

RESEARCH ARTICLE

Objective and Subjective Socioeconomic Position and Current Smoking Among Korean Adolescents

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Abstract

Background: Despite social gradients in adult smoking, the effects of socioeconomic position (SEP) on adolescent smoking is not well understood. This study examined effects of subjective SEP as well as the objective SEP on smoking among Korean adolescents. **Materials and Methods:** Data were obtained from the 2012 Korea Youth Risk Behavior Web-based Survey, a nationally representative sample of middle and high school students (38,221 boys; 35,965 girls). SEP was assessed by the Family Affluence Scale (FAS) and the self-rated household economic status. Relationships between SEP and smoking were analyzed by multivariate logistic regression. **Results:** The low perceived SEP for either the high or low FAS grade was related to an elevated likelihood of smoking in both genders. A significantly higher risk of smoking was found in boys of low perceived SEP in middle school (odds ratio [OR] 1.50; 95% confidence interval [CI] 1.28-1.77 for high FAS, OR 1.55; 95% CI 1.21-1.98 for low FAS), and of low perceived SEP and high FAS in high school (OR 1.13; 95% CI 1.02-1.26). Among girls, an elevated risk of smoking was observed in middle school group with low perceived SEP and low FAS (OR 2.01; 95% CI 1.44-2.79) and in the high school group of low perceived SEP, regardless of FAS level (OR 1.34; 95% CI 1.14-1.57 for high FAS, OR 1.31; 95% CI 1.04-1.65 for low FAS). **Conclusions:** The relationship of subjectively perceived SEP with smoking is as important as objective SEP and more significant in Korean high school adolescents.

Keywords: Perceived socioeconomic position-smoking-adolescents-family affluence scale

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Introduction

A body of studies has consistently suggested the inverse relationship between smoking rate and low socioeconomic position (SEP) in adults (Gilman et al., 2003; Hanson and Chen, 2007; Adler and Rhekopf, 2008; Cheah and Naidu, 2012). On the contrary, the effect of SEP might be controversial in the relationship with smoking among adolescents (Hanson and Chen, 2007; Ritterman et al., 2009). Although most studies have reported the elevated risk of smoking with the lower SEP in adolescence (Finkelstein et al., 2006; Hanson and Chen, 2007; Ritterman et al., 2009; Thakur et al., 2013), other results are varying and even reversed (Hanson and Chen, 2007).

The mixed findings may be caused by inaccuracies regarding measurement of SEP among adolescents (Boyce et al., 2006). A line of evidence has reported that most adolescents may not be able to response the conventional SEP indicators including the parents' educational attainment, occupation, and income (Cho and Khang, 2010). To corporate this problem, the Family Affluence Scale (FAS) has been developed and validated. FAS is composed of questions on the family material

circumstances to which the adolescents are almost certain to know the answers (Cho and Khang, 2010).

In addition, some studies have suggested the importance of subjective SEP indicators in adolescents (Finkelstein et al., 2006; Hanson and Chen, 2007; Ritterman et al., 2009). As adolescents may be less aware of objective SEPs which are mainly composed of parental SEP, the perceived SEP may better indicate how adolescents identify their actual economic circumstances (Goodman et al., 2003; Karvonen and Rahkonen, 2011). However, previous findings examining the association between smoking and SEP have been mainly focusing on objective SEP indicators (Hanson and Chen, 2007; Sarkar et al., 2013).

Therefore, this study was performed to explore the relationship of SEP and smoking based on both the subjective and objective measures of SEP in the Korean adolescents.

Materials and Methods

Data sets and study subjects

Data were drawn from the 2012 Korea Youth Risk Behavior Web-based Survey (KYRBS), which has been

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performed every year since 2005 by the Korea Centers for Disease Control and Prevention (KCDC) and the Ministry of Education, Science and Technology. The survey was designed to monitor the prevalence of health behaviors among adolescents and the progress toward national health objectives with planning and assessment of adolescent health promotion policies. It is an ongoing web-based survey conducted on a nationally representative sample of middle and high school students with a stratified, clustered, multistage probability sampling design. The study subjects were participants in the KYRBS and provided written consent for the survey and responded electronically to a questionnaire related to health behaviors via a computerized program during classroom time (Korea Centers for Disease Control and Prevention, 2012). The response rate of participants was 96.4% and the reliability and validity of KYRBS has been shown to be good (Bae et al., 2008; Korea Centers for Disease Control and Prevention, 2009; 2012). The number of study subjects was 74,186 who aged between 12 and 18 years old (38,221 for boys and 35,965 girls). The requirement for ethics approval for use of the publicly available KYRBS data was waived by the IRB.

Variables

In terms of smoking variable, subjects who had smoked at least one cigarette one or more days during the past 30 days were categorized into current cigarette smoking. For the SEP variable, two indicators were measured. The family affluence scale (FAS) was used for an objective measure of SEP. The scale of FAS consists of four items: 1) Does your family have a car? (no, one, two or more), 2) Do you have your own room? (no, yes), 3) During the past year, how many times did you travel away on holiday with your family? (not at all, once, twice, three times or more), and 4) How many computers do you have in your household? (none, one, two, three or more). Each item was given a score of 0 if the answer was no or not at all, 1 if the answer was yes, one, or once, 2 if the answer was two or more, twice or two, and 3 for the rest of the responses. The composite FAS score was calculated by summing the responses to these four items and the scores were then grouped as low (score of 0-2), middle (score of 3-5), or high (score of 6-9) (Boudreau and Poulin C, 2009). For the further analysis, subjects with low score of SEP were classified into low SEP group and others were grouped as high SEP group. As another indicator of SEP, a subjective measure of adolescent's SEP was assessed by the question "What do you perceive as your household economic status?" This perceived household economic status was asked on a 5-item scale: highest level, above average, average, below average, and lowest level. The subject who responded "below average and lowest level" was classified into low perceived SEP group and others were included in high perceived SEP group.

The information of age, living area, living with parents and health behaviors including alcohol consumption, drug use and physical activity were collected. The alcohol consumption and drug use were examined, asking whether they had drunk at least one or more days during the past 30 days or experienced any of drugs at least one time

during their life. The physical activity was assessed, asking whether subjects have done moderate intensity level of physical activities (Ping-Pong, carrying light things, slow swimming, non-competition volleyball, and badminton etc.) for more than 5 days per week. The psychological health status such as stress perception and depression symptom was also examined. The subjects who responded to perceive "very much" or "much" stress were classified into a group with stress. Depression symptom was assessed to respond in a yes or no fashion to the question "Were you feeling so sad or hopeless for at least two weeks or more that you stopped doing some usual activities during the last 12 months?"

Statistical analyses

The sampling design of the KYRBS was a multi-stage, clustered probability design that enables the representative sampling of middle and high school students. Thus, the relevant primary sampling units, stratification, and sample weights were taken into account in the data analysis. The proportion of general characteristics of subjects was weighted to the respondent's probability of being selected for the sex-, grade-, and school type-specific distributions for the region based on education statistics from the Ministry of Education. The objective SEP indicator based on FAS and perceived SEP indicator were combined to create a new variable reflecting SEP patterns according to SEP characteristics and levels; (a) both high perceived SEP and FAS; (b) high perceived SEP and low FAS; (c) low perceived SEP and high FAS; and (d) both low perceived SEP and FAS. The relationship between the combination pattern of SEP and factors related to SEP including smoking was assessed by Chi-square tests. Then, multivariate-adjusted odds ratios (ORs) and their 95% confidence intervals (95% CIs) were calculated to examine the effect of combination pattern of SEP on smoking by logistic regression analysis. The analyses were conducted separately for sex and school grade. All analyses were done using SAS version 9.2 (SAS Inc., Cary, NC, USA).

Results

The general characteristics of study subjects are shown in Table 1. About half of subjects were boys and high school students. The prevalence of current cigarette smoking was 16.3% for boys and 5.9% for girls showing higher in boys ($p < 0.001$). Most prevalence was higher in boys than in girls except for psychological related factors, including stress perception and depression symptom. For perceived economic status, boys showed a smaller proportion of low and mid-low status than girls (21.9% for boys vs. 23.3% for girls, $p < 0.001$). The distribution of FAS was not different between sexes. The proportion of adolescents with both high level of perceived SEP and FAS grade was largest among SEP patterns (72.3% for boys and 71.5% for girls) and those with low perceived SEP and high FAS grade had the next largest proportion, showing 16% for boys and 16.7% for girls.

The relationship between the combination pattern of socioeconomic position (measured by perceived household economic status and FAS) and other factors by

gender and school grade is shown in Table 2. Adolescents with low perceived SEP seemed to have more drinking, drug use, stress perception, and depression symptom than those with high perceived SEP for either high or low FAS grade and the results were consistent in gender and school grades. For current cigarette smoking, adolescents with low perceived SEP had higher proportion than those with high perceived SEP regardless of FAS grade in both boys and girls. As compared with the group in high perceived SEP and low FAS, the group with low perceived SEP and high FAS had a higher proportion of smoking in both boys

and girls. For girls in the middle school and boys in the high school, the group with both low perceived SEP and FAS had the highest proportion of smoking (9.6% for girls in the middle school, 26.6% for boys in the high school).

Table 3 shows age- or multivariate-adjusted odds ratios (95% confidence intervals) for smoking by combination pattern of SEP among boys and girls in the middle and high school students. Overall, the low perceived SEP for either high or low FAS grade was related to elevated likelihood of smoking in both genders. The risk of smoking was not different between those with both high perceived SEP and FAS and those with high perceived SEP and low FAS.

A significantly higher risk of smoking was found in the group of low perceived SEP and high FAS among total girls (odds ratio (OR) and 95% confidence interval (95% CI)=1.24 (1.05-1.45)) and high school boys (OR (95% CI)=1.13 (1.02-1.26)) compared with the group in both high perceived SEP and FAS after adjusting for confounding factors; in middle school girls it was found in the group of both low perceived SEP and FAS (OR (95% CI)=2.01 (1.44-2.79)). For the middle school boys and the high school girls, the group with low perceived SEP and high FAS and the group with both low perceived SEP and FAS had a significantly similar higher risk of smoking

Table 1. General Characteristic of the Study Subjects

	Boys		Girls		p*
	No.	%	No.	%	
Total	38,221	52.5	35,965	47.5	
School					
Middle	19,283	48.7	18,014	49.4	0.935
High					
General	14,458	39.3	13,985	39.2	
Vocational	4,480	12	3,966	11.4	
Health behaviors					
Current cigarette smoking	6,248	16.3	2,114	5.9	<0.001
Alcohol drinking	8,627	22.7	5,696	15.8	<0.001
Drug use	208	0.6	194	0.6	0.642
Moderate physical activity	6,055	15.7	2,235	6.3	<0.001
Living in urban area	33,784	93.3	31,944	94.3	0.245
Living with parents	31,709	83.6	29,759	83.6	0.945
Psychological factors					
Stress perception	13,340	34.8	18,026	49.6	<0.001
Depression symptom	9,722	25.5	13,023	36	<0.001
Perceived economic status					
Low	2,046	5.3	1,761	4.7	<0.001
Mid-Low	6,407	16.6	6,806	18.6	
Middle	17,185	44.7	17,699	49	
Mid-high	9,498	25.1	8,001	22.7	
High	3,085	8.3	1,698	5	
FAS [†] , grade (score)					
Low	4,560	11.7	4,396	11.8	0.285
Middle	20,284	52.5	19,392	53.4	
High	13,377	35.8	12,177	34.8	
Socioeconomic position (Perceived/ FAS)					
High/High	27,485	72.3	25,453	71.5	0.001
High/Low	2,283	5.8	1,945	5.2	
Low/High	6,176	16	6,116	16.7	
Low/Low	2,277	5.9	2,451	6.7	

*Significance of difference in proportion among groups of each variable tested using Chi-square test [†]FAS, family affluence scale

Table 3. The Relationship between Combination Pattern of Socioeconomic Position and Smoking (Odds ratios and 95% Confidence Intervals)

	SEP (Perceived/ FAS*)			
	High/High	High/Low	Low/High	Low/Low
Boys				
Total [†]	1.0	0.83 (0.68-1.01)	1.06 (0.95-1.19)	0.92 (0.76-1.10)
Middle school [‡]	1.0	1.00 (0.75-1.33)	1.50 (1.28-1.77)	1.55 (1.21-1.98)
High school [‡]	1.0	0.93 (0.77-1.13)	1.13 (1.02-1.26)	1.07 (0.90-1.27)
Girls				
Total [†]	1.0	1.01 (0.70-1.45)	1.24 (1.05-1.45)	1.10 (0.87-1.39)
Middle school [‡]	1.0	0.91 (0.59-1.42)	1.21 (0.99-1.47)	2.01 (1.44-2.79)
High school [‡]	1.0	1.20 (0.87-1.67)	1.34 (1.14-1.57)	1.31 (1.04-1.65)

*FAS, family affluence scale; [†]Model was adjusted for age, region, living with parents, moderate physical activity, drinking, drug use, stress perception, depression symptom, and type of high school; [‡]Model was adjusted for age, region, living with parents, moderate physical activity, drinking, drug use, stress perception, and depression symptom

Table 2. Distribution of Factors Related to the Combination Pattern of Socioeconomic Position (Measured by FAS[†] and Perceived Household Economic Status) by Gender and School Grades

	Boys				p*	Girls				p*
	Perceived (high)		Perceived (low)			Perceived (high)		Perceived (Low)		
	FAS (high)	FAS (Low)	FAS (high)	FAS (Low)		FAS (high)	FAS (Low)	FAS (high)	FAS (Low)	
Middle school										
Number	14,701	1,250	2,461	871	<0.001	13,499	1,066	2,512	937	<0.001
Current cigarette smoking	8.7 (0.3)	8.1 (0.9)	15.8 (0.8)	15.1 (1.5)	<0.001	3.5 (0.2)	3.7 (0.6)	7.0 (0.5)	9.6 (1)	<0.001
Alcohol drinking	10.7 (0.3)	8.8 (0.8)	16.1 (0.8)	12.3 (1.3)	<0.001	8.4 (0.3)	8.0 (0.8)	13.1 (0.8)	11.6 (1.1)	<0.001
Drug use	0.4 (0.1)	0.3 (0.1)	0.9 (0.2)	0.5 (0.3)	0.024	0.6 (0.1)	0.8 (0.3)	1.6 (0.3)	0.5 (0.3)	<0.001
Moderate physical activity	18.9 (0.4)	14.3 (1.0)	17.6 (0.8)	13.6 (1.3)	<0.001	6.8 (0.3)	5.5 (0.7)	8.5 (0.5)	7.1 (0.9)	0.008
Living in urban area	94.0 (0.9)	92.6 (1.0)	93.2 (1.0)	93.1 (1.1)	0.078	94.7 (0.7)	94.3 (0.9)	93.5 (1.0)	93.4 (1.0)	0.011
Living without parents	10.0 (0.3)	24.7 (1.6)	26.9 (1.1)	48.3 (1.8)	<0.001	9.1 (0.3)	24.5 (1.4)	26.8 (0.9)	49.4 (1.8)	<0.001
Stress perception	30.1 (0.4)	32.6 (1.3)	45.1 (1.1)	43.2 (1.8)	<0.001	42.1 (0.5)	47.5 (1.6)	60.1 (0.9)	59.9 (1.7)	<0.001
Depression symptom	21.7 (0.4)	18.7 (1.1)	32.2 (1)	29.3 (1.6)	<0.001	31.2 (0.5)	31.4 (1.5)	45.9 (1.1)	44.6 (1.7)	<0.001
High school										
Number	12,784	1,033	3,715	1,406	<0.001	11,954	879	3,604	1,514	<0.001
General high school	81.3 (1.5)	65.3 (2.6)	70.8 (2.1)	57.2 (3.0)	<0.001	83.0 (1.7)	66.8 (3.0)	71.3 (2.5)	56.0 (3.2)	<0.001
Current cigarette smoking	21.2 (0.7)	19.9 (1.3)	25.7 (1)	26.6 (1.3)	<0.001	6.2 (0.4)	6.8 (1)	10.7 (0.7)	10.5 (0.9)	<0.001
Alcohol drinking	32.4 (0.7)	30.3 (1.5)	35.9 (1)	38.5 (1.4)	<0.001	20.6 (0.7)	19.3 (1.6)	27.4 (1.1)	25.9 (1.4)	<0.001
Drug use	0.7 (0.1)	0.3 (0.1)	1.0 (0.2)	0.4 (0.2)	0.055	0.5 (0.1)	0.2 (0.1)	0.8 (0.2)	0.4 (0.2)	0.06
Moderate physical activity	13.3 (0.3)	12.5 (1.1)	14.1 (0.6)	12.5 (0.9)	0.427	5.4 (0.3)	4.7 (0.7)	6.2 (0.4)	6.3 (0.7)	0.188
Living in urban area	93.5 (0.8)	92.1 (1.3)	91.2 (1.1)	92.1 (1.2)	0.024	94.6 (0.7)	92.9 (1.0)	93.4 (0.8)	92.7 (1.2)	<0.001
Living with parents	11.2 (0.4)	25.9 (1.2)	27.4 (0.9)	50.6 (1.5)	<0.001	11.2 (0.4)	26.8 (1.4)	28.2 (0.9)	48.8 (1.4)	<0.001
Stress perception	34.1 (0.4)	34.8 (1.5)	44.2 (0.9)	43.9 (1.6)	<0.001	50.0 (0.5)	49.6 (1.7)	61.8 (0.7)	64.5 (1.2)	<0.001
Depression symptom	26.0 (0.4)	26.3 (1.2)	33.5 (0.7)	29.1 (1.3)	<0.001	36.1 (0.5)	30.1 (1.4)	44.3 (0.9)	44.7 (1.3)	<0.001

than the group in both high perceived SEP and FAS (OR (95% CI)=1.50 (1.28-1.77) and 1.55 (1.21-1.98) for the middle school boys; OR (95% CI)=1.34 (1.14-1.57) and 1.31 (1.04-1.65) for the high school girls, respectively).

Discussion

Our study demonstrated that the elevated risks of smoking were generally found in the Korean adolescents among low perceived SEP with either high or low FAS grade. The higher risk of smoking was found in the group of low perceived SEP and high FAS than the group of both low perceived SEP and FAS among high school students.

Our findings supported the inverse relationship between SEP and smoking like other studies (Finkelstein et al., 2006; Hanson and Chen, 2007; Ritterman et al., 2009). Among 44 studies examining SEP and smoking, 30 studies suggested that adolescence smoking has a negative relationship with SEP in a review paper (Hanson and Chen, 2007). Several studies have reported that teens with low SEP may be more likely to modeling smoking from their parents (Hanson and Chen, 2007; Reitzel et al, 2010; Golbasi et al., 2011). In addition, stress and negative life events which may be more common in low SEP groups, may lead to higher level of smoking in lower SEP teens (Hanson and Chen, 2007).

Interestingly, in this study, the significant risk was similar or even disappeared in the combination group of both low perceived SEP and FAS, as compared with that in the group of low perceived SEP and high FAS for high school students. Even, we found that the risk of smoking in the group with high perceived SEP and low FAS was not different to that in the group with both high perceived SEP and FAS. It should be noted that there may be limitations to the use of parental SEP indicators including FAS as social position in adolescence as they might not be aware of it (Judge and Benzeval, 1993; Emerson et al., 2006). To address this problem, we employed FAS instead. The FAS has been developed and used in European countries as a good predictor of socioeconomic differentials in health (Currie et al., 2008). According to a recent study, the FAS appeared to be useful as a measure of SEP for Korean adolescents (Cho and Khang, 2010). However, there is growing evidence that youths' smoking was more significantly associated with subjective SEP than objective SEP itself (Goodman et al., 2003; Adler et al., 2000). Although the objective SEP is negatively related with smoking during adolescence (Hanson and Chen, 2007), the objective SEP ignores the personal perception of one's place in the society (Goodman et al., 2003; Goodman et al., 2007). In adolescence, one's social position among peers may be of a greater importance to health outcome than the parent's objective social position (Glendinning et al., 1995). While the subjective perception of the family economic circumstances was affected by the objective SEP, the influence of the objective SEP on the subjective perception may not be identical in adolescence (Goodman et al., 2007).

In addition, the risk was relatively higher in the group with low perceived SEP and high FAS, as compared with that in the group with both low perceived SEP and

FAS in high school students, whereas in middle school students, the risk was relatively higher in the group with both low perceived SEP and FAS. Previous review paper suggested that some substance use behaviors in the early teens may be influenced by the family social status, as they spend most of their time with the family members. In late adolescence, however, the influence of friends may overpower the effects of the family SES, which may help explain the relatively higher influence of the subjective SEP possibly being reflected by the influence of the friends' or peer's SEP (Spencer et al., 2006).

The interpretation of this study should furthermore consider several limitations as follows. Firstly, the cross-sectional nature of this study does not allow for the inference of the causal relationship among the SEP and smoking in adolescents. Secondly, smoking status was defined on the self-reported data. Nonetheless, self-reports have been suggested to provide more valid information than other methods on the sensitive issues, especially among the adolescent age groups (Kokkevi et al., 2012). Thirdly, the subjective SEP and smoking was measured by a single item. However, the recent previous studies focusing on the various racial and ethnic groups have used this self-reported single question method, and this trend has increased in the recent years (Kokkevi et al., 2012).

Despite the limitations mentioned above, there is a paucity of study that has examined the relationship among both the subjective and objective SEP and smoking in adolescents. In addition, this study targeted a large representative youth sample with a high response rate. We have also included the FAS, a relatively objective SEP in adolescence, and employed various risk factors, including living with parents and type of high school.

In summary, the results of this study suggest that the relationship of the subjective SEP is important in smoking as much as the objective SEP and far more significant in the high school students. This information could be used to develop effective interventions, including defining the targeting for interventions to reduce the smoking in adolescents.

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