

The Relationships between Sexual Intercourse and Health Risk Behaviors in Korean and US Adolescents

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Purpose: Early sexual intercourse is associated with poor health outcomes in adolescents. It is known that sexual intercourse coincides with other health risk behaviors such as smoking, drinking, and using drugs. The purpose of this study is to identify the relationships between sexual intercourse and health risk behaviors among Korean and US adolescents using nationally representative data. **Methods:** Data were collected from the 2011 Korea Youth Risk Behavior Web-based Survey (29,676 students) and 2011 Youth Risk Behavior Surveillance System (10,135 high school students). Logistic regression analysis was performed. **Results:** In Korea, students who had sexual intercourse accounted for 7.0% in total. Among these, 9.7% were male and 4.2% were female students. In the US, a total of 51.3% students had sexual intercourse, and the proportion of the US male (49.3%) and female (53.4%) students who had sexual intercourse was similar. Korean and US students who experienced sexual intercourse were more likely to smoke, drink alcohol, and use drugs. **Conclusion:** Since the results of this study show the relationships between sexual intercourse and health risk behaviors, it is necessary to develop comprehensive sex education programs with effective strategies to reduce health risk behaviors in adolescents.

Key Words: Adolescent, Health, Korea, Sexual behavior, United states

INTRODUCTION

Recently, Western European and Asian countries including South Korea have continually reported the incidence of various diseases of the reproductive system, juvenile delinquency, illegal abortion, and single motherhood resulting from adolescents having sexual relationships. Earlier studies including the report of World Health Organization have reported that early sexual debut and early pregnancy increases the risks of death and negative health outcomes (e.g., sexually transmitted diseases, HIV infection, and cervical carcinoma) for not only male and female adolescents, but also their newborns [1-4]. Adolescents experiencing early sexual intercourse tended to have a higher risk of experiencing health risk behaviors including smoking and using drugs [3]. Also binge drinkers were

more likely to show risk-taking behaviors including sexual intercourse [5].

Previous studies on sexual intercourse among adolescents tended to focus on relationships between sexual intercourse and negative health effects on the reproductive system, unintended pregnancies [3,4], and sexual risk behaviors [5]. For example, a systematic review of 222 studies on sexual health of adolescents, most studies were about the sexual health of adolescents related to sexual risk behaviors such as condom use and contraception [5]. According to problem behavior theory, sexual intercourse in adolescents is closely related to various deviant behaviors including drinking, smoking, drug use, depression, suicide, and insufficient physical exercise [6]. Moreover, a meta-analysis reported that there are gender differences in sexual behaviors and attitudes such as casual sex, number

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Received: Jan 23, 2017 / Revised: Jun 6, 2017 / Accepted: Jun 16, 2017

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of partners, and attitudes towards casual sex [7]. Therefore, it is necessary to explore the relationships between sexual intercourse of adolescents and various health risk behaviors considering gender differences.

Korean adolescents live in a country where adolescent sexual intercourse is viewed negatively or as a taboo. However, they now have easy access to distorted sexual information and technologies through various media due to the introduction of an open sexual culture from the Western countries along with the rapid advancement in information technology. According to the results of the Korea Youth Risk Behavior Web-based Survey (KYRBWS), the rate of sexual intercourse in adolescents increased from 4.8% in 2005 to 7.4% in 2013 [8], which shows an upward trend of early sexual debut. The report of the Youth Risk Behavior Surveillance System (YRBSS) in the US indicated that the rates of US adolescents' sexual intercourse were 46.8% in 2005 and 41.2% in 2015. In particular, 20.6% of these had drunk alcohol or used drugs before sexual intercourse [9]. Although the prevalence of experiencing sexual intercourse in Korean adolescents was lower than that of their US and European counterparts, the increasing trend and problems associated with sexual activities reported by studies conducted in Western countries should not be ignored.

It would be meaningful to examine and compare the relationships between sexual intercourse and health risk behaviors in Korean and US adolescents to improve our limited understanding about sexual health of adolescents. Since Korea and the US have conducted the KYRBWS and the YRBSS, every 1~2 year (s) to measure various health and health risk behaviors of adolescents, most of the panel questions used in these surveys are similar or the same. Although the rate of sexual intercourse in US adolescents is much higher than that of those in Korea due to the liberal sexual culture, findings of the differences or similarities from these two countries may provide meaningful information regarding health of adolescents. The results could be also used for other Asian countries where both Confucian values and Western values are coexisting. Therefore, the purpose of this study was to examine the relationships between adolescent sexual intercourse and various health risk behaviors such as drinking, smoking, drug use, depression, and insufficient exercise through an analysis of the KYRBWS and YRBSS data. The detailed purposes of this study were to identify the degree of sexual and health risk behaviors in Korean and US adolescents by gender, then to identify the differences in health risk behaviors according to sexual intercourse in Korean and US adolescents by gender, and finally to identify the

relationships between sexual intercourse and health risk behaviors in Korean and US adolescents by gender.

METHODS

1. Study Design

This was a cross-sectional, descriptive study to examine the relationships between sexual intercourse and health risk behaviors in Korean and US adolescents by gender. A secondary data analysis was used on the data from the 7th KYRBWS in Korea and YRBSS in the US, which were conducted in 2011.

2. Participants and Data Collection

The Korean participants were female and male students enrolled in middle or high schools throughout Korea who were the participant population in the 7th KYRBWS [8]. For data collection, the KYRBWS website (<http://yhs.cdc.go.kr/>) was visited, and raw data were obtained after pledging to comply with the "regulations on raw data disclosure and use." The 7th KYRBWS, organized by the Ministry of Education, Science, and Technology; Ministry of Health and Welfare; and Korea Centers for Disease Control and Prevention, surveyed 79,202 male and female students (from 7th to 12th grades) from 800 schools (400 middle schools and 400 high schools). These schools were selected through (1) population stratification, (2) sample distribution, and (3) sampling using stratified cluster sampling. Among the students selected, 75,643 participated in the survey, showing a participation rate of 95.5% (refer to the 7th KYRBWS for more information on the sampling stages). The survey, which was conducted online, was an anonymous self-administered questionnaire comprising 134 questions on 14 categories of health behaviors in Korean adolescents. The variables surveyed in the categories of health risk behaviors (smoking, drinking, drug use, exercise during the recent 7 days, and depressive symptoms within the last 12 months) and sexual behaviors were used in the present study. The present study chose 29,676 students from 10th~12th grades as the analysis participants.

The US study participants included 15,425 students, both male and female, from 9th~12th grades, from 158 schools in 50 states, who had participated in the YRBSS conducted by the Centers for Disease Control and Prevention (CDC) in 2011 to monitor behaviors affecting the health of US adolescents. Data for the present study were collected online by visiting the CDC's website (<http://www.cdc.gov/healthyyouth/yrbs/data/index.htm>) and downloading the data available to the public for analysis. The schools were selected

using a probability sampling method, and the survey was conducted with 17,672 students from 194 schools; 15,425 students participated, showing a participation rate of 71% (refer to the 2011 YRBSS Data User's Guide for more information on the sampling). Among a total of 97 questions, the present study used the variables surveyed in the categories of health risk behaviors (smoking, drinking, drug use, exercise during the recent 7 days, and depressive symptoms within the last 12 months) and sexual behavior. To analyze the data from the YRBSS with those of Korean students in the same grade levels, the present study used data from 29,676 Korean students in grades 10~12 and 10,135 US students in grades 9~12. This study was approved by the Institutional Review Board of Kyungpook National University.

3. Measurements

1) Sexual behaviors

Variables of sexual behaviors were age at first sexual intercourse and types of contraception; the same variables were used in both Korean and US surveys. For questions related to sexual behaviors, both countries regarded the sexual behavior of inserting a penis into a vagina as sexual intercourse. Responses for the age at first sexual intercourse were classified into "13 years old or younger," "14 years old," "15 years old," "16 years old," and "17 years old or older."

2) Health risk behaviors

Health risk behaviors in this study included smoking, drinking, drug use, insufficient exercise during the past 7 days, and depressive symptoms within the last 12 months. These were surveyed in both Korean and US adolescents. In both surveys, the adolescents were asked, "Have you ever tried cigarette smoking, even 1 or 2 puffs?" as the question for smoking, to which the respondents answered "Yes" or "No." Regarding the question on drinking, the Korean survey asked, "Have you ever had a drink of alcohol, 1 or more glasses?" The respondents answered "Yes" or "No" to this question as well. On the other hand, the US survey asked, "How many days have you had 1 or more glass of alcohol until now?" To this question, the response of "0" days was considered "Never had a drink of alcohol" while each response type of "more than 1 day" was reclassified as "Yes, I had drank". On the question related to drug use, the Koreans answered either "Yes" or "No" to the question "Have you habitually or intentionally taken drugs or sniffed glue or butane gas?". In the US survey, the question was "How many times have you sniffed glue or butane gas

until now?", to which the response of "0" times was considered "Never sniffed," while each response type of "more than 1 time" was reclassified as "Have had sniffed." The question on exercise during the past 7 days was the same in both the Korean and US surveys, for which the responses were reclassified as "less than 5 times a week" and "5 times or more a week" for the present analysis. The question on depressive symptoms within the last 12 months was also the same in both the Korean and US surveys and consisted of same response types ("Yes" or "No"), which were then used for the analysis.

3) Data analysis

The data were collected via a survey using a complex sample design including stratification, clustering, and multiple stages of sample selection. Thus, we used the analyses originally provided by the 2011 KYRBWS and 2011 YRBSS to estimate the population parameters in both descriptive and multivariate analyses. The data were analyzed using SAS 9.3. The general characteristics, sexual intercourse, and health risk behaviors were analyzed by country and gender using descriptive statistics while the differences in health risk behaviors according to sexual intercourse were analyzed by a χ^2 test after dividing the participants into groups by gender. The relationships between sexual intercourse and health risk behaviors in Korean and US students were analyzed using a multiple logistic regression, and the fitness of the model used was examined using likelihood ratio statistics ($p < .0001$).

RESULTS

1. General Characteristics and Sexual Behaviors of Korean and US Adolescents

In terms of age, 16- and 17-year-olds made up 33.4% and 33.9% of the Korean adolescents, respectively, while, among US adolescents, the number of those aged 15 years or younger was the highest with 31.6% followed by 17 years old (26.9%) and 16 years old (26.4%). For sexual intercourse with the opposite sex, only 7.0% of the Korean adolescents responded that they had sexual intercourse whereas 51.3% of the US adolescents reported that they had sexual intercourse. For age at first sexual intercourse, Korean adolescents showed a pattern of increase in the rate of first sexual intercourse corresponding to an increase in age, whereas US adolescents showed distinctively higher rates at ages below 13, 14, and 15 years old. The contraceptive method used by 47% of Korean and 52.1% of US adolescents was condom use (Table 1).

Table 1. General Characteristics and Sexual Intercourse of Adolescents in Korea and the United States

Variables	Categories	Korea			US		
		Boys (n=14,946)	Girls (n=14,730)	Total (n=29,676)	Boys (n=5,119)	Girls (n=5,016)	Total (n=10,135)
		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Age (year)	≤ 15	1,890 (12.7)	1,846 (12.5)	3,736 (12.6)	1,672 (32.7)	1,530 (30.5)	3,202 (31.6)
	16	4,955 (33.2)	4,957 (33.7)	9,912 (33.4)	1,370 (26.8)	1,301 (25.9)	2,671 (26.4)
	17	4,963 (33.2)	5,109 (34.7)	10,072 (33.9)	1,357 (26.5)	1,364 (27.2)	2,721 (26.9)
	≥ 18	3,138 (21.0)	2,818 (19.1)	5,956 (20.1)	720 (14.1)	821 (16.4)	1,541 (15.2)
Sexual intercourse	No	13,492 (90.3)	14,109 (95.8)	27,601 (93.0)	2,597 (50.7)	2,339 (46.6)	4,936 (48.7)
	Yes	1,454 (9.7)	621 (4.2)	2,075 (7.0)	2,522 (49.3)	2,677 (53.4)	5,199 (51.3)
Age at first sexual intercourse	≤ 13	252 (17.3)	54 (8.7)	306 (14.8)	429 (17.0)	834 (31.2)	1,263 (24.3)
	14	166 (11.4)	59 (9.5)	225 (10.8)	597 (23.7)	523 (19.5)	1,120 (21.5)
	15	306 (21.1)	100 (16.1)	406 (19.6)	746 (29.6)	634 (23.7)	1,380 (26.5)
	16	370 (25.5)	199 (32.1)	569 (27.4)	521 (20.7)	472 (17.6)	993 (19.1)
	≥ 17	360 (24.8)	209 (33.7)	569 (27.4)	229 (9.1)	214 (8.0)	443 (8.5)
Contraceptive methods	Birth control pills	37 (2.5)	23 (3.7)	60 (2.9)	394 (15.6)	286 (10.7)	680 (13.1)
	Condoms	672 (46.2)	303 (48.8)	975 (47.0)	1,113 (44.1)	1,593 (59.5)	2,706 (52.1)
	Withdrawal	122 (8.4)	63 (10.1)	185 (8.9)	262 (10.4)	217 (8.1)	479 (9.2)
	Others	-	-	-	-	-	-
Fertility awareness		623 (42.9)	232 (37.4)	855 (41.2)	-	-	-
	Any intrauterine device	-	-	-	179 (7.1)	63 (2.4)	242 (4.7)
	Some other method	-	-	-	65 (2.6)	68 (2.5)	133 (2.6)
	No method	-	-	-	391 (15.5)	261 (9.7)	652 (12.5)
	Not sure	-	-	-	121 (4.8)	194 (7.2)	315 (6.1)

2. Health Risk Behaviors in Korean and US Adolescents

The characteristics of health risk behaviors in adolescents according to gender for both the Korean and US adolescents are reported in Table 2. Korean adolescents showed statistically significant gender-based differences ($p < .001$) in smoking, drinking, drug use, exercise during the past 7 days, and depressive symptoms within the last 12 months. Meanwhile, US adolescents showed statistically significant gender-based differences in all health risk behavior variables except for drinking alcohol ($p = .078$).

Further, both Korean and US adolescents showed statistically significant differences in health risk behaviors related to smoking, drinking, drug use, exercise during the past 7 days, and depressive symptoms within the last 12 months ($p < .001$). In particular, 1.1% of the Korean adolescents responded that they habitually or intentionally took drugs or sniffed glue or butane gas, which was drastically lower than the 10.9% US adolescents who reported the same. Korean adolescents also showed a much lower rate of exercise as compared to US adolescents. Specifically, the number of US adolescents who exercised 5 or more times a week was more than 5 times the number of Korean adolescents who did the same.

3. Differences in Health Risk Behaviors according to Sexual Intercourse of Korean and US Adolescents

As a result of examining the differences in health risk behaviors according to sexual intercourse among Korean and US adolescents, statistically significant differences were seen in all variables of smoking, drinking, drug use, exercise during the past 7 days, and depressive symptoms within the last 12 months in male (Table 3) and female students (Table 4).

4. Relationships between Health Risk Behaviors and Sexual Intercourse of Korean and US Adolescents

Each risk behavior was regressed on sexual intercourse while controlling for other risk behaviors. Smoking was the health risk behavior that showed a significant relationship with sexual intercourse in both Korean and US adolescents ($p < .001$). In both Korean and US adolescents, those who smoked showed a higher rate of sexual intercourse. In particular, the sexual intercourse rate of Korean female adolescent smokers was 4.47 times higher than that of non-smokers. Further, the sexual intercourse behavior of Kore-

Table 2. Health Risk Behaviors of Adolescents in Korea and the United States

Variables	Korea			US			Korea Total n (%)	US Total n (%)	p
	Boys	Girls	p	Boys	Girls	p			
	n (%)	n (%)		n (%)	n (%)				
Smoking									
No	8,725 (58.4)	11,514 (78.2)	<.001	2,814 (55.0)	2,575 (51.3)	<.001	20,239 (68.2)	5,389 (53.2)	<.001
Yes	6,221 (41.6)	3,216 (21.8)		2,305 (45.0)	2,441 (48.7)		9,437 (31.8)	4,746 (46.8)	
Drinking									
No	4,646 (31.1)	5,480 (37.2)	<.001	1,329 (26.0)	1,380 (27.5)	.078	10,126 (34.0)	2,709 (26.7)	<.001
Yes	10,300 (68.9)	9,250 (62.8)		3,790 (74.0)	3,636 (72.5)		19,550 (65.9)	7,426 (73.3)	
Using drugs									
No	14,740 (98.6)	14,618 (99.2)	<.001	4,507 (88.0)	4,528 (90.3)	<.001	29,358 (98.9)	9,035 (89.2)	<.001
Yes	206 (1.4)	112 (0.8)		612 (12.0)	488 (9.7)		318 (1.1)	1,100 (10.9)	
Physical activity									
< 5 days/week	12,907 (86.4)	14,051 (95.4)	<.001	3,176 (62.0)	1,965 (39.2)	<.001	26,958 (90.8)	5,141 (50.7)	<.001
≥ 5 days/week	2,039 (13.6)	679 (4.6)		1,943 (38.0)	3,051 (60.8)		2,718 (9.2)	4,994 (49.3)	
Depression									
No	10,324 (69.1)	8,662 (58.8)	<.001	3,242 (63.3)	3,940 (78.6)	<.001	18,986 (64.0)	7,182 (70.9)	<.001
Yes	4,622 (30.9)	6,068 (41.2)		1,877 (36.7)	1,076 (21.4)		10,690 (36.0)	2,953 (29.1)	

Table 3. Relationships between Sexual Intercourse and Health Risk Behaviors among Boys in Korea and the United States

Variables	Sexual intercourse in Korean boys				Sexual intercourse in US boys			
	No	Yes	Total	p	No	Yes	Total	p
	%	%	n (%)		%	%	n (%)	
Smoking								
No	62.2	23.3	8,725 (58.4)	<.001	73.9	35.5	2,814 (55.0)	<.001
Yes	37.8	76.7	6,221 (41.6)		26.1	64.6	2,305 (45.0)	
Drinking								
No	33.3	10.2	4,646 (31.1)	<.001	40.4	11.1	1,329 (26.0)	<.001
Yes	66.7	89.8	10,300 (68.9)		59.7	88.9	3,790 (74.0)	
Using drugs								
No	99.0	95.5	14,740 (98.6)	<.001	91.9	84.1	4,507 (88.0)	<.001
Yes	1.0	4.5	206 (1.4)		8.1	15.9	612 (12.0)	
Physical activity								
< 5 days/week	86.8	82.5	12,907 (86.4)	<.001	58.8	65.4	3,176 (62.0)	<.001
≥ 5 days/week	13.2	17.5	2,039 (13.6)		41.2	34.6	1,943 (38.0)	
Depression								
No	70.5	55.9	10,324 (69.1)	<.001	70.6	55.9	3,242 (63.3)	<.001
Yes	29.5	44.2	4,622 (30.9)		29.4	44.1	1,877 (36.7)	

an adolescents showed statistically significant relationships with smoking ($p < .001$), drinking ($p < .001$), habitual or intentional use of drugs ($p < .001$), and depressive symptoms within the last 12 months ($p = .026$ for male and $p < .001$ for female students). Specifically, students who habitually or intentionally used drugs showed a higher rate of sexual experience than those who did not (2.70 times in male and 3.21 times in female students).

On the other hand, the sexual intercourse behavior of US adolescents showed statistically significant relationships with smoking ($p < .001$) and exercise during the past 7 days ($p < .001$). Further, the sexual intercourse rates in male and female adolescent smokers were 3.01 and 2.63 times higher, respectively, than in non-smokers. Students who exercised 5 times or more a week during the past 7 days showed a lower sexual experience rate than those

who exercised less than 5 times a week by 0.57 times for male and 0.77 times for female students. Moreover, the health risk factors that showed a significant relationship with sexual experience rate in US female adolescents were drinking and drug use. In other words, female adolescents who had used alcohol or drugs before showed a sexual intercourse rate that was 1.18~1.57 times higher than in those who had not (Table 5).

DISCUSSION

The study results on the relationships between sexual intercourse and various health risk behaviors by gender demonstrated that smoking, drinking, and using drugs were predictors of higher sexual intercourse rates for both male and female Korean adolescents. For US adolescents, smoking was the only predictor of higher sexual inter-

Table 4. Relationships between Sexual Intercourse and Health Risk Behaviors among Girls in Korea and the United States

Variables	Sexual intercourse in Korean boys				Sexual intercourse in US boys			
	No	Yes	Total	<i>p</i>	No	Yes	Total	<i>p</i>
	%	%	n (%)		%	%	n (%)	
Smoking								
No	80.2	32.7	11,514 (78.2)	< .001	71.5	33.7	2,575 (51.3)	< .001
Yes	19.8	67.3	3,216 (21.8)		28.5	66.3	2,441 (48.7)	
Drinking								
No	38.5	8.5	5,480 (37.2)	< .001	43.4	13.6	1,380 (27.5)	< .001
Yes	61.5	91.5	9,250 (62.8)		56.6	86.4	3,636 (72.5)	
Using drugs								
No	99.4	96.1	14,618 (99.2)	< .001	95.0	86.1	4,528 (90.3)	< .001
Yes	0.6	3.9	112 (0.8)		5.0	13.9	488 (9.7)	
Physical activity								
< 5 days/week	95.5	93.2	14,051 (95.4)	.009	43.5	35.4	1,965 (39.2)	< .001
≥ 5 days/week	4.5	6.8	679 (4.6)		56.5	64.6	3,051 (60.8)	
Depression								
No	59.9	34.0	8,662 (58.8)	< .001	83.4	74.3	3,940 (78.5)	< .001
Yes	40.1	66.0	6,068 (41.2)		16.6	25.7	1,076 (21.5)	

Table 5. Multiple Logistic Regression Adjusted for Age among Adolescents in Korea and the United States

Variables	Korea				US			
	Boys		Girls		Boys		Girls	
	AOR (95% CI)	<i>p</i>	AOR (95% CI)	<i>p</i>	AOR (95% CI)	<i>p</i>	AOR (95% CI)	<i>p</i>
Smoking								
No	1.00	< .001	1.00	< .001	1.00	< .001	1.00	< .001
Yes	2.29 (2.05~2.55)		4.47 (3.77~5.30)		3.01 (2.64~3.44)		2.63 (2.31~3.01)	
Drinking								
No	1.00	< .001	1.00	< .001	1.00	.220	1.00	.013
Yes	0.50 (0.45~0.56)		0.34 (0.30~0.40)		1.08 (0.95~1.23)		1.18 (1.04~1.35)	
Using drugs								
No	1.00	< .001	1.00	< .001	1.00	.474	1.00	< .001
Yes	2.70 (1.95~3.75)		3.21 (1.89~5.45)		1.07 (0.88~1.31)		1.57 (1.25~1.97)	
Physical activity								
< 5 days/week	1.00	.090	1.00	.174	1.00	< .001	1.00	< .001
≥ 5 days/week	0.88 (0.76~1.02)		0.79 (0.56~1.11)		0.57 (0.51~0.64)		0.77 (0.69~0.87)	
Depression								
No	1.00	.026	1.00	< .001	1.00	.473	1.00	.550
Yes	0.88 (0.78~0.99)		0.69 (0.59~0.80)		0.95 (0.83~1.09)		0.95 (0.81~1.12)	

AOR=adjusted odds ratio.

course rates. Previous studies also reported significant relationships between sexual intercourse and drug use [10,11] and smoking [12,13]. According to the problem behavior theory proposed by Jessor [6], health risk behaviors such as adolescent smoking, drinking and drug use appear together, in a complex rather than individual manner, and these risk-taking behaviors are highly interrelated [6]. Particularly, in the present study, smoking and drug use were shown to be better predictors of sexual intercourse in female than in male students. For example, a greater influence of smoking on female than on male adolescents was reported in a study conducted with Turkish adolescents [12]. In their study, although smoking was found to be a predictor of sexual intercourse for both male and female adolescents, female adolescents with a smoking habit reported 16 times higher risk of experiencing sexual intercourse than those who had never smoked, and this is about 6 times greater than the risk of male adolescents [12]. This can be attributed to the sociocultural influence of viewing smoking and drug use as more serious delinquency in female adolescents than in male adolescents. When sexual intercourse of female students coincides with drinking and drug use, such behaviors have a critical impact on their physical health. Considering that they will become child-bearing women in future years, it is necessary for schools and society to devise attentive measures to monitor sexual experience and sexual health in female adolescents.

As far as the relationship between sexual intercourse and drinking experiences, contrary to preceding studies in Korea and from abroad reporting a significantly positive correlation between drinking and sexual intercourse in adolescents, the present study showed a negative correlation between drinking and sexual intercourse in Korean adolescents. This is thought to be because the preceding studies measured the effects of a drinking problem by measuring heavy drinking of 5 or more drinks or problem drinking [14] rather than a simple drinking experience used the present study (i.e., none vs. 1 or more drinks), which did not allow accurate identification of problem drinking. Thus, it was found that problem drinking affected sexual intercourse in adolescents. In addition, in a study investigating the relationship between sexual intercourse and health risk behaviors in 2,170 Swedish adolescents aged 15 years old, the sexual intercourse rate was significantly higher in adolescents with drinking problems [13]. Adolescents generally start drinking before they initiate sexual intercourse [16]. Therefore, the problem with adolescent alcohol consumption may be not the drinking behavior itself but, rather, the high probability of it being accompanied by risky behaviors such as sexual inter-

course. Thus, it is necessary to pay attention to particularly problem drinking of adolescents.

Examination of the relationship between sexual intercourse and exercise in adolescents showed no significant relationship between the two in the Korean students; however, it showed a negative relationship in the US students. It was difficult to find domestic studies on the relationship between sexual intercourse and exercise. Moreover, the results of preceding studies from abroad were inconsistent. For example, while some studies reported that physically active adolescents showed a low sexual intercourse rate [17], which may be because those who tend to perform positive health behaviors like exercise might be less likely to experience risk-taking behaviors such as sexual intercourse. However, Makenzius and Larsson [13] reported that physically active adolescents had a high sexual intercourse rate. With regard to this result, they explained that, among adolescents, particularly male adolescents may experience sexual activities as a form of expressing their physical health [13]. Thus, more studies are needed to explore the inconsistent relationship between physical activity and sexual intercourse in both Korean and US adolescents.

As far as relationship between depressive symptoms and sexual intercourse, there was a negative relationship in Korean adolescents while no relationship was found in US adolescents. However, preceding studies from abroad indicated that adolescent sexual intercourse was positively related to depressive symptoms [18,19]. Moreover, it was shown that female adolescents who first experienced sexual intercourse before the age of 16 years had a higher risk of developing depression during adulthood than did those who did so after the age of 16 years [18]. The mechanism behind this may be due in part to the fact that anti-social and depressed adolescents expressed their anti-social and depressed emotions through sex [20]. In the present study, depressive symptoms in adolescents were negatively related or unrelated to their sexual intercourse. The reason for this may be found in the validity of the test tools. In contrast to above studies using tools with proven validity and reliability such as the Center for Epidemiologic Studies Depression [18,19] to measure the depressive symptoms, the present study used "Yes" or "No" responses to the question on whether the respondents had felt depressive symptoms within the last 12 months. Therefore, it is determined that future studies on the relationship between depressive symptoms and sexual intercourse in Korean adolescents should measure depressive symptoms using tools with proven validity and reliability. Also, health care providers caring for adolescents should assess their depressive symptoms along with other risk behaviors.

CONCLUSION

The results of this comparative analysis of Korean and US adolescents showed that sexual intercourse coincides with other health risk behaviors, and different health risk behaviors are associated with higher rates of sexual intercourse. In addition, physical activities were a protective factor for sexual intercourse in US adolescents while they were not associated in Korean adolescents. These findings highlighted the needs of developing comprehensive sexual education programs considering other health risk behaviors found to coincide with risky sexual behaviors.

In particular, smoking appeared to be a significant predictive factor for sexual intercourse in male and female adolescents from both Korea and America. Until now, health care providers have tried to prevent adolescents younger than 18 years from smoking due to negative health consequences such as death from smoking-related diseases [21]. The findings from this study stressed an additional important reason by reporting that smoking coincide with sexual intercourse, which could result in unwanted reproductive health outcomes. Therefore, further efforts should be made to develop effective strategies to help adolescents avoid starting smoking cigarettes during adolescence.

The Western societies represented by US and European countries have long implemented various programs on sex and genital health care due to the high rate of adolescents' sexual intercourse [22]. For example, the US has recognized the negative impact of early sexual activities, especially before the age of 15 years, on adolescent health and thus has been applying a comprehensive sexual education guideline at the national level [22]. Therefore, sexual education programs for Korean adolescents not only establish healthy and proper sexual values but also prevent adolescents' early sexual intercourse behavior and discourage its predictive health risk behaviors.

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