



Research Article

Factors Associated with Early Smoking Initiation among Korean Adolescents

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SUMMARY

Purpose: The aim of this study was to identify factors associated with early initiation of cigarette smoking among Korean adolescents.*Methods:* A secondary analysis was conducted on the 2012 Korea Youth Risk Behavior Web-based Survey data using Cox proportional hazards regression.*Results:* Early smoking initiation was associated with being male, having a positive subjective health status, perceiving oneself as thin or average weight (body image), having an average happiness level, being stressed, consuming alcohol, having suicidal ideation, experiencing sexual intercourse, having low or average academic grades, having a parental education level of high school or below, not taking a family trip in the previous 12 months, and having a family that approves of smoking in the home.*Conclusions:* Interventions targeting the prevention of smoking initiation among adolescents should include individual factors such as health status, body weight, perceived mental health status, health-risk behaviors, and academic characteristics as well as family factors that reinforce family cohesion and home smoking bans. Moreover, male adolescents aged 12–13 years and their parents should be the main target of these interventions.

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Introduction

Smoking is one of the major health hazards globally [1]. Adolescents are still physically developing; therefore, smoking can be more damaging to the health of youth by triggering the development of chronic diseases and causing cell and tissue damage to a greater extent than it does in adults due to the toxic exposure to nicotine, tar, carbon monoxide, and the other toxic carcinogens contained in tobacco [2]. Despite our knowledge of the great risk of smoking initiation among South Korean youth, the age of smoking initiation has fallen in South Korea (hereafter Korea) from an average of 14.1 years old in 2008 to 13.5 years old in 2013 [3].

Smoking in youth can have a lifelong negative effect on health. One-third of adult smokers who start smoking as teenagers are at a high risk of mortality due to smoking-related diseases such as lung cancer or cardiovascular diseases [4]. Smoking in youth also has a negative effect on smoking behaviors in adulthood [5]. For

example, those who have smoked during childhood are five times more likely to smoke after childhood, and those who have started smoking in early adolescence are likely to become heavy smokers in adulthood [3,6]. Moreover, lower rates of successful smoking cessation in adulthood are associated with smoking initiation in early adolescence. Those who start smoking before age 13 are twice more likely to become heavy smokers (>20 cigarettes per day) and are much less likely to stop smoking in adulthood than those who start smoking after age 20 are [7]. Therefore, it is of utmost importance that public health programs tackle the problem of smoking initiation, especially among adolescents, rather than only focusing on smoking cessation [8].

Until now, many studies on smoking initiation have identified associations with psychosocial factors including sociodemographic, personal, behavioral, and environmental factors as well as the influence of family, peers, and the community [9,10]; (van Loon, Tjshuis, Surtees, & Ormel, 2005). However, the influence of these associated factors differed across various ethnic groups due to the varying influence of family and peers as well as the social and cultural contexts related to their perceptions of smoking [9]. In Korea, one study [3] followed a cohort of elementary students from

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age 10 for 4 years and identified demographic, individual, family, and school-related factors associated with smoking initiation. However, the follow-up period was relatively short, so generalizing the findings from that study across all Korean adolescents is difficult. Moreover, Park's study [3] did not include other important variables such as physical and mental health status, various health-risk behaviors, health-promoting behaviors, and family factors (e.g., family attitude towards smoking), all of which have been found to be associated with smoking initiation in previous studies [10]. Moreover, health-risk behaviors have been found to show ethnicity-specific associations [9].

Therefore, the present study investigated individual and family factors associated with an early initiation of cigarette smoking among Korean adolescents aged between 12–18 years using nationally representative data. These factors included sex, physical health (health status and body weight), mental health (happiness and stress levels), health-promoting behaviors (exercise and weight control), health-risk behaviors (internet use, alcohol consumption, suicidal ideation, and sexual activity), academic characteristics, and family factors (household income, parental education level, family cohesion, and family attitude toward smoking).

Methods

Data and study design

We performed a secondary data analysis of the 2012 Korea Youth Risk Behavior Web-based Survey (KYRBS), a cross-sectional study. The 2012 KYRBS was conducted by the Korean Centers for Disease Control and Prevention [11,12] and the Ministry of Health and Welfare of Korea to evaluate the prevalence of health-risk behaviors among Korean students aged between 12–18 years (grade 7–12). To select a nationally representative sample, a complex sampling method including multistage sampling, stratification, and clustering was employed. A three-stage cluster sampling method was used considering county size and the degree of urbanicity, and random sampling of classrooms in each grade of middle and high school students was performed. A total of 76,980 students were eligible for the study, and 74,186 students completed the survey with a response rate of 96.4%. We analyzed data on 73,850 students who answered questions about their lifetime smoking experience and their age at smoking initiation.

Ethical considerations

The KCDC provided the raw KYRBS data after reviewing our study's purpose and data analysis plans, and we were permitted to use the data on September 12, 2013. The Korean government approved the KYRBS protocol (approval no. 11758). All study participants completed the survey under the condition of anonymity.

Variable measurement

Lifetime smoking experience and its associated variables were identified from the results of online self-administered questionnaire. Lifetime smoking experience was the binary dependent variable (yes or no) in our analysis of age at smoking initiation.

The independent variables included individual and family factors. The individual factors included sex, subjective health status (unhealthy, average, or healthy), subjective body image (thin, average, or overweight), subjective happiness level (unhappy, average, or happy), average stress (yes for more than average or no), exercise level (yes for moderate exercise or no), active weight control (yes or no), internet use (yes or no), alcohol consumption

(yes for at least one experience in their lifetime or no), suicidal ideation (yes or no), sexual activity (yes or no), and academic grades (low, medium, or high). Family characteristics included household income (low, middle, or high), father's education level, mother's education level, taking a family trip in the previous 12 months (yes or no), and family approval of smoking at home (yes or no). As indicated, all variables were stratified into either two or three groups for easy comparisons in the data analysis.

Data analysis

Based on the complex survey design, all data were weighted by proportions in each sex, school year, and grades within each geographic area. The study population's characteristics by age group and lifetime smoking status were displayed as their actual frequencies and weighted percentages. Differences among independent variables with lifetime smoking status were examined using the chi-square test. Cox proportional hazards regression models (a survival analysis) were used to identify variables associated with smoking experiences at their first occurrence, by presenting relative ratios (RR) and their 95% confidence intervals. In this analysis, the dependent variable was analyzed as time to event; the event was the lifetime smoking experience (yes or no). If the participant answered yes to the lifetime smoking experience question, the time to event was the age at smoking initiation. If they answered no, the time to event was the age reported at survey completion. All the statistical analyses were performed with SPSS 20.0 (IBM Corp., Armonk, NY, USA).

Results

The results of the bivariate analysis on smoking experience by age group are shown in Table 1. The proportion of youth who had experienced smoking in their lifetime increased with age; 12.8%, 24.7%, and 31.4% of students aged 12–13 years, 14–15 years, and 16–18 years had smoked, respectively.

Differences in independent variables according to lifetime smoking are shown in Table 2. Those who experienced smoking were more likely to be male, have a poor subjective health status, thin, unhappy, stressed, perform moderate exercise, give effort toward weight control, not use the internet, drink alcohol, have suicidal ideation, engage in sexual activity, and have poor academic performance than were those who never smoked ($p < .001$). In addition, those who experienced smoking were in a lower household income status, reported lower paternal and maternal education level, were more likely to live with step parents, were less likely to have gone on a family trip in the previous 12 months, and were more likely to have a family that approved of smoking than those who never smoked were ($p < .001$).

The factors associated with smoking initiation in youth according to the results of our Cox survival analysis are shown in Table 3. The individual factors significantly associated with having an experience of smoking included being male (compared to

Table 1 Description of Study Population ($N = 73,850$).

Age (yrs)	Never smoked ($n = 55,735$)		Smoked ($n = 18,115$)	
	n^a	% ^b	n	%
12–13	16,877	87.2	2,573	12.8
14–15	18,826	75.3	6,351	24.7
16–18	20,032	68.6	9,191	31.4

^a Actual frequency.

^b Weighted percentages following complex sample analyses.

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