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# New anti-smoking legislation on youth smoking and quitting behaviours via a smoking cessation hotline

## Key Messages

1. The new anti-smoking legislation resulted in a short-term increase in the number of telephone calls received and subjects recruited by the quitline.
2. The effects of de-normalisation in the smoking behaviour appeared to have started among the youth smokers seeking help from Youth Quitline after the legislation. Nevertheless, more regular social marketing campaigns targeting youth quitting and the provision of free, easily accessible, and youth-oriented smoking cessation services are needed to maximise youth smokers' motivation to quit.
3. Smoke-free legislation needs to be reinforced by additional and regular campaigns to maximise smokers' motivation to quit.

## Introduction

The Hong Kong SAR government has implemented comprehensive smoke-free legislation on 1 January 2007 to prohibit smoking in all indoor workplaces, restaurants, karaokes, most public places/parks, and all beaches. Youth smokers are of concern as they are likely to become long-term smokers. They are more deterred by restrictions on smoking in public places, which are associated with the prevalence of youth smoking.<sup>1,2</sup>

Data were collected from the Youth Quitline<sup>3</sup> (first smoking cessation hotline for youth) before and after the smoke-free legislation came into effect to examine its impact on youth smokers in Hong Kong.

## Methods

This study was conducted from May 2007 to December 2008, using a two-group comparison. The Youth Quitline targeted Chinese smokers aged 12 to 25 years who smoked at least one cigarette in the past 30 days. Peer-led telephone counselling (a motivational intervention with multiple follow-up sessions) was provided. Data obtained from the quitline were classified into pre- and post-legislation groups.

From 8 August 2005 to 30 June 2008, 542 youth smokers consented and received telephone smoking cessation counselling from the Youth Quitline, of which 254 and 288 subjects formed the pre- and post-legislation groups, respectively.

Six months after legislation, the primary outcome was the self-reported number of quit attempts in the past 3 months; secondary outcomes included (1) the self-reported 7-day point prevalence quit rate, (2) self-reported continuous 1-month quit rate, (3) smoking reduction by at least 50%, and (4) the stage of readiness to quit in the past 30 days.

## Results

The Youth Quitline received 2765 calls, of which 1549 (56%) were relevant, and 600 eligible youth smokers were received. Our time-series analyses on the first three quarters of the pre- and post-legislation periods showed that the initial impact of legislation yielded an increase of 16.5 calls per week ( $P < 0.001$ ) and became insignificant within 6 months.<sup>4</sup> The mean number of calls per week decreased from 21.8 before implementation of the legislation to 15.0 thereafter. A higher percentage of smokers were recruited in the post- than the pre-legislation period (288/751 vs 254/798,  $P = 0.008$ ), given similar levels of the publicity about the quitline in terms of total events and the percentage initiated by The University of Hong Kong team in both periods (pre-legislation period: 57 events and 29 (50.0%);  $P = 0.52$ ).

Among the 542 youth smokers (mean age, 17.9 years; standard deviation [SD], 3.7 years) receiving smoking cessation interventions from Youth Quitline, 73%

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were male; 96% were single; 61% were full-time students; 45% had attained education below Form 4; 60% reported household income of HK\$10 000-29 999; 55% perceived good physical health; and 60% drank alcohol regularly. The youth smokers in the post-legislation period were younger, more were students, had higher household income, and had exercised in the past 30 days. Overall, the youth smokers started smoking at age 13.7 (SD, 2.4) years and consumed 11.1 (SD, 7.7) cigarettes daily (in their smoking days) in the past month, and 15% had a severe level of nicotine dependency. They usually smoked in public places (71%) and at home (52%). The post-legislation youth smokers were younger when they started smoking ( $P=0.02$ ), and fewer smoked at places for entertainment (24% vs 12%,  $P<0.001$ ), during social events (15% vs 6%,  $P<0.001$ ) and at school (17% vs 7%,  $P<0.001$ ).

Overall, 80% of the youth smokers had tried to reduce their daily cigarette consumption and 71% had previous attempts at quitting (lasting  $\geq 24$  hours). Of these smokers, 64% were in the lower stages of readiness to quit (pre-contemplation/contemplation). The youth smokers had high mean levels in perceived importance and difficulty in quitting, a moderate level of perceived confidence to quit successfully, and a relatively low level of self-efficacy to resist smoking. The two groups were not significantly different in these parameters.

### **Comparison of changes in quitting-related behaviours 6 months after legislation**

The post-legislation group showed more positive changes in quitting-related behaviours at month 6 compared to baseline, although only the difference in reduced cigarette consumption by at least half was significant. In particular, the post-legislation group had higher rates in having  $\geq 3$  quit attempts in the past 3 months (47% vs 39%), in having  $\geq 1$  quit attempt in the past 3 months (57% vs 53%), in self-reported successful quitting (7-day point prevalence quit rate of 27% vs 22%, continuous 1-month quit rate of 19% vs 18%), moving upward in the stage of readiness to quit (28% vs 26%), and reducing cigarette consumption by at least half (45% vs 36%,  $P=0.04$ ) [Table 1]. Exploratory analyses showed that the significant reduction in cigarette

consumption disappeared after excluding self-reported quitters (28% vs 22%,  $P=0.09$ ).

Multivariate logistic regression analysis revealed that the likelihood of having  $\geq 3$  quit attempts increased if the subject was in the preparation stage, had less nicotine dependency, was male, was more confident about quitting, and smoked fewer days in the last week. The likelihood of quitting increased if the subject was in the preparation or action stage, more confident about quitting, smoked fewer cigarettes (in smoking days) in the last month, and had an education level of Form 4-5. The likelihood of moving upward in the stage of readiness to quit increased if the subject had an education level above Form 5. The likelihood of reducing cigarette consumption by at least half increased if the subject was in the preparation stage, smoked fewer days in the last week, was more confident about quitting, and was recruited in the post-legislation period (Table 2).

### **Perceived impact of the smoke-free legislation after legislation**

Among the post-legislation group, about one third of the youth smokers had increased in their motivation to quit smoking (37%), perceived the importance in successful quitting (32%), and were confident of quitting (28%). About 11% perceived less difficulty in quitting, whereas over 60% exhibited no change in these variables. About 29% of the youth smokers reported receiving more encouragement to quit from their significant others; 22% offered more encouragement to other smokers to quit, and 78% were not affected by the legislation. After implementation of the legislation, 17% had increased and 35% had decreased exposure to second-hand smoke (Table 3).

## **Discussion**

The findings appeared to have an overall increase in awareness of smoking cessation among the youth smokers and persons around the smokers during the post-legislation period, as there were more calls and case recruitments for counselling, at least in the initial period after implementation. The indoor smoking ban has also restricted the venues for smoking among our youth smokers such as in schools,

**Table 1. Quitting behaviours at the 6-month follow-up (intention-to-treat analysis)**

Quitting behaviour	No. (%) of youth smokers			P value
	Total (n=542)	Pre-legislation (n=254)	Post-legislation (n=288)	
Had at least 3 quit attempts in the past 3 months	232 (42.8)	100 (39.4)	136 (47.2)	0.07
Had quit attempt(s) in the past 3 months	294 (54.5)	134 (52.8)	160 (56.5)	0.38
No smoking in the past 7 days	130 (24.0)	57 (22.4)	77 (26.7)	0.27
No smoking in the past month	101 (18.6)	45 (17.7)	56 (19.4)	0.66
Moved upward in stage of readiness to quit	144 (26.6)	65 (25.6)	81 (28.1)	0.56
Reduced daily cigarette consumption by at least half	219 (40.4)	92 (36.2)	130 (45.1)	0.04
Excluding quitters	n=412	n=197	n=211	
Had at least 3 quit attempts in the past 3 months	104 (25.2)	43 (21.8)	60 (28.4)	0.14
Reduced daily cigarette consumption by at least half	89 (21.6)	35 (17.8)	53 (25.1)	0.09

places for entertainment, and during social events, as fewer subjects reported smoking in those places. Previous studies showed that restriction in the overall social and physical environment for smoking would lead to de-normalisation of the smoking behaviour and would motivate smokers to quit.<sup>1,2</sup> More subjects in the post-legislation period indicated they would receive support from family and friends if they quit smoking, which shows a more favourable environment towards quitting.

Positive changes were noted in individual smoking and quitting behaviours at month 6 in the two periods, although not all differences were significant. After the legislation, the proportion of youth smokers reporting at least 3 quit attempts in the past 3 months increased from 39.4% to 47.2% (a difference of 7.8%). The legislation could motivate youth smokers to quit. There was a significant increase of 8.9% (from 36.2% to 45.1%) of those reducing cigarette consumption by at least half after

**Table 2. Multivariate logistic regression analysis of baseline predictors of four quitting-related outcomes at the 6-month follow-up (including quitters)**

Predictors	Adjusted odds ratio	95% CI
<b>Had at least 3 serious attempts in the past 3 months</b>		
Stage at baseline		
Pre-contemplation (reference)	1	
Contemplation	1.03	0.59-1.81
Preparation	2.54*	1.38-4.68
Action	1.28	0.50-3.30
Nicotine dependency		
Mild (reference)	1	
Moderate	1.10	0.64-1.90
Severe	0.50*	0.26-0.98
Gender		
Male (reference)	1	
Female	0.46*	0.38-0.99
Confidence in quitting (per score)	1.15*	1.04-1.27
No. of smoking days in the last week (per day)	0.87*	0.76-0.99
<b>7-day point prevalence quit rate</b>		
Stage at baseline		
Pre-contemplation (reference)	1	
Contemplation	1.10	0.59-2.03
Preparation	2.18*	1.20-3.97
Action	3.85*	1.73-8.57
Education level		
<Form 4 (reference)	1	
Form 4-5	0.60*	0.36-1.00
>Form 5	1.67	0.91-3.06
Confidence in quitting (per score)	1.19*	1.07-1.32
Daily cigarette consumption in smoking days in the last month (per cigarette)	0.97*	0.94-1.00
<b>Moved up in stage of readiness to quit</b>		
Education level		
<Form 4 (reference)	1	
Form 4-5	0.85	0.55-1.32
>Form 5	1.83*	1.09-3.07
<b>Reduced cigarette consumption by at least half</b>		
Stage at baseline		
Pre-contemplation (reference)	1	
Contemplation	1.03	0.62-1.70
Preparation	1.85*	1.10-3.12
Action	1.57	0.72-3.42
No. of smoking days in the last week (per day)	0.88*	0.79-0.99
Confidence in quitting (per score)	1.09*	1.00-1.20
Legislation period		
Before (reference)	1	
After	1.74*	1.17-2.61

\* P<0.05

**Table 3. Perceived impact of the anti-smoking legislation on youth smokers in the post-legislation group (n=288)**

Perceived impact	No. (%) of youth smokers		
	Increased	No change	Decreased
Motivation to quit (missing=29)	95 (36.7)	157 (60.6)	7 (2.7)
Importance in successful quitting (missing=29)	82 (31.7)	174 (67.2)	3 (1.2)
Confidence in quitting (missing=30)	73 (28.3)	179 (69.4)	6 (2.3)
Difficulty in quitting (missing=29)	39 (15.1)	191 (73.7)	29 (11.2)
Encouragement to quit from important others (missing=24)	76 (28.8)	187 (70.8)	1 (0.4)
Encouragement to others to quit (missing=19)	58 (21.6)	210 (78.1)	1 (0.4)
Second-hand smoke exposure (missing=16)	46 (16.9)	132 (48.5)	94 (34.6)

the legislation (including quitters). This showed a positive effect of the legislation on smoking behaviour among youth smokers. Calling during the post-legislation period was an independent predictor of smoking reduction by at least 50% after controlling for the effects of stage of readiness to quit, daily cigarette consumption, and confidence in quitting at baseline. Reducing smoking is an important first step to complete quitting in the future, and sheds light on developing and testing of effective strategies focusing on smoking reduction as a tool to reach complete cessation among the youth smokers.

The post-legislation group showed a slight increase in the 7-day point prevalent quit rate (22.4% vs 26.7%), but the result was not statistically significant, which may not be too surprising, as the youth smokers in our samples reported similar intention to quit before and after legislation. Despite the overall decrease in smoking prevalence in Hong Kong from 14% to 12% after the legislation, in 2008 the smoking prevalence among Hong Kong adolescents (aged 15-19 years) increased from 2.4% to 3.5%.<sup>5</sup> Therefore, the smoke-free legislation alone may not be effective in preventing the initiation of smoking and inducing quitting if there are no strong and sustained campaigns. The stage of readiness to quit and confidence of quitting at baseline were important independent predictors for quitting behaviour at month 6 among the youth smokers. To boost motivation and confidence, there should be personalised smoking cessation counselling such as the Youth Quitline.

Although most youth smokers in the post-legislation group thought that there had been little/no change, about one third of them reported a positive impact on their perceived self-efficacy to resist smoking, suggesting that more effort from the government in promoting quitting is necessary.

### **Limitations**

Only 288 youth smokers were recruited from the Youth Quitline after legislation, which was smaller than the 377 expected. The existing sample size did not provide sufficient statistical power to detect small legislation effects. In addition, the self-reporting of data could have introduced a bias. The follow-up rates could have been improved but as the rates were similar in both groups, the bias was unlikely, and a conservative approach was used by treating the drop-outs as smokers. About 33.9% of the pre-legislation youth smokers had their 6-month follow-

up during the post-legislation period, which might have introduced biases, particularly with respect to differences in smoking and quitting behaviours that might tend to reduce the apparent impact of the legislation.

### **Conclusion**

The effect of denormalisation of smoking has started to appear among the youth smokers who called Youth Quitline, as they reported an overall moderate reduction in cigarette consumption and fewer of them smoked in schools, places of entertainment, and during social events. There were positive changes in smoking reduction and more quit attempts initially, but so far there was no significant effect on complete cessation.

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