



Original Article

Interaction Between Smoking Cigarettes and Alcohol Consumption on Sexual Experience in High School Students



Soo Jeong Kim ^a, Kyoung Won Cho ^{b,*}

^a Department of Health Administration, Division of Health Sciences, Dongseo University, Busan, Korea

^b Department of Healthcare Administration, Kosin University, Busan, Korea

ABSTRACT

Article history:

Received: May 16, 2019

Revised: August 28, 2019

Accepted: September 4, 2019

Keywords:

alcohol consumption, sexual behavior, smoking, students

Objectives: This study aimed to analyze nationwide representative data from the 11th Korean Youth Health Risk Behavior Web-Based Survey to determine whether factors including socio-demographics, smoking and alcohol consumption, were factors related to high school students that had experienced sexual intercourse.

Methods: A total of 33,744 students (17,346 boys and 16,398 girls) in 1st, 2nd, and 3rd grade at high school were analyzed. SPSS complex samples methods were used for analyses. Socio-demographic and health risk behaviors (type of region of residence, family structure, and economic status, student academic achievement, gender, high school grade, pocket money, student smoking, alcohol consumption, and having engaged in sexual intercourse) were considered as independent variables.

Results: There were 3.6% of girls and 9.9% of boys in high school that were sexually active. This behavior and the average number of cigarettes smoked daily, and alcohol consumed weekly, represented a dose-response relationship, after considering confounding factors. Compared with students that did not smoke or consume alcohol, smoking 1-9 cigarettes per day and consuming 1-6 cups of alcohol and group "smoking more than 10 cigarettes per day and consuming more than 7 cups of alcohol, had a 5.94 and 22.25 higher risk of having had sexual intercourse, respectively.

Conclusion: Cigarette smoking and alcohol consumption were associated with an increased likelihood of high school students engaging in sexual intercourse.

<https://doi.org/10.24171/j.phrp.2019.10.5.03>
pISSN 2210-9099 eISSN 2233-6052

©2019 Korea Centers for Disease Control and Prevention. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Adolescents who are sexually active are at higher risk of unplanned pregnancy and sexually transmitted infections, HIV and AIDS [1,2]. Smoking under the age of 30 is directly linked to premature deaths and it is therefore a crucial stage to prevent the progressive damage caused by smoking [1-3]. Globally, the birth rate was 44.1 births per 1,000 girls aged 15-19 years in 2015 [3]. Sexually risky behavior in adolescence is independently linked to health risk behaviors such as tobacco smoking and alcohol use [4]. Indeed, the use of alcohol, and drugs significantly increased the likelihood of experiencing

sexual encounters and initiating sexual intercourse [5]. Sexual experiences of adolescents are influenced by various factors including socio-economical characteristics, parental cohabitation, and school characteristics such as school type [6-9]. The numbers of Korean adolescents that are sexually active, consume alcohol and smoke is increasing, and the average age of sexual intercourse was slightly younger in 2015 (13.2 years) compared with 2009 (13.8 years) [10].

There have been many studies on health risk behaviors in Korean adolescents. However, the majority of these studies were focused on each health risk behavior e.g. smoking, and alcohol consumption. Previous studies have reported

*Corresponding author: Kyoung Won Cho
Department of Healthcare Administration, Kosin University, Busan, Korea
E-mail: kwcho@kosin.ac.kr

independent effects of each health risk behavior on variables that affect an adolescent becoming sexually active. Therefore, in this study the interaction effects of smoking and alcohol consumption were studied (because of the high prevalence of these factors among adolescents) to determine whether these factors, together with sociodemographic and health behavior characteristics, affected adolescent engagement in sexual intercourse with a view to aid development of a sex-related intervention programs for high school students.

Materials and Methods

1. Design and setting

Data from the 11th Korean Youth Health Risk Behavior Web-Based Survey (YRBWS) (2015) which is a nationally representative survey of Korean youth, conducted by Korea Centers for Disease Control and Prevention, was analyzed. This is a national surveillance system for monitoring adolescent health risk behaviors, similar to the United States Youth Risk Behavior Surveillance System (YRBSS) [11].

2. Data collection

The raw data was obtained from the Korean YRBWS website (<https://yhs.cdc.go.kr/new/pages/use2.asp>). The population of Korean YRBWS were from national middle and high school students in 2015. The population consisted of stratified parameters, such as 132 strata and 229 regions (urban, metropolitan and rural). A total of 68,043 students were extracted from 800 sample schools. Finally, 33,744 high school students in the selected sample were considered to be analyzed.

3. Dependent variable

Sexual intercourse was assessed with the request to select all categories of sexual intercourse that you have experienced. The multiple response options included never, with the opposite sex and with the same sex.

4. Independent variable

Independent variables included socio-demographic characteristics and health risk behaviors. Socio-demographic characteristics included region, family structure, economic status, academic achievement, gender, grade, pocket money per week [Korean Won (KRW)]. Health risk behavioral variables included the number of cigarettes smoked per day and alcohol consumption per week (Table 1). The amount of smoking was quantified by merging smoking status during past 30 days and the average daily amount of cigarettes smoked. It was defined

Table 1. Socio-demographic and health risk behavioral characteristics of students.

Characteristics		N	%
Type of region	Urban	16,103	47.7
	Metropolitan	14,868	44.1
	Rural	2,773	8.2
Family structure	Father and mother	31,146	92.3
	Father only or mother only	2,238	6.6
	Other (not living with either parent)	360	1.1
Economic status	High	2,151	6.4
	Moderate high	7,794	23.1
	Moderate	16,469	48.8
	Moderate low	5,837	17.3
	Low	1,493	4.4
Academic achievement	High	3,439	10.2
	Moderate high	8,042	23.8
	Moderate	10,007	29.7
	Moderate low	8,292	24.6
	Low	3,964	11.7
Gender	Female	16,398	48.6
	Male	17,346	51.4
Grade	1 st	11,122	33.0
	2 nd	11,113	32.9
	3 rd	11,509	34.1
Pocket money/wk (KRW)*	< 20,000	16,593	49.2
	20,000-59,999	13,420	39.8
	60,000-12,999	2,766	8.2
	≥ 130,000+	965	2.9
Cigarettes smoked/d	Non	29,741	88.1
	1-9	3,223	9.6
	≥ 10	780	2.3
Alcohol (Soju) consumption/wk (cup)	Non	25,204	74.7
	1-6	5,112	15.1
	≥ 7	3,428	10.2
Experienced sex	No	31,437	93.2
	Yes	2,307	6.8

* As of June 30, 2015, Korea's 1,135 won (KRW) was equivalent to US \$ 1.

as non-smoker, 1-9 cigarettes and more 10 cigarettes. The amount of alcohol consumption was quantified by merging the alcohol drinking status during the past 30 days and the average amount per session. The categories were defined as non-drinker, Soju 1-6 cups and more 7 cups.

5. Statistical analysis

Statistical analyses were conducted on weighted data for the complex sampling design (strata, cluster, weight) of the Korean YRBSS. To identify differences according to socio-demographic characteristics and health risk behaviors according to sexual experience, complex sampling χ^2 test was used. A complex sampling, simple and multiple logistic regression analysis was used to calculate ORs and associated CIs to determine the relationships between related factors such as socio-demographic and health risk behavioral factors, and whether the student had experienced sex. Interactions between the number of cigarettes smoked, alcohol consumption and having had sex were identified. Gender, high school grade, family structure, and the amount of pocket money per week were adjusted for.

All values of tables were represented as unweighted frequency and percentage. All p values are 2-tailed, and $p < 0.05$ were considered statistically significant. All statistical analyses were conducted using IBM SPSS Statistics 24.0 (IBM Corp., Armonk, NY, USA).

Results

1. Sexual intercourse

The socio-demographic and selected behavioral characteristics of the students are shown in Table 1. Among 33,744 study participants, 17,346 (51.4%) were male students and 16,398 (48.6%) were female students. Among them, 11,122 (33.0%) were 1st grade (aged 17 years), 11,113 (33.0%) were 2nd grade (aged 18 years), 11,509 (34.0%) were 3rd grade (aged 19 years). Based on pocket money per week, 16,593 (49.2%) were "less than 20,000 KRW", 13,420 (39.8%) were "between 20,000 and 60,000 KRW", 2,766 (8.1%) were "between 60,000 and 130,000 KRW", 965 (2.9%) were "more than 130,000 KRW" and the group of students receiving "less than 20,000 KRW" accounted for the most students.

Sexual intercourse stratified by the socio-demographic characteristics is shown in Table 2. All characteristics excluding "type of region" had a statistically significant effect on sexual intercourse ($p < 0.001$). In subgroup analyses of family structure, students in the group "father and mother" had the least number that had sexual intercourse (6.2%), while the group "father only or mother only" and the group "other" had

11.0% and 35.6%, respectively. Students in the group "other" were less affected by parents' monitoring compared with students living with at least 1 parent, resulting in the increase of students that had sexual intercourse.

Male students that had sexual intercourse accounted for 9.9% of the selected population which was comparatively higher than in females where 3.6% of students had sexual intercourse. This difference between male and female students was significantly different ($p < 0.001$). Students in the group "moderate" had the lowest number of students that had sexual intercourse (5.3%), while the group "moderate high" (5.9%), "moderate low" (7.4%), "high" (14.5%), "low" (15.0%) respectively came next in order in subgroup analyses by economic status. In the results of subgroup analyses, academic achievement and sexual intercourse, showed a J-shape relationship. That is, students in the group "moderate high" had the lowest number of students that had sexual intercourse (5.1%), while the group "moderate" (5.4%), "moderate low" (6.8%), "high" (9.6%), "low" (11.7%), came next in order. A significantly increasing proportion of students had sexual intercourse with increasing numbers of cigarettes smoked per day and alcohol consumption per week (Soju) as observed in subgroup analyses of health risk behaviors.

2. Association between health risk behaviors and sexual experience

The socio-demographic and health risk behavioral characteristics of the high school students had a high association with students engaging in sexual intercourse as shown in Table 3.

The Table 3 shows first the unadjusted figures, and then the adjusted figures. In family structure, students in "other (not living with either of the parents)" had a higher number of students that had sexual intercourse than students living with either of their parents (OR 4.13, 95% CI 3.01-5.66). Economic status and academic achievement showed a U-shape relationship with the number of students that had sexual intercourse. In comparison with the "moderate" group in economic status, "moderate high" and "moderate low" were 1.13 times and 1.24 times higher, respectively, while "high" and "low" were 2.04 times and 1.81 times higher, respectively. In comparison with the "moderate" group in academic achievement, "high" and "low" were 1.41 times and 1.31 times significantly higher, respectively. In case of gender, before controlling the confounding variables, males were 3 times higher than females to have sexual intercourse, after controlling, the influence decreased to 1.85 times. A significantly increasing proportion of students that had intercourse had increasing pocket money per week and this trend increased with increasing school class grade.

Table 2. The influence of socio-demographic and health risk behavioral characteristics according to whether a student had sexual intercourse.

		Experienced sex		χ^2	p
		No (N = 31,437)	Yes (N = 2,307)		
Type of region	Urban	15,012 (93.2)	1,091 (6.8)	2.97	0.595
	Metropolitan	13,864 (93.2)	1,004 (6.8)		
	Rural	2,561 (92.4)	212 (7.6)		
Family structure	Father and mother	29,214 (93.8)	1,932 (6.2)	622.88	< 0.001
	Father only or mother only	1,991 (89.0)	247 (11.0)		
	Other (not living with either parent)	232 (64.4)	128 (35.6)		
Economic status	High	1,839 (85.5)	312 (14.5)	485.45	< 0.001
	Moderate high	7,333 (94.1)	461 (5.9)		
	Moderate	15,593 (94.7)	876 (5.3)		
	Moderate low	5,403 (92.6)	434 (7.4)		
	Low	1,269 (85.0)	224 (15.0)		
Academic achievement	High	3,110 (90.4)	329 (9.6)	299.16	< 0.001
	Moderate high	7,630 (94.9)	412 (5.1)		
	Moderate	9,471 (94.6)	536 (5.4)		
	Moderate low	7,724 (93.2)	568 (6.8)		
	Low	3,502 (88.3)	462 (11.7)		
Gender	Female	15,813 (96.4)	585 (3.6)	532.35	< 0.001
	Male	15,624 (90.1)	1,722 (9.9)		
Grade (age, y)	1 st (17)	10,606 (95.4)	516 (4.6)	33,744.00	< 0.001
	2 nd (18)	10,350 (93.1)	763 (6.9)		
	3 rd (19)	10,481 (91.1)	1,028 (8.9)		
Pocket money/wk (KRW)*	< 20,000	15,866 (95.6)	727 (4.4)	1,144.83	< 0.001
	20,000-59,999	12,446 (92.7)	974 (7.3)		
	60,000-12,999	2,451 (88.6)	315 (11.4)		
	≥ 130,000+	674 (69.8)	291 (30.2)		
Cigarettes smoked/d	Non	28,577 (96.1)	1,164 (3.9)	3,918.71	< 0.001
	1-9	2,466 (76.3)	757 (23.7)		
	≥ 10	394 (51.0)	386 (49.0)		
Alcohol (Soju) consumption/wk (cup)	Non	24,326 (96.5)	878 (3.5)	2,795.71	< 0.001
	1-6	4,627 (90.8)	485 (9.2)		
	≥ 7	2,484 (72.3)	944 (27.7)		

Data are presented as n (%).

* As of June 30, 2015, Korea's 1,135 won (KRW) is equivalent to US \$ 1.

A distinct dose-response relationship was observed with the number of cigarettes smoked per day and students that had sexual intercourse. A significantly increasing risk ratio was observed in "1-9 cigarettes" (OR 3.13, 95% CI 2.74-

3.58) and "more than 10 cigarettes" (OR 6.53, 95% CI: 5.34-7.98) compared with the non-smoking group. In addition, an increasing risk ratio of students that had sexual intercourse was observed in the "1-6 cups of Soju" group (OR 1.81, 95%

Table 3. Association between independent variables and whether a student had experienced sex.

		Crude OR (95% CI)	Adjusted OR (95% CI)
Type of region	Urban	1.00	1.00
	Metropolitan	1.04 (0.89-1.22)	1.10 (0.99-1.23)
	Rural	1.16 (0.87-1.54)	1.07 (0.84-1.36)
Family structure	Father and mother	1.00	1.00
	Father only or mother only	1.90 (1.65-2.19)	1.30 (1.11-1.52)
	Other (not living with either parent)	9.51 (7.49-12.07)	4.13 (3.01-5.66)
Economic status	High	3.24 (2.83-3.71)	2.04 (1.74-2.40)
	Moderate high	1.15 (1.03-1.28)	1.13 (1.01-1.27)
	Moderate	1.00	1.00
	Moderate low	1.42 (1.26-1.61)	1.24 (1.08-1.41)
	Low	3.33 (2.82-3.92)	1.81 (1.49-2.21)
Academic achievement	High	2.05 (1.76-2.38)	1.41 (1.19-1.67)
	Moderate high	0.97 (0.85-1.12)	1.04 (0.90-1.21)
	Moderate	1.00	1.00
	Moderate low	1.36 (1.19-1.55)	1.15 (1.01-1.31)
	Low	2.49 (2.17-2.84)	1.31 (1.12-1.53)
Gender	Female	1.00	1.00
	Male	3.00 (2.62-3.44)	1.85 (1.64-2.09)
Grade (age, y)	1 st (17)	1.00	1.00
	2 nd (18)	1.53 (1.33-1.75)	1.30 (1.14-1.49)
	3 rd (19)	2.07 (1.81-2.35)	1.61 (1.41-1.83)
Pocket money/wk (KRW)*	< 20,000	1.00	1.00
	20,000-59,999	1.75 (1.58-1.94)	1.32 (1.19-1.47)
	60,000-12,999	2.82 (2.47-3.23)	1.53 (1.30-1.79)
	≥ 130,000+	10.00 (8.36-11.96)	3.34 (2.67-4.16)
Cigarettes smoked/d	Non	1.00	1.00
	1-9	7.60 (6.81-8.50)	3.13 (2.74-3.58)
	≥ 10	23.52 (19.74-28.01)	6.53 (5.34-7.98)
Alcohol (Soju) consumption/wk (cup)	Non	1.00	1.00
	1-6	2.78 (2.47-3.12)	1.81 (1.60-2.05)
	≥ 7	10.45 (9.35-11.69)	3.48 (3.04-3.98)

* As of June 30, 2015, Korea's 1,135 won (KRW) is equivalent to US \$ 1.
OR = odds ratios; CI = confidence interval.

CI 1.60-2.05) and "more than 7 cups of Soju" (OR 3.48, 95% CI 3.04-3.98) group compared with students that did not consume alcohol.

3. Interaction between smoking and alcohol consumption on sexual experience

Even after all confounding variables were considered, a clear interaction of the number of cigarettes smoked, and alcohol consumption was observed (Figure 1). In other words,

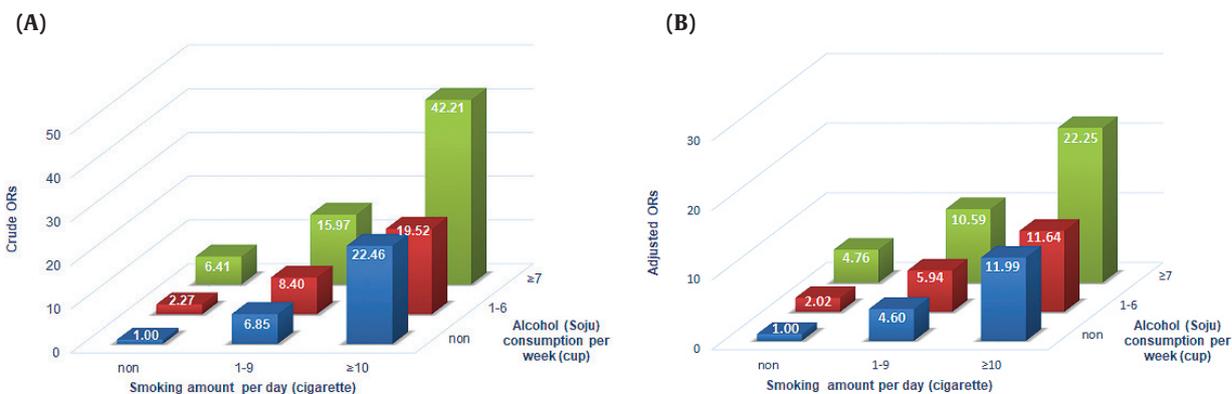


Figure 1. Interaction between cigarette smoking and alcohol consumption. (A) Before and (B) after adjusting for confounding variables, a clear interaction of the number of cigarettes smoked and alcohol consumption was observed.

compared with “non-smoking” and “no alcohol consumption” groups, “smoking 1-9 cigarettes per day and consuming 1-6 cups of alcohol”, and “smoking more than 10 cigarettes per day and consuming more than 7 cups of alcohol” had 5.94 and 22.25 higher risk ratios, respectively, of students that had sexual intercourse.

Discussion

The results in this study demonstrated significant associations between the number of cigarettes smoked, alcohol consumption, and sexual intercourse.

Individual, family and health-risk behaviors are important factors associated with sexually active adolescents [12,13]. According to the precedent study results that used the same secondary data as this study, a gender difference was observed in middle school students with 2.5% male and 1.6% female students having sexual intercourse [8,9,14]. Moderate economic status showed the lowest risk ratio of sexual intercourse, while increase in pocket money per week increased the risk ratio. Previous studies have investigated the relationship between economic status and sexual experience, providing quite different results. Economic status and academic achievement showed U-shape relationship with the sexual experience risk ratio. These studies showed that economic status and academic achievement were related [4,8,9,15,16].

Sexual-risk behaviors have been reported to be strongly associated with health-risk behaviors [17,18]. In this current study, the daily average number of cigarettes smoked and weekly consumption of alcohol were observed to have a dose-response relationship with students having had sexual intercourse. Even after controlling for confounding factors,

there was a strong relationship which has also been reported by other studies [4,6,9,15,19-21].

Consistent with previous research, a positive association between consumption of alcohol and students having had sexual intercourse was observed in this study. It has been reported that the odds of initiating sexual intercourse increased 1.5 times if the use of alcohol and drugs increased by 1 standard deviation [5]. This may be due to lack of inhibition, being with adolescents prone to engage in risk taking, and socialization about behaviors that often occur in similar social settings [22,23]. Alcohol impairs judgment [24], and may increase the risk of unplanned sex by diminishing an individual’s ability to consider the adverse consequences [25]. Several studies have shown that alcohol consumption in adolescence is associated with an early age of becoming sexually active [13,22,23]. Reducing substance use and alcohol consumption may mitigate adolescent sexual-risk behaviors, thereby promoting their physical, psychological, and sexual health [4,26,27].

Studies have reported that smoking status and plans to quit smoking, had an impact on the effectiveness of anti-smoking public service announcements [28,29]. Therefore, comprehensive and lasting intervention in schools and local communities combined with public service announcements is thought to be the most effective way to reduce smoking among adolescents.

Interventions that reduce sexual intentions, exposure to risky situations, and the consequences of alcohol consumption may help to delay a student becoming sexually active [30]. Interventions focused on preventing alcohol consumption in early adolescence may have the potential to reduce the associated risks of sexually transmitted diseases [31]. The mass media have been shown to affect a broad range of

adolescent health-related behaviors including violence, eating disorders, smoking tobacco and alcohol consumption [32]. Smoking prevention education and cessation counseling in Korea is conducted routinely from elementary to high school, provided by the Office of Education and public health centers. However, prevention of alcohol consumption and counseling for alcoholics is overlooked. Therefore, there is a need to educate against alcohol consumption in schools and counseling programs should be rolled out broadly from elementary school age.

Conflicts of Interest

No potential conflict interest relevant to this article was reported.

References

- [1] Finer LB, Darroch JE, Singh S. Sexual partnership patterns as a behavioral risk factor for sexually transmitted diseases. *Fam Plann Perspect* 1999;31(5):228-36.
- [2] World Health Organization [Internet]. Adolescent pregnancy. [cited 2018 Jan 14]. Available from: <http://www.who.int/mediacentre/factsheets/fs364/en/>.
- [3] World Health Organization [Internet]. Adolescent birth. [cited 2018 Jan 14]. Available from: <http://apps.who.int/gho/data/node.sdq.3-7-viz-2?lang=en/>.
- [4] Rew L, Tracy C, Li CC. Early and risky sexual behavior in a sample of rural adolescents. *Issues Compr Pediatr Nurs* 2011;34(4):189-204.
- [5] Santelli JS, Kaiser J, Hirsch L, et al. Initiation of sexual intercourse among middle school adolescents: The influence of psychosocial factors. *J Adolesc Health* 2004;34(3):200-8.
- [6] Han SH, Kim JJ, Choi MJ. Effected Factors on the Initiation of Sexual Activity among Korean Young Adults. *J Health Info Stat* 2002;27(1):21-36.
- [7] Mo HS, Oh HE, Cho E. A Study on the Relationship between Risk Behaviors, Sexual Knowledge, Sexual Attitudes, and Sexual Experience in Male High School Students. *Korean J Women Health Nurs* 2006;12(3):210-20.
- [8] Yu JO, Kim HH, Kim JS. Factors Associated with Sexual Debut among Korean Middle School Students. *Child Health Nurs Res* 2014;20(3):159-67.
- [9] Gwon SH, Lee CY. Factors that Influence Sexual Intercourse among Middle School Students - Using Data from the 8th (2012) Korea Youth Risk Behavior Web-based Survey -. *J Korean Acad Nurs* 2015;45(1):76-83.
- [10] Korea Centers for Disease Control and Prevention. Reports on the 11th Korea youth risk behavior web-based survey, 2015. Seoul (Korea): Korea Centers for Disease Control and Prevention; 2015.
- [11] Korea Centers for Disease Control and Prevention [Internet]. Youth Risk Behavior Surveillance System. Available from: <https://www.cdc.gov/healthyyouth/data/yrbs/index.htm>.
- [12] Rew L. Adolescent health: a multidisciplinary approach to theory, research, and intervention. Sage Publication, Inc; 2005.
- [13] Le YCL, Behnken MP, Markham CM, et al. Alcohol use as a potential mediator of forced sexual intercourse and suicidality among African American, Caucasian, and Hispanic high school girls. *J Adolesc Health* 2011;49(4):437-9.
- [14] Valle AK, Torgersen L, Røysamb E, et al. Social class, gender and psychosocial predictors for early sexual debut among 16 year olds in Oslo. *Eur J Public Health* 2005;15(2):185-94.
- [15] Kim KH, Kwon HJ, Chung HK et al. A Study on the Variables Forecasting Male Adolescents's Sexual Intercourse. *J Korean Acad Nurs* 2004;34(6):954-63.
- [16] Lee JH. A Study on the Variables Forecasting Female High School Students' Sexual Intercourse. *Stud Korean Youth* 2007;18(2):111-31.
- [17] Palen LA, Smith EA, Flisher AJ, et al. Substance use and sexual risk behavior among South African eighth grade students. *J Adolesc Health* 2006;39(5):761-3.
- [18] Kiene SM, Barta WD, Tennen H, et al. Alcohol, helping young adults to have unprotected sex with casual partners: findings from a daily diary study of alcohol use and sexual behavior. *J Adolesc Health* 2009;44(1):73-80.
- [19] Kuzman M, Simetin IP, Franelić IP. Early sexual intercourse and risk factors in Croatian adolescents. *Coll Antropol* 2007;31 Suppl 2:121-30.
- [20] Boislard P, MA Poulin F. Individual, familial, friends-related and contextual predictors of early sexual intercourse. *J Adolesc* 2011;34(2):289-300.
- [21] Santelli JS, Kaiser J, Hirsch L, et al. Initiation of sexual intercourse among middle school adolescents: The influence of psychosocial factors. *J Adolesc Health* 2004;34(3):200-8.
- [22] Fortenberry JD. Adolescent substance use and sexually transmitted diseases risk: A review. *J Adolesc Health* 1995;16(4):304-8.
- [23] Leigh BC. Alcohol and unsafe sex: An overview of research and theory. *Prog Clin Biol Res* 1990;325:35-46.
- [24] Steel CM, Josephs RA. Alcohol myopia. Its prized and dangerous effects. *Am Psychol* 1990;45(8):921-33.
- [25] Hingson R, Heeren T, Winter MR, et al. Early age of first drunkenness as a factor in college students' unplanned and unprotected sex attributable to drinking. *Pediatrics* 2003;111(1):34-41.
- [26] Guo J, Stanton B, Cottrell L, et al. Substance use among rural adolescent virgins as a predictor of sexual initiation. *J Adolesc Health* 2005;37(3):252-5.
- [27] Pedersen W, Samuelsen SO, Wichstrom L. Intercourse debut age: poor resources, problem behavior, or romantic appeal? A population-based longitudinal study. *J Sex Res* 2003;40(4):333-45.
- [28] Lee MC, Na JH, Kim JH. A Study on the Effects of Anti-Smoking Advertising according to a Smoking Status and Message Framing. *Korean J Advert Public Relations* 2006;8(3):210-36.
- [29] Cho KW, Lee J, Ryu JH, et al. Effects of Anti-Smoking Public Service Announcements on the Attitudes of Korean College Students toward Smoking. *Osong Public Health Res Perspect* 2017;8(6):397-404.
- [30] Markham CM, Rushing SC, Jessen C, et al. Factors associated with early sexual experience among American Indian and Alaska Native youth. *J Adolesc Health* 2015;57(3):334-41.
- [31] Strachman A, Impett EA, Henson JM, et al. Early adolescent alcohol use and sexual experience by emerging adulthood: a 10-year longitudinal investigation. *J Adolesc Health* 2009;45(5):478-82.
- [32] Escobar-Chaves SL, Tortolero SR, Markham CM, et al. Impact of the media on adolescent sexual attitudes and behaviors. *Pediatrics* 2005;116(1):303-26.