

# Factors Associated with Cigarette Smoking Among Young Military Conscripts in Taiwan

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**Background:** The purpose of this study was to identify the most important risk factors that influence cigarette smoking among young adult military conscripts in Taiwan.

**Methods:** A cross-sectional survey was conducted among young conscripts (19–25 years old) in Taiwan from August to December 2001. A total of 3,569 conscripts who had served more than 1 month in the military were chosen. Information regarding cigarette smoking and other factors was collected using a standard structured questionnaire.

**Results:** Subjects whose lifestyles included betel-nut chewing (OR, 16.81; 95% CI, 11.35–25.91) and alcohol drinking (OR, 2.11; 95% CI, 1.54–2.90) were more likely to smoke compared to subjects without these adverse behaviors. Subjects whose education stopped at junior high school or before were more likely to smoke compared to those with a university degree (OR, 5.36; 95% CI, 3.77–7.69). Subjects who had a higher proportion of peers who smoked were more likely to smoke compared to those with no peers who smoked (OR, 3.16; 95% CI, 2.42–4.15). Subjects whose parents and peers approved of smoking were also at a higher risk for smoking compared with those whose parents and peers disapproved (father's approval—OR, 3.28 and 95% CI, 2.02–5.43; mother's approval—OR, 3.11 and 95% CI, 1.47–7.12; peer approval—OR, 2.27 and 95% CI, 1.60–3.22).

**Conclusion:** From this study, we found that education level, betel-nut chewing, alcohol intake, smoking behavior of peers, and the attitudes of parents and peers toward smoking are all associated with the risk of a young adult conscript becoming a habitual cigarette smoker. These results provide insight for targeting critical risk factors in helping these individuals control or cease their cigarette smoking habit in the future. [*J Chin Med Assoc* 2008;71(11):559–565]

**Key Words:** cigarette smoking, factors, military conscript

## Introduction

Substantial evidence has shown that cigarette smoking is a leading cause of morbidity and mortality in chronic diseases such as cardiovascular disease, cancer and chronic obstructive pulmonary disease.<sup>1,2</sup> In our previous paper, we reported that the prevalence of cigarette smoking is slightly elevated during military service and is even higher among young conscripts when compared with the general population.<sup>3</sup> In Taiwan, almost all young male adults are required to serve in the armed forces. Therefore, preventing smoking among young adult conscripts is an important national health issue.

Many general characteristics such as age, education level, area of residence, time served in the military, and

parental education level are potential risk factors associated with cigarette smoking in adolescents and young adults. In a military study, age difference was a contributing factor in explaining cigarette smoking among young conscripts.<sup>4</sup> Furthermore, in Europe, national health data showed that smoking was more prevalent among less educated people than among more educated people.<sup>5,6</sup> This agrees with many studies that show the trends in cigarette smoking may be associated with education level.<sup>7,8</sup> In addition, a subject's area of residence, service period, and parents' education levels are also associated with cigarette smoking.<sup>9–13</sup>

The use of alcohol, betel-nut chewing, and cigarettes contribute to substantial health risks and are often used concurrently among adults. Ko et al<sup>14</sup> found that



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concurrent smoking and drinking habits were closely related to betel-nut chewing preferences. Similarly, Wen et al<sup>15</sup> demonstrated a relationship between betel-quid chewing and cigarette smoking, and the 2 were associated with a combined effect that may lead to serious health consequences. Recently, Weitzman and Chen<sup>16</sup> found that over 98% of current smokers also drink alcohol, and smoking and drinking are powerfully interrelated. Many studies have reported the concurrence of smoking and drinking among adults.<sup>17</sup>

The prevalence of smoking was found to be higher in subjects who were raised in environments in which there were many smokers, particularly when parents and peers were smokers.<sup>18–22</sup> In addition, young adults were more likely to smoke when their parents or peers expressed positive attitudes toward smoking.<sup>23</sup>

There is growing concern that during military service, young conscripts might develop a habit of cigarette smoking. Adequate understanding of the risk factors associated with smoking will not only lead to understanding the total burden to society, but is also useful in the development of effective prevention strategies. The purpose of this study was to identify the most important risk factors that influence smoking among military conscripts in Taiwan.

## Methods

### *Study sample and study design*

A cross-sectional survey was conducted among military conscripts in the southern and eastern regions of Taiwan from August 1 to December 31, 2001. A total of 3,617 young adult conscripts who had served more than 1 month were included in this study. Forty-eight subjects with incomplete or missing data were excluded from the final analysis. Informed consent was obtained from the participants before survey.

### *Data collection and measurement*

All participants completed a structured questionnaire concerning sociodemographics, lifestyle, and the attitudes and behavior of family members and peers. The complete list of questions is shown in Tables 1 and 2. The questionnaire used in this study had been tested by 68 military conscripts before survey. The validity and consistency of the questionnaire were acceptable to measure the habit of smoking among these subjects. The content validity of our questionnaire about the attitude of smoking was 0.96, split-half reliability was 0.75, and Cronbach's alpha was 0.8.

With regard to sociodemographics, we divided the education level of the military conscripts into "junior

high school or below", "senior high school", "college", and "university or above" on the questionnaire. For parents, due to the likelihood of a lower education level for that generation, we added "elementary school". We defined smoking based on a modification of the World Health Organization questionnaire.<sup>24</sup> A current smoker was defined as a subject who smoked  $\geq 1$  cigarette/day during the past 30 days and had smoked  $> 100$  cigarettes in their lifetime, or who considered himself a current habitual smoker. A past smoker was defined as a subject who had not smoked cigarettes during the past 30 days, but had smoked  $> 100$  cigarettes in their lifetime, or who did not consider himself a current habitual smoker. A nonsmoker was defined as a subject who had not smoked cigarettes during the past 30 days and had not smoked  $> 100$  cigarettes in his lifetime, or who considered himself a nonsmoker.

We defined drinking based on drinking frequency, alcohol concentration, or a history of habitual drinking. A current drinker was defined as a subject who consumed  $\geq 2$  drinks/week of liquor (or equal alcohol concentration/week) in their lifetime or who was a habitual drinker before or during military service.<sup>25</sup>

We defined habitual betel-nut chewing based on chewing frequency and history. A current betel-nut chewer was defined as a subject who had chewed  $\geq 1$  betel nut during the past 30 days, had chewed  $\geq 1$  betel nut/week, and had chewed  $> 50$  betel nuts in their lifetime before or during military service.<sup>25</sup>

### *Statistical analysis*

We conducted  $\chi^2$  tests for each characteristic (e.g. age, education level, etc.) to evaluate the impact of each factor on cigarette smoking status (i.e. nonsmoker, past smoker, current smoker). We used multivariate logistic regression analyses to assess which factors could best predict cigarette smoking behavior among young adults in Taiwan. A 2-tailed  $p$  value  $< 0.05$  was considered statistically significant. All statistical analyses were conducted using the SAS statistical package (SAS Institute Inc., Cary, NC, USA).

## Results

The general characteristics and cigarette smoking status of the 3,569 subjects are presented in Table 1. All subjects were male, with a mean age of  $22 \pm 2$  years. Overall, the prevalence of current cigarette smokers was 51.3% among young adults in Taiwan. Smoking was significantly associated with age, education level, region of residence, and time served in the military (all

**Table 1.** General characteristics and cigarette smoking status of 3,569 young military conscripts in Taiwan\*

	Nonsmoker (n=1,715)	Past smoker (n=24)	Current smoker (n=1,830)	$\chi^2$ test
Age (yr)				211.3 <sup>†</sup>
≤20	406 (37.0)	8 (0.7)	685 (62.3)	
21	566 (43.0)	10 (0.8)	739 (56.2)	
22	259 (56.8)	2 (0.4)	195 (42.8)	
23	199 (65.2)	2 (0.7)	104 (34.1)	
≥24	285 (72.3)	2 (0.5)	107 (27.2)	
Education level				501.7 <sup>†</sup>
≤ Junior high school	124 (19.1)	4 (0.6)	523 (80.3)	
Senior high school	898 (45.2)	16 (0.8)	1,072 (54.0)	
College	355 (68.7)	2 (0.4)	160 (30.9)	
≥ University	338 (81.4)	2 (0.5)	75 (18.1)	
Region of residence in Taiwan				12.9 <sup>†</sup>
Northern	304 (54.5)	4 (0.7)	250 (44.8)	
Middle	204 (47.7)	3 (0.7)	221 (51.6)	
Southern	1,130 (47.0)	15 (0.6)	1,258 (52.4)	
Eastern	77 (42.8)	2 (1.1)	101 (56.1)	
Time served in military (mo)				24.1 <sup>†</sup>
1–6	264 (43.2)	6 (1.0)	341 (55.8)	
7–12	599 (49.2)	7 (0.6)	612 (50.2)	
13–18	534 (53.1)	5 (0.5)	467 (46.4)	
> 18	318 (43.3)	6 (0.8)	410 (55.9)	
Betel-nut chewing status				690.1 <sup>†</sup>
No	1,688 (58.9)	20 (0.7)	1,159 (40.4)	
Yes	27 (3.8)	4 (0.6)	671 (95.6)	
Alcohol drinking status				272.6 <sup>†</sup>
No	1,643 (53.6)	21 (0.7)	1,399 (45.7)	
Yes	72 (14.2)	3 (0.6)	431 (85.2)	

\*Data presented as n (%); <sup>†</sup> $p < 0.05$ .

$p < 0.05$ ). The highest prevalence of cigarette smoking was observed among the youngest subjects with the lowest educational levels. The prevalence of current cigarette smokers went from 62.3% to 27.2% as age increased from ≤20 to ≥24 years old. More dramatically, the prevalence of current smokers was 80.3% among subjects with an education level ≤ junior high school, while it was only 18.1% among subjects with a university degree. A somewhat higher prevalence of cigarette smokers was observed among residents of eastern Taiwan compared to residents in other regions. The prevalence of current smokers was reduced among subjects who had served 18 months compared to those who had served ≤6 months in the military. However, among subjects who had served > 18 months, smoking prevalence was similar to that observed among subjects who had served ≤6 months. The adverse behavior of cigarette smoking was significantly correlated with alcohol drinking and betel-nut chewing (all  $p < 0.05$ ).

The characteristics of the subjects' parents and peers are presented in Table 2. Smoking was significantly associated with only the father's education level, the smoking habits of the parents and peers, and the attitudes of parents and peers toward smoking (all  $p < 0.05$ ). Smoking prevalence was highest among subjects whose parents and peers approved of smoking. Prevalences of 84.6%, 91.5%, and 71.2% were observed among subjects whose fathers, mothers, and peers approved of smoking, respectively. Prevalence of smoking was also high among subjects whose parents and peers were current smokers. Prevalences of 56.2%, 62.1%, and 61.5% were observed among subjects whose fathers, mothers, and >50% of peers smoked, respectively. Smoking prevalence was influenced by the relative education levels of the father and mother to a similar extent. Smoking prevalence was 54.7% among subjects whose fathers had the least education, and only 39.0% among subjects whose fathers had the most education.

**Table 2.** Characteristics of the family and peers of 3,569 young military conscripts in Taiwan\*

	Nonsmoker (n = 1,715)	Past smoker (n = 24)	Current smoker (n = 1,830)	$\chi^2$ test
Father's education level				35.9 <sup>†</sup>
≤Elementary school	692 (44.5)	13 (0.8)	851 (54.7)	
Junior high school	393 (46.0)	4 (0.5)	457 (53.5)	
Senior high school	427 (51.9)	5 (0.6)	391 (47.5)	
≥College or above	203 (60.4)	2 (0.6)	131 (39.0)	
Mother's education level				8.2
≤Elementary school	882 (47.0)	12 (0.7)	981 (52.3)	
Junior high school	412 (46.7)	7 (0.8)	463 (52.5)	
Senior high school	340 (50.7)	4 (0.6)	326 (48.6)	
≥College or above	81 (57.0)	1 (0.7)	60 (42.3)	
Father's smoking status				60.4 <sup>†</sup>
No	784 (56.0)	5 (0.4)	610 (43.6)	
Yes	931 (42.9)	19 (0.9)	1,220 (56.2)	
Mother's smoking status				12.4 <sup>†</sup>
No	1,624 (48.8)	23 (0.7)	1,679 (50.5)	
Yes	91 (37.5)	1 (0.4)	151 (62.1)	
Father's attitude towards son's smoking				360.2 <sup>†</sup>
Does not approve	1,133 (62.9)	10 (0.6)	657 (36.5)	
Approve	32 (14.1)	3 (1.3)	192 (84.6)	
No comment	550 (35.7)	11 (0.7)	981 (63.6)	
Mother's attitude towards son's smoking				246.7 <sup>†</sup>
Does not approve	1,393 (56.2)	17 (0.7)	1,067 (43.1)	
Approve	10 (7.7)	1 (0.8)	118 (91.5)	
No comment	312 (32.4)	6 (0.6)	645 (67.0)	
Percentage of peers who smoke				317.4 <sup>†</sup>
Less than half	427 (79.6)	3 (0.6)	106 (19.8)	
About half	470 (53.8)	7 (0.8)	397 (45.4)	
More than half	818 (37.9)	14 (0.6)	1,327 (61.5)	
Peer attitudes toward subjects' smoking				252.4 <sup>†</sup>
Do not approve	556 (71.3)	8 (1.0)	216 (27.7)	
Approve	103 (28.2)	2 (0.6)	260 (71.2)	
No comment	1,056 (43.6)	14 (0.6)	1,354 (55.8)	

\*Data presented as n (%); <sup>†</sup>p < 0.05.

Multivariate logistic regression indicated that the factors most significantly associated with smoking behavior of young adults were: education level, betel-nut chewing, alcohol drinking, parents' attitude toward smoking, proportion of peers who currently smoked, and peer attitude toward smoking (Table 3). Based on the odds ratios (OR), subjects who chewed betel nuts had the highest probability of cigarette smoking (OR, 16.81; 95% confidence interval [CI], 11.35–25.91). Subjects with an education level ≤ junior high school had the second highest probability of cigarette smoking (OR, 5.36; 95% CI, 3.77–7.69). Subjects whose parents approved of smoking had the next highest probability of smoking (father's approval—OR,

3.28 and 95% CI, 2.02–5.43; mother's approval—OR, 3.11 and 95% CI, 1.47–7.12), and a similar probability was observed when > 50% of the subjects' peers were current smokers (OR, 3.16; 95% CI, 2.42–4.15). Finally, subjects with a drinking habit were as likely to smoke as subjects whose peers approved of smoking (drinking—OR, 2.11 and 95% CI, 1.54–2.90; peer approval—OR, 2.27 and 95% CI, 1.60–3.22).

## Discussion

In this cross-sectional study, we found that the prevalence of smoking among young military adults was

**Table 3.** Factors associated with cigarette smoking among 3,569 young military conscripts in Taiwan

Independent variables	OR	95% CI
Education level		
≤ Junior high school	5.36	3.773–7.69
Senior high school	2.66	2.002–3.58
College	1.63	1.177–2.30
≥ University	1.00	
Betel-nut chewing status		
No	1.00	
Yes	16.81	11.355–25.91
Alcohol drinking status		
No	1.00	
Yes	2.11	1.548–2.90
Father's attitude towards son's smoking		
Does not approve	1.00	
Approve	3.28	2.022–5.43
No comment	1.96	1.594–2.41
Mother's attitude towards son's smoking		
Does not approve	1.00	
Approve	3.11	1.477–7.12
No comment	0.99	0.799–1.24
Percentage of peers who smoke		
Less than half	1.00	
About half	2.43	1.822–3.26
More than half	3.16	2.422–4.15
Peer attitudes toward subjects' smoking		
Does not approve	1.00	
Approve	2.27	1.600–3.22
No comment	1.94	1.558–2.42

OR = odds ratio; CI = confidence interval.

significantly associated with education level, betel-nut chewing, alcohol drinking, parental and peer attitudes toward smoking, and the proportion of peers who smoke. Further, after adjusting for potential confounding factors, we found that age, region of residence, period of service in the military, and parents' education levels were not significantly associated with cigarette smoking in this population.

We found that education was a strong predictor of habitual cigarette smoking among young adult conscripts. A person's education level may reflect their capacity to take in new information and to act on it.<sup>6,13,26,27</sup> In addition, subjects with more education may have more cultural, intellectual, socioeconomic, and psychosocial resources to help them face adverse

personal circumstances in a healthy way compared to those with less education.

We found that lifestyle habits such as alcohol drinking and betel-nut chewing were also associated with cigarette smoking even after controlling for potential confounding factors. The betel-nut is popular in certain Asian countries and it is predominantly used by men.<sup>28</sup> Males chew betel nut to project a "macho" image, and it is often used on social occasions.<sup>14,29</sup> Our results are consistent with previous reports that betel-nut chewers were more likely to have habits like cigarette smoking or drinking of alcoholic beverages,<sup>14</sup> and that alcohol drinking, betel-nut chewing, and cigarette smoking are likely to cluster together in adult subjects.<sup>16,17,30</sup>

Our results suggest that parents who approve of smoking are more likely to have children who smoke as young adults. This is consistent with the results of Shakib et al,<sup>18</sup> who also identified parental approval of smoking as one of the most important determinants of adolescent smoking. In the Chinese culture, children are taught to take heed of their parents and elders and to act according to their guidance without objection.<sup>31</sup> Therefore, parents' attitudes toward smoking may have direct effects on a subject's smoking habits, and may be a good target in a smoking prevention program. Further, our models suggest no significant relationship between the parents' and subject's smoking habits. This is in contrast to some studies which found that young adults with parents who smoke are more likely to become smokers.<sup>18,19</sup> Our results suggest that the smoking status of adult military conscripts might be related to their peers' smoking status and attitudes toward subjects' smoking, because they live in the military base most of their time, not with the family, which could explain these findings.

Our findings show that young adults are more likely to smoke if their friends smoke or express approval of smoking. This result agrees with those of Unger et al,<sup>32</sup> who showed that both perceived access and peer influences are significant risk factors for habitual smoking. Other studies also identified peer influence as one of the determinants of smoking in young adults.<sup>20–22</sup> Peers often mimic and act as reference groups in support of opinions, attitudes, and practices of adverse behaviors. Young adults commonly start smoking in order to identify with friends. Flay et al<sup>20</sup> clearly showed that friends who smoke have both direct and indirect influences on initiation of smoking. This evidence suggests that peers can be used as an important resource to help young adults in a smoking cessation program.

Our study has several limitations that should be noted. First, the information we collected on smoking



habits was based on a self-report structured questionnaire, and misclassifications may have occurred if underreporting of smoking was systematic; for example, underreporting may be linked to sociocharacteristic status. However, underreporting associated with sociocharacteristic status has previously been shown to have little or no effect.<sup>33,34</sup> Thus, we assume that any misclassifications are likely to be minimal and random and would only attenuate our results. Second, this study examined the relationship between subjects' reported smoking status and their perceptions of smoking among parents and friends. However, we did not actually collect data from their parents and friends. The perception of smoking among friends may be more closely related to a subject's own smoking habits than to the actual number of friends who smoke.<sup>35</sup> Finally, the cross-sectional survey design limits exploration of the causal relationship between lifestyle factors, attitude of peers and adverse behaviors among young adults. Previous evidence has indicated that affiliation with friends who smoke leads to smoking behavior, but studies have also shown that adolescents who smoke tend to seek out friends who are also smoking.<sup>21</sup> Further studies are necessary to examine peer influence more closely.

In conclusion, this study has identified the most effective ways to approach individuals at high risk for cigarette smoking and to develop population-based multifactorial interventions to help young adult conscripts control or quit smoking in the future. We should also propose more anti-smoking programs and a cigarette smoking-free environment to the Department of Defense.

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