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Effectiveness of a smoking restriction policy on smoking behaviour in the military

Yu-Lung Chiu [a,b], Hsin-Chun Lo [c], Ching-Huang Lai [b], Shu-Ling Hwang [d], Fu-Gong Lin [b], Shu-Jia Huang [b], Shiang-Huei Jiang [b], Shan-Ru Li [e], Ya-Mei Tzeng [e], Wen-Hui Fang [f], Senyeong Kao [b,e,*]

[a] Graduate Institute of Medical Science, National Defense Medical Center, Taipei, Taiwan
[b] School of Public Health, National Defense Medical Center, Taipei, Taiwan
[c] Air Force Institute of Technology, Taiwan
[d] Center for General Education, National Defense Medical Center, Taipei, Taiwan
[e] Graduate Institute of Life Science, National Defense Medical Center, Taipei, Taiwan
[f] Department of Family and Community Medicine, Tri-Service General Hospital, National Defense Medical Center, Taipei, Taiwan

HIGHLIGHTS

- Active and regular restriction policies in the military were evaluated.
- The change of smoking behaviours was assessed during basic recruit training.
- 867 and 840 conscripts under the active and regular restriction policies were observed.
- Active smoking restrictions could reduce the daily cigarette consumption of smokers.
- Smokers under the active smoking restrictions decrease nicotine dependence.

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1. Introduction

The World Health Organization estimates the number of annual deaths attributable to tobacco smoking to increase to 8 million by 2030. Tobacco use is a major preventable cause of morbidity and mortality and is responsible for one-tenth of all adult deaths worldwide (World Health Organization, 2012). In Taiwan, the mortality rate attributable to smoking was found to be 27%, and the direct costs of smoking and second-hand smoke exposure amounted to US$828,000,000, accounting for 3.4% of the total personal healthcare expenditure (Sung, Chang, Wen, & Tsai, 2014; Wen et al., 2005). The prevalence of smoking among military recruits is higher than that of the general population (Bray et al., 2009; Nelson & Pederson, 2008). Tobacco may be a part of the military culture because military members use tobacco for pleasure and comfort and as a morale booster.[5] In Taiwan, the prevalence of cigarette smoking among military conscripts significantly increases during military service and is higher than that of the general population (Chu, Wu, Shen, & Lin, 2006; Lin, Wu, Lai, Shi, & Chu, 2010). Moreover, compared with non-smokers in the military, smokers showed worse inspiratory vital capacity and a greater rate of decrease in cardiorespiratory fitness (Macera et al., 2011; Sekulic & Tocilj, 2006). Because of the high rate of smoking in the military and the adverse health effects of smoking, a policy restricting cigarette smoking for military conscripts was promulgated in Taiwan.

In 2003, the Ministry of Defense and the Health Promotion Administration jointly initiated a tobacco hazard prevention program in the Taiwanese military. The program consisted of the following four components: a smoke-free policy, education, smoking cessation services, and surveillance (Bureau of Health Promotion, Department of

* Corresponding author.
E-mail addresses: fugong@mail.ndmctsgh.edu.tw (F.-G. Lin), kao@mail.ndmctsgh.edu.tw (S. Kao).

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Health, 2010). Under the program, commanding officers can set additional smoke-free restriction policies in every camp. The smoking restriction policies during basic recruit training in Taiwan include reducing the number of designated smoking areas, increasing the distance between the designated smoking areas, defining the time periods allocated for smoke, and restricting smoking behaviours. Smoking is not completely prohibited in the military, but it is restricted to the designated areas. Implementing a no-smoking policy during basic military training in the United States reduced the smoking prevalence among military members (Conway et al., 2004; Hurtado & Conway, 1996; Woodruff, Conway, & Edwards, 2000). Research on the effect of environmental smoking restrictions in military settings in Asian countries is scant. Therefore, we evaluated the effectiveness of a smoking restriction policy on Taiwanese military conscripts who smoked.

2. Materials and methods

2.1. Study design and sample

This is an observational study. From August 1, 2014, until April 2, 2015, 867 and 840 current smokers were recruited from the enrolees of a new training regiment of the Taiwan army under active and regular smoking restriction policies, respectively. The conscripts were assigned to the regiment according to their place of residence. All participants completed a written informed consent for data collection after receiving a complete description of the process of the study. Before the conscripts entered the new training regiment, smokers were identified using self-reports, which recorded that they smoked >100 cigarettes in their lifetime. The research protocol was approved by the Institutional Review Board of the Tri-Service General Hospital, National Defense Medical Center (2-102-05-012).

2.2. Smoking restriction

The differences between the smoking restriction policies for the two groups originally were as follows:

(1) Time period allocated for smoking: The members under the active smoking restriction policy were allowed to smoke during morning and evening break time, whereas those members under the regular smoking restriction policy could smoke at any time.

(2) Number of designated smoking areas: The average numbers of designated smoking areas, which were calculated based on the ratio of the number of designated smoking areas versus the total units of training (under the active and regular smoking restriction policies), were 0.71 and 1.60, respectively.

(3) Distance between the designated smoking areas: The mean distances between the smoking areas available for members under the active and regular smoking restriction policies were 10.20 m and 6.92 m, respectively.

(4) Smoking restrictions: The smokers under the active smoking restriction policy were permitted to go to the designated smoking areas as a group, but the smokers under the regular smoking restriction policy were permitted to smoke independently.

2.3. Data collection

Data were collected using a questionnaire at the onset and 8 weeks after training. The survey at the onset captured data on the following control variables: education level, age, cigarette smoking habit in their family and/or among their friends, perceived harmful effects of smoking, perceived benefits of smoking, and perceived effects of smoking on interpersonal relationships. Outcome variables were assessed at the onset and at the end of training.

2.4. Outcome variable assessment

This study evaluated smoking status, daily cigarette consumption and the level of nicotine dependence as the outcomes. Smoking status was defined as a current smoker or a former smoker. Eight weeks after training, smokers were asked, "Have you smoked any cigarettes in the previous 7 days?" Respondents who answered "*no*" were classified as former smokers, and those who answered "*yes*" were classified as current smokers. The smoking cessation rate was the percentage of smokers who self-reported as former smokers. To examine daily cigarette consumption, data on the number of cigarettes smoked per day for the past 30 days were recorded. The Fagerstrom Test for Nicotine Dependence (FTND) was used to determine the level of nicotine dependence (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991).

2.5. Control variable measurements

Education level was classified as junior high school or higher, senior high school, higher vocational school, college, and university or higher. The perceived harmful effects of smoking were categorised as respiratory disease, cancer, periodontal disease, genital disease, and cardiovascular disease. The perceived benefits of smoking were feeling refreshed, relieving stress, and building relationships with other smokers. Each item was answered with '*yes*' or 'no.' The participants responded '*positive*,' '*none*,' or '*negative*' when asked about the perceived effects of smoking on interpersonal relationships.

Table 1
Characteristics of smoking conscripts.

Variable	Active smoking restriction policy (n = 867)		Regular smoking restriction policy (n = 840)		p[a]
	n	%	n	%	
Education level					<0.001
Junior high school or below	95	11.0	306	37.6	
Senior high school	159	18.3	322	39.6	
Higher vocational school	43	5.0	11	1.4	
College	539	62.2	169	20.8	
University or above	31	3.6	5	0.6	
Age (Mean ± SD)	23.6 ± 1.62		20.8 ± 2.04		<0.001
Cigarette smoking of family or friend	685	79.0	718	85.5	<0.001
Perceived smoking harm					
Respiratory disease	704	81.2	631	75.1	0.003
Cancer	605	69.8	554	66.0	0.101
Periodontal disease	335	38.6	283	33.7	0.038
Genital disease	513	59.2	526	62.6	0.158
Cardiovascular disease	480	55.4	394	46.9	0.001
Perceived smoking benefit					
Refreshing	431	49.7	404	48.1	0.536
Relieving stress	681	78.5	651	77.5	0.643
Building relationship with smokers	458	52.8	354	42.1	<0.001
Perceived interpersonal relationship caused by smoking					<0.001
Positive effect	472	54.4	341	42.1	
No effect	335	38.6	396	48.9	
Negative effect	60	6.9	73	9.0	

[a] Examined by chi-square test and Independent *t*-test.