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Smokers' reactions to the new larger health warning labels on plain cigarette packs in Australia: Findings from the ITC Australia project

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Abstract

Objectives—This study examined whether larger sized Australian cigarette health warning labels (HWLs) with plain packaging (PP) were associated with increased desirable reactions towards the HWLs post-implementation.

Methods—Data were from the ITC longitudinal cohort survey assessing Australian smokers one wave prior to the policy change in 2011 (n=1104) and another wave after the policy change in 2013 (n=1093). We assessed initial attentional orientation (AO) to or away from warnings, plus other reactions, including cognitive reactions towards the HWLs and quit intentions.

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Declaration of Interests

Dr Cummings has served in the past and continues to serve as a paid expert witness for plaintiffs in litigation against the tobacco industry. Drs Fong and Thrasher have each served as a paid expert witness or consulting expert for governments in countries whose policies are being challenged by parties under trade agreements. Dr Hammond has served as an expert witness on behalf of national governments in legal challenges to packaging regulations, as well as an advisor to regulatory agencies for tobacco packaging policies. Dr Borland was a member of an expert advisory committee that advised the Australian government on the research done to support the introduction of the plain packaging legislation. Dr Yong declares that he has no conflicts of interest.

Ethics clearance

The study has received ethical approval from the relevant institutional review board or research ethics committee at The Cancer Council Victoria (Australia), Roswell Park Cancer Institute (USA), University of Waterloo (Canada), and University of Strathclyde (UK).

Author contributions

HHY conducted the literature reviews, analysed the data, and drafted the manuscript. RB, KMC and GTF conceived of the study design and revised drafts of the manuscript. DH and JFT provided comments and revised drafts of the manuscript. All approved the final version.

Results—As expected, AO towards the HWLs and reported frequency of noticing warnings increased significantly after the policy change, but not more reading. Smokers also thought more about the harms of smoking and avoided the HWLs more after the policy change, but frequency of forgoing cigarettes did not change. The subgroup who switched from initially focusing away to focusing on the HWLs following the policy change noticed and read the HWLs more, and also thought more about smoking harmful effects, whereas the subgroup (5.4%) who changed to focusing away from the HWLs showed opposite effects. We tested the mediational model of Yong et al (2014) and confirmed it for predicting quit intentions, with larger effects post-policy.

Conclusions—Increasing the size of HWLs and introducing them on PP in Australia appears to have led to an overall increase in desired levels and strength of some reactions, but evidence of reactance was among a small minority.

Keywords

health warning labels; plain packaging; quit intentions; attentional orientation

INTRODUCTION

In December 2012, Australia became the first country in the world to successfully implement a law requiring all tobacco products to be sold only in standardized or plain packaging (PP). At the same time, a new set of 7 health warning labels (HWLs) was introduced to replace those first introduced in 2006. The display area of the new HWLs increased from 30% to 75% on the front of the packs but the HWLs at the back of packs which covered 90% of the surface area was maintained (see Figure 1). Like the old 2006 set, the new warnings comprised a warning statement and its corresponding graphic imagery on both front and back of cigarette packs, and a corresponding explanatory message on the back of packs. The 7 new warnings covered the same topics as in the old set but 4 of them had new graphic images. A new set of 13 information messages about the health effects of chemicals in tobacco smoke also appeared on one side of packs to replace the single information message previously required [1].

Past research has demonstrated that warnings that are larger in size and graphic in nature will be more salient and hence, more impactful than smaller and text-only warnings [2-4]. Experimental studies that have controlled for warning content have confirmed the greater potency of larger HWLs [5-7]. Past population-level studies have also shown that smokers' reactions to HWLs, in particular, a greater depth of cognitive processing is associated with increased quit intentions [8-10], which along with warning-related forgoing of cigarettes, has been shown to be a strong predictor of quit attempts [11].

The introduction of PP was also expected to enhance the noticeability of the HWLs, as past experimental studies have shown that graphic warnings on PP are noticed more [12, 13] and better recalled [12, 14, 15]. However, it is unclear if these findings would generalise to the real world as real-world study of the impact of PP on smokers' reactions to the health warnings has not been possible until now.

Experimental research using eye-tracking methodology indicates that plain cigarette packs increase visual attention to health warnings among non-smokers and non-regular smokers, but not among regular smokers [13]. A follow-up study showed that regular smokers actively avoid cigarette pack health warnings rather than preferentially attend to the now less prominent branding [16]. It appears that regular smokers may have learned to divert their attention away from cigarette pack health warnings. Finding out to what extent this occurs in the context of repeated exposures to packs in real life is important.

One aspect of orienting to packs that is related to avoidance is the extent to which smokers first attend to the warnings as opposed to other aspects of the pack (i.e., their attentional orientation [AO] towards different parts of the pack). Independent of content, smokers' AO is likely to be towards the largest and most graphically interesting elements of the pack. It is expected that smokers' AO towards pack warning labels should increase as a result of both the larger-sized and novelty of the newly introduced warning labels and also the diminished size and complexity of the rest of the pack due to the PP requirements. However, based on the experimental work described above, the larger more prominent warnings might cause some smokers to actively engage in efforts to avoid the labels. While it might be argued that any avoidance behaviour might offset some of the positive impacts of health warnings, to date, population-based studies have failed to find any undesirable effects of warning avoidance [17, 18]; indeed those who engage in such behaviour are indirectly more likely to attempt quitting [11].

As the implementation of PP also increases warning label salience [12], the two and a half fold increase in the size of the health warnings on the front of packs should cause warnings to be noticed and read more, stimulate greater thoughts about the risks of smoking, and prompt more smokers to forgo their cigarettes. Survey data collected before and after the policy change in Australia available from the Australian arm of the International Tobacco Control Four-Country project provided the opportunity to test these hypotheses. We also explored whether the more prominent warnings post-implementation would be more potent by exploring for any changes in the strength of associations of upstream warning reactions with the proximal warning-stimulated cognitive reactions, and with subsequent quit intentions, testing the mediational model we have developed [11].

METHODS

Data source and sample

Data analysed come from two survey waves of the Australian arm of the International Tobacco Control Four (ITC4) country project, one set (n=1104) collected between September, 2011 and February, 2012, about a year prior to the implementation of the new HWLs and PP, and the other set (n=1093) collected two to six months post-implementation between February and May, 2013 (average inter-wave interval=16.2 months, SD=0.8). The ITC4 is a longitudinal cohort study of adult smokers in Australia, the UK, US and Canada, and respondents were followed up approximately annually with replenishment of those lost to the study using similar sampling procedures. Table 1 presents the sample characteristics by survey wave.

Details of the ITC methodology have been described elsewhere [19]. Briefly, respondents were recruited via random-digit dialing methods into the study as smokers who met the following criteria: aged 18+ years, had smoked at least 100 cigarettes in their lifetime, and smoked at least once in the past 30 days. Surveys were administered via a mix of phone and web. The ITC cohort was constructed with probability sampling methods from the population of each country within strata defined by geographic region and community size. It was therefore designed to be broadly representative of its respective populations.

Measures

Respondents were asked a set of questions to assess HWL effectiveness at each survey wave.

Attentional orientation (AO) towards the packs—This was assessed using the question: "When you look at a cigarette pack, what do you usually notice first – the warning labels, or other aspects of the pack such as branding?"

HWL salience—This was assessed using two questions: "In the last month, how often, if at all, have you noticed the warning labels on cigarette packages?"; and "In the last month, how often, if at all, have you read or looked closely at the warning labels on cigarette packages?" both rated on a 5-point response scale from "never" to "very often". Initial exploratory analyses indicated that the policy changes had differential effects on the two measures, thus they were used as separate measures rather than combined into a scale as per Borland et al. [2].

HWL cognitive reactions—These were assessed using three questions: "To what extent, if at all, do the warning labels make you think about the health risks of smoking?"; "To what extent, if at all, do the warning labels on cigarette packs make you more likely to quit smoking?"; "In the past 6 months, have warning labels on cigarette packages led you to think about quitting?". The first two questions had response options: "Not at all, A little, Somewhat, and A lot" and the last one had: "Not at all, Somewhat, and Very much". Responses to the 3 questions were combined into a scale by averaging them as per Borland et al. [17] (alpha=.83 and .85 for 2011 and 2013 surveys, respectively).

HWL behavioural reactions—These were assessed using two questions, one assessing forgoing behaviour: "In the last month, have the warning labels stopped you from having a cigarette when you were about to smoke one?" (Never, Once, A few times, Many times); and the other assessing avoidance behaviour "In the last month have you made any effort to avoid looking at or thinking about the warning labels – such as covering them up, keeping them out of sight, using a cigarette case, avoiding certain warnings, or any other means?" (Yes/No).

Quit intentions—At each wave, we assessed smokers' quit intentions using the question: "Are you planning to quit smoking --within the next month, within the next 6 months, sometime in the future beyond 6 months, or are you not planning to quit?".

Covariates included age (recoded into four groups: 18-24, 25-34, 35-54, and 55+ years), sex, income levels (low=<$A30,000; medium=$A30,000-$A59,999; and high=$A60,000+) and educational attainment (low=completed high school or less; medium=technical/trade/diploma; high=completed university/postgraduate degrees), cigarettes per day (recoded as <10, 11-20, 21-30, 30+), past year quit attempts (whether they made at least one quit attempts in the past 12 months), survey mode (phone versus web), and year of recruitment into the study.

Data analysis

Smokers' reactions and AO to HWLs pre- and post-implementation of new HWLs and PP were computed for descriptive purposes using weighted data. Generalised estimating equations (GEE) models were employed to examine pre-post changes by testing for significant main effect of survey wave while controlling for socio-demographic and smoking-related variables. GEE models can account for the correlated nature of repeated measurements and also include cases with at least one data point, thus maximizing the power to detect effects. Dichotomous outcome variables such as avoidance and AO were modelled using binomial distribution with logit link function. Outcome variables such as noticing, reading, cognitive reactions, forgoing and quit intentions were treated as quasilinear and modelled as continuous variables using Gaussian distribution with identity link function as initial exploration indicated that these variables when dichotomized were less sensitive in detecting an effect due to loss of information. Parameters were estimated using unstructured correlation structure with robust variance estimation procedure. GEE modelling of pre-post changes was limited to smokers only (both recontacted and newly recruited smokers) at both survey waves as ex-smokers are less likely to be exposed to the pack HWLs. This resulted in 1525 unique individuals (853 with 1 data point and 672 with 2 data points) who provided a total of 2197 person-wave observations for GEE analyses.

To examine whether the pre-post changes differed by AO patterns, we employed difference scores as outcomes and conducted linear regression analyses (since the difference scores were generally normally distributed) to test for group differences in outcomes by regressing the difference scores onto a dummy variable used to represent the four different patterns of change across waves in AO towards the HWLs (i.e., brand-brand; brand-warning; warning-brand; and warning-warning). For ease of interpretation, relevant subgroup was chosen as the reference group for comparison purposes. This set of analyses included only smokers who provided data on both survey waves. To assess effects of attrition, we examined baseline differences in covariates between those retained (n=788) and those lost (n=316) and found those lost to the study were more likely to be highly educated (p=.04), complete a phone survey (p<.001) and be recruited into the study in the year before the baseline wave (p=.006). These variables were controlled for in all regression analyses.

Finally, additional GEE analyses were conducted to examine associations of upstream HWL reactions and AO with warning-stimulated cognitive reactions (midstream outcome) and quit intentions (downstream outcome), to determine whether the strength of the associations differed between pre- and post-policy implementation by testing for any significant

interactions between survey year and reactions on the outcome of interest. All analyses were conducted using Stata v12.1.

RESULTS

The inter-correlations between the HWL reaction and AO measures at the two survey waves were all positive and significant (all p's <.001), although the stability of AO (r=0.25) and avoidance (r=0.35) were notably lower than the rest (all r's>0.50). Correlations between measures were generally similar across the two waves, with the biggest difference being the association between AO and noticing which showed a small increase (0.31 to 0.42) from pre to post-policy changes (see Supplementary Table 1).

Pre-post changes in reactions and AO to the new HWLs with PP

Table 2 presents the prevalence estimates of HWL reactions and AO, and also the results of GEE analyses testing for significant changes in these estimates, from pre- to post-implementation of the new HWLs and PP while controlling for potential demographic and smoking-related confounders. There was a marked increase in AO towards HWLs (odds ratios [OR]=4.19, p<.001), in noticing (regression coefficients [β]=.15, p=.001), but not in reading of warning labels. There was also a significant increase in cognitive reactions (β=.11, p<.001) and a large increase in avoidance behaviour (OR=3.06, p<.001), but no significant change in warning-related forgoing of cigarettes.

Pre-post changes in HWL reactions and quit intentions by AO pattern

Because of the large change in AO, we explored the relationship between the patterns of change in AO across waves, and changes in HWL reactions (see Table 3). Shifting from first not focusing to focusing first on the HWLs was associated with greater noticing and reading of the warning labels (β=.60 and .37, respectively, both p's<.001), greater cognitive reactions (β=.12, p=.03), and a greater avoidance of warning labels (β=.08, p=.07) as compared to those who first focused on the pack branding at each wave. By contrast, changing the initial focus away from the warnings was significantly associated with a decline in noticing (β=−.47, p=.04), a decline in cognitive reactions towards the warnings (β=−.34, p=.004) and a decline in avoidance behaviour (β=−.19, p=.06) as compared to those who first focused on warning labels at both waves.

Relationship with cognitive reactions and quit intentions

We examined the relationship of each upstream HWL measure with warning-stimulated cognitive reactions and with quit intentions and tested for significant interactions with survey year to determine if the relationship with these outcomes had changed pre to post-policy implementation. We found that noticing, reading, avoidance and AO were all individually positively associated with warning-stimulated cognitive reactions (β =.26, .28, .40, and .45, respectively, all p's<.001) but only noticing showed a significant interaction with survey wave (p=.04) being larger post-policy implementation (β =.33 vs .28 at pre, both p's<.001).

For quit intentions, individual models testing for main and interaction effects revealed that only cognitive reactions and forgo showed significant main effects whereas AO, noticing, reading, and cognitive reactions had significant interactions with survey year with all having larger effects post-implementation (see Table 4). Results stratified by survey year indicate that pre-implementation, only cognitive reactions and forgo were each significantly associated with quit intentions ($p<.001$ and $p<.01$, respectively) but at post-implementation, all except avoidance were significantly associated with intention (all $p<.001$). In order to confirm the mediating role of cognitive reactions on quit intentions as per Yong et al [11], additional models were conducted in a stepwise fashion where cognitive reactions and forgo (most proximal to quit intentions) were entered first (model 1) while controlling for all relevant potential confounders. This model showed cognitive reactions, but not forgoing to have independent predictive effects. Next we added the cognitive by wave interaction (model 2), and found it was significant ($\beta = .10$, $p=.02$), as was the main effect ($\beta = .21$, $p<.001$). We then tried adding the upstream variables and their interactions, but none of these effects was significant, leaving model 2 as the most parsimonious model. Given the interaction in Model 2, we ran this model separately for the two waves and found that the main effect of cognitive reactions was the only reaction significant in both waves with the effect being larger post-policy implementation ($\beta = .35$ vs .18 at pre, both p's$<.001$).

DISCUSSION

The results from this study indicate that changing the content and increasing the front display area of HWLs and introducing them in conjunction with PP has resulted in the HWLs becoming more attention-grabbing. More smokers now report having their attention initially drawn towards the HWLs, rather than away from it. Thus, as predicted, current smokers noticed the new enhanced warnings significantly more than the old warnings. However, there was no change in frequency of reading the warning labels among current smokers, even though the HWL content has changed. The failure to find an increase in reading may be because the graphic picture tells the story, so the text may not need to be read often. Research on Australian previous warning regimen has shown that introduction of new warning content, in the second year after the change to graphic warnings in 2006, did not stimulate more reactions [20], perhaps because new warning content only needs to be attended to and read once for that information to be known. It may also be because the explanatory messages and the information messages on the health effects of chemicals in tobacco smoke appear only on the back and side of packs, areas which were not changed as much, and which smokers pay less attention to [21].

As predicted, the new, larger HWLs on PP stimulated more cognitive reactions so they appear to be better at promoting thoughts about the risks of smoking than the previous ones. This is consistent with the explanations above that re-reading is not necessary for graphic warnings to stimulate appropriate thoughts about the risks of smoking. That said, at least some of the increase in frequency of reactions is likely to be a medium-term response to the novelty of the new warnings as significant wear out over time has been consistently found for all types of warnings [20]. Consistent with past studies [9, 10, 17, 22], our findings also confirm that smokers stimulated by HWLs to think about the harms of smoking and also think about quitting were more motivated to quit and that cognitive reactions serve as an

important pathway through which the effects of more upstream reactions to the HWLs exert their influence on quit intentions [11]. Of note is the greater potency of cognitive reactions as the final pathway to intentions following the policy change suggesting that the new HWLs with PP are generating smoking harm-related thoughts that are more effective in motivating people to quit smoking.

On the less positive side, there was no evidence of a significant impact of the policy change on frequency of forgoing a cigarette in reaction to pack warning messages, as it has been responsive to past policy changes [2], and although we found no independent relationship with quit intentions in this study, we have previously shown that its effect is linked more directly with quit attempts [11], so failure to find an increase in this reaction is disappointing. The findings also confirm our expectation that the new warnings would result in greater avoidance behaviour, consistent with past research [17, 18]. Evidence of increased avoidance behaviour is an indication that the new HWLs are emotionally engaging, and previous research suggests that emotionally engaging HWLs are more effective because they are more likely than non-emotionally engaging HWLs to prompt smokers to attempt quitting, even when they are trying to avoid this kind of HWLs [11]. However, the analysis involving AO suggests that at least for a minority, those stimulated to shift from initially focusing on to focusing away from the warnings, they reported a reduction in avoidance. This suggests that the systematic reorienting is not being experienced as a deliberate act of avoidance [13, 16], perhaps as an attempt to check brand-related aspects of the pack. That this reorienting away was associated with reduced cognitive reactions suggests that this strategy may be effective in reducing the warning impact, and thus can be thought of as a form of mild reactance. The mechanism for this apparent reactance is not clear, but it may be that in the context of the warnings dominating the pack, more systematic avoidance is required if the smoker is not to be confronted by the harms visually every time they have a cigarette. Longer-term follow-up is needed to find out whether this reactance is only temporary or more sustained. Further research could also usefully include eye-tracking studies to see if smokers used to PP show the same avoidance patterns as they have done to novel PP stimuli [13,16].

This study has several strengths which include longitudinal cohort design allowing for a pre-post evaluation of policy change, replenishment sample to minimize attrition bias, and a broadly representative sample of smokers in Australia.

While some aspects of the study were longitudinal, the prediction of quit intentions was based on cross-sectional data. Thus caution needs to be exercised in interpreting the finding as causal, in particular, while intentions are logically subsequent to reported past reactions, it is possible that the person’s intentional state may affect their recall of past reactions.

Another important study limitation is that it was not possible to disentangle effects due to changes in HWL content and size from those due to PP as both policies were implemented simultaneously. Past experimental research suggests that these two policies are likely to work synergistically with increased size of warnings on cigarette packages improving communication impact, and PP undermining pack appeal and purchase intent [23-25].

We also cannot be sure that all of the effects were entirely due to the policies as there were mass media campaigns about the new HWLs and PP which could have inflated the effects we found. Past research suggests that HWLs on cigarette packs are likely to work best when accompanied and reinforced by the same messages delivered through mass media campaigns [26].

Our study also underrepresents young smokers. This group is theoretically most likely to be affected by the HWLs and PP because for them there has been less time to habituate to any warnings, and being less dependent, they may be more able to act on the concerns the warnings generate. Thus, our estimates of effects may be conservative.

Conclusions

Increasing the size of cigarette health warning labels from 30% to 75% of the front display area while also implementing PP in Australia appears to have led to an overall increase in some desired reactions among smokers. Smokers preferentially attended to and noticed these larger-sized warnings more than the older ones, and the warnings also stimulated more thoughts about smoking-related risks, a reaction associated with increased quit-related activity. The new warnings with plain packaging also stimulated more avoidance of warnings than the old warnings. However, a small subset of smokers who preferentially attended to other aspects of the packs showed some psychological reactance. So overall, while the net effect of the new policies appears to be positive, there are some indications that the effects might be smaller than anticipated, partly due to apparent reactance among a small minority.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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What this paper adds

Past research suggests that warnings that are larger in size, graphic in nature, and/or presented on plain packaging will be more effective than those smaller in size, text-only, and/or presented on fully branded packaging. However, studying the impact of increasing the size of health warning labels and presenting them on plain cigarette packaging has not been possible until now.

This study presents the first real-world data to show that such policy configuration for health warning labels has had a positive impact on smokers in Australia. However, there is a small minority of smokers who may not benefit from the new warnings because they have learnt to systematically avoid focusing on the warning labels.

Figure 1.
Examples of cigarette packs before (left) and after (right) the introduction of new set of pictorial health warning labels with plain packaging in Australia.

Table 1

Characteristics of current smokers by survey year.

Variables (%)	Pre-policy change (2011) survey n=1104	Post-policy change (2013) survey n=1093
Age in years		
18-24	2.6	2.0
25-39	18.5	17.0
40-55	43.4	40.5
55+	35.5	40.5
Gender		
Male	45.5	46.4
Female	54.5	53.6
Education		
Low	53.6	54.4
Medium	27.1	28.7
High	19.3	16.9
Income		
Low	26.4	29.8
Medium	26.9	26.3
High	41.1	35.6
No information	5.6	8.3
Cigarettes per day		
<10	28.6	28.4
11-20	43.4	41.7
21-30	21.5	22.6
30+	6.5	7.3
Made at least one quit attempt in the past year	39.8	37.1
Survey mode		
Web	38.7	49.4
Phone	61.3	50.6
Year of recruitment		
2002	19.1	14.0
2003	1.9	1.6
2004	4.7	3.7
2005	5.2	3.8
2006	12.9	8.8
2007	14.8	10.5
2009	4.3	2.5
2010	12.9	7.4

Variables (%)	Pre-policy change (2011) survey n=1104	Post-policy change (2013) survey n=1093
2011	24.3	12.4
2013	--	35.2

Percentages are based on unweighted data; --, not applicable;

Table 2

GEE results testing the changes in smokers' reactions and attentional orientation to health warning labels (HWLs) from pre (2011) to post (2013) implementation of new HWLs and plain packaging.

Outcome variables	n/N [b]	Weighted prevalence estimates [a]		Survey year main effects (2013 vs 2011)	
		Pre (2011)	Post (2013)	B (SE)	OR (95% CI)
Notice	1499/2159	3.23	3.40	.15 (.05)**	--
Read	1501/2164	2.33	2.28	.00 (.04)	--
Cognitive reactions	1502/2163	1.82	1.95	.11 (.02)***	--
Forgo	1500/2159	1.23	1.28	.01 (.02)	--
Avoid (Yes vs No)	1504/2169	**13.3**	**33.9**	--	3.06 (2.50-3.75)***
Attentional orientation (HWL first vs Branding first)	1504/2169	**29.1**	**64.4**	--	4.19 (3.52-4.99)***

All estimates in the table adjusted for age, sex, income, education, cigarettes per day, past year quit attempts, survey mode (phone vs web) and wave of recruitment;

B, regression coefficients; SE, standard errors;

OR, odds ratios; CI, confidence interval;

--, Not applicable;

* p<.05;

** p<.01;

*** p<.001;

n, number of unique individuals; N, number of person-wave observations;

Score range: Notice =1-5, Read =1-5, Cognitive reactions=1-3.7, Forgo=1-4;

a, all figures refer to mean scores except those in bold which refer to percentages

b, variation in n is due to missing data on one or more independent variables included in the models;

Table 3

Relationship of pre-post implementation changes in attentional orientation response pattern with changes in warning label reactions.

Pre-post change in outcome variables	n [a]	Attentional orientation response pattern across survey years, B (SE)			
		Brand-Brand	Brand-Warning	Warning-warning	Warning-Brand
Notice	663	Ref	.60 (.12)***	Ref	−.47(.22)*
Read	666	Ref	.37 (.10)***	Ref	−.31 (.25)
Cognitive reactions	664	Ref	.12 (.05)*	Ref	−.34 (.12)**
Forgo	662	Ref	−.05 (.05)	Ref	.02 (.16)
Avoid	668	Ref	.08 (.04)	Ref	−.19 (.10)
% of total	672	36.2	37.6	20.8	5.4

B, regression coefficients adjusted for age, sex, income, education, cigarettes per day, past year quit attempts, survey mode (phone vs web), and year of recruitment; SE, standard errors;

* p<.05;

** p<.01;

*** p<.001;

[a], variation in n is due to missing data on one or more independent variables included in the models;

Table 4

Association of HWL reactions with quit intentions showing both main and interaction effects for the combined model and main effects for the stratified models by pre and post-policy implementation.

Independent variables	Quit intentions		
	Combined model	Stratified model by survey year	
	B (SE) [a] n=1499-1504 [b] N=2159-2169	Pre (2011) B (SE) [a] n=1085-1090 [b]	Post (2013) B (SE) [a] n=1073-1079 [b]
Notice	.04 (.02)	.03 (.02)	.12 (.02)***
Notice × wave	.08 (.03)**	--	--
Read	.03 (.02)	.02 (.02)	.11 (.02)***
Read × wave	.08 (.03)*	--	--
Cognitive reactions	.20 (.03)***	.19 (.04)***	.33 (.03)***
Cognitive reactions × wave	.10 (.04)*	--	--
Forgo	.11 (.04)*	.11 (.04)**	.16 (.05)***
Forgo × wave	.05 (.06)	--	--
Avoid	.04 (.07)	.06 (.08)	.09 (.06)
Avoid × wave	.04 (.09)	--	--
Attentional orientation	.04 (.06)	.05 (.06)	.23 (.06)***
Attentional orientation × wave	.17 (.08)*	--	--

B, regression coefficients; SE, standard errors; --, not applicable;

[a], regression coefficients based on separate models for each independent variable where estimates were adjusted for age, sex, education, income, cigarettes per day, past year quit attempts, survey mode (phone vs web), survey year, and year of recruitment for the combined model and for the same covariates except survey year for the stratified models;

[b], variation in n is due to missing data on one or more independent variables included in the models;

n, number of unique individuals; N, number of person-wave observations;