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South Korean Adolescents' Intention to Smoke

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***Objectives*: The purpose of this study was to examine associations between intention to smoke, and 3 constructs of the Theory of Planed Behavior, including attitude, subjective norm, and perceived behavioral control related to smoking among adolescents in South Korea. *Methods*: We used a cross-sectional correlational design. The survey was conducted on 13- to 15-year-old adolescents (N = 740) in Seoul, South Korea. Multilevel modeling was conducted to analyze the data. *Results*: After adjusting for sociodemographic and economic factors, attitude toward smoking, subjective norm about smoking, and perceived behavioral control about smoking were independent statistically significant predictors of intention to smoke. When all 3 were considered together, attitude toward smoking and perceived behavioral control remained statistically significant, but subjective norm about smoking did not. The number of licensed tobacco retailers also predicted intention to smoke. *Conclusions*: Attitude, perceived behavioral control, and tobacco retailers around schools need to be considered when developing tobacco prevention and control programs and policies for adolescents.**

***Key words*: adolescent health; smoking; smoking intention; multilevel analysis**

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Tobacco use is a risk factor for various illnesses including cancer, lung disease, and cardiovascular disease.[1] It is the leading cause of preventable death around the world. Smoking-related diseases cost billions of dollars each year in direct medical care and lost productivity.[2] Most adult smokers initiate tobacco use during adolescence. Among South Korean adolescents, the lifetime smoking rate is 19.9% and the current smoking rate is 9.2%.[3] Whereas the current smoking rate is lower in South Korea than in the United States (US) (14.1%), it is higher than in many Asian countries, such as China (6.9%), Singapore (6.0%), and Japan (boys 2.2%, girls 1.1%).[4] These rates are a serious concern in South Korea because established smoking behavior is difficult to change due to nicotine's addictive effects.

According to the Theory of Planned Behavior (TPB),[5,6] behavioral beliefs, normative beliefs, and control beliefs shape attitude toward the behavior, subjective norm, and perceived behavioral control respectively. The TPB assumes that attitude, subjective norm, and perceived behavioral control influence the formation of a behavioral intention; behavior is determined by this intention which is considered the strongest predictor of behavior. The TPB has been examined in a variety of studies on health behavior,[7-10] including adolescent smoking initiation.[11-15] However, few studies have attempted to evaluate the TPB in smoking initiation by adolescents in South Korea.

According to the ecological perspective of health behavior,[16,17] a health behavior is formed by various levels of influence including intra-personal, inter-personal, and physical environments. The TPB addresses individual psychosocial constructs only and does not include social and environmental factors, which are emphasized in the ecological perspective of health behavior. For example, previous literature reported that the higher density of licensed tobacco retailers (LTRs) in a prescribed area[18,19] is associated with adolescent smoking. Thus, this LTR factor in the neighborhood may need to be considered in research examining predictors of adolescent smoking in addition to the socio-demographic and economic factors that are known to be associated with adolescent smoking, such as being male,[20]having lower economic status,[21] having a higher allowance,[22] having siblings that smoke,[23] and having peers that smoke.[24]

The research question for this study was: "Do attitude, subjective norm, and perceived behavioral

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control predict intention to smoke?" The purposes of the study were to: (1) describe characteristics of the sample; and (2) determine whether attitude, subjective norm, and perceived behavioral control predict intention to smoke.

METHODS

Data Collection

We used a cross-sectional research design. The first author selected 4 boroughs, Eunpyeong-gu, Seodaemun-gu, Gangseo-gu, and Yangcheon-gu of Seoul in that the distribution ratio of teen population and mean perceived level of income of these boroughs were comparatively similar to the means of the entire 20 boroughs of Seoul.[25] With the assistance of a board member of the Korean Health Teachers Association, the first author contacted school nurses and/or school principals of all middle schools in these boroughs to ask permission for participation in the survey. Based on their responses, 14 middle schools in these boroughs were selected. Among these schools, one class in the second grade (primary age range: 13-14) and another class in the third grade (primary age range: 14-15) were randomly selected. The second and third grades of middle school in South Korea correspond to eighth and ninth grades of junior high school in the US. All students in selected classes were asked to participate in the paper-and-pencil survey after parent/guardian informed consent and minor assent forms were obtained. The survey was conducted in their classrooms or school health rooms after school by the first author in September 2015. The survey took 30 minutes on average to complete. To ensure confidentiality, every participant was asked after completion of the survey to use the envelope provided and return the sealed envelope to the first author. Because some questionnaires had missing or inappropriate answers, only 698 questionnaires out of the total sample of 740 (94.3%) were used in the analysis.

Instruments

Hanson[11] developed the Fishbein/Ajzen-Hanson Questionnaire (FAHQ) to measure all constructs – behavioral beliefs, normative beliefs, control beliefs, attitude, subjective norm, perceived behavioral control, and intention – of the TPB[6] in a study examining predictors of smoking intention in female adolescents. The items for intention, attitude, subjective norm, and perceived behavioral control were developed from adjectives and phrases suggested by Ajzen and Fishbein[26] and Ajzen.[6,27] The instrument included 50 items with 7-point semantic scales. The Cronbach's α of each measure (construct) in this instrument ranged from 0.96 to 0.66.[6]

Because the FAHQ was written in English, the first author translated this instrument to Korean. Following Brislin's translation model,[28] the first author translated the instrument to Korean, and this draft was validated by back-translation by a person who was proficient both English and Korean. Then, a language expert in an English major validated the back-translated English version with the original instrument. If the English expert disagreed, the first author revised the Korean version and asked a person who had conducted back-translation to review the revision. The English expert again compared the original version with the re-translated version. This process was repeated until the English expert confirmed that both English and Korean versions conveyed the same meaning.

Before conducting the survey, the Korean Fishbein/Ajzen-Hanson Questionnaire (KFAHQ) was verified for content validity by 2 native Korean experts in health behavior and adolescent health. They were asked whether each question was appropriate to be included in the instrument, whether each question covered the construct in Korean, and whether additional questions were required. The scale content validity index (S-CVI) was 0.88. Polit and Beck proposed that a value of 0.90 for the S-CVI was excellent.[29] Additionally, Korean experts were asked whether the instrument was culturally appropriate. According to their suggestion, the first author changed the word meaning "sexual partner" to a word meaning "a friend who I am going out with." A pilot survey among 32 adolescents in a middle school located in Seoul was conducted to examine the internal consistency of the instrument. Cronbach's α values calculated for each of the scales ranged from a high of 0.89 for the intention scale to a low of 0.68 for the perceived behavioral control scale. A value of 0.70 or greater for Cronbach's α is regarded as desirable.[30]

Of the 50 original items, 3 were used to measure intention to smoke, 3 for attitude toward smoking, one for subjective norm about smoking, and 3 for perceived behavioral control about smoking. To measure intention to smoke, participants were asked to report intention to smoke in the next month on 3 7-point semantic differential evaluative scales of true/false, likely/unlikely, probably/probably not, with a range of scores from +3 to -3, respectively. The average score of the 3 items was considered as the participant's level of intention to smoke. In the study by Hanson,[11] participants with a positive mean intention to smoke were classified as those with intent smoker. South Korean adolescents tend to feel uncomfortable with questions about smoking in surveys and they may not have answered these questions honestly.[31] In this study, participants with -2 or greater were classified as weak-intent nonsmoker and intent smoker, which were grouped together; those with -3 were grouped as strong-intent nonsmoker. This categorization helped to select the South Korean adolescents that may have possible smoking intention. We attempted to examine whether intention to smoke (first group vs second group) was statistically associated with attitude, subjective norm, and perceived behavioral control. The Cronbach's α value for the

Table 1
Characteristics of Participants (N = 698)

Variable	Value	N (%) or mean ± SD	
Age (years)	14.48 ± 0.56		
Sex	Girls	378	(54.2)
	Boys	320	(45.8)
Perceived socio-economic status	High	134	(19.2)
	Middle	466	(66.8)
	Low	98	(14.0)
Weekly allowance (KRW[a])		14,700 ± 17,300	
Sibling smoking	No	648	(92.8)
	Yes	50	(7.2)
Peer smoking	No	504	(72.2)
	Yes	194	(27.8)
Number of LTRs passed[b]		4.90 ± 3.90	
Attitude toward smoking	Positive or less negative	149	(21.3)
	Most negative	549	(78.7)
Subjective norm about smoking	Higher	104	(14.9)
	Lower	594	(85.1)
Perceived behavioral control about smoking	Higher	365	(52.3)
	Moderate	155	(22.2)
	Lower	178	(25.5)
Intention to smoke	Higher	113	(16.2)
	Lower	585	(83.8)

Note.
SD = standard deviation
a KRW is South Korea's currency, the won (1100 KRW = US $1).
b Number of LTRs passed in a day while commuting to school.

scale of intention to smoke in this study was 0.85.

Three items were used to measure attitude toward smoking. Participants rated attitude toward smoking on 3 7-point semantic differential evaluative scales pleasant/not pleasant, nice/awful, a lot of fun/not fun at all, with a range of scores from +3 to -3, respectively. The sum of these 3 scores was considered as the participant's attitude toward smoking. In this study, because the attitude measure was not normally distributed, to minimize the potential influence of extreme values, we transformed this variable to dichotomous items. Participants with a score of -8 or greater were classified as persons with a positive or less negative attitude toward smoking; those with a score of -9 were classified as persons with the most negative attitude toward smoking. The Cronbach's α value for the scale of attitude toward smoking in this study was 0.85.

One item was used to measure subjective norm about smoking. Participants answered how they perceived what significant others would think about their smoking with the item "If I smoke cigarettes, most people who are important to me would…" on a 7-point semantic differential evaluative scale of approve/disapprove, with a range of +3 to -3. This score was considered as the level of subjective norm. Because the subjective norm measure was not normally distributed, we transformed this variable to be dichotomous, as we did for the attitude construct. Participants with a -2 or greater were classified as having a higher subjective norm about smoking; those with a -3 were classified as having a lower subjective norm about smoking.

To measure perceived behavioral control, 3 items were measured—"If I wanted to, I could easily not smoke cigarettes during the next month." "How much control do you think you have over whether you smoke cigarettes?" and "Do you think it would be difficult or easy for you not to smoke cigarettes during the next month?" We used 7-point semantic differential evaluative scales of agree/disagree, complete control/no control, and easy/difficult, with a range of +3 to -3, respectively. The sum of these 3 scores was considered as the level of perceived behavioral control. Similarly, because the perceived behavioral control measure was not normally distributed, we transformed this variable to the 3 categorical items. Participants with scores of

Table 2
2 x 2 Tables for Bivariate Associations among Attitude toward Smoking, Subjective Norm about Smoking, and Perceived Behavioral Control

Associations between attitude toward smoking and subjective norm about smoking

		Attitude toward smoking		Total	p
		Less or negative	Most negative		
Subjective norm about smoking	Lower	80 (57.0)	514 (93.6)	594 (85.1)	< .001
	Higher	69 (46.3)	35 (6.4)	104 (14.9)	
Total		149 (100.0)	549 (100.0)	698 (100.0)	

Associations between attitude toward smoking and perceived behavioral control about smoking

		Attitude toward smoking		Total	p
		Less or negative	Most negative		
Perceived behavioral control about smoking	Lower	85 (57.0)	93 (16.9)	178 (25.5)	< .001
	Moderate	41 (27.5)	114 (20.8)	155 (22.2)	
	Higher	23 (15.4)	342 (62.3)	365 (52.3)	
Total		149 (100.0)	549 (100.0)	698 (100.0)	

Associations between subjective norm about smoking and perceived behavioral control about smoking

		Subjective norm about smoking		Total	p
		Lower	Higher		
Perceived behavioral control about smoking	Lower	119 (20.0)	59 (56.7)	178 (25.5)	< .001
	Moderate	132 (22.2)	23 (22.1)	155 (22.2)	
	Higher	343 (57.7)	22 (21.2)	365 (52.3)	
Total		594 (100.0)	104 (100.0)	698 (100.0)	

9 were classified as having higher perceived behavioral control about smoking, those with scores of 6 to 8 as having moderate perceived behavioral control about smoking, and those with scores of 5 or less as having lower perceived behavioral control about smoking. Cronbach's α value for the scale of perceived behavioral control in this study was 0.55.

Measures

The survey gathered information on socio-demographic and socio-economic status, and 4 constructs of the TPB. Socio-demographic and socio-economic status information included sex, perceived economy, weekly allowance, sibling smoking, peer smoking, and number of LTRs passed in a day while commuting to school.

Analytic Methods

Because data in this study had the nested structure in which individual students were clustered within upper-level groups (schools), we used multilevel modeling (MLM), which allowed us to examine individual-level and group-level factors simultaneously while controlling for school-level variation.[32] MLM was conducted using HLM version 7, and descriptive statistics were conducted using SPSS version 22.

Characteristics of participants were described using number, mean, and standard deviation. Associations between 2 items measuring attitude toward smoking, subjective norm about smoking, and perceived behavioral control about smoking were examined by contingency tables and the chi-square test. The relationship between intention to smoke as the outcome variable and each of the 3 TPB constructs (attitude, subjective norm, and perceived behavioral control) as a predictor variable was examined using MLM (entered into the model individually), controlling for covariates, including sex, perceived economy, weekly allowance, sibling smoking, peer smoking, and number of LTRs passed in a day while commuting to school. Subsequent MLM examined the joint relationship between intention to smoke and the 3 TPB constructs (entered into the model simultaneously), controlling for the same covariates. The level of significance was set at $p < .05$.

RESULTS

Characteristics of Participants

Table 1 shows the characteristics of participants. The mean age of the sample was 14.48 years with

Table 3
Association of Intention to Smoke with Attitude, Subjective Norm, and Perceived Behavioral Control about Smoking

Predictor variable	OR	95% CI	p
Individual association[a]			
Attitude toward smoking (positive or less negative vs. most negative)	29.57	17.09–51.18	< .001
Subjective norm about smoking (higher vs. lower)	7.38	4.51–12.09	< .001
Perceived behavioral control about smoking (per one level increase)	0.27	0.21–0.37	< .001
Joint association[b]			
Attitude toward smoking (positive or less negative vs. most negative)	15.37	8.43–28.05	< .001
Subjective norm about smoking (higher vs. lower)	1.86	0.97–3.60	.063
Perceived behavioral control about smoking (per one level increase)	0.48	0.33–0.68	< .001
Sex (boys vs. girls)	1.64	0.92–2.96	.096
Perceived economy (per one level increase)	0.80	0.51–1.27	.350
Weekly allowance (per 10,000 KRW[c] increase)	1.05	0.90–1.23	.497
Sibling smoking (yes vs. no)	1.28	0.50–3.32	.614
Peer smoking (yes vs. no)	1.53	0.84–2.80	.168
No. of LTRs passedd (per one LTR pass increase)	1.09	1.02–1.17	.017

Note.
OR = odds ratio, CI = confidence interval
a Results for each predictor variable were obtained individually, controlling for the covariates (sex, perceived economy, weekly allowance, sibling smoking, peer smoking, and number of LTRs passed in a day while commuting to school).
b All the listed predictor variables were included in one model.
c KRW is South Korea's currency, the won (1100 KRW = US $1).
d Number of LTRs passed in a day while commuting to school.

more girls (54.2%) than boys. A total of 66.8% of the sample answered their household socio-economic status was in the middle, 19.2% said it was high, and 14.0% said it was low. The mean weekly allowance was 14,700 won (equivalent to US $13; 1100 won = US $1). A total of 7.2% reported sibling smoking and 72.2% reported peer smoking. The mean number of LTRs passed in a day while commuting to school was 4.90.

A total of 21.3% participants had a positive or less negative attitude toward smoking, and 14.9% held a higher subjective norm about smoking. In terms of perceived behavioral control about smoking, 52.3% had higher, 22.2% had moderate, and 25.5% had lower. A total of 16.2% answered they had the intention to smoke in the next month. Table 2 presents the magnitude of the bivariate associations among the 3 TPB constructs (attitude, subjective norm, and perceived behavioral control about smoking). The results show that they were significantly related to each other.

Predictors of Intention to Smoke

Table 3 shows the individual association of intention to smoke with attitude, subjective norm, and perceived behavioral control about smoking, controlling for covariates, including sex, perceived economy, weekly allowance, sibling smoking, peer smoking, and number of LTRs passed in a day while commuting to school. Each construct of the TPB was a statistically significant predictor of intention to smoke. Compared with the participants with the most negative attitude toward smoking, those with a positive or less negative attitude were considerably more likely to have the intention to smoke (OR = 29.57, $p < .001$). Compared with the participants with a lower subjective norm about smoking, those with a higher subjective norm about smoking were also more likely to have the intention to smoke (OR = 7.38, $p < .001$). A higher level of perceived behavioral control was associated with a lower likelihood of having the intention to smoke (OR = 0.27, $p < .001$).

Table 3 also shows the joint association of intention to smoke with attitude, subjective norm, and perceived behavioral control about smoking, together with other variables. Attitude and perceived behavioral control remained statistically significant predictors of intention to smoke, but subjective norm did not. The self-reported number

of LTRs passed in a day was a statistically significant predictor of intention to smoke.

DISCUSSION

In this study, attitude, subjective norm, and perceived behavioral control of the TPB, respectively, predicted intention to smoke while controlling for socio-demographic and socio-economic factors and number of LTRs passed. Although attitude and perceived behavioral control were found to be predictors of intention to smoke when they were entered simultaneously, controlling for covariates, subjective norm was not. The results indicate that attitude toward smoking and perception of self-control over tobacco use influenced the formation of an intention to smoke in South Korean adolescents.

Most studies of the TPB have shown that attitude, subjective norm, and perceived behavioral control are all predictors of adolescent smoking.[14,15,33] Hanson[11] reported that attitude, subjective norm, and perceived behavioral control were predictors of smoking intention among African-American girls, but only attitude and perceived behavioral control were found to be predictors in Puerto Ricans and non-Hispanic Whites. Some studies reported that, of the 3 TPB constructs, attitude was the strongest and social norm was the weakest predictor of intention to smoke.[14,34,35]

Our results were partly consistent with previous literature. Attitude toward smoking was the strongest predictor of intention to smoke. Tobacco marketing has focused on the formation of positive attitudes toward smoking among children in their middle school years.[36] Tobacco companies tend to convey favorable images and messages about smoking and tobacco products in their advertising. Therefore, attitude change among adolescents should be the main target of youth smoking prevention programs and policies.

We found that subjective norm was no longer a statistically significant predictor after adjusting for attitude toward smoking and perceived behavioral control about smoking. The non-significance of the subjective norm measure could be attributed to differences between South Korean and US cultures, as the Fishbein/Ajzen-Hanson Questionnaire was developed using a US population and may not be fully applicable to South Korean adolescents. Another explanation is that because subjective norm about smoking was correlated with attitude toward smoking and perceived behavioral control about smoking (Table 2), the influence of subjective norm on behavioral intention may have been hidden by attitude and perceived behavioral control. In this study, subjective norm was measured by one question. Given that subjective norm in smoking initiation by adolescents is about the perception of disapproval or approval of smoking by important others, this may be associated with adolescent smoking initiation. Further studies need to examine the effects of subjective norm on smoking intention in South Korean adolescents.

Because the KFAHQ was translated to Korean from English, there might be an issue of cultural appropriateness Notably, the translated instrument was reviewed by Korean native health experts and was thoroughly translated following the Brislin's translation model[28] with careful attention. However, to address cultural relevance further, the KFAHQ may need to be verified in future studies with other South Korean adolescent populations.

In this study, variables including sex, perceived economy, weekly allowance, sibling smoking, and peer smoking were not significantly associated with intention to smoke after taking into account the 3 TPB variables. This suggests that, regardless of these factors, attitude toward smoking and perceived behavioral control about smoking were important in predicting adolescent intention to smoke.

The number of LTRs passed in a day while commuting to school was statistically significantly associated with intention to smoke in addition to attitude toward smoking and perceived behavioral control about smoking. This means that the number of LTRs encountered daily was independently associated with intention to smoke. According to the ecological perspective of health behavior,[16,17] physical environmental factors as well as intra-personal and inter-personal levels influence individual health behavior. The presence of LTRs around schools may have affected participants' attitude, subjective norm, perceived behavioral control, and intention to smoke. This suggests that licensing and zoning regulations for LTRs may be needed in areas frequented by adolescents for tobacco prevention and control among youths. In future research on the effects of the built environment on adolescent smoking intention, the addition of the presence of LTRs to the TPB may be warranted.

The results of this study provide meaningful information about psychosocial factors and LTR factors in predicting intention to smoke among South Korean adolescents. Our results also demonstrate that attitude toward smoking and perceived behavioral control about smoking are useful in predicting adolescent intention to smoke, controlling for various socio-demographic and socio-economic factors, and the number of LTRs passed on the way to school.

Limitations

This study had some limitations. Because convenience sampling was used in the selection of target schools for the survey, there was potential for bias in the sample composition. Because the survey was cross-sectional, one cannot infer a causal relationship. Despite the measures of attitude, subjective norm and perceived behavioral control in the original instrument were continuous variables, those in this study were categorical variables. The way we differentiated weak non-intention and intention versus strong non-intention also differed from

how this distinction was made previously – based on intention to smoke and intention not to smoke. These differences may have affected external validity of the study result. Nevertheless, this study yielded meaningful results. For example, attitude and perceived behavioral control were significantly associated with comparatively higher intention to smoke among South Korean adolescents, who may have tendencies not to answer questions related to smoking honestly.

Conclusions

This cross-sectional study examined associations between smoking intention and the TPB constructs of intention to smoke, subjective norm about smoking, and perceived behavioral control about smoking. Attitude toward smoking and perceived behavioral control were significant predictors of intention to smoke. Our results support the application of the TPB in predicting adolescents' intention to smoke and provide useful information about factors influencing intention to smoke among South Korean adolescents.

Based on our results, attitude and perceived behavioral control need to be the primary targets in adolescent smoking prevention programs and policies; moreover, these initiatives need to occur before smoking is initiated. Health researchers, school health personnel, and adolescent health policymakers need to pay attention to factors associated with adolescent attitude change toward smoking, such as tobacco companies' marketing strategies. They also should consider adolescent perception of control over behavioral performance to prevent adolescent smoking initiation. Limiting the number of LTR licenses around schools and restricting tobacco marketing in LTRs may be reasonable policy suggestions to prevent the formation of a positive attitude toward smoking. It is important to begin adolescent smoking prevention programs early, before youths have the intention to smoke. Future directions for research include the use of random sampling in data collection.

Human Subjects Statement

The University of Virginia Institutional Review Board approved all procedures of this study (2015-0311-00).

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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