude XT3 (2.50 GHz processor) touchscreen computer, using Digivey version 4 software.[27] Participants were randomly allocated to one of four cigarette pack conditions by Digivey's randomise function, which uses a pseudo random number generator provided by the underlying programming language (see: http://msdn.microsoft.com/en-us/library/system.random(v=vs.90).aspx). Branded pack conditions replicated cigarette packs available for purchase at the time of survey; plain pack conditions tested the new plain packaging design, combining plain packaging stripped of branding elements with larger HWLs. The four pack conditions were: a) Branded Winfield Blue 25; b) Plain Winfield Blue 25; c) Branded B&H Smooth 25, and; d) Plain B&H Smooth 25, see Figure 1. Within each pack condition, respondents were presented with a standard set of items to rate their assigned pack. All pack conditions featured the same graphic image and text HWL: 'Smoking causes peripheral vascular disease' that first appeared on Australian cigarette packs in 2006. The brands used were two of the most popular brand variants in the Australian mainstream (Winfield (Blue 25)) and premium (B&H (Smooth 25)) cigarette markets.[28] Plain pack digital images were created using specifications outlined in the Australian Government's *Tobacco Plain Packaging Act 2011*, while images of branded packs were supplied by the Centre for Behavioural Research in Cancer, Victoria, Australia.

Outcome measures

Brand appeal

While viewing the assigned pack image, respondents were asked to rate packs on various pack, smoker and taste characteristic statements, see Table 1. These items were developed by Wakefield and colleagues[19-21] based on past tobacco industry packaging studies used to assess pack attractiveness, brand imagery characteristics and perceived sensory attributes. Among adult smokers, these items have variably been used as: individual outcome items;[19] or combined to form four outcome scales and one individual item with inter-item reliability statistics presented.[20]

Brand appeal rating items were combined to form four scales and one stand-alone item in order to replicate the outcome measure structure of Wakefield *et al.*'s previous plain packaging study.[20] The outcome measures were: (1) positive pack characteristics - 'popular among smokers'; 'attractive'; 'sophisticated'; 'a brand you might try/smoke'; (2) positive smoker characteristics – 'trendy' and 'successful'; (3) negative smoker characteristic – 'boring'; (4) positive taste characteristics – 'enjoyable to smoke' and 'satisfying in taste'; and (5) negative harm characteristics – 'high in tar and nicotine' and 'harmful to your health'. Although these measures have shown strong to moderate internal consistency on Cronbach's alpha previously,[20] they have not been tested in the current population, thus we undertook Cronbach's alpha assessment on scales with more than one item.

Scale reliability assessments revealed the outcome measures had moderate to strong internal consistency: positive pack characteristics ($\alpha = .83$); positive smoker characteristics ($\alpha = .71$); positive taste ($\alpha = .84$), and; negative harm characteristics ($\alpha = .65$).

Table 1 about here

Purchase intentions

Participants were presented with images of the two brand name options (Winfield and B&H) on a single screen and asked: "If you ran out of cigarettes and only the packs below were available in the store you went to, which would you be most tempted to buy?" Participants could choose between the two brand name images or select 'I would not buy any'.

Participants who had previously viewed and rated a plain packaging image (i.e. Pack B or D; see Figure 1) received plain image response options, and those who had previously rated a branded packaging image (i.e. Pack A or C) received branded image response options at this question.

Socio-demographic variables

Gender, age, income, income source, Aboriginal or Torres Strait Islander status, marital status, highest level of education and housing type were assessed.

Statistical Analyses

Analyses were conducted using Stata v11 (www.stata.com). Characteristics of participants are presented by intervention group to assess the success of the randomisation.

Outcome measure assessment

As the outcome variables were not normally distributed we used non-parametric methods for analysis. Median scores with 95% confidence intervals are presented graphically for each of the four pack conditions. Exploratory data analysis indicated that there may be a potential pack type by brand name interaction, i.e. the relationship between packaging types (branded versus plain packaging) differed for the two different cigarette brand names. As the study had limited statistical power to assess interaction effects, we did not formally test this, but undertook analysis considering the four pack conditions separately, rather than as a factorial design. The Kruskal-Wallis test was used as a global assessment of differences in factor scores among the four pack conditions. If the *p*-value for this test was <0.1, pairwise comparisons using the Wilcoxon rank sum test were undertaken to compare median scores between branded packaging and plain packaging for each of the two brand names. Odds ratio analyses were used to assess the effect of packaging type (branded versus plain) on purchase intention.

Sample size for this study was determined by requirements for another trial for which participants were recruited. Post hoc power calculations demonstrated that a sample of 350 participants (approximately 85 in each of the pack type by brand name groups) would allow detection of differences in scores between branded and plain packaging (within each brand

name) of approximately half a standard deviation, with 5% significance level and 90% power (to allow for some loss of power due to the use of non-parametric analyses).

RESULTS

Sample

A total of 787 clients were approached by SCSO staff during the study period and 608 were eligible to be approached to participate by the RA. Of those, 581 (96%) completed the survey and 362 (62%) of these were identified as current smokers (daily and occasional). Eight smokers were excluded as they primarily used something other than manufactured or roll-your-own tobacco. The demographic details of the study participants in each intervention group are presented in Table 2. The majority of the sample had not finished high school (64%), earned less than AUD$300/week (55%) and received their income from Government benefit payments (95%). Socio-demographic characteristics were similar across the four intervention groups.

Table 2 about here

Brand Appeal Ratings

Figure 2 about here

Figure 2 displays ratings across the four pack conditions on the positive pack (2a), positive smoker (2b), negative smoker (2c), positive taste (2d), and negative harm (2e) response scales. The positive pack scale varied significantly across the pack conditions ($p = 0.001$), with pairwise comparisons revealing that branded packaging images were rated significantly more positively than plain packaging images in the Winfield condition ($p < 0.001$), however there was no difference in the B&H condition ($p = 0.102$), see Table 3. Positive smoker characteristic ratings were significantly different across the four pack conditions ($p = 0.003$); branded packaging images were rated more positively than plain packaging images within the Winfield condition ($p = 0.001$), but not the B&H brand name condition ($p = 0.197$), see Table 3. There was no difference in the negative smoker characteristic ratings across the four pack conditions ($p = 0.427$). The four pack conditions were rated significantly differently when

assessing positive taste characteristics ($p = 0.033$). Pairwise comparisons revealed plain packaging images were less appealing on taste attributes than branded packaging images for the Winfield condition ($p = 0.004$), however there were no differences detected in taste ratings between plain and branded packaging images in the B&H condition. The four pack conditions rated similarly in regards to negative harm characteristics ($p = 0.411$) as shown in Figure 2e and Table 3.

Table 3 about here

Purchase Intent

Participants were asked to choose which pack, if any, they would prefer to purchase out of the two brand names used in this study. Participants who viewed plain packaging images only were more likely to select that they would not buy any of the presented options (35%), compared to those who viewed branded packaging images (19%) [OR = 2.2, 95%CI = 1.3, 3.5; $p = 0.002$].

DISCUSSION

This study found that plain cigarette packs were rated as significantly less appealing than branded packs in a sample of socioeconomically disadvantaged smokers. Branded packaging was viewed as more appealing, smokers of these packs were rated in a more positive way, and the cigarette taste was preferred compared to cigarettes in plain packaging. No differences between branded and plain packaging relating to negative smoker or negative harm characteristics were detected. Finally, plain packaging reduced cigarette purchase intentions in comparison to branded packaging among smokers. The overall results of this study are supportive of previous plain packaging simulation research conducted with general population samples suggesting that plain packs are viewed less favourably on measures of brand appeal than branded packs.[19, 20]

One notable finding of this research, demonstrating the importance of branding in the tobacco market, was a possible interaction effect between packaging type (branded versus plain) and brand name (Winfield versus B&H). Plain pack images were rated consistently lower than branded images on measures of positive pack, positive smoker and positive taste appeal for the Winfield condition, but no differences were detected for the B&H condition. It might be

expected that plain packaging of B&H cigarettes is unlikely to have much effect among socially disadvantaged smokers as this brand is positioned as a premium product at a high price point,[29] with apparent low penetration among this smoker group: only 1.6% of participants reported regularly using B&H cigarettes compared to 9% in the general population.[28] Comparatively, engagement with the 'mainstream', value-for-money Winfield brand is much higher among socially disadvantaged smokers: participants reported regularly using this brand at the same rate as the general population (19%).[28] Plain packaging has the potential to show stronger effects for brands that are personally relevant to the individual smoker.

Similarly to Wakefield *et al.'s* previous simulation studies, this study found no difference between plain and branded cigarette packaging on negative harm ratings. This may indicate that the removal of branding elements such as colours, logos, and fonts on packs is more effective in reducing brand appeal associations rather than tapping into negative harm perceptions. It is also likely that the measures used in this study, intended to assess brand appeal, were not adequate to assess negative harm perceptions related to packaging. It may also be the case that effects on perceived harm are stronger among youth compared to adults, as previous simulation studies indicate plain packaging reduces false beliefs about smoking among adolescents[14] and increases cessation intentions among young adults.[8] Our study also found that the presentation of plain packaging, compared to branded packaging, reduced purchase intentions among socioeconomically disadvantaged smokers, consistent with previous simulations conducted with general population smokers.[20, 22]

Implications

The results of this study support the move toward plain packaging policies for cigarettes. Most research used in the development of plain packaging policies was conducted with general population samples, with limited data to indicate how socioeconomically disadvantaged groups, who have among the highest smoking rates, may respond to this tobacco control policy. The current study indicates that socioeconomically disadvantaged smokers are likely to respond similarly to the general population, with plain packaging reducing brand appeal ratings and purchase intentions among these smokers. Further research, particularly in low-income countries could provide insight about the possibility of disseminating this policy internationally.

Early research in Australia indicates plain packaging makes tobacco less appealing and increases the urgency to quit smoking,[24] however it will be important to monitor impact over time. Plain packaging policies have the potential to reduce smoking initiation. Associations with brand identity and appeal are motivating factors in smoking uptake among youth.[30, 31] There are documented cases of cigarette rebranding, for example the development of the Camel 'Smooth Character', to appeal to young adult smokers with the explicit intentions of increasing market share and prevalence of smoking among youth.[32] Plain packaging policies prevent this kind of brand targeting and have the potential to reduce uptake among youth by reducing brand appeal and purchase intentions. It will also be important to assess the use of any avoidance strategies, such as pack stickers and cigarette cases, and to monitor whether these are temporary solutions, or whether on-going changes to policy are required.

Strengths and Limitations

The primary limitation of the study is its reliance on a convenience sample limiting its external validity and generalizability. However, socially disadvantaged groups are notoriously difficult to recruit and retain in health research.[33, 34] Recruitment challenges were overcome by accessing community services as recruitment sites and using convenience samples. As a result, this study is the first to obtain a large sample of socially disadvantaged smokers' responses to a simulation of a one-off exposure to an important tobacco control policy development. Since the policy has been implemented, socially disadvantaged smokers' day-to-day experience is one of being exposed to these plain packs multiple times a day, and so the findings from this study may underestimate the real world effects of this change. This study was also limited by the measurement of purchase intentions rather than actual behaviour, the use of only two cigarette brands for comparison. Use of a wider range of brands for comparison is recommended for research in countries considering implementing plain packaging. Although the study employed a computer image instead of actual packs, previous packaging research demonstrates results are generally consistent regardless of stimulus presentation modality.[22, 35, 36] The outcome measures used in this study pose an additional limitation. Although they were selected for the purpose of comparing results with previous plain pack research,[19, 20] they have not been evaluated for validity or reliability and this should be assessed in the future.

As this study tested the Australian Government's new plain pack design, which combines plain packaging with larger HWLs, we were unable to distinguish which factor (plain packaging or larger HWLs) produced the observed results. Previously, Wakefield *et al*.[20] examined the importance of branding versus HWL size on cigarette packaging, concluding that plain packaging reduced elements of brand appeal far more than increasing the size of HWLs. In their study, when packs were plain, increasing the size of HWLs above 30% did not reduce brand appeal further. This finding suggests that the effects observed in the current study are more likely due to stripping the pack of branding elements, than increasing the HWL size. Finally, the last 2 – 3months of survey occurred during the policy roll-out phase and participants may have already been exposed to and purchased plain packs. Prior exposure may have allowed participants to become familiar with the new pack designs, and may explain why participants did not rate packs differently on negative harm and smoker measures.

Conclusions

The findings of this study support plain packaging policy, and show this strategy has the potential to reduce positive associations with cigarette packs among a group of highly socioeconomically disadvantaged smokers. It will be important to monitor the long-term outcomes of plain packaging policy, particularly with regards to uptake of smoking in disadvantaged groups. Further plain pack research in low-income countries is recommended, to support the potential dissemination of the policy internationally.

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CONTRIBUTORSHIP STATEMENT

All authors contributed to the concept development and design of the project. AG led data collection, analysis and manuscript write-up. BB, CP and CDE oversaw data collection. CDE and SD advised on, and CDE oversaw data analysis. All authors contributed to manuscript drafts and approved of the final manuscript.

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DATA SHARING STATEMENT

No additional data are available.

COMPETING INTERESTS

None to declare.

ETHICS APPROVAL

University of Newcastle's Human Research Ethics Committee.

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Table 1. Standard items used to assess responses to pack images.

Survey items	Response scale
Pack characteristics: *How well do you think the following phrases relate to the cigarette pack shown?* This pack is popular among smokers This pack is attractive This pack is sophisticated This pack is a brand you might try/smoke	Response scale: 1 (not at all) to 7 (extremely)
Smoker characteristics: *How well do you think the following characteristics describe a typical smoker of the pack shown?* A typical smoker of this pack is trendy A typical smoker of this pack is boring A typical smoker of this pack is successful	Response scale: 1 (not at all) to 7 (extremely)
Taste attributes: *Please rate the following phrases describing the taste of cigarettes from the pack shown.* I would expect the cigarettes in this pack to be enjoyable to smoke I would expect the cigarettes in this pack to be high in tar and nicotine I would expect the cigarettes in this pack to be satisfying in taste I would expect the cigarettes in this pack to be harmful to your health	Response scale: 1 (not at all) to 7 (extremely)

Table 2. Demographic characteristics of the survey sample ($N = 354$).

Characteristic	Winfield Branded N (%)	Winfield Plain N (%)	B&H Branded N (%)	B&H Plain N (%)	Total N (%)
N	92 (26)	95 (27)	88 (25)	79 (22)	354
Age					
18 – 39	56 (61)	51 (54)	51 (58)	48 (61)	206 (58)
40+	36 (39)	44 (46)	37 (42)	31 (39)	148 (42)
Gender					
Female	61 (66)	46 (52)	66 (70)	43 (54)	216 (61)
Aboriginal and/or Torres Strait Islander					
Yes	23 (25)	14 (16)	17 (18)	10 (13)	64 (18)
Marital Status					
Married / De facto / Living with partner	29 (32)	15 (17)	23 (24)	20 (25)	87 (25)
Separated / Divorced	27 (29)	29 (33)	27 (28)	20 (25)	103 (29)
Never married / Single / Widowed	36 (39)	44 (50)	45 (47)	39 (49)	164 (46)
Highest Education					
Primary school	0 (0)	4 (5)	4 (4)	4 (5)	12 (3.4)
High school years 7-10	62 (67)	54 (61)	59 (62)	39 (49)	214 (61)
High school years 11-12	11 (12)	13 (15)	13 (14)	14 (18)	51 (14)
TAFE / trade qualification	14 (16)	13 (15)	16 (17)	21 (27)	64 (18)
University degree	5 (5)	4 (5)	3 (3)	1 (1)	13 (3.7)
Personal Weekly Income					
<$299	54 (59)	55 (58)	48 (56)	38 (48)	195 (55)
>$300	36 (39)	33 (35)	31 (35)	37 (47)	137 (39)
Prefer not to answer	2 (2)	7 (7)	9 (10)	4 (5)	22 (6)
Income source					
Paid work	6 (7)	2 (2)	4 (4)	1 (1)	13 (3.7)
Government payment (Centrelink)	85 (92)	85 (97)	89 (94)	76 (96)	335 (95)
Other	1 (1)	1 (1)	2 (2)	2 (3)	6 (1.7)
Housing type					
Own house/private rental	26 (28)	31 (33)	28 (32)	23 (29)	108 (31)
Government rental	55 (60)	42 (44)	44 (50)	43 (54)	184 (52)
Homeless/Supported accommodation	11 (12)	22 (23)	16 (18)	13 (17)	62 (18)
Regular cigarette brand					
Winfield	10 (17)	16 (21)	14 (24)	10 (18)	50 (20)
Benson & Hedges	1 (1.7)	1 (1.3)	2 (3.5)	0 (0)	4 (1.6)
Other	36 (62)	50 (65)	34 (59)	36 (66)	156 (63)
I don't have a regular brand	11 (19)	10 (13)	8 (14)	9 (16)	38 (15)
Regular tobacco type					
Manufactured cigarettes	58 (63)	77 (81)	58 (66)	55 (70)	248 (70)
Roll-your-own tobacco	34 (37)	18 (19)	30 (34)	24 (30)	106 (30)

Table 3. Effect of pack condition on brand appeal ratings ($N = 354$).

	Pack Condition						
	Winfield_Branded	*Winfield_Plain*	*B&H_Branded*	*B&H_Plain*	*Global test*	*Pairwise*	
						Winfield (branded v plain)	*Benson&Hedges (branded v plain)*
	(n = 92) Median (95%CI)	*(n = 95) Median (95%CI)*	*(n = 88) Median (95%CI)*	*(n = 79) Median (95%CI)*	*P*	*P*	*P*
Positive pack	3.86 (3.5 – 4.25)	2.25 (2 – 2.5)	2.63 (2.07 – 3.25)	2.5 (1.75 – 2.75)	<0.001	<0.001	0.102
Positive smoker	2.5 (2 – 3.5)	1 (1 – 2)	2.5 (2 – 3)	2.5 (1.5 – 2.87)	0.003	0.001	0.197
Negative smoker (boring)	2 (1 – 3)	2 (1 – 2)	2 (1 – 3)	3 (1.27 – 3.73)	0.427	n/a	n/a
Positive taste	4 (3.5 – 4.5)	3 (2.11 – 3.5)	3.75 (3 – 4)	3 (2 – 4)	0.033	0.004	0.804
Negative harm	5.5 (4.55 – 6)	5.5 (4.5 – 6)	4.5 (4 – 5.5)	6 (5.14 – 6.5)	0.411	n/a	n/a

Socioeconomically disadvantaged smokers' ratings of plain and branded cigarette packaging: An experimental study

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ABSTRACT

Objectives: This study aimed to test the potential impact of plain packaging for cigarettes on brand appeal among highly socioeconomically disadvantaged smokers using the new design for cigarettes implemented in Australia, which combines plain packaging with larger health warning labels.

Design: A 2x2 factorial design trial embedded within a cross-sectional computer touchscreen survey. Data was collected between March and December 2012.

Setting: Socially disadvantaged welfare aid recipients were recruited through a large Social and Community Service Organisation in NSW, Australia.

Participants: N=354 smokers. The majority of the sample had not completed high school (64%), earned less than AUD$300/week (55%) and received their income from Government payments (95%).

Interventions: Participants were randomised to one of four different pack conditions determined by brand name: Winfield versus Benson & Hedges, and packaging type: branded versus plain. Participants were required to rate their assigned pack on measures of brand appeal and purchase intentions.

Results: Plain packaging was associated with significantly reduced smoker ratings of 'positive pack characteristics' ($p < 0.001$), 'positive smoker characteristics' ($p = 0.003$), and 'positive taste characteristics' ($p = 0.033$) in the Winfield brand name condition only. Across the four pack conditions, no main differences were found for 'negative smoker characteristic' ($p = 0.427$) or 'negative harm characteristics' ($p = 0.411$). In comparison to ~~branded~~ plain packaging, the presentation of ~~plain~~ branded packaging was associated with ~~lower~~ higher odds of smokers' purchase intentions (OR = 2.18, 95%CI = 1.34, 3.54; $p = 0.002$).

Conclusions: Plain packs stripped of branding elements, featuring larger health warning labels, were associated with reduced positive cigarette brand image and purchase intentions among highly socioeconomically disadvantaged smokers.

ARTICLE SUMMARY

Article focus

- Previous simulation studies have shown that plain packaging for cigarettes is associated with reduced perceptions of brand appeal, reduced demand and cessation intentions, however none have been conducted with socially disadvantaged smokers who have among the highest smoking rates.
- This study tested the Australian Government's new plain pack design for cigarettes which combines plain packaging with larger pictorial health warning labels.

Key messages

- This experimental simulation study found that plain packaging for cigarettes reduced positive brand appeal ratings and purchase intentions among socially disadvantaged smokers compared to branded cigarette packaging.
- In this study the plain pack condition tested the new design for plain cigarette packs in Australia, which combines plain packaging with larger health warning labels.
- The results of this study support the move toward plain packaging policies for cigarettes.

Strengths and limitations of this study

- This study is the first to obtain a large sample of socially disadvantaged smokers' responses to a simulation of a one-off exposure to an important tobacco control policy development.
- Use of a convenience sample limits the external validity and generalizability of the results.
- Use of a wider range of brands for comparison is recommended for research in countries considering implementing plain packaging.

INTRODUCTION

Smoking rates are disproportionately high among groups who experience multiple levels of disadvantage such as those with low income (26%),[1] Indigenous populations (50%),[2] the homeless (69% – 73%)[3, 4] and individuals with a mental illness (35% – 90%).[5-7] Comparatively, the population smoking rate in Australia is 15%.[1] Therefore, evaluating tobacco control approaches for effectiveness with disadvantaged social groups is a priority.

Cigarette manufacturers use the cigarette pack to promote their product in a number of ways. The cigarette pack is highly visible to both the user and others,[8] and reinforces brand image.[9] Packaging distinguishes brands from competitors and communicates brand imagery, character and values.[9, 10] Pack design can also be used to target segments of the market. For example, packs targeting women typically use bright graphics and feminine colours, descriptor terms such as 'slim' and 'thin' and packaging with increased height and decreased width compared to standard packaging.[11] To engage the youth market, pack designs are novel, with fashionable designs and attractive imagery, have innovative pack construction (i.e. pack shape and method of opening), and promote 'mild' taste or 'smoothness'.[12] Economy packs that emphasise quality are important for targeting low-income smokers, and often use design elements such as ~~price-marking (~~printing product price on packaging~~)~~.[13] Packaging has been particularly important in markets such as Australia where stringent advertising restrictions have long prohibited traditional avenues of advertising and promotion of brand and product.

Design elements of the cigarette pack are constructed to capture starter smokers, encourage brand-switching and brand loyalty, and to expand market share.[9, 13] Packaging colours, product descriptors, brand imagery and logos have all been shown to impact on the perceptions and experiences of the product.[14] A colour code for tobacco products is well established: lighter packaging colours are perceived to contain a product that is less harmful to health. Numerous studies have shown that smokers associate the colour 'red' with high strength and harshness, 'blue' as being mild, and anything progressively lighter as healthier or less harmful.[15, 16]. Similarly, many countries have banned the use of descriptor terms such as 'light', 'mild' and 'low tar' as cigarettes labelled with these terms are falsely perceived as being less harmful to health, and easier to give up.[16] Replacement terms such as 'gold', 'silver' and 'smooth' were still perceived as less harmful than regular varieties, suggesting that removal of both colours and descriptor terms may be more effective than the

removal of either alone in reducing false beliefs about tobacco risk.[14] Health warning labels (HWLs) that use pictures, supportive text and take up larger portions of the pack space have been shown to increase the effectiveness of the warnings in communicating risk and promoting cessation.[17, 18] Specifically, in a cross-sectional survey in the US, Bansal-Travers *et al.*[17] found that participants selected larger, pictorial, and loss-framed HWLs as the most effective in communicating health risks.

Evidence from plain packaging simulation studies shows that progressively plainer cigarette packaging, incorporating larger HWLs and fewer branding elements, was perceived as less attractive,[19, 20] reduced false beliefs about tobacco risk[14, 17] and was associated with cessation intentions.[8, 20] Wakefield and colleagues have conducted a number of online simulation experiments, exposing participants to pack conditions which vary by brand, degree of plain packaging[19, 21] and HWL size.[20] The studies found that packs with progressively fewer branding elements were perceived as less appealing overall,[19] larger HWLs combined with plain packs reduced adolescents' positive ratings of packs,[21] and presentation of plain packs compared with branded packs increased participant intentions of not purchasing a pack.[20] However, none of these studies examined differences in effects by socioeconomic status (SES). Additionally, best-worst[8] and experimental auction[22] studies have found plain packs featuring large graphic HWLs were the most effective pack type in reducing demand and promoting cessation among adult smokers.

The Australian Government's *Tobacco Plain Packaging Act 2011*, legislated mandatory plain and standardised packaging on cigarettes sold in Australia which include dark colour, pictorial and supportive text HWLs that cover at least 75% front-of-pack and 90% back-of-pack, have all logos and branding removed, and use only specified font styles and sizes.[23] The policy also limits pack and stick dimensions. The legislation was introduced to reduce product appeal, increase the effectiveness of health warnings, and reduce misperceptions about the harms of smoking. ~~Providing some early support, t~~The first study to examine effects of plain packaging during the roll-out phase using a computer-assisted telephone survey found that compared to smokers smoking from branded packs, smokers with plain packs were more likely to perceive their tobacco as being lower in both quality and satisfaction, to think about and prioritise quitting and to support the plain packaging policy.[24] However, this study had a low representation of disadvantaged smokers, did not examine effects by SES and did not control for novelty of HWL content. While there is

evidence of reduced appeal for plain packaging compared to branded packaging of tobacco products within the general population, it is important to investigate whether similar effects are likely to occur for groups experiencing social and financial hardship. The aim of this study was to examine brand appeal and purchase intentions associated with branded cigarette packs compared to the new design Australian plain packs among a sample of socioeconomically disadvantaged smokers.

METHODS

Design

A two by two packaging type (branded versus plain) by brand name (Winfield versus Benson & Hedges (B&H)) factorial experimental design was used; randomly exposing participants to one out of a possible four cigarette pack conditions. Each participant completed a uniform series of pack ratings within the experimental condition they were assigned. Data were collected using a touchscreen computer between March and December 2012.

Setting & Sample

As the target population for the study was smokers with high social disadvantage, the sample was drawn from a service outlet of a large, national non-government, social and community service organisation (SCSO). The service provides 'emergency relief' welfare such as food vouchers, grocery items, and financial aid to individuals experiencing various forms of social and financial hardship in a large catchment area of Western Sydney, NSW. The client profile of SCSO's includes an over-representation ~~of a number~~ of disadvantaged groups including Aboriginal and Torres Strait Islanders, single parents, long-term unemployed, and those whose primary income is a government benefit.[25]

Those eligible to participate were clients aged over 18 years, able to comprehend English, and who were not too ill or distressed to take part (as judged by SCSO staff). Previous research has demonstrated high smoking prevalence rates of 60%-70% amongst SCSO clients.[26]

Recruitment

Clients were introduced to the study when they attended the SCSO for their emergency relief appointment. SCSO staff explained that a touchscreen computer survey about smoking was being conducted and if clients were interested they were led to a private room where a

Research Assistant (RA) provided further detailed information. The RA provided assistance to complete the survey if required. As the survey was anonymous, survey completion was taken as implied consent. Participants were reimbursed for their time with an AUD$20 grocery voucher.

Smoking status

Smoking status was assessed by asking "Do you currently smoke tobacco products?" with response options i) 'Yes, daily', ii) 'Yes, at least once a week', iii) Yes, but less often than once a week' and iv) 'No, not at all', followed by asking "Have you smoked at least 100 cigarettes or a similar amount of tobacco in your life" (yes/no/not sure). Those who reported to smoke daily, or who reported to smoke occasionally as well as having smoked at least 100 cigarettes in their life were classified as current smokers. Once smoking status was assessed non-smokers exited from the survey.

Figure 1 about here

Presentation of experimental conditions

The study was conducted on a Dell Latitude XT3 (2.50 GHz processor) touchscreen computer, using Digivey version 4 software.[27] Participants were randomly allocated to one of four cigarette pack conditions by Digivey's randomise function, which uses a pseudo random number generator provided by the underlying programming language (see: http://msdn.microsoft.com/en-us/library/system.random(v=vs.90).aspx). Branded pack conditions replicated cigarette packs available for purchase at the time of survey; plain pack conditions tested the new plain packaging design, combining plain packaging stripped of branding elements with larger HWLs. The four pack conditions were: a) Branded Winfield Blue 25; b) Plain Winfield Blue 25; c) Branded B&H Smooth 25, and; d) Plain B&H Smooth 25, see Figure 1. Within each pack condition, respondents were presented with a standard set of items to rate their assigned pack. All pack conditions featured the same graphic image and text HWL: 'Smoking causes peripheral vascular disease' that first appeared on Australian cigarette packs in 2006. The brands used were two of the most popular brand variants in the Australian mainstream: (Winfield (Blue 25)) and premium (B&H (Smooth 25)) cigarette markets.[28] Plain pack digital images were created using specifications outlined in the

Australian Government's *Tobacco Plain Packaging Act 2011*, while images of branded packs were supplied by the Centre for Behavioural Research in Cancer, Victoria, Australia.

Outcome measures

Brand appeal

While viewing the assigned pack image, respondents were asked to rate packs on various pack, smoker and taste characteristic statements, see Table 1. These items were developed by Wakefield and colleagues[19-21] based on past tobacco industry packaging studies used to assess pack attractiveness, brand imagery characteristics and perceived sensory attributes. Among adult smokers, these items have variably been used as: individual outcome items;[19] or combined to form four outcome scales and one individual item with inter-item reliability statistics presented.[20]

Brand appeal rating items were combined to form four scales and one stand-alone item in order to replicate the outcome measure structure of Wakefield *et al.*'s previous plain packaging study.[20] The outcome measures were: (1) positive pack characteristics - 'popular among smokers'; 'attractive'; 'sophisticated'; 'a brand you might try/smoke'; (2) positive smoker characteristics – 'trendy' and 'successful'; (3) negative smoker characteristic – 'boring'; (4) positive taste characteristics – 'enjoyable to smoke' and 'satisfying in taste'; and (5) negative harm characteristics – 'high in tar and nicotine' and 'harmful to your health'. Although these measures have shown strong to moderate internal consistency on Cronbach's alpha previously,[20] they have not been tested in the current population, thus we undertook Cronbach's alpha assessment on scales with more than one item.

Scale reliability assessments revealed the outcome measures had moderate to strong internal consistency: positive pack characteristics ($\alpha = .83$); positive smoker characteristics ($\alpha = .71$); positive taste ($\alpha = .84$), and; negative harm characteristics ($\alpha = .65$).

Table 1 about here

Purchase intentions

Participants were presented with images of the two brand name options (Winfield and B&H) on a single screen and asked: "If you ran out of cigarettes and only the packs below were

available in the store you went to, which would you be most tempted to buy?" Participants could choose between the two brand name images or select 'I would not buy any'. Participants who had previously viewed and rated a plain packaging image (i.e. Pack B or D; see Figure 1) received plain image response options, and those who had previously rated a branded packaging image (i.e. Pack A or C) received branded image response options at this question.

Socio-demographic variables

Gender, age, income, income source, Aboriginal or Torres Strait Islander status, marital status, highest level of education and housing type were assessed.

Statistical Analyses

Analyses were conducted using Stata v11 (www.stata.com). Characteristics of participants are presented by intervention group to assess the success of the randomisation.

~~Instrument evaluation~~

Outcome measure assessment

As the outcome variables were not normally distributed we used non-parametric methods for analysis. Median scores with 95% confidence intervals are presented graphically for each of the four pack conditions. Exploratory data analysis indicated that there may be a potential pack type by brand name interaction, i.e. the relationship between packaging types (branded versus plain packaging) differed for the two different cigarette brand names. As the study had limited statistical power to assess interaction effects, we did not formally test this, but undertook analysis considering the four pack conditions separately, rather than as a factorial design. The Kruskal-Wallis test was used as a global assessment of differences in factor scores among the four pack conditions. If the *p*-value for this test was <0.1, pairwise comparisons using the Wilcoxon rank sum test were undertaken to compare median scores between branded packaging and plain packaging for each of the two brand names. Odds ratio analyses were used to assess the effect of packaging type (branded versus plain) on purchase intention.

Sample size for this study was determined by requirements for another trial for which participants were recruited. Post hoc power calculations demonstrated that a sample of 350

participants (approximately 85 in each of the pack type by brand name groups) would allow detection of differences in scores between branded and plain packaging (within each brand name) of approximately half a standard deviation, with 5% significance level and 90% power (to allow for some loss of power due to the use of non-parametric analyses).

RESULTS

Sample

A total of 787 clients were approached by SCSO staff during the study period and 608 were eligible to be approached to participate by the RA. Of those, 581 (96%) completed the survey and 362 (62%) of these were identified as current smokers (daily and occasional). Eight smokers were excluded as they primarily used something other than manufactured or roll-your-own tobacco. The demographic details of the study participants in each intervention group are presented in Table 2. The majority of the sample had not finished high school (64%), earned less than AUD$300/week (55%) and received their income from Government benefit payments (95%). Socio-demographic characteristics were similar across the four intervention groups.

Table 2 about here

Brand Appeal Ratings

~~Scale reliability assessments revealed the outcome measures had moderate to strong internal consistency: positive pack characteristics (α = .83); positive smoker characteristics (α = .71); positive taste (α = .84), and; negative harm characteristics (α = .65).~~

Figure 2 about here

Figure 2 displays ratings across the four pack conditions on the positive pack (2a), positive smoker (2b), negative smoker (2c), positive taste (2d), and negative harm (2e) response scales. The positive pack scale varied significantly across the pack conditions ($p = 0.001$), with pairwise comparisons revealing that branded packaging images were rated significantly more positively than plain packaging images in the Winfield condition ($p < 0.001$), however there was no difference in the B&H condition ($p = 0.102$), see Table 3. Positive smoker characteristic ratings were significantly different across the four pack conditions ($p = 0.003$);

branded packaging images were rated more positively than plain packaging images within the Winfield condition ($p = 0.001$), but not the B&H brand name condition ($p = 0.197$), see Table 3. There was no difference in the negative smoker characteristic ratings across the four pack conditions ($p = 0.427$). The four pack conditions were rated significantly differently when assessing positive taste characteristics ($p = 0.033$). Pairwise comparisons revealed plain packaging images were less appealing on taste attributes than branded packaging images for the Winfield condition ($p = 0.004$), however there were no differences detected in taste ratings between plain and branded packaging images in the B&H condition. The four pack conditions rated similarly in regards to negative harm characteristics ($p = 0.411$) as shown in Figure 2e and Table 3.

Table 3 about here

Purchase Intent

Participants were asked to choose which pack, if any, they would prefer to purchase out of the two brand names used in this study. Participants who viewed plain packaging images only were more likely to select that they would not buy any of the presented options (35%), compared to those who viewed branded packaging images (19%) [OR = 2.2, 95%CI = 1.3, 3.5; $p = 0.002$].

DISCUSSION

This study found that plain cigarette packs were rated as significantly less appealing than branded packs in a sample of socioeconomically disadvantaged smokers. Branded packaging was viewed as more appealing, smokers of these packs were rated in a more positive way, and the cigarette taste was preferred compared to cigarettes in plain packaging. No differences between branded and plain packaging relating to negative smoker or negative harm characteristics were detected. Finally, plain packaging reduced cigarette purchase intentions in comparison to branded packaging among smokers. The overall results of this study are supportive of previous plain packaging simulation research conducted with general population samples suggesting that plain packs are viewed less favourably on measures of brand appeal than branded packs.[19, 20]

One notable~~unexpected~~ finding of this research, demonstrating the importance of branding in the tobacco market, was a possible interaction effect between packaging type (branded versus plain) and brand name (Winfield versus B&H). Plain pack images were rated consistently lower than branded images on measures of positive pack, positive smoker and positive taste appeal for the Winfield condition, but no differences were detected for the B&H condition. ~~This sample of smokers may have less experience with the B&H brand, positioned as a 'premium' brand in Australia with a higher recommended retail price than the Winfield brand, which is considered a 'mainstream' brand offering value for money~~ It might be expected that plain packaging of B&H cigarettes is unlikely to have much effect among socially disadvantaged smokers as this brand is positioned as a premium product at a high price point,[29] with apparent low penetration among this smoker group: ~~While 19% of the sample reported regularly using the Winfield brand~~ only 1.6% of participants reported regularly using B&H cigarettes~~,~~ compared to ~~19% and~~ 9%~~, respectively,~~ in the general population.[28] Comparatively, engagement with the 'mainstream', value-for-money Winfield brand is much higher among socially disadvantaged smokers: participants reported regularly using this brand at the same rate as the general population (19%).[28] ~~It could be interpreted that the effect of p~~Plain packaging ~~may be~~has the potential to show stronger effects for brands that are personally relevant ~~brands, or brands within market segmentations relevant~~ to the individual smoker.

Similarly to Wakefield *et al.'s* previous simulation studies, this study found no difference between plain and branded cigarette packaging on negative harm ratings. This may indicate that the removal of branding elements such as colours, logos, and fonts on packs is more effective in reducing brand appeal associations rather than tapping into negative harm perceptions. It is also likely that the measures used in this study, intended to assess brand appeal, were not adequate to assess negative harm perceptions related to packaging. It may also be the case that effects on perceived harm are stronger among youth compared to adults, as previous~~There are, however, other~~ simulation studies ~~that~~ indicate plain packaging reduces false beliefs about smoking among adolescents[14] and increases cessation intentions among young adults.[8] Our study also found that the presentation of plain packaging, compared to branded packaging, reduced purchase intentions among socioeconomically disadvantaged smokers, consistent with previous simulations conducted with general population smokers.[20, 22]

Implications

The results of this study support the move toward plain packaging policies for cigarettes. Most research used in the development of plain packaging policies was conducted with general population samples, with limited data to indicate how socioeconomically disadvantaged groups, who have among the highest smoking rates, may respond to this tobacco control policy. The current study indicates that socioeconomically disadvantaged smokers are likely to respond similarly to the general population, with plain packaging reducing brand appeal ratings and purchase intentions among these smokers. Further research, particularly in low-income countries could provide insight about the possibility of disseminating this policy internationally.

Early research in Australia indicates plain packaging makes tobacco less appealing and increases the urgency to quit smoking,[24] however it will be important to monitor impact over time. Plain packaging policies have the potential to reduce smoking initiation. Associations with brand identity and appeal are motivating factors in smoking uptake among youth.[30, 31] There are documented cases of cigarette rebranding, for example the development of the Camel 'Smooth Character', to appeal to young adult smokers with the explicit intentions of increasing market share and prevalence of smoking among youth.[32] Plain packaging policies prevent this kind of brand targeting and have the potential to reduce uptake among youth by reducing brand appeal and purchase intentions. It will also be important to assess the use of any avoidance strategies, such as pack stickers and cigarette cases, and to monitor whether these are temporary solutions, or whether on-going changes to policy are required.

Strengths and Limitations

The primary limitation of the study is its reliance on a convenience sample limiting its external validity and generalizability. However, socially disadvantaged groups are notoriously difficult to recruit and retain in health research.[33, 34] Recruitment challenges were overcome by accessing community services as recruitment sites and using convenience samples. As a result, this study is the first to obtain a large sample of socially disadvantaged smokers' responses to a simulation of a one-off exposure to an important tobacco control policy development. Since the policy has been implemented, socially disadvantaged smokers' day-to-day experience is one of being exposed to these plain packs multiple times a day, and so the findings from this study may underestimate the real world effects of this change. This

study was also limited by the measurement of purchase intentions rather than actual behaviour, the use of only two cigarette brands for comparison. Use of a wider range of brands for comparison is recommended for research in countries considering implementing plain packaging. Although the study employed a computer image instead of actual packs, previous packaging research demonstrates results are generally consistent regardless of stimulus presentation modality.[22, 35, 36] The outcome measures used in this study pose an additional limitation. Although they were selected for the purpose of comparing results with previous plain pack research,[19, 20] they have not been evaluated for validity or reliability and this should be assessed in the future.

As this study tested the Australian Government's new plain pack design, which combines plain packaging with larger HWLs, we were unable to distinguish which factor (plain packaging or larger HWLs) produced the observed results. Previously, Wakefield *et al*.[20] examined the importance of branding versus HWL size on cigarette packaging, concluding that plain packaging reduced elements of brand appeal far more than increasing the size of HWLs. In their study, when packs were plain, increasing the size of HWLs above 30% did not reduce brand appeal further. This finding suggests that the effects observed in the current study are more likely due to stripping the pack of branding elements, than increasing the HWL size. Finally, the last 2 – 3months of survey occurred during the policy roll-out phase and participants may have already been exposed to and purchased plain packs. Prior exposure may have allowed participants to become familiar with the new pack designs, and may explain why participants did not rate packs differently on negative harm and smoker measures.

Conclusions

The findings of this study support plain packaging policy, and show this strategy has the potential to reduce positive associations with cigarette packs among a group of highly socioeconomically disadvantaged smokers. It will be important to monitor the long-term outcomes of plain packaging policy, particularly with regards to uptake of smoking in disadvantaged groups. Further plain pack research in low-income countries is recommended, to support the potential dissemination of the policy internationally.

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COMPETING INTERESTS

None to declare.

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ETHICS APPROVAL

University of Newcastle's Human Research Ethics Committee.

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Table 1. Standard items used to assess responses to pack images.

Survey items	Response scale
Pack characteristics: *How well do you think the following phrases relate to the cigarette pack shown?* This pack is popular among smokers This pack is attractive This pack is sophisticated This pack is a brand you might try/smoke	~~Visual analogue~~Response scale: 1 (not at all) to 7 (extremely)
Smoker characteristics: *How well do you think the following characteristics describe a typical smoker of the pack shown?* A typical smoker of this pack is trendy A typical smoker of this pack is boring A typical smoker of this pack is successful	~~Visual analogue~~Response scale: 1 (not at all) to 7 (extremely)
Taste attributes: *Please rate the following phrases describing the taste of cigarettes from the pack shown.* I would expect the cigarettes in this pack to be enjoyable to smoke I would expect the cigarettes in this pack to be high in tar and nicotine I would expect the cigarettes in this pack to be satisfying in taste I would expect the cigarettes in this pack to be harmful to your health	~~Visual analogue~~Response scale: 1 (not at all) to 7 (extremely)

Table 2. Demographic characteristics of the survey sample ($N = 354$).

Characteristic	Winfield Branded N (%)	Winfield Plain N (%)	B&H Branded N (%)	B&H Plain N (%)	Total N (%)
N	92 (26)	95 (27)	88 (25)	79 (22)	354
Age					
18 – 39	56 (61)	51 (54)	51 (58)	48 (61)	206 (58)
40+	36 (39)	44 (46)	37 (42)	31 (39)	148 (42)
Gender					
Female	61 (66)	46 (52)	66 (70)	43 (54)	216 (61)
Aboriginal and/or Torres Strait Islander					
Yes	23 (25)	14 (16)	17 (18)	10 (13)	64 (18)
Marital Status					
Married / De facto / Living with partner	29 (32)	15 (17)	23 (24)	20 (25)	87 (25)
Separated / Divorced	27 (29)	29 (33)	27 (28)	20 (25)	103 (29)
Never married / Single / Widowed	36 (39)	44 (50)	45 (47)	39 (49)	164 (46)
Highest Education					
Primary school	0 (0)	4 (5)	4 (4)	4 (5)	12 (3.4)
High school years 7-10	62 (67)	54 (61)	59 (62)	39 (49)	214 (61)
High school years 11-12	11 (12)	13 (15)	13 (14)	14 (18)	51 (14)
TAFE / trade qualification	14 (16)	13 (15)	16 (17)	21 (27)	64 (18)
University degree	5 (5)	4 (5)	3 (3)	1 (1)	13 (3.7)
Personal Weekly Income					
<$299	54 (59)	55 (58)	48 (56)	38 (48)	195 (55)
>$300	36 (39)	33 (35)	31 (35)	37 (47)	137 (39)
Prefer not to answer	2 (2)	7 (7)	9 (10)	4 (5)	22 (6)
Income source					
Paid work	6 (7)	2 (2)	4 (4)	1 (1)	13 (3.7)
Government payment (Centrelink)	85 (92)	85 (97)	89 (94)	76 (96)	335 (95)
Other	1 (1)	1 (1)	2 (2)	2 (3)	6 (1.7)
Housing type					
Own house/private rental	26 (28)	31 (33)	28 (32)	23 (29)	108 (31)
Government rental	55 (60)	42 (44)	44 (50)	43 (54)	184 (52)
Homeless/Supported accommodation	11 (12)	22 (23)	16 (18)	13 (17)	62 (18)
Regular cigarette brand					
Winfield	10 (17)	16 (21)	14 (24)	10 (18)	50 (20)
Benson & Hedges	1 (1.7)	1 (1.3)	2 (3.5)	0 (0)	4 (1.6)
Other	36 (62)	50 (65)	34 (59)	36 (66)	156 (63)
I don't have a regular brand	11 (19)	10 (13)	8 (14)	9 (16)	38 (15)
Regular tobacco type					
Manufactured cigarettes	58 (63)	77 (81)	58 (66)	55 (70)	248 (70)
Roll-your-own tobacco	34 (37)	18 (19)	30 (34)	24 (30)	106 (30)

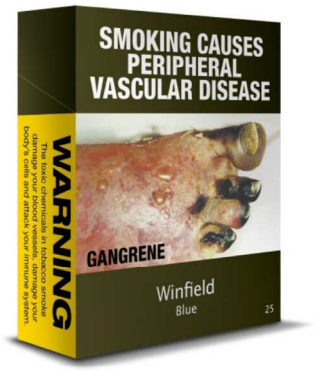
Table 3. Effect of pack condition on brand appeal ratings ($N = 354$).

	Pack Condition						
	Winfield_Branded	*Winfield_Plain*	*B&H_Branded*	*B&H_Plain*	*Global test*	*Pairwise*	
						Winfield (branded v plain)	*Benson&Hedges (branded v plain)*
	(n = 92) Median (95%CI)	*(n = 95) Median (95%CI)*	*(n = 88) Median (95%CI)*	*(n = 79) Median (95%CI)*	*P*	*P*	*P*
Positive pack	3.86 (3.5 – 4.25)	2.25 (2 – 2.5)	2.63 (2.07 – 3.25)	2.5 (1.75 – 2.75)	<0.001	<0.001	0.102
Positive smoker	2.5 (2 – 3.5)	1 (1 – 2)	2.5 (2 – 3)	2.5 (1.5 – 2.87)	0.003	0.001	0.197
Negative smoker (boring)	2 (1 – 3)	2 (1 – 2)	2 (1 – 3)	3 (1.27 – 3.73)	0.427	n/a	n/a
Positive taste	4 (3.5 – 4.5)	3 (2.11 – 3.5)	3.75 (3 – 4)	3 (2 – 4)	0.033	0.004	0.804
Negative harm	5.5 (4.55 – 6)	5.5 (4.5 – 6)	4.5 (4 – 5.5)	6 (5.14 – 6.5)	0.411	n/a	n/a

Original Branded Packaging

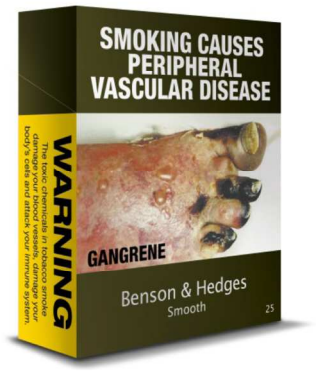
Plain Packaging

A



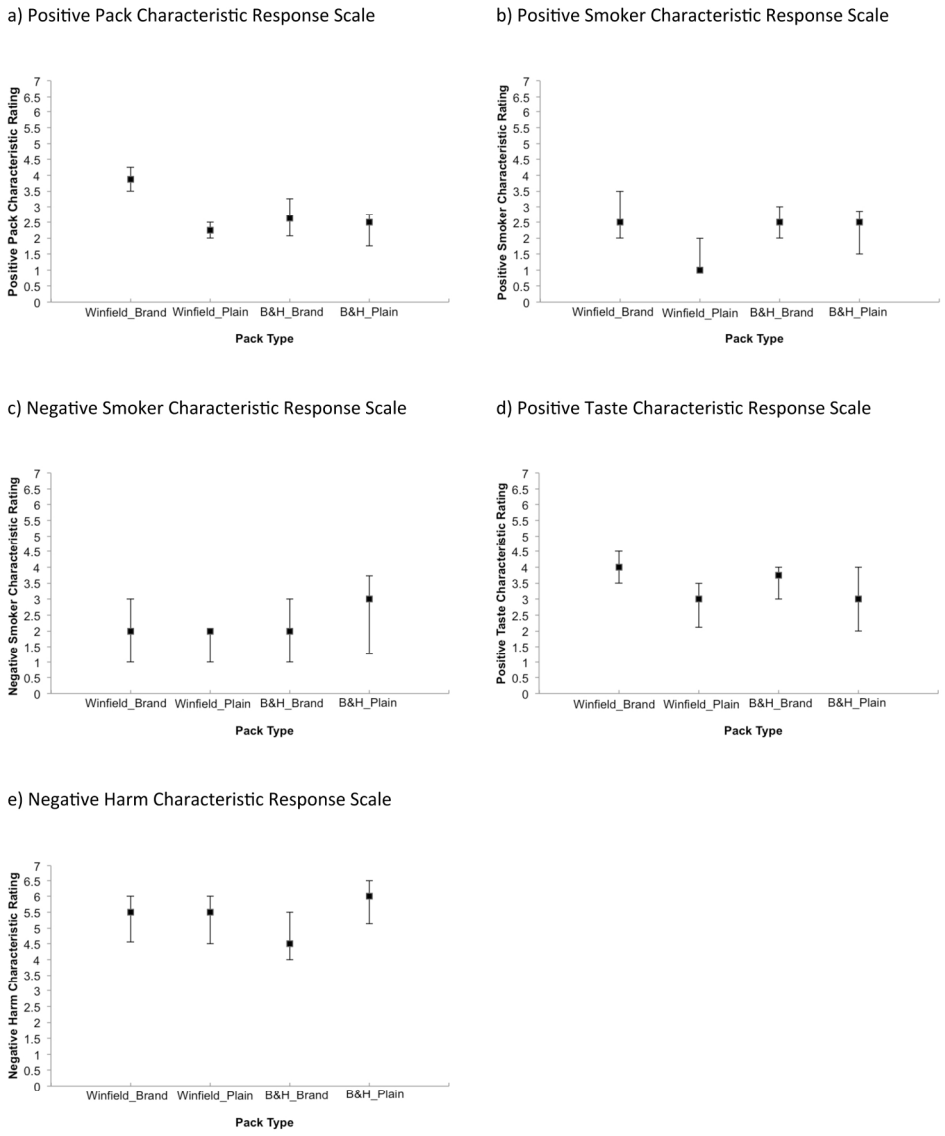
B

C



D

173x207mm (300 x 300 DPI)



*B&H refers to the Benson & Hedges brand name condition.

Figure 2. Median ratings with 95%CI for each response scale by pack condition (N = 354).
173x212mm (300 x 300 DPI)

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Yes
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Yes
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Yes
Objectives	3	State specific objectives, including any prespecified hypotheses	Yes
Methods			
Study design	4	Present key elements of study design early in the paper	Yes
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Yes
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Yes
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Yes
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Yes
Bias	9	Describe any efforts to address potential sources of bias	Yes
Study size	10	Explain how the study size was arrived at	Yes
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Yes
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Yes
		(*b*) Describe any methods used to examine subgroups and interactions	NA
		(*c*) Explain how missing data were addressed	NA
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	NA
		(*e*) Describe any sensitivity analyses	NA
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Yes
		(b) Give reasons for non-participation at each stage	Yes
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Yes
		(b) Indicate number of participants with missing data for each variable of interest	NA
Outcome data	15*	Report numbers of outcome events or summary measures	Yes
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for	NA

		a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	Yes
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Yes
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Yes
Generalisability	21	Discuss the generalisability (external validity) of the study results	Yes
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Yes

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.