

Original Investigation

Smokers' responses toward cigarette pack warning labels in predicting quit intention, stage of change, and self-efficacy

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Abstract

Introduction: This paper is concerned with the effects of cigarette pack warning labels on quitting intentions. We examined whether different responses among smokers toward cigarette pack warning labels could predict quit intentions and self-efficacy in quitting. Variables studied were "noticing warning labels during last month," "reading or looking closely at warning labels," "avoiding looking at labels during last month," "thinking about health risks of smoking because of the warning labels," "more likely to quit because of the warning labels," and "stopping from having a cigarette when about to smoke one because of the labels."

Methods: A total of 2,006 adult smokers in Malaysia were surveyed in face-to-face interviews using a standardized questionnaire. Of those, 1,919 male smokers were included in the analyses.

Results: The responses "more likely to quit because of the warning labels" and "stopped from having a cigarette when about to smoke one" significantly predicted all stages of change and self-efficacy, independent of the other measures. In addition, thinking about the health risks and reading the warnings more often added extra predictive capacity but only in the early stages of contemplating change.

Discussion: Less intense processing of the information may be important in initiating thoughts, but cognitions about quitting and foregoing cigarettes are the key mechanisms by which warnings stimulate quitting intentions and help smokers feel capable

of succeeding. Malaysian smokers appear to respond to warnings in ways comparable with those from developed countries.

Introduction

Tobacco use is a global problem, resulting in a wide range of diseases and death and with great economic costs. By the year 2020, worldwide tobacco-related deaths are estimated to reach 10 million every year, two thirds of which will be in developing countries (Mackay, Eriksen, & Shafey, 2006). Cigarette smoking is the main form of tobacco use in Malaysia. Annually about one-quarter of Malaysian deaths (almost 10,000) are attributed to smoking-related diseases. This exceeds the number of road accident deaths in Malaysia during the year 2004 (Clearing-house for Tobacco Control, 2005).

Smokers' interest in quitting and their self-efficacy for doing so mediate and predict behavior change and the maintenance of change (Cote, Godin, & Gagne, 2004; DiClemente, 1981; DiClemente, Prochaska, & Gibertini, 1985; Dijkstra, Roijackers, & De Vries, 1998; Dino, Kamal, Horn, Kalsekar, & Fernandes, 2004; Fong et al., 2006; Haddad & Petro-Nustas, 2006; MacKenzie, Pereira, & Mehler, 2004). Figure 1A portrays the relationship between those mediators and behavior change.

Interest in quitting (or intention to quit) has been conceptualized both as a continuous variable and as a series of stages. The latter has been popularized by the transtheoretical model of Prochaska and DiClemente (Maibach & Cotton, 1995), which

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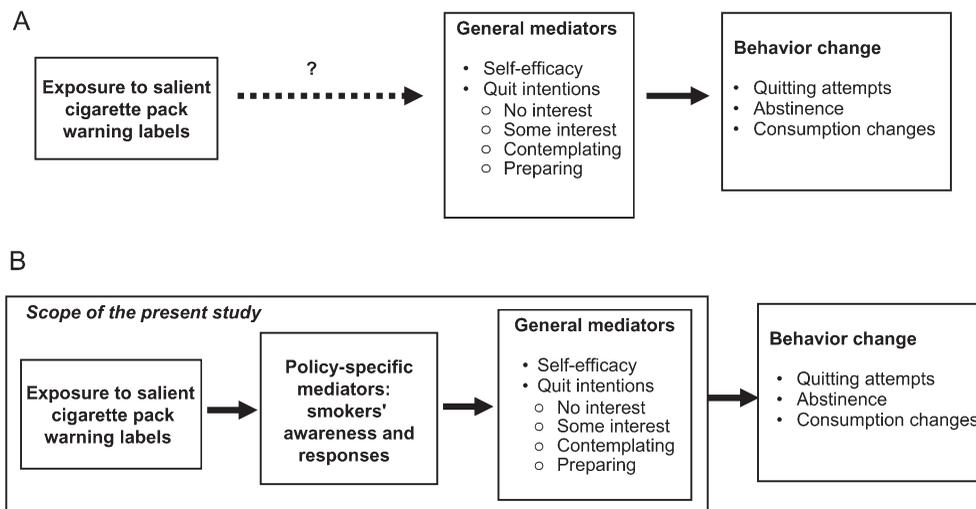


Figure 1. Relationship between mediators and behavior change (A). Scope of present study (B).

postulates three stages of change before quitting: precontemplation (no interest in quitting in the next 6 months), contemplation (in between), and preparation (planning to quit in the next 30 days). Others have suggested dividing the precontemplation stage (e.g., Dijkstra et al., 1998). One possible distinction is between those not planning to quit at all and those with no plans in the next 6 months. In the present study, we tested this distinction in conjunction with the other two transtheoretical model-based distinctions or stage boundaries.

We examined the effects of cigarette pack warning labels on quitting intentions. Stronger health warnings on cigarette packs are mandated for parties to the WHO Framework Convention on Tobacco Control (FCTC). Warnings on cigarette packs have been shown to lead to increased knowledge (Borland & Hill, 1997; Hammond, Fong, McDonald, Brown, & Cameron, 2006), and new warnings have been associated with increased cognitive processing and other reactions (Hammond et al., 2007). Some of these reactions to cigarette pack warning labels have been predictive of increased intentions to quit, more quit attempts, successful quitting, and smoking reduction (Borland, 1997; Hammond, Fong, McDonald, Cameron, & Brown, 2003). Borland (1997) found that a measure of foregoing cigarettes as a result of noticing the warnings was associated with increased intentions to quit, increased subsequent quit attempts, and having quit 5 months later, but they found no effect for noticing alone. Hammond et al. (2003) found that a measure of depth of cognitive processing was associated with the same three outcomes after a 3-month follow-up.

Both these studies were conducted in Western countries. Although evidence indicates that models of the determinants of quitting intentions developed in the West are predictive in non-Western countries (e.g., Wang, Borland, & Whelan, 2005), nothing is known about the impacts of health warnings. The present study was part of a larger survey of adult Malaysian smokers conducted under the International Tobacco Control (ITC) Policy Evaluation Project during the year 2005. The project aimed at evaluating the psychosocial and behavioral impact of key tobacco control policies (Fong et al., 2006). Some of the important findings identified earlier from our preliminary analysis were related to cigarette pack warning labels. Noticing

warning labels was significantly associated with increased knowledge about smoking-related health hazards and was correlated with previous quit attempts (Fathelrahman et al., 2006).

In the present study, we examined how specific smokers' responses to and perceptions of warning labels could predict interest in quitting and self-efficacy (Figure 1B).

Methods

Demographic characteristics

The original sample was 2,006 smokers, 95.7% male due to low smoking prevalence among females. In our present analyses, we included only male smokers (1,919 subjects). They came from six states in Malaysia (Selangor, 33.6%; Johor, 18.5%; Terengganu, 15.4%; Kedah, 13.6%; Sabah, 11.2%; and Sarawak, 7.8%); 61.4% were urban residents and 38.6% were from rural areas.

The average participant's age was 40.9 years (range = 18–98); 15.2% were aged 18–24 years, 33.6% were 25–39, 32.9% were 40–54, and 18.3% were 55 or older. Malays were the predominant ethnic group (68.4%); in addition, 11.4% were Chinese, 5.6% were Indian, and 14.6% were "Other."

Design

The design of the study was cross-sectional using face-to-face interviews with a standardized questionnaire. The questionnaire was developed in English and was based on the ITC policy evaluation survey first used in four Western countries (United States, United Kingdom, Canada, and Australia; Fong et al., 2006; Thompson et al., 2006). It was adapted for use in Malaysia and translated and back-translated into Malay. It was administered in either the English or the Malay version. Respondents were drawn from one state in each of the country's six zones: Kedah, Selangor, Johor, Terengganu, Sabah, and Sarawak. The sample of the households was selected using a multistage clustered sampling technique. Households targeted by the survey were enumerated by the Malaysian Department of Statistics. The occupants of 988 recruited households could not be reached

by the survey team for the following reasons: could not find house, vacant dwelling, not a household, safety threat, no answer after four visits, or no answer throughout the survey. Of those reached, only 44 refused to participate and 12 could not be interviewed due to language problems. According to the available records, the response rate for the whole survey (i.e., including male and female smokers) was 97.28%.

The questionnaire included 111 questions on various issues involving demographic characteristics of the respondent, smoking behaviors such as number of cigarettes smoked per day, quitting behaviors, knowledge about smoking-related health hazards, and perceptions and thoughts in a response to different antitobacco health policies (e.g., banning of smoking in public places, prohibition of advertisement of tobacco products, and cigarette pack warning labels).

The independent variables relevant to the present study were two measures of warning salience—"noticing warning labels during last month" (notice) and "reading or looking closely at warning labels" (read)—and four kinds of reactions to the warnings. Of the reactions, two were cognitive—"thinking about health risks of smoking because of the warning labels" (think harm) and "more likely to quit because of the warning labels" (quit-likely)—and two were behavioral—"avoiding looking at labels during last month" (avoid) and "stopping from having a cigarette when about to smoke because of the labels" (forego).

Outcome (i.e., dependent) variables studied were quit intentions and self-efficacy. Quit intentions were derived from the question "Are you planning to quit smoking?" with four possible answers: (1) "within the next month" (preparation), (2) "within the next 6 months" (contemplation), (3) "sometime in the future beyond 6 months" (some interest), and (4) "not planning to quit" (no interest). The last two responses were a division of the precontemplation stage of change (Maibach & Cotton, 1995). We created three dichotomous outcome variables: any interest in quitting (categories 1–3 vs. 4), contemplating it (categories 1 and 2 vs. 3 and 4), and preparing (category 1 vs. the rest).

The question related to self-efficacy was, "If you decided to give up smoking completely in the next 6 months, how sure are you that you would succeed?" Smokers with self-efficacy were defined as those who answered the question by saying extremely sure, very sure, or somewhat sure and were compared with those who said they were not at all sure.

Chi-square and binary logistic statistics were used for bivariate analyses, and multiple logistic regressions were used for multivariate analyses to test associations, whenever applicable. Odds ratios (ORs) and 95% CIs were calculated for each predictor variable. A *p* value of less than .05 was considered statistically significant.

The mediating effect of the different variables was tested according to the procedures of Baron and Kenny (1986) and Frazier, Tix, and Barron (2004). Mediation of an outcome requires that (a) an association exists between the predictor and the potential mediator, (b) both are associated with the outcome, and (c) the strength of the relationship between the predictor and the outcome is reduced or eliminated when the mediator is added to a predictive analysis.

Results

Reactions to the warning labels

More than 75% of the respondents had noticed and read or looked closely at the labels (Table 1). Reactions to the warnings were less common, ranging from 72.3% who reported the warnings stimulated thinking about health risks to a minority (19.1%) who reported avoiding the labels.

Regarding the outcome variables, 61.8% of smokers had at least some self-efficacy in quitting successfully. For intentions, 44.5% were not interested in quitting, 55.5% had current intentions to quit, and 11.5% and 5.4% were in the stages of "at least contemplation" and "preparation," respectively.

Associations between warning reactions and outcomes

Table 2 portrays bivariate analyses. The relationships between the six warning label variables and both the three intention measures and self-efficacy were all positive, although some were not significant. Avoidance of warnings and noticing the warnings were not significantly associated with preparing and any interest in quitting. The other four warning variables were associated with all outcomes.

Table 3 shows the results of multivariate analyses for each of the four outcomes separately. Avoidance of warnings was not a significant independent predictor in any case and was dropped from the analyses reported here. Foregoing cigarettes and quit-likely were predictive in all cases. For having any interest in quitting, health thoughts also were independently predictive, and noticing warnings had a negative effect. Contemplation also was predicted by reading the warnings. Preparation and self-efficacy had no other predictors.

Variables mediating the relationship between labels' salient factors and related outcomes

All six measures are positively correlated with each other, although the associations with avoidance of warnings were low. The pathways of action related to the outcomes are presented in Figure 2. This figure spells out the direct links but not the full mediational models. For the predictor variables, only the strongest bivariate relationships are included. We did not test for complex interactions between these variables in terms of their routes of influence, but as can be seen from Table 2, all have significant associations with the outcomes (albeit inconsistent for avoidance). Both quit-likely and foregoing cigarettes are directly related to the three intention measures and self-efficacy. Based on the bivariate associations, the main pathway of influence to quit-likely is from noticing to reading, from reading to thinking about the harms, and from thinking about the harms to thinking about quitting. Where there were no direct effects on the outcome, these variables that are conceptually earlier in the chain have their effects mediated by some combination of the subsequent ones. There is also a weak secondary path from avoidance to foregoing; however, because avoidance was significantly related only to contemplation and self-efficacy, its effects can only be thought of as mediated by foregoing in those two cases. Foregoing must be influenced by more than avoidance;

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Table 1. Frequencies and percentages of smokers' categories according to the different dependent and independent variables

Item			Frequency	Percentage
Factors related to salience of warning labels	<i>Notice</i> : During last month noticed cigarette pack warning labels (<i>N</i> = 1,878)	Yes	1,609	85.7
		No	269	14.3
	Read: During last month read or looked closely at labels (<i>N</i> = 1,872)	Yes	1,439	76.9
		No	433	23.1
Factors related to smokers' responses and perceptions	<i>Think harms</i> : Thinking about health risks of smoking because of warning labels (<i>N</i> = 1,874)	Yes	1,355	72.3
		No	519	27.7
	<i>Quit-likely</i> : More likely to quit because of the warning labels (<i>N</i> = 1,875)	Yes	1,119	59.7
		No	756	40.3
	<i>Forego</i> : During last month stopping from having a cigarette when about to smoke one (<i>N</i> = 1,869)	Yes	740	39.6
		No	1,129	60.4
<i>Avoid</i> : During last month avoid looking at labels (<i>N</i> = 1,854)	Yes	354	19.1	
	No	1,500	80.9	
Outcome variables	<i>Quit intention</i> : Planning to quit smoking (<i>N</i> = 1,884)	Yes	1,045	55.5
		No	839	44.5
	Stage of change was at least contemplation (<i>N</i> = 1,884)	Yes	217	11.5
		No	1,667	88.5
	Stage of change was preparation (<i>N</i> = 1,884)	Yes	101	5.4
		No	1,783	94.6
<i>Self-efficacy</i> in successful quitting (<i>N</i> = 1,900)	Yes	1,174	61.8	
	No	726	38.2	

based on bivariate associations, its strongest association is with quit-likely.

Discussion

The present study shows that warning labels have a clear relationship with quitting interest, particularly through the warnings stimulating thoughts about quitting and then leading to the person foregoing cigarettes. The foregoing finding essentially replicates that of Borland (1997) in an Australian sample, which showed that forgoing a cigarette was more frequent among smokers in the preparation and, to a lesser extent, contemplation stages of change, compared with those in precontemplation. We have shown that forgoing predicts equally well each of the three-stage transitions we studied. The finding for

quit-likely is consistent with that of Hammond et al. (2003) that depth of cognitive processing predicts intentions. Thus, these effects on quitting interest occur in cultural contexts quite different from those of the developed countries where the previous research was done (i.e., Australia and Canada primarily).

Previous work has shown that these reactions to warning labels go on to predict subsequent quitting activity, something we have not been able to test for here, but we will do so once the next wave of data from this study becomes available. Given that Malaysia has only small and nonprominent warnings, the findings to date attest to the potential impact of packaging information. The consistency of the findings also suggests that the impacts of warnings are likely to be fairly universal, although confirmation in a broader range of countries is still required and final confirmation on effects on subsequent behavior is needed.

Table 2. Factors related to the salience of warning labels and factors related to smokers' perceptions and responses predicting quit intention, self-efficacy in a successful quitting, and stage of changes (univariate analyses)^a

Reactions to the warning labels	Any interest in quitting		Contemplating		Preparing		Self-efficacy	
	OR (95% CI)	<i>p</i> Value	OR (95% CI)	<i>p</i> Value	OR (95% CI)	<i>p</i> Value	OR (95% CI)	<i>p</i> Value
Notice	1.20 (0.92–1.55)	.174	2.27 (1.34–3.84)	.002	2.02 (0.97–4.21)	.056	1.83 (1.41–2.37)	<.001
Read	1.59 (1.28–1.98)	<.001	2.93 (1.86–4.62)	<.001	3.23 (1.62–6.47)	<.001	1.90 (1.53–2.37)	<.001
Think harms	2.58 (2.10–3.18)	<.001	2.65 (1.77–3.95)	<.001	2.52 (1.42–4.48)	.001	2.63 (2.13–3.23)	<.001
Quit-likely	2.64 (2.18–3.19)	<.001	2.79 (1.99–3.93)	<.001	3.09 (1.86–5.14)	<.001	3.21 (2.64–3.91)	<.001
Forego	2.72 (2.23–3.31)	<.001	2.97 (2.21–3.98)	<.001	4.11 (2.64–6.39)	<.001	3.15 (2.56–3.88)	<.001
Avoid	1.24 (0.98–1.58)	.069	1.49 (1.06–2.08)	.020	1.36 (0.85–2.19)	.199	1.32 (1.03–1.69)	.026

Note. OR = odds ratio.

^aChi-square test.

Table 3. Factors related to the salience of warning labels and factors related to smokers' perceptions and responses predicting quit intention, self-efficacy in a successful quitting, and stage of changes (multivariate analyses: final models exclude nonsignificant effects)

Independent variables	Any interest in quitting		Contemplating		Preparing		Self-efficacy	
	Adj. OR (95% CI)	p Value	Adj. OR (95% CI)	p Value	Adj. OR (95% CI)	p Value	Adj. OR (95% CI)	p Value
Notice	0.58 (0.43–0.78)	<.001	<i>ns</i>		<i>ns</i>		<i>ns</i>	
Read	<i>ns</i>		1.78 (1.09–2.88)	.020	<i>ns</i>		<i>ns</i>	
Think harms	1.68 (1.28–2.19)	<.001	<i>ns</i>		<i>ns</i>		<i>ns</i>	
Quit-likely	1.76 (1.38–2.24)	<.001	1.72 (1.18–2.51)	.005	1.78 (1.02–3.12)	.043	2.36 (1.90–2.92)	<.001
Forego	1.99 (1.60–2.49)	<.001	2.12 (1.53–2.93)	<.001	3.24 (2.00–5.26)	<.001	2.18 (1.73–2.74)	<.001

Note. Adj. OR = adjusted odds ratio; *ns* = nonsignificant.

The present study is the first to look at the impacts of warnings on self-efficacy. Those who believed that they were more likely to quit because of the warning labels (*OR* = 2.35) and those who forewent cigarettes (*OR* = 2.18) were almost twice as likely to have high self-efficacy in quitting successfully.

A major limitation of the present study was its cross-sectional design, which limits our ability to understand the causal relationships between variables, especially between the suggested mediators and the outcomes. For example, do smokers stop smoking cigarettes because they have high self-efficacy or does stopping lead to increased self-efficacy? For intention, it may be more reasonable to assume that the intentions are made at the moment of surveying, whereas the reactions to the warnings are all recollections of past activity. However, even here there is room for “backward” influence. For example, those who are thinking of quitting might have their memories of reactions to warnings made more salient as they are relevant to their current state, so that part of the effect could be reporting bias. Similarly, for the mediational pathways, noticing warnings must precede reading them, which are likely precursors to the person’s thinking about their implications, which might influence behaviors,

but there can be exceptions. Avoidance by its nature preempts earlier stages based on memories (expectations) of what would be seen and of undesired reactions (e.g., feeling pressure to quit when not psychologically ready to do so) and is an example of why the causal pathway might not be as hypothesized. Future longitudinal research is required to confirm that our findings represent the directions of association we have inferred.

Our findings shed light on how variables might be important at various points in the progression from openness to quit at all, through contemplation, to planning in the next month. In particular, less in-depth processing of the warnings might be enough to influence smokers to move toward thinking about quitting, but from that point, unless the warnings facilitate those thoughts or stimulate foregoing cigarettes, their impact on progression might be limited. However, the small numbers who actually planned to quit and the consequent reduced power to find effects needs to be kept as an alternative explanation for the failure to find direct effects of the less conceptually proximal reactions to warnings.

Avoiding looking at the warning labels was not an independent predictor of either self-efficacy or the three quit intention variables. This result was consistent with the finding of a previous Canadian study on pictorial (graphic) warning labels (Hammond, Fong, McDonald, Brown, & Cameron, 2004). However, we found no evidence of any adverse effect of avoidance; any indirect effects were slightly positive.

One curious finding was the negative association between noticing warnings and having any interest in quitting once other factors were included. This finding suggests that merely noticing and not taking further action is predictive of no interest in quitting, which seems reasonable. The results show that some processing is necessary for any effect, but minimal processing probably has no positive effect in itself.

In conclusion, cognitive and behavioral responses toward health warnings were significant predictors of both quit intentions and self-efficacy. These responses could be used as indicators for the capacity of warning labels to stimulate behavior change. These findings confirm the importance of health warnings as a potentially important stimulus to smoking cessation and that the effects found in developed countries generalize to at least one developing country. Policy makers should be reassured that health warnings on cigarette packs are likely to have positive effects wherever they are implemented. Given that

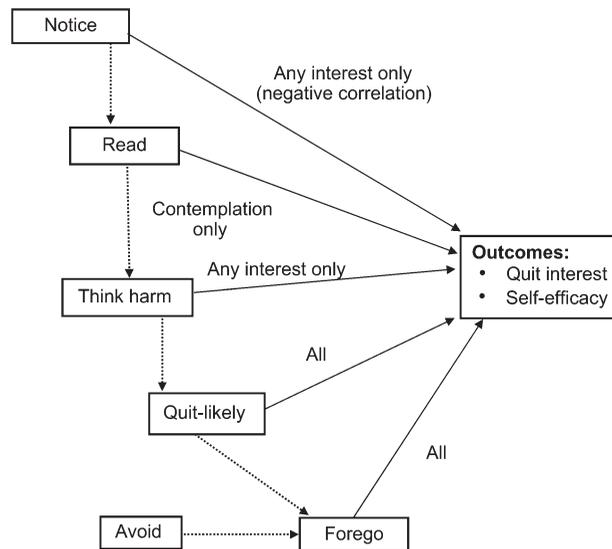


Figure 2. Summary of the direct pathways of influence of reactions to health warnings on interest in quitting and self-efficacy and likely main indirect effects. Dotted lines represent the strongest bivariate relationships between the reactions, with the direction of influence inferred.

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the effects were found with the relatively weak Malaysian warnings, it seems likely that even larger effects on quitting will be achieved if warnings are implemented in line with the FCTC obligations or recommendations.

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Declaration of Interests

The authors have no competing interests.

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